Northern shrimp and striped shrimp – Shrimp fishing areas 0, 1, 4-7, the Eastern and Western Assessment Zones and North Atlantic Fisheries Organization (NAFO) Division 3M

Foreward

The purpose of this integrated fisheries management plan (IFMP) is to identify the main objectives and requirements for the Northern shrimp fishery for Shrimp Fishing Areas (SFAs) 0, 1, 4 -7, the Eastern and Western Assessment Zones and the Flemish Cap (NAFO Division 3M). Often referred to as the Northern shrimp fishery, there are two species of shrimp prosecuted – Pandalus borealis (Northern shrimp) and Pandalus montagui (striped shrimp). Unless otherwise specified, the 'Northern shrimp fishery' and this IFMP pertain to both species.

This plan outlines the objectives of this fishery and the management measures that will be used to achieve these objectives. This document also serves to communicate the basic information on the fishery an its management to Fisheries and Oceans Canada (DFO) staff, co-management boards and other stakeholders and Indigenous groups. This IFMP provides a common understanding of the basic "rules" for the sustainable management of the fisheries resource.

This IFMP is not a legally binding instrument which can form the basis of a legal challenge. The IFMP can be modified at any time and does not fetter the Minister's discretionary powers set out in the Fisheries Act. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the IFMP in accordance with the powers granted pursuant to the Fisheries Act.

Where DFO is responsible for implementing obligations under land claims agreements, the IFMP will be implemented in a manner consistent with these obligations. In the event that an IFMP is inconsistent with obligations under land

claims agreements, the provisions of the land claims agreements will prevail to the extent of the inconsistency.

This is a ‘rolling’ or ‘evergreen’ plan subject to amendment at the discretion of the Minister of Fisheries and Oceans while respecting the applicable legislation, policies and regulations.

Adam Burns,
Director General
Fisheries Resource Management, Ottawa

In this integrated fisheries management plan:

1. Overview of the fishery
2. Stock assessment, science and traditional knowledge
3. Economic, social and cultural considerations
4. Management issues
5. Objectives
6. Access and allocation
7. Management measures
8. Shared stewardship arrangements
9. Compliance plan
10. Performance review

Annex A – History of the Northern shrimp fishery
Annex B – Profile of access
Annex C – Information on the Last In, First Out (LIFO) Policy
Annex D – Northern shrimp licence holders and their respective organizations
Annex E– Coordinates of the fishery
Annex F – Northern shrimp enterprise allocation program
Annex G – Northern Shrimp Advisory Committee membership and terms of reference
Annex H – Stock assessment and precautionary approach framework
Annex I – Harvest decision rules SFA 4 – 6, EAZ, SFA 1
Annex J – Rebuilding plan for Northern shrimp SAF 6
Annex K – Northern shrimp research (provisional and subject to change)
Annex L – Economic information
Annex M – Marine conservation targets

Section 1 – Overview of the fishery

1.1 History

The Northern shrimp fishery commenced in the early 1970s when an exploratory fishing program confirmed the presence of commercial abundances of shrimp stocks (Pandalus borealis and Pandalus montagui) in waters stretching southward from Baffin Island to the northeast coast of Newfoundland. It later expanded to include fishing off the east coast of Newfoundland in Shrimp Fishing Area (SFA) 7 and onto the Flemish Cap (Northwest Atlantic Fisheries Organization [NAFO] Division 3M). Map at Figure 1. A more detailed history of the fishery is available at ANNEX A.

Between 1978 and 1991, seventeen > 100' sector (offshore) licences were introduced. Quota sharing principles were developed in 1997 and permits were introduced to inshore fish harvesters, thereby giving access to the < 65' fleet (i.e. the inshore fleet). In 2007, these permits were converted to licences. Since 1997,

“special” allocations were provided to Indigenous organizations and community groups, including to Nunavut in adjacent northern SFAs.

Generally, stocks continued to increase until the mid to late 2000s, after which time the fishable biomass began to decline in southern SFAs, which has been associated with changing oceanic conditions and related ecosystem dynamics. In 2011, NAFO suspended directed fishing for shrimp in Division 3M, and in Division 3L (SFA 7) beginning in 2015. Annex B shows total allowable catches (TACs) and allocations by SFA since 1997.

In 2013, the boundaries in the North (SFAs 2 and 3 at the time) were modified to align with scientific surveys and land claim areas. New allocations for both species were granted to Nunavut and Nunavik inside the respective settlement areas (Figure 2).

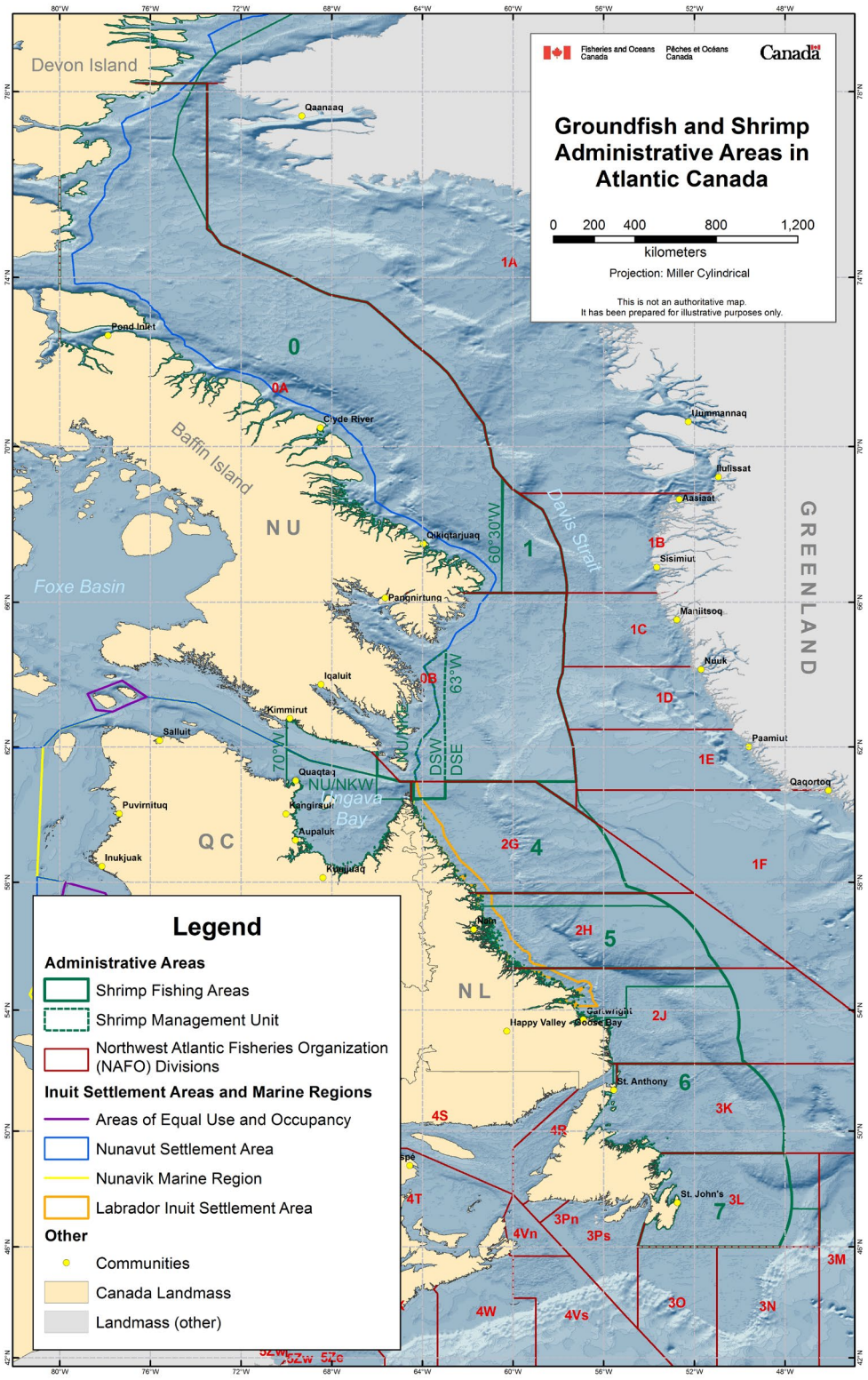

Figure 1. Northern Shrimp Fishing Areas as of 2013.

Between 1997 and 2015, the Last In, First Out (LIFO) policy was the main access and allocation tool the Department used to apply reductions (and occasionally increases in certain circumstances) in TAC. In 2016, stemming from recommendations provided by a Ministerial Advisory Panel, LIFO was abolished and replaced with a proportional sharing arrangement in southern SFAs 4, 5, 6 and 7, should it reopen to commercial fishing. In the areas north of SFA 4, access and allocation decisions will continue to be made through the appropriate consultative processes, in a manner consistent with the Land Claims Agreements. More information on LIFO, including the Ministerial Advisory Panel, can be found in ANNEX C.

1.2 Type(s) of fishery

The shrimp fishery in SFAs 0, 1, 4-7, and Davis Strait West is commercial. The fisheries in the Western Assessment Zone (WAZ) and Davis Strait East, and Nunavut and Nunavik East management units (MUs) are considered to be 'exploratory stage 2' of the New Emerging Fisheries Policy, and are licensed under Section 7 of the Fisheries Act. There is no shrimp fishery for food, social, ceremonial or recreational purposes.

1.3 Participants

The >100' shrimp sector

Commonly referred to as the 'offshore' fleet, there are seventeen >100' sector licences currently held by fourteen corporate entities. There has been no increase in the number of >100' shrimp sector Northern shrimp licences issued since 1991. The current > 100' sector licence holdings by company and representative organization are listed in ANNEX D. The Canadian Association of Prawn Producers (CAPP) and the Northern Coalition (NC) represent 16 of the 17 offshore licences. In total, 4.5 of the > 100' sector licences are held by Indigenous interests.

The >100' shrimp sector, comprising vessels with length overall (LOA) greater than 30.48m (100ft) and weight greater than 500t, is comprised of approximately ten factory freezer trawlers. The > 100' sector vessels operate out of ports in Newfoundland and Nova Scotia, with occasional landings in Greenland when fishing in far northern waters as ice and other environmental conditions permit. The shrimp harvested by the >100' shrimp sector is size sorted, with most of the sizes being cooked, and then frozen at sea, and packaged for export to various global markets.

Fishing trips last from 20 to 75 days. Vessels generally make about 9 - 12 trips per year, averaging 300-320 sea days annually.

The inshore fleet

The inshore fleet or sector is composed of Newfoundland and Labrador (NL) based inshore vessels with maximum vessel eligibility of LOA < 89'11", the NL-based "midshore" fleet with LOA between 65' and 99', and the Quebec (QC) fleet comprised of Lower North Shore Quebec based vessels <89' 11".

Between 1997 and 2000 new access for an inshore shrimp fishery was granted to fish harvesters in Newfoundland and Labrador and Quebec in SFAs 4 and 6.

Initially the inshore fleet (NL and QC) was comprised of approximately 390 licence holders. Since 2007 through rationalization the number decreased to approximately 260 licence holders. A few of these inshore licences are issued to Indigenous organizations as commercial communal licences. In SFA 6, Quebec harvesters have access to 2.45% of the inshore fleet allocation.

The inshore fleet in NL is represented by the Fish Food and Allied Workers Union (FFAW) through five fleet committees (2J, 3K north, 3K south, 3L, and 4R) elected by the licence holders. The inshore Quebec licence holders are represented by L'Association des Capitaines Propriétaries de la Gaspésie (ACPG).

Shrimp caught by the inshore fleet is generally landed fresh (and sometimes frozen specifically from SFA 4) to be cooked, peeled and further processed as necessary by onshore licensed processing plants. The inshore fleet's operations are based in NAFO Divisions 2J, 3KL, 4R and 4S and are administered based on the enterprise's homeport, by NAFO Division in the following manner: 2J, 3K north (north of 50°30'North), 3K south (south of 50°30'North), 3L, 4R and 4S. Currently the fishery is only conducted in SFA 6 with limited effort in SFA 4 and 5, however from 2000 – 2014 the inshore fleet also fished in SFA 7.

Special allocation holders

During some periods of quota increase in nearly all SFAs, the Minister provided "special" allocations to organizations, communities or entities including Indigenous organizations for their economic benefit. Most of these are not commercial licence holders and, depending on the SFA, their allocations are primarily harvested by the >100' shrimp sector through royalty arrangements. All special allocations in SFAs 4, 5 and 6 can be harvested by either the offshore or inshore fleet. However, in SFA 6, if the inshore fleet harvests the allocation, an arrangement with an inshore fleet must be approved. Additionally, some of these special allocation holders are issued a temporary licence and harvest their allocations with their own vessels. Initially, and until the abolishment of LIFO in 2016, special allocations generally remained at a fixed amount and since many special allocations were the last to gain entry into the fishery, they were the first to be removed or reduced if the TAC fell to certain thresholds under LIFO. However, with the move to proportional percent shares in the southern SFAs in 2016, those special allocation holders in SFAs 4 – 7 now hold a percent share of the TAC in that particular SFA.

Nunavut, Nunavik and Nunatsiavut land claimants

There are three land claims agreements with provisions relating to the management of the Northern shrimp fishery: The Nunavut Land Claims Agreement (NLCA) (1993), the Nunavik Inuit Land Claims Agreement (NILCA) (2005) and the Labrador Inuit Land Claims Agreement (LILCA) (2007). Each of the agreements provides for consideration of Inuit harvesting opportunities related to shrimp.

Nunavut's shrimp resources are fished by individual Nunavut fishing companies. The NWMB provides its decisions and recommendations to the DFO Minister on the sub-allocation of Nunavut shrimp resources to individual Nunavut based fishing companies for a specified number of years. Nunavut sub-allocation recipients may be issued a temporary licence to participate in the fishery. Also, 1.5 of the offshore shrimp licences are held by a Nunavut fishing company, which provides quotas in SFA 0, 1, the EAZ and 4-7.

Pursuant to NILCA, Nunavik Inuit's shrimp allocations are provided to Makivik Corporation (or a Makivik Designated Organization) to fish on their behalf. Makivik also holds a > 100' sector licence which provides shrimp quotas in SFA 0, 1, the EAZ and 4-7, and therefore the issuance of a temporary licence is not necessary.

Allocations in MUs Nunavut East, Nunavik East in the EAZ, and Nunavut West and Nunavik West, located in Hudson Strait in the WAZ, are reserved for Nunavut and Nunavik shrimp harvesters, as the MUs are located inside the Nunavut Settlement Area (NSA) and the Nunavik Marine Region (NMR).

Labrador Inuit allocations are fished via communal commercial licences issued to the Nunatsiavut Government (NG) which can be harvested by either the offshore or inshore fleet. Portions of the EAZ, SFAs 4 and 5 fall both within the Labrador Inuit Settlement Area (LISA) and adjacent waters as described in the LILCA. A portion of SFA 6 also falls within Waters Adjacent to the Zone. Labrador Inuit interests also have 1.5 offshore shrimp licences which provide quotas in SFA 0, 1, the EAZ and 4-7.

1.4 Location of the fishery

Subject to any closures in effect, the fishery occurs off the coast of eastern Canada from 47°15' N (Flemish Cap and the northern edge of the Grand Banks (Division 3M) to 69° N (Baffin Bay). Most fishing occurs between depths of 200m and 600m. SFAs were created to distribute fishing effort and improve the effectiveness of management regimes.

Prior to 2013, shrimp fishery management in northern waters consisted of many overlapping quotas for both species (P. borealis and P. montagui). Further, management units were not aligned with the science assessment zones or the Nunavut or Nunavik land claim Settlement Area boundaries. As of 2013 (Figure 1), boundaries were modified and SFAs were aligned with the Nunavut Settlement Area (NSA), the Nunavik Marine Region (NMR) and the EAZ and WAZ survey boundaries. New MUs within these SFAs alleviate concentration of fishing effort for P. montagui in the Resolution Island area and also eliminate overlapping management units and quotas. As a result of these boundary changes, new or increasing quotas for P. montagui and P. borealis in Hudson Strait and Davis Strait were established.

The realignment of boundaries with the survey assessment zones and the creation of MUs within the NSA and NMR took several years to complete and involved consultation and engagement with relevant management boards and land claims beneficiaries, as well as with other stakeholders (e.g., the offshore fleet and the provinces) and Indigenous groups in the fishery. The new MUs are enforced by condition of licence. An amendment to the Atlantic Fisheries Regulations will be required to reflect the shrimp MU boundary changes in the WAZ and EAZ. A map of the management boundaries prior to 2013 is at Figure 2.

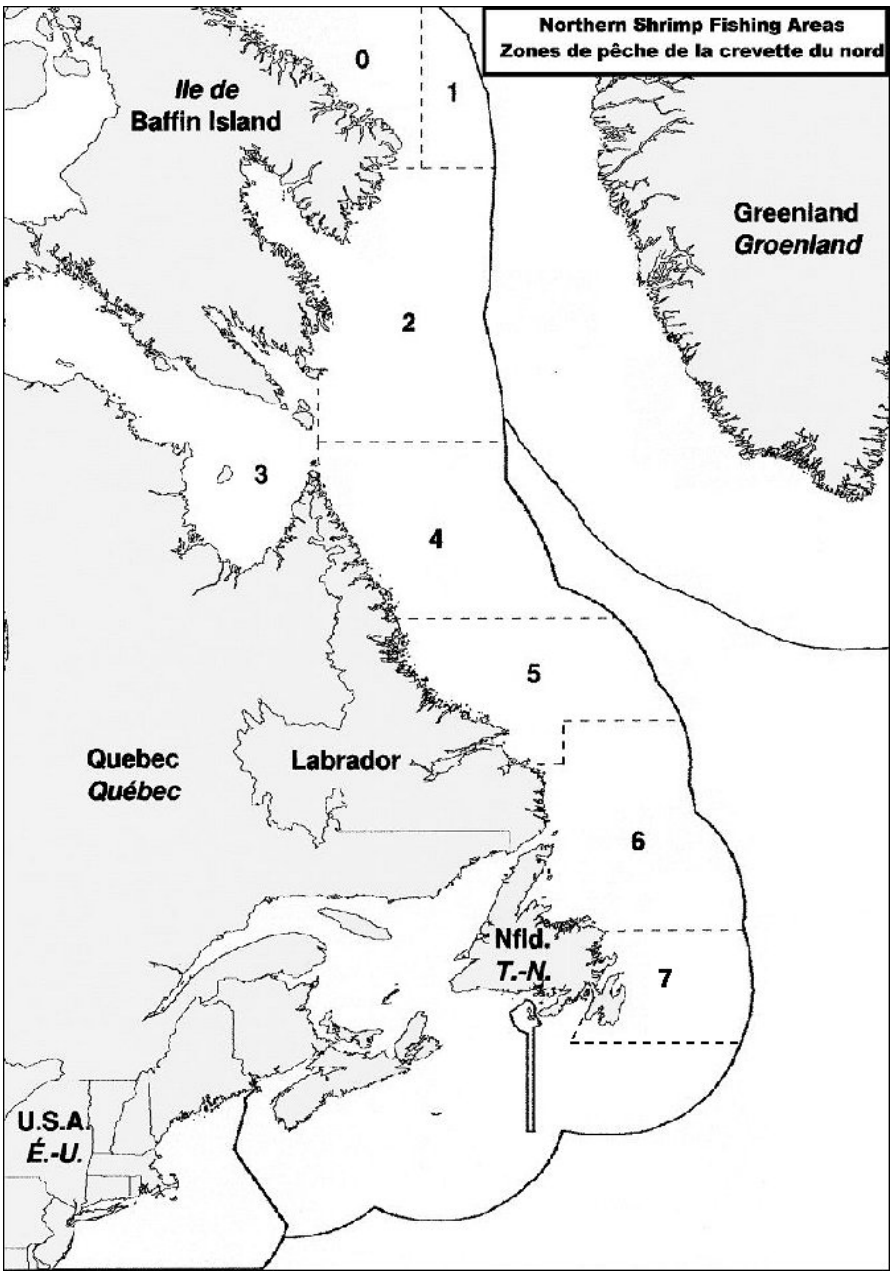

Figure 2 – Map prior to the 2013 Boundary Changes

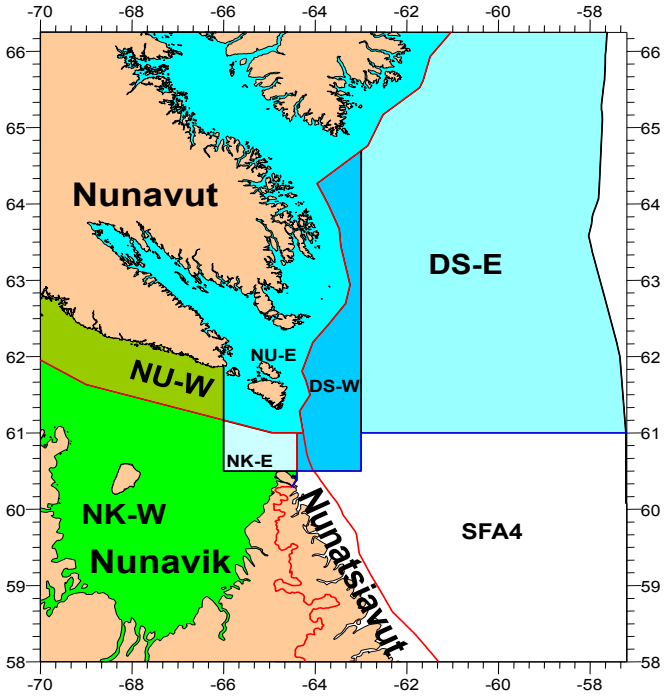

Figure 3- Map showing Eastern Assessment Management Units (Blue) and Western Assessment Management Units (Green)

P. borealis (Northern shrimp) is the main species harvested in SFA 0, 1, Davis Strait and SFAs 4-6. P. borealis is also harvested as part of the directed shrimp fishery in MUs Nunavut and Nunavik West and as bycatch in MUs Nunavut and Nunavik East. A second species, P. montagui (Striped shrimp), is directed for in MUs Nunavut and Nunavik East and West, and as bycatch in MU Davis Strait East and SFA 4. Coordinates of the fishery can be found at ANNEX E.

In the shrimp fishery, there are both SFAs and management units (MUs). SFA boundaries are the same delineations for both science assessments and management purposes. MUs are smaller management areas within a SFA. Collectively, SFAs and MUs are referred to as management areas in this IFMP.

1.5 Fishery characteristics

Gear

Most of the >100' sector and inshore sector vessels use otter trawls, with a very limited number using beam trawls. The minimum mesh size for otter and beam trawls is 40mm.

To effectively minimize the bycatch of other species, the use of a Nordmore grate is a mandatory measure, and is described in detail in Section 7.6.

Management

Northern shrimp fishery management is based on a two-year cycle. In year one, DFO Science provides stock status results in a full stock assessment process. TAC recommendations to the Minister are based on science recommendations, the Precautionary Approach framework that includes Harvest Decision Rules, and consultations with stakeholders and Indigenous groups through NSAC and relevant wildlife management boards. In year two, DFO Science provides a stock status update that is used to determine TAC, also in consultation processes with stakeholders, Indigenous groups and wildlife management boards.

The >100' sector fishery is managed under the Enterprise Allocation (EA) (ANNEX F) system whereby quota is divided equally among the 17 licences, except in SFA 0 which is fished under a competitive regime. When Division 3M was open to commercial fishing, it was managed using an effort based system, with the > 100' fleet equally sharing Canada's allocation. The >100' sector and Nunavut quotas in the Davis Strait East MU are exploratory (licenced under Section 7 of the Fisheries Act) but both exploratory and commercial fisheries are managed consistently. The Nunavut and Nunavik MUs are completely within the NSA and NMR respectively. The >100' sector holds no quota in the Nunavut and Nunavik MUs, and access to these areas is limited to those enterprises that receive allocations in these areas, as amended from time to time.

The inshore fishery in both NL and QC is managed under a competitive regime but in NL the fishery is conducted with trip limits and harvesting caps determined and managed by industry since 1997. The season for this fleet generally occurs from April through to December, with most harvesting between May and October.

1.6 Governance

Fisheries Act, regulations and policies

The Northern shrimp commercial fisheries are regulated by Canada's Fisheries Act, and the regulations pursuant to it, including (but not limited to) the:

- Fishery (General) Regulations
- Atlantic Fishery Regulations, 1985
- Oceans Act
- Species at Risk Act

The Fisheries Act gives the Minister of Fisheries and Oceans ultimate responsibility for the management of marine fisheries. The management of the commercial fisheries is also governed by a suite of policies related to the granting

of access, economic prosperity, resource conservation and Indigenous use, including the Commercial Fisheries Licensing Policy for Eastern Canada 1996.

Sustainable Fisheries Framework

DFO has had a Sustainable Fisheries Framework (SFF) in place since 2009, which provides the basis for Canadian fisheries (including Northern shrimp) to be conducted in a manner that support conservation and sustainable use. It incorporates existing fisheries management policies with new and evolving policies. The SFF also includes tools to monitor and assess initiatives geared towards ensuring an environmentally sustainable fishery, and identifies areas that may need improvement. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.

The policies that facilitate an ecosystem based approach to fisheries management include:

- A Fishery Decision-Making Framework Incorporating the Precautionary Approach
- Managing Impacts of Fishing on Benthic Habitat, Communities, and Species
- Policy on Managing Bycatch

Land claims

To date, there are three land claims agreements in place that must be taken into consideration in the management of the Northern Shrimp fishery:

- The Nunavut Agreement
- Labrador Inuit Land Claims Agreement
- Nunavik Inuit Land Claims Agreement

These Agreements are treaties within the meaning of section 35 of the Constitution Act, 1982. Land claims agreements establish a system for the co-management of fisheries resources within and adjacent to these land claims settlement areas. The Agreements (among other things) set out the harvesting rights of the beneficiaries to the respective Agreements, provide for the establishment of wildlife management structures, set out the role of those structures and cooperative management processes, and set out procedural and substantive requirements on the Minister. The Government of Canada retains ultimate responsibility for wildlife management within and outside respective settlement areas.

Northwest Atlantic Fisheries Organization (NAFO)

SFA 1 (located in the south eastern part of NAFO Division 0A) is part of a trans-boundary Canada-Greenland stock managed individually by each jurisdiction. The shrimp stock is distributed in NAFO Subarea 1 (in Greenlandic waters) and NAFO Division 0A east of 60°30'W, which in Canada is fished in SFA 1. At the request of Canada and Denmark (on behalf of Greenland) NAFO's Scientific Council (SC) completes annual assessments of this shrimp stock and provides science advice and a TAC recommendation.

SFA 7 (NAFO Division 3L) is part of a straddling stock managed by NAFO. Canadian harvesters fished in SFA 7 from 2000 – 2014. Consistent with NAFO's precautionary approach framework, SFA 7 has been closed to directed fishing since 2015 due to declines in biomass indices and concern for this resource.

NAFO Division 3M is a high seas stock managed by NAFO but through effort control (limits on number of vessels and days on ground for each member country) instead of quotas. Canadian > 100' sector vessels had fished in this area from 1994 – 2011. 3M has been closed to directed fishing since 2011.

Decision making process

Management of the Northern shrimp fishery is done in consultation with stakeholders and Indigenous groups primarily through the Northern Shrimp Advisory Committee (NSAC). NSAC strives to reach consensus when making recommendations to the Minister for decision. Stakeholder and Indigenous group's perspectives, science results and other considerations are presented to the Minister for decision. The Minister retains ultimate authority and responsibility for management and conservation of fish resources. NSAC membership and terms of reference are located in ANNEX G.

As the Department employs multi-year management for commercial fisheries, NSAC meetings are scheduled every two years, barring any circumstance that may require convening the Committee in interim years. The meetings coincide with the years in which science assessments are conducted and are scheduled to occur in the odd numbered years (2019, 2021, etc). However, in recent years, due to declines observed in the south and the overall economic importance of the fishery, NSAC has generally convened annually.

Minutes of NSAC meetings can be found under "Fisheries" online.

In order to address new or ongoing issues, working groups comprised of representation from NSAC membership are formed. Some working groups are struck to resolve single issues, while others function to address longer term issues. Examples of the latter include a working group to oversee Marine

Stewardship Council (MSC) certification. Activities of any working group during the year are presented to the Committee at the advisory meeting.

In addition, consultation with the NL inshore shrimp fleet also occurs as needed, generally prior to the start of each season to discuss sharing of the inshore quota among the five inshore fleets (2J, 3Kn, 3Ks, 3L and 4R) and other operational matters as required.

1.7 Approval process

Recommendations of NSAC are brought to the Minister of Fisheries and Oceans for decision. The Minster's decisions are communicated to NSAC and incorporated into the IFMP and / or other departmental documentation (i.e. management decision website) as appropriate.

Overall authority and responsibility for resource conservation and management rests with the Minister. However, in the case of SFAs / MUs that fall within and/or adjacent to defined settlement area boundaries of the Nunavut, Nunavik and/or Labrador Inuit Land Claims Agreements, these Agreements provide for the establishment of resource or wildlife co- management structures whose roles and responsibilities vary from advisory to decision making.

Where co-management structures have both a decision making (within settlement area boundaries) and advisory role (outside settlement areas) under their respective Agreements, the interaction between these structures and the Minister follows a prescribed process whereby the Minister may accept, reject or vary a decision of the co-management structure. Land Claims agreements also set out circumstances and processes for which government must seek the advice of co-management structures as well as the processes for seeking this advice.

In accordance with the terms of the respective agreements, requests for decisions or recommendations are submitted by DFO to relevant Land Claims co-management structures. With respect to shrimp in the NSA and NMR, the NWMB and NMRWB jointly provide TAC recommendations and harvest levels for the respective settlement areas, however there is no requirement under either agreement for a joint submission to be made. The TJFB is the primary body to make recommendations to the Minister in relation to conservation and management issues in the LISA, and to advise the Minister on conservation and management of fish in waters adjacent to the Zone.

Other senior departmental officials, such as the Regional Director General, or Director General of Fisheries Resource Management in Ottawa may make management decisions pertaining to the day to day operations of the fishery that are relatively straight forward and that do not relate to TAC.

Fisheries management decisions can be found online.

Section 2 – Stock assessment, science, and traditional knowledge

2.1 Biological synopsis

Northern shrimp (Pandalus borealis)

Figure 4: Pandalus borealis, or Northern shrimp

Northern shrimp (Pandalus borealis) are found in the Northwest Atlantic from Baffin Bay south to the Gulf of Maine, usually between 150 and 600 metres deep, often in areas where the ocean floor is soft and muddy and where temperatures near the bottom range from about 0 to 6 ºC (DFO 2017a and DFO 2017b).

Northern shrimp are protandrous hermaphrodites. They first mature as males, mate as males for one to three years and then change sex, spending the rest of their lives as mature females. Most shrimp reach male sexual maturity during the second or third year of life and generally the transition to the female form takes place in winter when the shrimp are a few years old. Mating takes place in late summer and fall. Fertilized eggs are attached to the female's abdominal appendages for seven to eight months until they hatch in the spring. Larvae are pelagic, spending three to four months in the water column. At the end of this period, they move to the bottom and take up the lifestyle of the adults (DFO 2017a and DFO 2017b).

In more northern areas, shrimp are thought to live longer than eight years, while those in the south likely live for six or seven years. Shrimp can grow to about 15 to 16 centimetres in total length, although the average size is about half of this. They are considered harvestable once their carapace length exceeds 17 millimetres, which occurs at approximately three years of age. Most of the fishable biomass is female (DFO 2017a and DFO 2017b) however, the portion that is female varies by area and year.

Striped shrimp (Pandalus montagui)

Figure 5 Pandalus montagui, or striped shrimp

Striped shrimp (Pandalus montagui) are found from Davis Strait south to the Bay of Fundy. Striped Shrimp prefer a hard bottom and are typically found in waters with a temperature of -1 to 2 ºC at depths of 100 to 500 metres (DFO 2017a and DFO 2017b).

Striped shrimp are protandrous hermaphrodites, functioning as males early in their lives then changing sex and reproducing as females for the remainder of their lives. Females usually produce eggs once a year in late summer to fall and carry them, attached to their abdomen, through the winter until spring, when they hatch. Newly hatched shrimp spend three to four months as pelagic larvae. At the end of this period, they move to the bottom and take up the lifestyle of the adults. They migrate into the water column during the night. The migration consists of mainly males and smaller females (DFO 2017b).

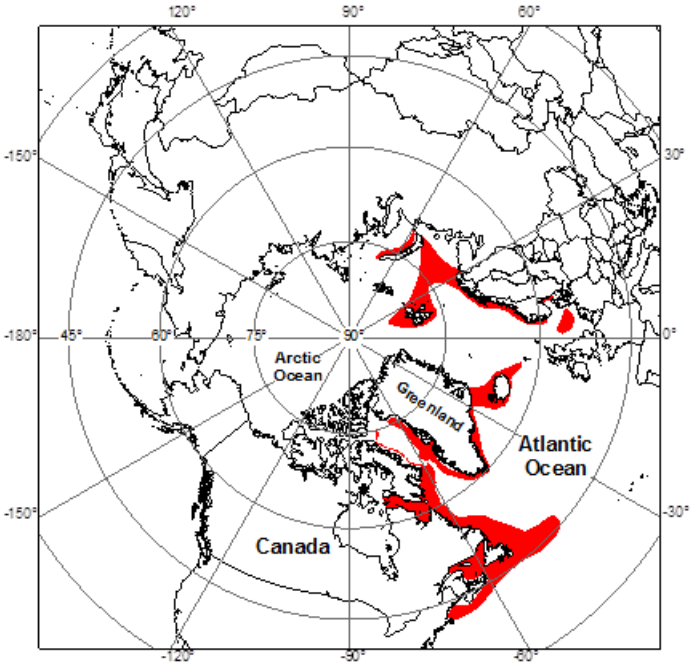

Figure 6. Distribution of Northern Shrimp (Pandalus borealis) in the northern hemisphere (redrawn and modified from Bergström Bergström, 2000)

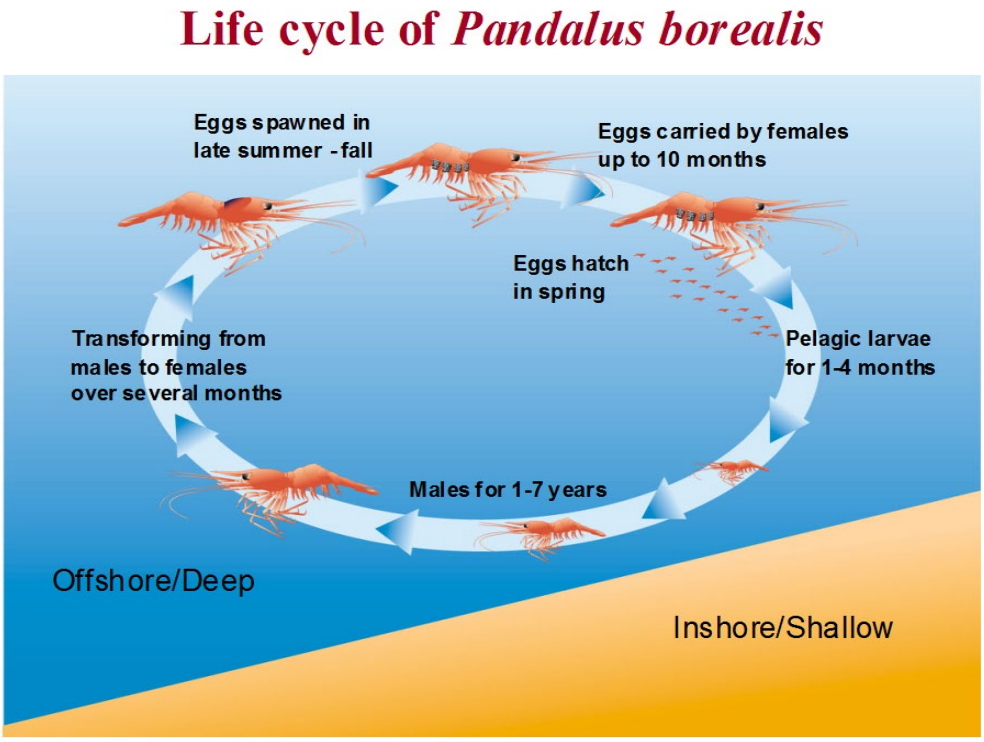

Figure 7. The general life cycle of Pandalus borealis and P. montagui (Aschan, pers comm.)

2.2 Ecosystem interactions

The recent long-term warming trend in waters of the northwest Atlantic is associated with both climate change and the warm phase of the Atlantic Multi-Decadal Oscillation. A suite of associated changes (e.g. slowing down of the Labrador Current, reduction in ice coverage, more frequent extreme weather events) can have important effects on the marine ecosystem impacting all trophic levels. A warming ecosystem may affect many commercial species (DFO 2014).

Sea ice dynamics are an important driver of the spring phytoplankton bloom. The timing of the bloom has an influence on Northern shrimp recruitment and has been correlated with shrimp production rates. Overall, ecosystem production seems to be, at least in recent decades, mainly regulated by bottom-up processes. This implies that current trends in the climate system and lower trophic levels would be expected to impact overall ecosystem productivity (DFO 2014).

As a forage species, shrimp is an important prey item for several species, including Atlantic cod (Gadus morhua), Greenland halibut (Reinhardius hippoglossides), redfish (Sebastes spp.), skates (Raja radiate, R. spinicauda), wolffish (Anarhichas spp.), and harp seals (Phoca groenlandica). This is particularly important when the availability of alternate high-energy prey is low.

Shrimp are primarily harvested by bottom trawls, which can disrupt benthic communities and habitats such as corals and sponges. Concentrations of coral and sponge constitute "Significant Benthic Areas" that are sensitive to bottom trawling due to the sessile nature and low growth rate of these organisms. Benthic communities may also constitute fragile ecosystems in that bottom trawling can reduce their diversity and modify their structure. In 2010, DFO held a national science advisory process to review available information and provide science advice regarding the occurrence, sensitivity and ecological function of corals, sponges and hydrothermal vents in Canada. Information on this process can be found at online. Further refinement of the delineation of aggregations of cold-water coral and sponge as Significant Benthic Areas, and presentation of information on the fishing activity in relation to these significant areas, was reviewed at a national science advisory process in 2016.

2.3 Indigenous traditional knowledge and fisher traditional ecological knowledge

Indigenous and fisher traditional ecological knowledge (TEK) is an important component of fisheries management and is used together with scientific knowledge for effective fisheries decision-making. DFO routinely consults resource users on a wide range of topics (e.g. management issues, stock assessment studies, quotas and management measures), and incorporates their views and traditional knowledge in the development of scientific research and fishery management plans. While Indigenous peoples did not traditionally fish Northern shrimp, Indigenous and commercial fishers have knowledge of the marine ecosystem (e.g. climate change, sea ice patterns) and their observations can contribute to an understanding of long-term changes in environment that ultimately affect the management of the Northern shrimp fishery.

2.4 Stock assessment

Stock assessment results can be found on the DFO Canadian Science Advisory Secretariat website.

(See Annex H: Stock assessment and precautionary approach framework.)

Resource status is assessed based on indices from fishery-independent surveys conducted by DFO and industry, trends in fishery catch per unit effort (CPUE) derived from logbooks and observer datasets, and biological sampling from multiple sources. Resource status in SFAs 5 and 6 (Northern shrimp) is updated annually based on DFO fall multi-species trawl survey data. Resource status in

the EAZ, WAZ and SFA 4 (Northern and striped shrimp) is updated annually based on Northern Shrimp Research Foundation-DFO summer trawl survey data.

The surveys provide information on shrimp distribution and length frequencies which are used to calculate indices of total abundance, fishable biomass and spawning stock biomass. Additionally, the fall multi-species surveys provide data on bottom temperature, predation and consumption. Fishable biomass is the weight of all shrimp (both males and females) which have a carapace length greater than 17 millimetres. Female spawning stock biomass is defined as the weight of all female shrimp regardless of size, though most are of fishable size. To determine the exploitation rate index, the commercial catch is divided by the survey fishable biomass index from the previous year (for fall surveys) or from the same year (for summer surveys) (DFO 2017a and DFO 2017b).

The various indices also provide information on fishery performance, including exploitation rate and distribution of fishing effort, composition of shrimp catches, and inferences on the state of fishable biomass and female spawning stock biomass. Information on female spawning stock biomass has been used to develop proxy reference points under the precautionary approach framework for some stocks.

2.5 Stock scenarios

Northern shrimp – SFA 7

The Northern shrimp stock in SFA 7 has declined since 2007 and is below the limit reference point for biomass (B_{lim}). Due to declines in biomass indices and concern for this resource, SFA 7 has been closed to directed fishing since 2015.

Northern shrimp – SFA 6

The Northern shrimp resource in SFA 6 has been declining since 2006 and is in the Critical Zone of the precautionary approach framework. As of the 2016 survey, fishable and female spawning stock biomass indices were at the lowest levels since this DFO multi-species survey time series began in 1996. Environment and ecosystem indicators in the area indicate that indices will likely remain low in the short term (DFO 2017b).

Northern shrimp – SFA 5

The Northern shrimp resource in SFA 5 is in the healthy zone of the precautionary approach framework. Biomass index declines are more difficult to interpret in this area due to the narrow range of biomass indices (DFO 2017b).

Northern shrimp – SFA 4

The Northern shrimp resource in SFA 4 is in the healthy zone of the precautionary approach framework. The Biomass has not shown a significant trend in either direction since the survey began in 2005 (DFO 2017b).

Striped shrimp – SFA 4

The fishable biomass for the Striped shrimp resource in SFA 4 has varied without trend. The fluctuations in the fishable biomass index are likely due to the strong currents near the northern border. There is no TAC for this resource but a bycatch limit is in place (DFO 2017b).

Northern shrimp – Eastern Assessment Zone

The Northern shrimp resource in the Eastern Assessment Zone is in the healthy zone of the precautionary approach framework. The fishable biomass index has varied without trend around the long-term mean. The fluctuations in biomass are likely due to strong currents in Hudson Strait (DFO 2017a).

Striped shrimp – Eastern Assessment Zone

The fishable biomass index within the PA Framework for the Striped shrimp resource in the Eastern Assessment Zone has varied without trend around the long-term mean. The fluctuations in the fishable biomass index are likely due to the strong currents near the southern border (DFO 2017a).

Northern shrimp – Western Assessment Zone

The Northern shrimp resource in the Western Assessment Zone decreased in 2016 compared to 2015. The 2014 survey began a new time series, not directly comparable with previous surveys. Because the time series is so short, trends cannot yet be inferred (DFO 2017a).

Striped shrimp – Western Assessment Zone

The Striped shrimp resource in the Western Assessment Zone decreased in 2016 compared to 2015. The 2014 survey began a new time series, not directly comparable with previous surveys. Because the time series is so short, trends cannot be inferred. (DFO 2017a)

Northern shrimp – SFA 1

The Northern shrimp resource in SFA 1 is a part of the Canada/Greenland shared population, with Canada having an access to a relatively small portion of the fishery. The assessment of the entire stock is performed by the NAFO SC,

while each fishery is managed by individual countries. In 2016 the stock was assessed to be in relatively good condition (11% above B_{msy}). The risk of the stock being below the B_{lim} was very low (less than 1%). The outlook for this stock is positive, with either a stable or positive growth trajectory, providing the mortality pressure remains the same.

2.6 Precautionary approach framework for Northern shrimp

The Fishery Decision-Making Framework Incorporating the Precautionary Approach (PA) applies to fish stocks that are the targets of a commercial, recreational, or subsistence fishery. It may be applied more broadly to other stocks, if necessary or as circumstances warrant.

The framework requires that a harvest strategy be incorporated into respective fishery management plans to keep the removal rate moderate when the stock status is healthy, promote rebuilding when stock status is low, and provide for a low risk of serious or irreversible harm to the stock. It also requires a rebuilding plan is in place when a stock reaches the Critical Zone. In general, the precautionary approach in fisheries management is about being cautious when scientific knowledge is uncertain, and not using the absence of adequate scientific information as a reason to postpone or fail to take action to avoid serious harm to fish stocks or their ecosystem. This approach is widely accepted as an essential part of sustainable fisheries management (DFO 2006).

A precautionary approach to the management of the shrimp fishery, consistent with the basic tenants set out in the framework, is in place for most Northern shrimp fishery areas. Priority is given to monitoring the stock and establishing a data time series to support management decisions. Biomass indices, commercial catch levels, and exploitation rate indices are used to indicate stock status. Scientific uncertainty is quantified by including standard errors for these indices. This approach is based on biological criteria established by Science and peer-reviewed through the applicable Canadian Science Advisory Secretariat (CSAS) or NAFO Scientific Council processes. Scientific uncertainty and uncertainty related to the implementation of management measures for Northern shrimp are explicitly considered when evaluating stock status and making management decisions. The application of a precautionary approach to this fishery is done in concert with industry, co-management organizations, and other stakeholders and Indigenous groups through NSAC and other relevant processes.

Precautionary approach reference points

Reference points for Northern shrimp were developed using proxies. The provisional upper stock reference (USR) was defined as 80%, and the provisional lower reference point (LRP) as 30%, of the geometric mean of female spawning stock biomass (SSB) index over a productive period. Because of differences in survey history, the reference periods were taken to be 1996-2003 for SFA 6,

1996-2001 for SFA 5, 2005-2009 for SFA 4, and 2006-2008 for EAZ. Reference points for Striped Shrimp in SFA 4, and WAZ, and for Northern Shrimp in WAZ are in the process of being developed.

Reference Points for Northern (borealis) and Striped (montagui) Shrimp

SFA	Critical Zone	LRP	Cautious Zone	USR	Healthy Zone
SFA 4 borealis	SSB<20,400 t	20,400 t	20,400 t ≤ SSB < 54,400 t	54,400 t	SSB≥54,400 t
SFA 5	SSB<15,200 t	15,200 t	15,200 t ≤ SSB < 40,700 t	40,700 t	SSB≥40,700 t
SFA 6	SSB<82,000 t	82,000 t	82,000 t ≤ SSB < 219,000 t	219,000 t	SSB≥219,000 t
EAZ borealis	SSB<6,800 t	6,800 t	6,800 t ≤ SSB < 18,200 t	18,200 t	SSB≥18,200 t
EAZ montagui	SSB<2,300 t	2,300 t	2,300 t ≤ SSB < 6,100 t	6,100 t	SSB≥6,100 t

References for additional information on stock status and the Precautionary Approach for Northern and Striped Shrimp are in Annex H.

A harvest rate strategy is the approach taken to manage the harvest of a stock and is a necessary element of any fishery plan. In order to implement the PA, pre-agreed harvest decision rules and management actions for each zone are essential components of a harvest rate strategy. Harvest decision rules for shrimp stocks with a PA in place are at Annex I.

The stock in SFA 6 entered into the Critical Zone in 2017. As per the PA. a rebuilding plan for this stock is required, and can be found at Annex J.

2.7 Research

Shrimp are an important forage species within the ecosystem, particularly in the absence of alternative high energy prey, and therefore management of the shrimp fishery should adopt a more conservative approach than would otherwise be adopted under a single species management approach. There is a need for a better understanding of ecosystem demands and impacts of commercial fishing on shrimp as a forage species and to incorporate this into future assessments. This research would be reflected in the use of additional ecosystem indicators in the assessments and in the future modelling work that will help develop, and refine, new precautionary approach reference points (DFO 2013). A better understanding of these factors could potentially lead to ecosystem based management rather than single species management.

Effects of climate change on shrimp resources should be considered when making management decisions. More research is required to determine whether environmental variables could be used in conjunction with recruitment signals to predict future stock size (DFO 2013).

The Department conducts research independent of other organizations but also in concert with other research groups, such as NAFO's Scientific Council and the Northern Shrimp Research Foundation (NSRF). For a list of research activities, see Annex K. This list of ongoing and potential future research activities should be considered as provisional, and as such is subject to change. For example, SFA 7 is managed by NAFO and ultimately the Department can make requests for research but any final decisions are outside of our purview. Additionally, considerations such as emerging issues, changing priorities as well as the availability of human and financial resources influence the research undertaken.

Literature Cited

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Section 3 – Economic, social and cultural Considerations

The Northern shrimp fishery in Canada makes an important contribution to regional economic development and growth in Eastern Canada and the Arctic through the use of required operational goods and services and the employment and training of local residents engaged in the various steps of the shrimp supply chain from harvesting to processing to distribution/export. The Arctic Northern shrimp fishery vessels employ a substantial number of Inuit and Innu residing in northern Labrador, Nunavik and Nunavut (See Annex L for further employment information). The formation of Northern harvesting partnerships has been an important source of revenue for Northern development. The Northern shrimp fisheries supports harvesting as well as processing plants and logistics services, providing important local employment most notably in Newfoundland and Labrador, but also in New Brunswick, Nova Scotia and Quebec. Additionally, goods and services needed to support vessel operations and land-based

processing production and distribution are important contributors to the local economy creating jobs and generating income in various industries. Among the contributing activities are vessel and gear repair, maintenance, stevedoring, provisioning (food and fuel), observer coverage, and travel/transportation.

3.1 Domestic landings[i] and exports

Canada, as one of the world's leading producers of cold-water shrimp, saw a strong increase of 44% in landed value for the Canadian Northern Shrimp fishery from 2013 to 2015 (See Annex L, for details on landings, including by fleet). This increase was exclusively due to notable price increases, as landed quantities decreased 17% over the same period.

The Canadian Northern Shrimp fishery is harvested by two fleets; the <89'11" inshore fleet and the >100' offshore fleet. Inshore vessels deliver mainly wet shrimp to onshore plants for processing (cooking and peeled). The >100' fleet processes and packages shrimp on board factory trawlers, primarily cooked shell on; raw small size (industrial) shrimp that is too small for cooked shell-on markets is cooked and peeled in shore-based processing plants in Canada and other countries.

Export volumes of Canadian Northern shrimp decreased 14% from 77,000 mt in 2013 to 67,000 mt in 2015[ii]. The value of Northern shrimp exports increased annually from $327M in 2013 to $439M in 2015. Northern shrimp accounted for approximately 7% of Canada's total fish and seafood export value in 2015. Of this, 80% was generated by Canada's top four export destinations in Asia and Europe, in particular China ($126M), Denmark ($88M), the United Kingdom ($85M), and Iceland ($52M). There was strong price growth over the period, with average prices for all Northern Shrimp products rising 56%. Prices received by Canadian producers are influenced by the interaction of global supply and demand of shrimp (cold-water and warm-water shrimp) and shrimp substitutes, as well as other factors (resource availability, exchange rates).

Section 4 – Management issues

4.1 Management challenges during periods of ecosystem change

The decline in shrimp production in SFA 6 has been associated with various environment and ecosystem changes including a recent warming trend, early timing of the phytoplankton bloom and increasing biomass of predatory fishes. Given declining per-capita net production of shrimp, commercial fishing pressure will now be influencing stock declines more than it did in the past (i.e. prior to 2009).The current PA (Section 2.6) was defined based on the mean of female spawning stock biomass index over a productive period, based on available data and consistent with the PA framework. It has been suggested that the current reference points may not be appropriate for the current state of the shrimp resource as they were derived based on a period of more favourable ecosystem conditions. A science response process was held in 2017 to review the reference

points used in the PA for Northern Shrimp in SFA 6. It was concluded that it is not currently clear whether shrimp are experiencing a new productivity regime, whether there were low or high productivity regimes in the past, or where the stock lies relative to its potential production in current conditions. Due to the uncertainties, the current reference points remain unchanged at this time. However, DFO Science is working on developing models for Northern Shrimp in SFA 4-6. If an appropriate model is developed, it will be used to inform the need to revise the current PA and to predict how the stock will respond to different exploitation rates.

4.2 Climate change

It is not known to what extent climate change affects shrimp abundance, distribution or overall ecological conditions, including predator prey relationships.

The long-term warming trend in waters off of NL is associated with climate change, and with the warm phase of the Atlantic Multi-decadal Oscillation, a key indicator of climate conditions over the North Atlantic. Associated with the warming trend is the slowing down of the Labrador Current, a reduction in ice coverage, and more frequent extreme weather events which can have important effects on the ecology of the marine ecosystem, impacting all trophic levels and long-term prospects for commercial species.
Given that the current warm phase is expected to continue in the near term in NAFO Divisions 2J3KL (Southern SFA 5, and the entirety of SFAs 6 and 7), and may possibly persist for more than a decade, the Department held a science response process in the summer of 2014 to provide an overview of the prospects for key Newfoundland and Labrador stocks, including Northern shrimp, over the next three to five years within the context of increasing temperatures. The warming trend in environmental conditions has a detectable negative impact on shrimp production. Reduced productivity is also associated with the increasing biomass of predatory fish and exploitation rates of shrimp.

Unfavourable environmental conditions for shrimp are expected to continue in the short term.

4.3 Conflicts between shrimp and crab

Snow crab and shrimp fisheries occur on common grounds in Divisions 2J3K. The presence of conflict has resulted in research activities and closed areas. Results of a 2005 study indicated that shrimp bottom trawling could be associated with an increased incidence of crab damage (i.e. leg loss). However, there is no evidence that shrimp trawling imposes substantial mortality on hard-shelled Snow crab.

An area of the Hawke Channel was closed to all fisheries, except Snow crab, beginning in 2002. The primary rationale for the closed area was in response to

the Fisheries Resources Conservation Council recommendations in 2000 and 2001 to protect juvenile turbot and spawning cod respectively. The crab harvesters in 2J supported the closure as it addressed their concerns of the possible negative effect of shrimp trawling on the snow crab resource. A 2012 study found the closure had no impact on improving Snow crab catch rates. An area of 3K, in the Funk Island Deep, was first closed to gillnetting in 2002 and was later closed to bottom trawling through a combination of mandatory and voluntary closures in 2005 out of concern for Snow crab. No formal studies on the effectiveness of this closure have been conducted to date. (Additional information on Closed Areas can be found in Section 7.3.)

4.4 Groundfish bycatch / presence of groundfish

The use of the Nordmore grate markedly reduced groundfish bycatch, however increases in some groundfish stocks have resulted in the potential for increased bycatch . This increase in groundfish has and may continue to require the implementation of additional management measures that allow the Northern shrimp fishery to operate efficiently while not jeopardizing recovering groundfish stocks. As knowledge on bycatch and its impact improves, management measures may be introduced or modified in licence conditions (e.g. move away provisions) or other mechanisms.

As the presence of groundfish, most notably cod, has increased in the southern areas, inshore fishers are of the view that its presence and abundance may be altering shrimp behavior, presence and abundance, causing shrimp to move higher in the water column where it would not be detected by the DFO multi-species surveys. Additionally, shrimp are an important food source for cod and the increased predation overall, particularly while alternative high-energy prey (i.e. capelin) is low, may be having a negative impact on shrimp. This is one of the priorities identified by the Science / Resource Management Working Group mentioned in section 8.1.

4.5 Depleted species

Species at Risk Act (SARA)

The leatherback sea turtle (Dermochelys coriacea) is listed as endangered under SARA and is occasionally encountered in the Northern shrimp fishery, however the use of the Nordmore grate prevents it from being inadvertently captured. Two species of wolffish, Anarhichus denticulatus (Northern) and Anarhichus minor (Spotted), are bycatch in the Northern shrimp fishery and listed as threatened under SARA. A third species, the Atlantic wolffish (Anarhichas lupusis) is also listed under SARA with Special Concern designation.

Northern shrimp licence conditions prohibit the retention of the above mentioned SARA species listed as endangered or threatened and clearly state that it must be returned to the place from which it was taken, and if alive, in a manner that

causes it the least harm. Further, the licence conditions require that any interactions with species at risk must be reported in the logbook, detailing location, time of catch and the quantity, weight and condition (alive or dead) of the animal.

The SARA Public Registry has further details.

4.6 Oceans and habitat considerations

Benthic issues
As described in Section 7.3, there are several mandatory and voluntary closures within the geographic range of the Northern shrimp fishery to address concerns for various species and/or sensitive benthic habitats. NSAC established a Working Group on Closed Areas (later renamed the Ecosystems Working Group) to specifically address benthic issues should they arise and to provide related advice to NSAC.

4.7 Gear impacts

A review of trawl impacts was conducted in 2006 by the Department, which concluded that bottom-contact gear have an impact on benthic populations, communities and habitats. Addressing impacts requires case by case assessments, with solutions customized to the particular set of circumstances leading to the impacts.

Because the trawl is mechanically attached to the vessel, losing gear in this fishery is extremely rare. Due to the cost, most, if not all vessels will search and retrieve any lost trawl.

4.8 International issues

NAFO Division 0A east of 60°30’ W and Subarea 1, which in Canadian waters occurs in SFA 1, is a transboundary stock between Canada and Greenland. In response to requests from both jurisdictions, the NAFO Scientific Council provides scientific advice on catches. There is currently no agreement in place between the two countries regarding processes to set the global TAC, or to determine sharing arrangements. Canada and Greenland have entered into both formal and informal discussions that seek to advance progress on achieving a joint management approach to this stock. In the absence of such an agreement, and based on its own assumptions of risk, Greenland sets its own TAC and assigns Canada a percentage of this TAC (less than 3%). Canada, on the other hand, traditionally sets a global TAC consistent with Scientific Council advice, and claims roughly 14.2% of this to be fished domestically.

Until an agreement is in place, Canada continues to unilaterally establish the TAC and claim its share of 14.2%. Harvest decision rules for SFA 1 are in Annex I.

5. Objectives - Fishery objectives

Fisheries and Oceans Canada, with its co-management partners, stakeholders and Indigenous groups, strives to manage this fishery to maximize economic benefits in an ecologically sustainable manner. The long-term objectives relate to conservation and sustainable harvest, benefits to stakeholders and Indigenous groups, and the co-management of the shrimp resource. Corresponding short term objectives, strategies and management measures have been implemented, or are in the process of being developed.

Conservation and sustainable harvest (long term objective)

- To promote the sustainable utilization of Northern shrimp stocks.
- To promote cost-effective harvesting strategies that ensures compliance with objective-oriented management and conservation measures and promotes a responsible image for all fleet sectors.
- To mitigate the negative impacts on other species, habitat, and the ecosystem where shrimp fishing occurs.
- Within specified resource management constraints, to promote a harvest level that stabilizes industry infrastructure and meets marketing requirements, in the pursuit of economic viability objectives for the shrimp sector.
- To promote fishing practices that avoid or mitigate negative impact on sensitive habitat and species.
- To explicitly recognize the ecosystem role of shrimp in TAC-setting decisions, particularly as a forage species.
- To keep stocks in, or return to the healthy zone as per the PA framework.

Strategies (short term objective)	**Management Measures (short term objective)**
Precautionary approach • Utilize a precautionary approach framework when setting exploitation rates for the directed fishery • The significant role of shrimp as a forage species is taken into account in decision making • Manage activity in ecologically sensitive areas • Promote the development of sustainable fishing	**Precautionary approach (Section 2.6)** • Provide biomass and abundance estimates through timely science surveys • Utilize indicators of stock and fishery change • Control fishing mortality by setting annual TAC, taking into account the role of shrimp in the ecosystem • Utilize appropriate exploitation rates and reference points, which take into account the role of shrimp in the ecosystem • Use fishery closures / closed areas to achieve conservation objectives as required

practices. • Manage by-catch or mortality for all non-targeted species • Employ effective monitoring and surveillance tools and mechanisms that ensure compliance with conservation measures	• Prohibit bottom contact fishing in established sensitive benthic areas • Enforce regulations against discarding and highgrading • Require a maximum of 22 (SFA 6,7) or 28 mm (SFA 1,4, 5 and in the management units in the Eastern Assessment Zone (EAZ) and Western Assessment Zone (WAZ)) separator grates as condition of licence • Require live release of species listed under SARA as endangered or threatened • Observer coverage is targeted at 100% for > 100' vessels and 10% for inshore boats • Use of Vessel Monitoring Systems for all shrimp boats • Employ Dockside Monitoring Programs for 100% of inshore landings • Employ aerial and dockside surveillance in addition to period audits of landings and catch information outside regular operations

Benefits to stakeholders and Indigenous groups (long term objective)

- To promote the continued development of a commercially viable and self-sustaining fishery
- To provide fair access to and equitable sharing of the Northern shrimp resource
- Helps industry maintain Marine Stewardship Council Certification

Strategy (short term) • No new access to this fishery • When dealing with TAC changes in the SFAs 4, 5 and 6, use percent shares as the primary policy guiding allocations. When dealing with TAC changes in the northern SFAs in the WAZ and EAZ, make allocation decisions on a case by case basis, respecting Land Claim obligations • Balance fleet capacity with resource availability	**Management Measures (short term)** • Continue enterprise allocation structure for >100' sector • Continue to limit entry to the fishery through licensing • Consult with management boards in Land Claim areas on TAC levels in or adjacent to their settlement area waters

• Enterprise and licence combining for the inshore fleet • Fulfill obligations with respect to fishery resources as defined in the Nunavut Land Claims Agreement, the Labrador Inuit Land Claims Agreement and the Nunavik Inuit Land Claims Agreement.	

Co-management of the resource (long term objective)

- Co-management of the resource in or adjacent to Land Claim settlement areas involves working with the Inuit of Nunavut, Nunavik, and Nunatsiavut
- At NAFO, for the Flemish Cap (3M) and 3L shrimp fisheries, to promote a TAC and quotas management scheme, or otherwise controlling fishing effort to achieve a sustainable fishery.
- With Greenland, for NAFO Division 0A and Subarea 1 shrimp, to continue to promote an agreed TAC and quota and management scheme.
- To promote a co-management approach, providing licence holders with an effective sharing of responsibility, accountability and decision making, within the constraints of the Fisheries Act, the precautionary approach and harvest decision rules.

Strategy (short term objective) • Regular and open dialogue and communication to help foster relationships with land claimants; adherence to obligations as per various Land Claims • Maintain an effective consultative process for resource users to participate in the decision-making process • Establish Multi-stakeholder working groups designed to examine domestic and international issues, e.g. Conservation and Compliance, Closed Areas, Marine Stewardship Council Certification • Contribute to and participate in NAFO meetings • Providing experts to NAFO Scientific Council • Conduct bi-lateral negotiations between Canada and Greenland, with input and participation from industry	**Management measures (short term objective)** • Organize annual Northern Shrimp Advisory Committee (NSAC) meetings • Convene Working Groups as appropriate • Convene Shrimp Working Group under NAFO consultative process as appropriate • Convene domestic consultations and bi-lateral discussions with Greenland as appropriate • Collaboratively define science priorities and design appropriate research activities

• Manage Joint Project Agreement between DFO and the Northern Shrimp Research Foundation to pursue mutually beneficial scientific activities	

At advisory meetings, a review of the P. borealis and P. montagui fisheries takes place which includes a discussion of whether these objectives are being met and key management issues are being addressed. As part of this process, the information gathered through other evaluation processes like the Department's Sustainability Survey for Fisheries is used to help identify areas for improvement in the management of these fisheries and through consultation with stakeholders and Indigenous groups, potential improvements are explored and priorities established.

6. Access and allocation

6.1 Access and allocations

In addition to measures based on precautionary and ecosystem-based management, DFO applies principles of access and allocation to the administration of the Northern shrimp fishery.

Access is described as “the opportunity to harvest or use fisheries resources, generally permitted by licences or leases issued by Fisheries and Oceans Canada under the authority of the Minister of Fisheries and Oceans. The Department shall take Aboriginal and treaty rights to fish into account when providing these opportunities.”

Access to the Northern shrimp fishery is considered stable for both the >100’ sector and the inshore fleet. There is no new access to the Northern shrimp fishery, and consideration must be given to relevant land claims when making access and allocation decisions.

Allocation is “the amount or share of the fisheries resource and/or effort that is distributed or assigned by the Minister of Fisheries and Oceans to those permitted to harvest the resource.”

The Minister can, for conservation purposes or for any other valid reasons, modify access, allocations and sharing arrangements as outlined in this IFMP in accordance with the powers granted pursuant to the Fisheries Act.

Following the TAC decision, quotas are established for the fleets and special allocation holders that have access to that management area.

Quotas and allocations from 1996 – present can be found in the Profile of Access at Annex B.

6.2 Harvesting of Northern Shrimp Allocations

When significant quota increases occurred in the Northern shrimp fishery between 1997 and 2016, special allocations were often created to benefit various groups (inshore affected fishers, Indigenous groups, etc.). Over the years, specific harvesting requirements were introduced that determined which fleet is permitted to harvest these allocations and in some cases, specify landing requirements. In 2017, the decision was taken that holders of special allocations in SFA 6 could choose to have their allocation harvested by the inshore fleet and / or the offshore fleet, however arrangements with inshore harvesters would need to occur on a fleet level and not at the individual harvester level in order to address leveraging and other concerns.

Harvesting Of Northern Shrimp Allocations

			EAZ				WAZ					
Fleet / Interest	SFA 0	SFA 1	DSW	DSE	NUE	NKE	NUW	NKW	SFA 4	SFA 5	SFA 6	Fished Only By:
>100' sector	●	●	●	●					●	●	●	Any >100' sector Northern shrimp licence holder
Nunavut (NU)		●	●	●								Any NU temporary or > 100 sector Northern shrimp licence holder with sub-allocations in that area
					●		●					Those enterprises that receive allocations in these areas, as amended from time to time
Nunavik (NK)						●		●				
			●									Any > 100' sector Northern shrimp licence holder or vessel acquired by NK interests
Makivik		●										Any > 100' sector Northern shrimp licence holder
Northern Coalition										●		
IACF Cartwright to L'Anse au Clair										●		Any Canadian wetfish trawler >65' – 99' or > 100' sector Northern shrimp licence holder
IACF Northern Peninsula										●		
Inshore									●			< 90' inshore vessel or > 100' sector Northern shrimp licence holder
Nunatsiavut Government									●	●		
NunatuKavut Community Council										●		
Imakpik Fisheries										●		
Innu Nation									●	●		
											●	Any > 100' sector Northern shrimp licence holder, and / or through an arrangement with an approved inshore fleet sector
St. Anthony Basin Resources											●	
Fogo Island CoOp											●	
Inshore Fleet											●	Any < 90' inshore licence holder

In an attempt to encourage development in the early years of the fishery, the Department allowed licence holders to charter foreign vessels to harvest their allocations. This practice was phased out over time and today all vessels in the fishery are Canadian and carry mostly Canadian crews. The exception to this rule is the use of foreign vessels as short term charter replacements to cover exceptional cases such as vessel loss, or in extremely rare cases, when there is a shortage of Canadian vessel capacity.

6.3 Percent shares

The Northern shrimp TAC for each of the SFAs 0 to 6 is allocated to the >100' shrimp sector, special allocation holders and the inshore fleet depending on the MU/SFA. Prior to 2016, the LIFO policy was the main tool the Department used to determine access and allocations for each management area, subject to Land Claims considerations. LIFO is described in Annex C.

Beginning in 2016, the Department, by Ministerial decision, implemented stable percent shares to remaining allocation holders in each of the southern SFAs (4-6). The Minister modified the percent shares in SFA 4 in 2017 to increase the share of the adjacent Labrador Inuit. Such an approach is not feasible in northern areas where land claims obligations require consideration of any changes in TAC on a case by case basis. Percent shares determine the amount of allocations to participants in SFAs 4, 5 and 6.

Fleet / Interest	**SFA 4**	**SFA 5**	**SFA 6**	**SFA 7***
Offshore (equally divided among >100' licence holders)	76.2%	38.04%	23.1%	20.2%
Inshore	5.3%	-	69.6%	65.7%
Innu Nation	8.5%	5.19%	1.7%	-
Nunatsiavut Government	10%	9.9%	-	-
Northern Coalition**	-	28.0%	-	-
NunatuKavut Community Council	-	6.22%	-	-
Inshore Affected Cod Harvesters (Cartwright to L'anse au Clair)	-	8.84%	-	-
Inshore Affected Cod Harvesters (Northern Peninsula)	-	1.04%	-	-
Imakpik Fisheries	-	2.77%	-	-
St Anthony Resource Basin Inc (SABRI)	-	-	4.5%	-
Fogo Island Co-Op	-	-	1.1%	-
PEI Consortium	-	-	-	9.4%
Miawpukek First Nation	-	-	-	4.7%

*Should NAFO take the decision to resume commercial fishing in SFA 7, the quota allocation key will be as described.
** Northern Coalition's share is divided equally among Labrador Fishermen's Union Shrimp Company (2 shares), Torngat Fish Producers Coop, Unaaq Fisheries, Qikiqtaaluk Corporation, Makivik Corporation and Nunatsiavut Group of Companies

7. Management Measures

7.1 Total allowable catch

Stocks are managed through TAC in each SFA. The TAC is the total amount of shrimp that is permitted to be caught for that fishing season in each SFA, and is determined annually. Generally, the TAC and fleet quotas fluctuate each year by management area. With the implementation of percent shares in SFAs 4 - 6, as the overall TAC changes, the fleet quotas / allocations are adjusted accordingly.

TACs in most management areas are guided according to the harvest decision rules outlined in the precautionary approach framework for Northern shrimp (section 2.6) and include perspectives obtained during consultations with stakeholders and Indigenous groups, as well as other relevant information. For SFA 1, following consultation with relevant stakeholders, Canada adopts an overall TAC (shared between Canada and Greenland), and claims its domestic share based on the formula of 17% of 5/6 of the overall TAC (14.2%) accepted by Canada, recognizing that 1/6th of the area would be inshore waters in Greenland with the remaining 5/6 being offshore areas. There are also processes in place to establish TACs and quotas in the WAZ and EAZ which require specific decisions and recommendations from the NWMB and NMRWB. The TAC in SFA 7 is set by NAFO. Please check the latest TAC announcements and the Profile of Access at Annex B.

7.2 Fishing Ssasons

The fishing season for the Northern shrimp >100' sector is from January 1 – December 31 for transboundary and NAFO managed stocks (SFAs 0, 1, 3L (SFA 7) and 3M), and April 1 – March 31 for DFO managed stocks, (SFAs EAZ, WAZ, 4, 5, and 6). The inshore trawlers' season is generally from April 1 – December 31, or until the quota is taken, whichever comes first. The opening of the fishery depends on the TAC being announced and for the inshore trawlers, is also based on the sharing of the inshore quota between the 2J, 3K north, 3K south, 3L and 4R fleets. Fishing seasons are regulated under the authority of the Atlantic Fishery Regulations, 1985.

7.3 Closed areas

The following closed areas have been implemented for conservation purposes related to habitat and / or benthic issues, and are regulated through a variation order under the authority of the Atlantic Fishery Regulations, 1985.

7.3.1 Hatton Basin coral protection zone

In 2007, the > 100' sector shrimp and groundfish sectors introduced a 12,500 square kilometre (3,644 square nautical miles) coral protection zone in the northern Labrador Sea to protect coral concentrations in that area. This was part

of an industry-led initiative, sponsored by CAPP, the Groundfish Enterprise Allocation Council (GEAC), and the NC, which also includes other conservation measures designed to promote marine stewardship and the preservation of sensitive marine ecological features.

7.3.2 Hawke Channel closed area

The primary rationale for the closed area was in response to the Fisheries Resource Conservation Council recommendations in 2000 and 2001 to protect juvenile turbot and spawning cod respectively. In 2001, due to concerns about the impact of bottom trawling for shrimp on crab fishing grounds, a proposal for a pilot project involving a “no-trawl” zone was received from the 2J crab licence holders. After consultation with stakeholders and Indigenous groups, and a review of available information, in September 2002, DFO implemented a 400 square nautical mile ‘no-trawl/no-gillnetting’ study area to conduct work similar to that conducted in Division 3K. The 2J ‘no-trawl/no-gillnetting’ study area was expanded to cover 2,576 square nautical miles in July 2003. Since the Hawke Box has been closed, there have been no studies undertaken to determine if the closure is having any effect on cod and turbot populations. Given this lack of substantiated evidence, the Hawke Box closure has been a long standing issue with some industry.

7.3.3 Funk Island Deep closed area

The Funk Island Deep closed area in SFA 6, was originally closed in 2002 to gillnetting to protect snow crab, and in 2005 the closure was extended to include the inshore shrimp trawlers, with their concurrence. This closed area covers roughly 2,119 square nautical miles and was a voluntary closure for the > 100’ sector shrimp trawlers until 2018 (see Annex M).

7.3.4 Vulnerable marine ecosystems closed areas (in the NAFO Regulatory Area)

Since 2008, the Northwest Atlantic Fisheries Organization has undertaken extensive scientific research on vulnerable marine ecosystems (VME). This is part of its ongoing commitment to an ecosystems approach to fisheries management and to fulfill its commitment to prevent significant adverse impacts on VMEs as called for by the United Nations General Assembly resolution 61/105.

Following the identification by NAFO of areas identified as VMEs in the NAFO Regulatory Area, fourteen areas have been closed to bottom contact fishing, including two closures that cover a portion of Division 3N to protect significant concentrations of corals and sponges, to prevent the significant adverse impacts of bottom fishing activities on VMEs known to occur or likely to occur. One closed area is in 3K, known as the Orphan Knoll, where the Northern Shrimp fishery occurs. No vessel shall engage in bottom fishing activities in the following area in

Division 3K enclosed by straight lines joining the following points in the order which they are listed:

50 degrees 00 minutes 30 seconds North 45 degrees 00 minutes 30 seconds West
51 degrees 00 minutes 30 seconds North 45 degrees 00 minutes 30 seconds West
51 degrees 00 minutes 30 seconds North 47 degrees 00 minutes 30 seconds West
50 degrees 00 minutes 30 seconds North 47 degrees 00 minutes 30 seconds West

7.3.5 Inshore crab areas closures

As a result of concerns about the impact of bottom trawling on Snow crab, at the request of the inshore crab fleets in 3KL the inshore Snow crab fishing areas are closed to all bottom dragging fisheries in SFAs 6 and 7, which includes Northern shrimp fishing by the inshore shrimp trawlers.

- SFA 6 - Fishing is not authorized in that portion of SFA 6 inshore of a straight line connecting by the following coordinates:
  52 degrees 15 minutes North latitude, 55 degrees 26 minutes West longitude to
  52 degrees 15 minutes North latitude, 54 degrees 20 minutes West longitude to
  51 degrees 20 minutes North latitude, 54 degrees 57 minutes West longitude to
  51 degrees 20 minutes North latitude, 54 degrees 20 minutes West longitude to
  51 degrees 00 minutes North latitude, 54 degrees 20 minutes West longitude to
  51 degrees 00 minutes North latitude, 55 degrees 09 minutes West longitude to
  50 degrees 30 minutes North latitude, 55 degrees 30 minutes West longitude to
  50 degrees 30 minutes North latitude, 54 degrees 20 minutes West longitude to
  50 degrees 10 minutes North latitude, 54 degrees 20 minutes West longitude to
  50 degrees 10 minutes North latitude, 53 degrees 20 minutes West longitude to
  49 degrees 35 minutes North latitude, 53 degrees 20 minutes West longitude to
  49 degrees 35 minutes North latitude, 52 degrees 50 minutes West longitude to
  49 degrees 15 minutes North latitude, 52 degrees 50 minutes West longitude.

- SFA 7 - Fishing is not authorized in that portion of SFA 7 inshore of a straight line connecting by the following coordinates:

  49 degrees 15 minutes North latitude. 52 degrees 51 minutes West longitude to
  47 degrees 26 minutes North latitude, 52 degrees 03 minutes West longitude to
  46 degrees 28 minutes North latitude, 52 degrees 31 minutes West longitude to
  46 degrees 12 minutes North latitude, 53 degrees 32 minutes West longitude to
  46 degrees 17 minutes North latitude, 53 degrees 32 minutes West longitude to
  46 degrees 30 minutes North latitude, 54 degrees 18 minutes West longitude.

7.3.6 Marine Protected Areas

The Government of Canada has agreed to domestic and international marine conservation targets (MCTs) to conserve 10% of coastal and marine areas through effectively managed networks of protected areas and 'other effective area-based conservation measures' by 2020 (Aichi Target 11). To further highlight these targets as a priority, the Government of Canada identified an interim target of 5% by 2017. See Annex M for more information on MCTs.

A map of marine areas that are protected across the country is available online.

In support of MCT, a Network of Marine Protected Area (MPAs) and other effective area-based conservation measures (i.e. Fisheries Act closures) is currently being developed in the Newfoundland and Labrador Shelves Bioregion to support the conservation and sustainable management of marine resources and their habitats. Within NAFO Divisions 2GHJ3KL there are two inshore MPAs established under the Oceans Act. The Gilbert Bay MPA is located on the southeast coast of Labrador in NAFO Subdivision 2J and covers approximately 60 km^2. This MPA was designated in 2005 to conserve and protect Gilbert Bay golden cod and its habitat. The Eastport MPA is located in Bonavista Bay in NAFO Subdivision 3L. It was also designated as an MPA in 2005 and covers 2.1 km^2. The conservation objective of the MPA is to maintain a viable population of American lobster through the conservation, protection, and sustainable use of resources and habitats; and to ensure the conservation and protection of threatened or endangered species.

Ecologically and Biologically Significant Areas
Within the range of the Northern shrimp fishery, 17 Ecologically and Biologically Significant Areas (EBSAs) have been identified (Figure 8), however division 3L is part of a larger area currently being re-evaluated and could potentially change.

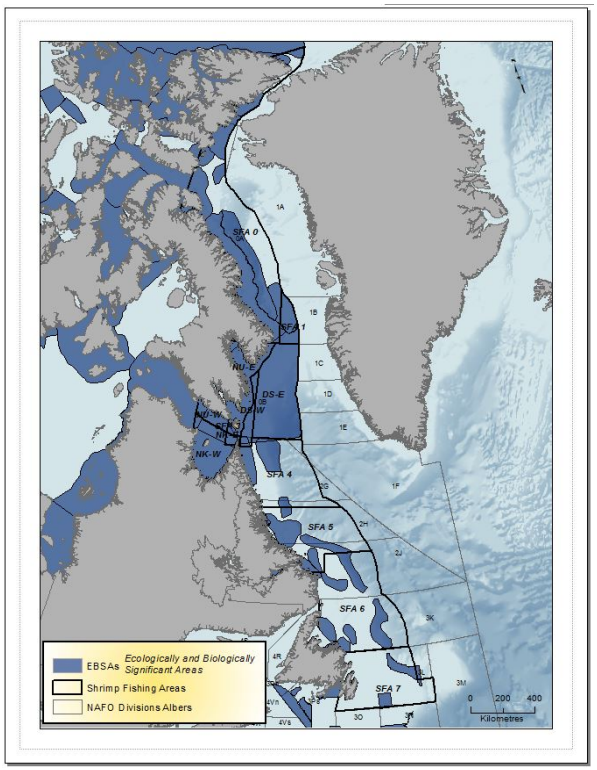


Figure 8: Ecologically and Biologically Significant Areas (EBSAs) located within the range of the Northern shrimp fishery.

EBASs are identified by science and other experts as areas that are particularly important to the structure and function of the marine environment or a particular ecosystem. They are not based on regulation, and are not managed in the way MPAs are managed. Rather, their identification is intended to raise awareness and draw attention to activities that may threaten an area. The identification of EBSAs is a tool for calling attention to areas that have particularly high ecological or biological significance, to facilitate provision of a greater-than-usual degree of risk aversion in the management of activities in such areas.

Further information on these EBSAs can be found in the following documents:

- Placentia Bay-Grand Banks Large Ocean Management Area Ecologically and Biologically Significant Areas
- Identification of Additional Ecologically and Biologically Significant Areas (EBSAs) within the Newfoundland and Labrador Shelves Bioregion
- Identification of Ecologically and Biologically Significant Areas (EBSA) in the Canadian Arctic
- Ecologically and Biologically Significant Areas in Canada's Eastern Arctic Biogeographic Region, 2015

7.4 Enterprise allocations

Enterprise allocations (EA) is the total amount of quota that each > 100' sector licence holder is allocated in each management area. Quota transfers among allocation holders are permitted in all SFAs, however access to the Nunavut and Nunavik MUs is limited to those entities receiving allocations in these areas, as amended from time to time. EAs also apply to the four inshore licences with allocations in SFA 4. EA is similar to an individual quota. EAs are managed as a condition of licence. The EA Program is described in Annex F.

7.5 Quota reconciliation

Quota reconciliation is the process of deducting inadvertent quota overruns from one year to the next, with the enterprise(s) paying for the full allocation, and fishing only that portion remaining after the previous year's overruns have been deducted. This procedure is applied to all sectors participating in this fishery.

Quota reconciliation is not a penalty or sanction; it is an accounting of overruns to ensure that quotas are respected. However, for the inshore fleet, DFO will close fisheries when established quotas are reached or projected to be reached, and those who continue to fish after the closure may be subject to prosecution.

7.5.1 >100' Sector season bridging

Season bridging was first introduced in 2007. Season bridging refers to a licence holder 1) borrowing from the following year's quota to be fished in the current year; or 2) transferring some of the current year's unused quota to be caught in the following year (carry forward). The ability to season bridge provides the >100' sector harvesters with increased flexibility to better prosecute the fishery and adjust to mechanical problem, weather and ice conditions and resource availability. This policy applies to >100' sector licence holders in Davis Strait East and West and SFAs 4 – 6 without limitation when the stock is in the Healthy Zone. "Without limitation' means that all 17 licences could carry forward or borrow their permitted amount of quota in the same SFA. Should there be a conservation concern in a particular SFA as evidenced by its positioning in the Cautious Zone of the PA framework, season bridging amounts may be capped or suspended in that particular SFA, as has been the case in SFA 6 since 2014.

The >100' sector licence holders may each carry forward a total of 750t from the previous year's uncaught commercial quota, with no limitation in any Healthy SFA, that must be fished during the first 90 days (April 1 – June 30) of the new fishing seasons for SFAs 5 and 6, and the first 120 days (April 1 – July 31) for Davis Strait and SFA 4.

Licence holders may borrow up to 500t from the next year's quota in SFAs 4 – 6 and Davis Strait, with no limitation in any Healthy SFA, to be fished during the last 30 days (March 1 – 31) of the fishing season.

7.5.2 Inshore Fleet Season Bridging

In 2012 - 2015, season bridging for the inshore shrimp fleet allowed limited bridging of unharvested quota in SFA 6 from one year to the next, contingent on the stock being in the Healthy Zone. Should there be a conservation concern in a particular SFA as evidenced by its positioning in the Cautious zone of the PA framework, season bridging amounts may be capped or suspended. Fleets have the opportunity to request carry forward prior to the end of the fishing season. Carry forward will be limited to 5% of the inshore fleet's quota up to a maximum of 1,500t.

7.6 Fishing Gear Restrictions

The minimum mesh size authorized while fishing for shrimp is 40mm throughout the otter trawl. The minimum mesh size requirement is regulated through the Atlantic Fishery Regulations, 1985.

The otter trawl must be configured with toggle and chain lengths set to a minimum of 71.12cm (28 inches), length measured from the centre of the toggle hole to the fishing line (bolch line) for both > 100' sector and inshore vessels.

Nordmore grate
As a result of concerns about the level of by-catch of marine mammals, turtle and groundfish species by the small-meshed shrimp trawls and the effect on their populations, an exclusion device known as the Nordmore grate was introduced in the Canadian shrimp fishery in 1993. This device sorts out the larger species, allowing them to escape through an opening in the top of the net, while allowing smaller shrimp to pass through and be retained in the cod-end of the net (Figure 9).

Although grates were not mandatory in the most northern areas prior to 1997, the >100' shrimp sector had been using them voluntarily in all areas for some time. In 1997, the grate was made mandatory in all areas and is now required in all shrimp trawls, in all SFAs, at all times. The maximum grate spacing for the inshore shrimp trawlers is 22mm. The >100' shrimp sector uses a 22mm in SFAs 0, 1, 6, 7, and outside the Canadian Fisheries Waters in 3L, and 28mm grate in the EAZ, WAZ, and SFAs 4 and 5.

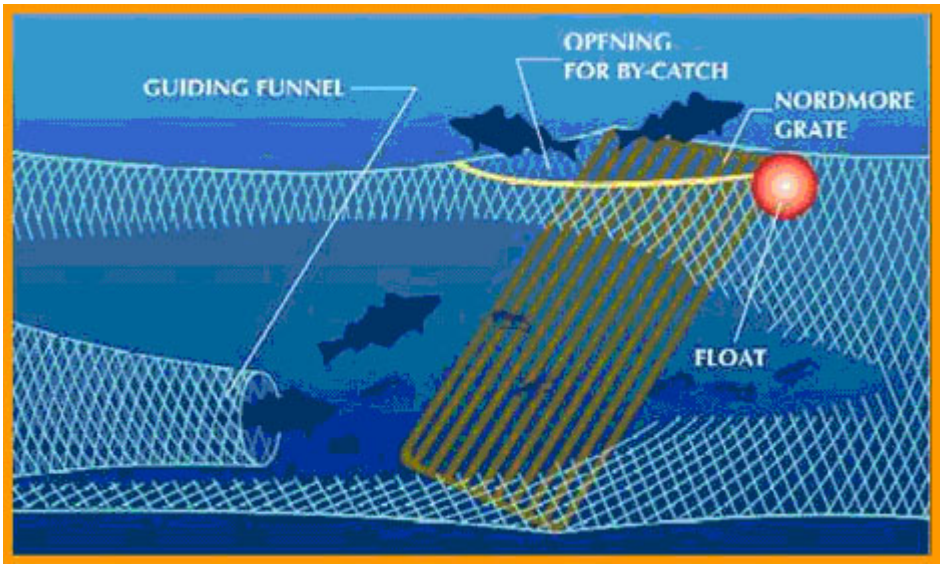


Figure 9 – Nordmore grate

7.7 Incidental catch

Information on bycatch is obtained by the Department from logbooks completed and submitted by industry, and from observer data. DFO Science compiles data and produces reports and updates.

Minimizing the bycatch of groundfish in all Atlantic fisheries is extremely important given the conservation concerns for the groundfish stocks and the management measures in place for their protection. All shrimp vessels fishing in Canadian waters use sorting grates to separate and release marine mammals, turtles and groundfish (and other finfish) species. Further efforts to minimize by-catch may be required with the listing of additional protected species under the SARA. Closed areas are an additional measure to minimize bycatches and negative interaction with groundfish and other species. In absolute and relative terms, and especially compared to shrimp fisheries in many other parts of the world, bycatches in the Northern shrimp fishery are very low – averaging less than [2%] of the directed shrimp catch by weight.

A number of provisions are employed with respect to incidental catch in the Northern shrimp fishery. These include:

- All incidentally caught species shall be returned to the water from where they were taken and where alive in a manner that causes the least harm.
- In the event that the total incidental catch of all groundfish species in any set exceeds the greater of 2.5% or 100 kg total weight, the licence holder/operator must immediately change the vessel's fishing area by a minimum of 10 nautical miles from any coordinate during the last tow.
- If total bycatches of capelin in any haul exceed the greater of 5 metric tonnes or 10 percent by weight of the catch of shrimp, the licence holder/operator

shall employ active avoidance measures to reduce capelin bycatch. If a subsequent tow is made in the same area within 72 hours of the first tow and the subsequent haul contains bycatches of capelin exceeding 5 metric tonnes or 10 percent by weight of the catch of shrimp, the licence holder/operator must change fishing area by a minimum of 10 nautical miles from any position of that tow. The operator must record in the logbook the active avoidance measures taken in response to the first haul which contains excessive capelin bycatch. The operator must also record in the logbook the position (latitude and longitude) at time of capelin bycatch, as well as the quantity caught by weight in kilograms.

7.8 Control and monitoring of removals

Access to Northern shrimp stocks is regulated through fishing licences, and measures that include, but are not limited to SFA, season, quotas and enterprise allocations, and gear specifications.

At-sea observers monitor for compliance of the management measures including by-catch, discarding and highgrading, gear restrictions, area and closed time provisions. Observers also collect valuable scientific information including size composition, catch, effort, by-catch composition etc. Dockside monitoring by a certified Dockside Monitoring Company is conducted on all landings from the inshore fleet. Dockside monitoring of shrimp landed from the >100' shrimp sector is not required because of the 100% observer coverage. Completion and submission of accurate fishing log books and fish purchase slips are required.

7.9 Quota monitoring and bycatch

Catch estimates including bycatch levels are supplied by the licence holder on a daily basis. This is supplied though the completion and submission of a fishing logbook. For vessels >100', a daily hail on catch is required.

Observers estimate catch and by-catch based on observations of catches within the codend and by estimating the total packout product weight. All shrimp caught must be counted against the quota.

Additional information on compliance protocol for Northern shrimp is at Section 9.

7.10 Decision rules

As described, for each SFA there are rules related to TAC level, gear type, season and closed areas, as well as other limits as outlined in the Northern shrimp condition of licence. Additionally, the PA framework requires that harvest decision rules are developed that provide details on the harvest rates and possibly other management procedures that are required in each zone, or steps within a zone. These management actions are designed to achieve the desired

outcome by affecting the removal rate. For Northern shrimp, the spawning stock biomass is used to determine what PA zone the stock is in – Healthy, Cautious or Critical. Ultimately, the Minister has full authority on setting TACs.

Past management decisions, including TACs, for Northern shrimp can be found online.

The PA is described in section 2.6, and the harvest decision rules are at Annex I.

7.11 Licencing

The Northern shrimp fishery is a limited entry fishery with no new licences available. Only those who held a licence in the previous year will be eligible for renewal of that licence in the current year. The Minister of Fisheries and Oceans has absolute discretion under the Fisheries Act for the issuance of fishing licences. Licences may be reissued to a new licence holder upon the request of the current licence holder. In the case of offshore corporations, only those that have a majority of Canadian ownership are eligible to obtain licences. Generally, in the inshore fishery, only independent core fish harvesters are eligible to obtain a licence, they may decide to hold this licence in their wholly-owned corporations.

Nunavut sub-allocation recipients receive a temporary licence.

Additional Inshore Licencing/ Allocation Measures- NL

- Beam Trawl Licences:
    - 3K and 3L Shrimp beam trawl licences cannot be converted to otter trawl licences,
    - 3K and 3L Shrimp beam licences are not eligible for reissuance.
- SFA 4 Licences:
- SFA 4 Northern shrimp licences may be reissued to an eligible 3L Independent Core fish harvester who does not currently hold a Northern shrimp licence. Reissuance of SFA 4 Northern shrimp licences to individuals or entities in NAFO Division 2GHJ may be considered. The permanent transfer of allocations from the SFA 4 inshore Northern shrimp fleet to the >100' shrimp sector is not permitted.
- Other general licencing policy provisions will apply.

Enterprise combining & licence combining in the Inshore Sector

Enterprise combining is a voluntary fleet self-rationalization policy which allows most shrimp licence holders in Newfoundland and Labrador to acquire Northern shrimp from an enterprise within the same NAFO Division that is exiting the industry; other eligibility provisions apply. Licence combining is similar to enterprise combining but does not require the enterprise holding the shrimp licence to exit the fishery, all other licences in the enterprise will not be cancelled. A maximum of four harvest caps may be held by one enterprise, however 3K south based enterprises hold a maximum of five harvest caps; this is in order to reach a level of parity with a fully combined 3K north based enterprise SFA 6

Northern shrimp licence. Shrimp beam trawl licences in 3KL and 3L are not eligible for enterprise combining. In addition, inshore enterprise allocations in SFA 4 are eligible for combining within SFA 4.

7.12 Logbooks & Purchase Slips

Catch estimates including by-catch levels are supplied by the licence holder on a daily basis. This is supplied though the completion and submission of a fishing logbook, either paper or electronic. For vessels >100 ft, a daily hail on catch is required. All shrimp caught must be counted against the quota.

Logbooks are one of the monitoring tools used in this fishery. Under Section 61 of the Fisheries Act, all licence holders are required to complete and return logbooks to DFO. Logbooks must be completed accurately, in accordance with instructions provided. Logbook data is vital to both monitoring catch and for the science assessment process. Prompt return of logbooks is vital to ensure all logbook data is available for science assessments in January. The mandatory completion and return of a logbook is a condition of licence. Shrimp purchase slips are required to be submitted by processors.

7.13 Dockside Monitoring

The objective of the Dockside Monitoring Program (DMP) is to provide accurate, timely, and independent third party verification of landings to ensure the TAC is not overrun, and to ensure licence holders' catches are accurately accounted. DMP constitutes one of the primary sources of landing information on which the management of the inshore fishery is based. The fishing industry and the Department are therefore dependent on the accurate verification of landings by dockside monitoring corporations (DMCs). All DMP costs are the responsibility of individual fish harvesters or fishing fleets. It is also the responsibility of licence holders to ensure that monitors who oversee the offloading of catches are certified by Fisheries and Oceans Canada. The dockside monitoring requirement is managed as a condition of licence.

Dockside monitoring by a certified dockside monitoring company is conducted on all inshore fleet landings. Dockside monitoring of shrimp landed from the >100' shrimp sector is not required because of the 100% observer coverage.

7.14 At-Sea Observers

The At–Sea Observer Program was designed to collect independent third party fisheries data for science, resource management and compliance and deterrence purposes. This important component of fishery management provides information and an at-sea presence while fisheries are on-going. At-Sea Observers observe, record and report detailed biological and fishery data, such as size composition, catch, bycatch composition, fishing effort and all catch data, fishing gear type,

fishing location, discarding and highgrading, gear restrictions, area and closed time provisions, etc.

The fishery is monitored by extensive industry-funded at-sea observer coverage. The >100' shrimp sector and Nunavut temporary licence holders carry 100% observer coverage resulting in approximately 2000 observer days annually. The observer coverage requirement for the inshore fleet is based on a 10% coverage target. Inshore licence holders are required to carry at-sea observers at the request of DFO. Licence conditions are not valid unless a letter of arrangement from the observer company is attached confirming payment of observer fees. The at-sea observer requirement is managed as a condition of licence.

7.15 Vessel Monitoring System

As a means to ensure compliance with regulations regarding the area fished, mandatory use of the electronic vessel monitoring system (VMS) was fully implemented in 2004. By utilizing VMS in the fishery there is more accurate, complete and detailed statistical information on the location and timing of fishing activity for DFO Science and Fisheries Management, and improved compliance for restricted areas and more efficient deployments of Conservation and Protection (C&P) resources. VMS includes an automatic location and communication (ALC) device that will transmit the vessel's position to DFO. Fish harvesters are responsible for covering the cost of the ALC device, its installation on-board their vessel, and the cost of operations. The VMS requirement is managed as a condition of licence.

7.16 NAFO Regulatory Area

The Northern shrimp fishing licence is not valid for operating in the NAFO Regulatory Area (NRA) unless the NAFO schedule is attached and the licence holder/operator has received a briefing from the Offshore Compliance Unit, NL Region. While operating in the NRA outside Canadian fisheries waters, the licence holder/operator shall abide by the NAFO Conservation and Enforcement Measures.

7.17 Land Claims restrictions

Fishing for shrimp is only permitted in the NSA as defined in the Nunavut Land Claims Agreement, or in the NMR as defined in the Nunavik Inuit Land Claims Agreement to enterprises that receive allocations in these areas, as amended from time to time.

7.18 Species at Risk Act

The Species at Risk Act (SARA) came into force in 2003. Under the SARA species may be identified as "at risk". The purposes of the Act are: "…to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened." A main issue related to species at risk in the Northern shrimp fishery is the incidental capture of species of wolffish. Their status as species at risk in Canada results in legal protection and mandatory recovery requirements. Protection under the Act prohibits killing, harming and harassing of individuals and also prohibits damaging or destroying their residence, i.e., protection of critical habitat.

Three species of wolffish are commonly caught as bycatch in the Northern shrimp fishery. Two species, the Northern wolffish (Anarhichas denticulatus) and the Spotted wolffish (Anarhichas minor), are listed as "threatened" under SARA and therefore prohibitions apply. Both species have undergone a decline in population size of more than 90% since the late 1970's. For these two species, current management measures, as conditions of licence for the fishery, require that they be returned to the water at the site where they are captured. Release should be done as quickly as possible without harm to the wolffish in order to maximize the animal's survival, however, dead wolfish must also be returned to the water. A third species, the Striped wolffish (Anarhichas lupus), listed as "special concern", is also protected under SARA. Conditions of licence require reporting of interactions with wolffish while conducting fishing operations in the logbook.

To address the condition of these wolffiish species, DFO, in conjunction with industry, fish harvesters and other governmental departments, has developed a recovery strategy for Northern wolffish and Spotted wolffish, and management plan for Atlantic wolffish in Canada that has identified actions to protect and recover these species.

The Species at Risk Public Registry can be accessed online.

7.19 Other inshore management measures, NL Region

- All shrimp harvested must be landed.
- Freezing of shrimp is not permitted on the vessel during any trip, except the four SFA 4 licence holders.
- Mechanical shrimp sorting device is not authorized on board the vessel.
- The licence holder/operator shall not fish in more than one SFA during the same shrimp fishing trip, unless there is an At-Sea Observer onboard the fishing vessel. If an At-Sea Observer is onboard the fishing vessel, the licence holder/operator is authorized to fish multiple SFAs during the same trip.

- The licence holder/operator shall not fish in more than one SFA during the same tow.
- Under existing regulations, transport licenses are required to transport Northern shrimp by vessels other than fishing vessels. For the inshore fleet transport licences will only be issued for transporting Northern shrimp that has been landed on shore. Transhipment from inshore fishing vessels is not authorized

8. Shared stewardship arrangements

There are mechanisms not based on policy or a regulatory framework that allow the Department to advance conservation aspects of the Northern shrimp fishery.

8.1 Working groups

Working groups: There are several NSAC working groups established to address ongoing issues or resolve one time occurrences. Ongoing working groups include:

- Marine Stewardship Council (MSC) – aids industry in maintaining their MSC certification, which was achieved in 2008
- Ecosystems – looks at issues such as closed areas, corals and sponges, and other ecosystem related concerns
- Precautionary Approach – established to improve the current PA
- SFA 1 PA – established to develop HDRs and a PA for SFA 1, which is a shared stock with Greenland
- DFO Science / Resource Management / Industry Working Group – established to look at issues and make recommendations to NSAC on issues where Science and Resource Management intersect.

8.2 Northern Shrimp Research Foundation

DFO has partnered with the Northern Shrimp Research Foundation (NSRF) to conduct a shrimp survey in SFA 4 and the EAZ since 2005. In 2012, section 10 of the Fisheries Act was adopted, which changed the administrative rules around joint projects. Beginning in 2014 the NSRF and DFO also worked collaboratively to do the science survey in the WAZ. This survey is the only independent source of information of shrimp stocks in these areas, providing the necessary information for determining stock status in the Precautionary Approach framework and informing decisions on TAC.

Beginning in 2013 and subject to annual Ministerial approvals, a 1,700t allocation of shrimp from SFA 4 has been used to generate the financing required to cover the costs of the Northern shrimp survey pursuant to section 10 of the Fisheries Act. For this work, DFO enters into a collaborative agreement with the NSRF to perform the activities. The quota for the surveys was added as a NSRF allocation in SFA 4 and generates proceeds of approximately $1.5 million to fully cover costs of the survey conducted by NSRF.

As per the draft National Policy for Allocating Fish for Financing Purposes, project proponents must demonstrate support (2/3 majority) for both the proposal and the allocation that will be set aside to finance the activity before it is approved by the Department.

8.3 Closed areas

Information on closed areas, including voluntary closures can be found in section 7.3.

9. Compliance plan

The Conservation and Protection program promotes and maintains compliance with legislation, regulations and management measures implemented to achieve the conservation and sustainable use of Canada's aquatic resources, and the protection of species at risk, fish habitat and oceans.

The program is delivered through a balanced regulatory management and enforcement approach including:

- Promotion of compliance through education and shared stewardship;
- Monitoring, Control and Surveillance (MCS) activities; and,
- Management of major cases /special investigations in relation to complex compliance issues.

The deployment of Conservation and Protection resources in the Northern shrimp fishery is conducted in conjunction with the management plan objectives as well as in response to emerging issues. The mix of enforcement options available and overriding conservation objectives determine the level and type of enforcement activity. The enforcement operational planning process is designed to establish priorities based on management objectives and conservation concerns. The monitoring and evaluation elements of enforcement operational plans facilitate in-season adjustments should conservation concerns and/or significant non-compliance emerge. Additionally, the National Fisheries Intelligence Service (NFIS) is to have a growing role in advising Conservation and Protection programs through intelligence-led, fully integrated, threat-risk based priority setting and decision making practices.

9.1 Regional Compliance Program Delivery

Conservation and Protection (C&P) is responsible for compliance and enforcement work related to all the regional fisheries, as well as habitat, the Canadian Shellfish Sanitation Program, and other activities. Given the magnitude of the task, allocation of time towards a specific fishery is based in large part on an assessment of risk to the resource. In relation to the Northern shrimp fishery, the primary activities conducted by C&P include the following:

- **Education and shared stewardship**

Conservation and Protection supervisors and area chiefs will actively participate in annual consultations with the fishing industry and Indigenous organizations. Compliance issues will be presented and recommendations requested for resolution. As well, informal meetings will continue as required to resolve in-season matters.

As part of its activities under the education pillar, C&P will present and discuss fisheries conservation with fishers on a regular basis. The resulting information will be used as part of the planning process within C&P.

- **Monitoring, control and surveillance**

C&P promotes compliance with the management measures governing the northern shrimp fishery by the following means:

Patrols and inspections: C&P detachments will conduct shrimp patrols by vehicle, vessel, and fixed wing aircraft in accordance with national/regional priorities and operational plan. Detachments will ensure that monitoring and inspections of fish landing activity are carried out.

Dockside monitoring: The Dockside Monitoring Program (DMP) provides for independent third-party verification of landed catch in metric units by a DFO certified Dockside Observers. DMP is required in the northern shrimp fishery for all landings from <100ft vessels, but is not currently required on shrimp landed from >100ft vessels due to 100% observer coverage.

Aerial surveillance: Conservation and Protection will ensure that surveillance flights are conducted throughout the season as part of the operational plan. Dedicated air surveillance patrols are conducted in the Northern shrimp fishery areas utilizing both Transport Canada and DFO contracted air surveillance aircraft.

Vessel monitoring: The VMS system will be relied upon to provide real-time data on the location of vessels within this fleet. Utilization of this resource will assist officers in monitoring fishing activity, monitoring closed areas, deploying resources, determining the port of destination and the estimated time of arrival to port. The VMS data will also be relied upon to conduct future analysis and comparisons of fishing activity. Additionally, for more complete coverage, there is an agreement in place with Greenland to share VMS data.

At-sea observer program: At-sea observers will be deployed in accordance with the established deployment plan to observe record and report aspects of the fishing activity. The resulting data will be utilized to compare reported catch

composition of vessels against other available sources of information (DMP, Logbooks, observed trips vs. non-observed trips). There is 100% observer coverage for vessels over 100 feet and 10% for smaller inshore vessels, other requirements include daily hails, catch reports and port entry reports.

Fishery officers will review quota monitoring reports to ensure individual quotas are not exceeded.

9.2 Consultation

Shared stewardship and education are achieved in Northern Shrimp Fishery through a renewed emphasis on the importance of C&P communication with the community at large including:

- C&P participation in advisory meetings with Resource Management, other DFO branches and industry to determine expectations in relation to monitoring, control and surveillance activities.
- Presentations to client/stakeholder groups, including school visits or community awareness programs.
- Informal interaction with all parties involved in the fishery on the wharf, during patrols or in the community to promote conservation.
- Internal DFO consultation with Resource Management and other DFO branches to assess the effectiveness of enforcement activities and to develop recommendations for the upcoming season.

9.3 Compliance performance

Post season analysis sessions will be conducted between C&P and Resource Management staff to review issues encountered during the previous season and to make recommendations on improving management measures. The initial sessions will be conducted at the Area level, followed by a regional session that will be held with other sectors.

The C&P program captures and maintains compliance activity information, The following table gives a breakdown of fishery officer enforcement effort and compliance results in the shrimp fishery for the past five years.

Table 2 Northern shrimp- enforcement summary

		Violation Break-down					
Year	**Fishery Officer Patrol Hours**	**Warning Issued**	**Charges Laid**	**Charges Pending**	**Charges not Approved**	**NAFO Citations**	**Tickets Issued**
2012	980.5	27	6	0	0	0	0
2013	815	29	9	1	1	0	0
2014	829.75	24	5	0	0	1	0
2015	686	31	5	5	3	0	0
2016	667.5	23	1	9	0	0	0

9.4 Current Compliance Issues

Conservation and Protection issues may differ for the >100' sector and the inshore fleet but overall include: fishing gear requirements; quota monitoring; by-catch; highgrading; licence conditions; dockside monitoring requirements; shrimp species verification of borealis or montagui; and, area/time closures.

Compliance concerns in this fishery include fishing closed areas, hail requirements for port entry, bycatch, discards, and misreporting of the species and /or area of capture. The objective to address the issues are to minimize compliance concerns while ensure compliance with the management measures as outlined in the Strategy.

9.5 Compliance strategy

C&P develops operational plans that outline monitoring and compliance activities that will be carried out by C&P personnel adjacent to shrimp management areas. C&P regions collaborate on the development of these operational plans, both formally (e.g. Northern Operations Committee) and informally. Detachment's will promote effective monitoring and enable personnel to effectively maintain compliance with management measures.

The objectives of the operational plans are to provide a body of information that will provide guidance to C&P personnel, while engaged in monitoring and reviewing of fisheries, to ensure compliance and conduct investigations. Sources of information to be used include vessel positioning data, officer inspection data, fishing logs, DMP records, briefing and de-briefing of observers, and at sea observer records. Operational plans and program results will be routinely assessed to ensure compliance principles are met.

Compliance strategies include:

- Compliance promotion activities with all stakeholders and Indigenous groups
- Stewardship activities including the NSAC sub-committee on conservation and compliance
- Report-a-Poacher program through crime stoppers
- Scheduled dedicated and multi-tasked air surveillance , and other sea surveillance as per operational requirements
- 100% coverage of At-Sea Observers for the > 100' sector
- 100% dockside monitoring for inshore vessels, and other dockside checks
- Auditing of landings data
- Investigating non-compliance
- Taking enforcement actions including warnings and prosecutions where noncompliance is detected
- Enforcing Vessel Monitoring Systems (VMS) requirements, including an agreement with Greenland on sharing of VMS data
- Working with other enforcement partners, including Transport Canada (use of surveillance aircraft), Department of National Defence (vessel and surveillance aircraft use, as available) and Greenlandic Fisheries Authorities (exchange of information and best practices).

10. Performance review

The Sustainability Survey for Fisheries is completed annually to help DFO self-assess progress towards sustainability, identify gaps in knowledge and practices, and to report externally on performance and progress towards sustainable management of fisheries.

Under multiyear management, every second year NSAC convenes to discuss current science advice, management measures and performance of the fishery. The NSAC meeting is an opportunity for stakeholders and Indigenous groups to review the fishery, and raise any point or concern and if necessary, propose changes to management that could improve the operations and/ or overall sustainability.

A regular review of the Northern shrimp fishery is conducted at NSAC meetings and includes an assessment of whether the objectives are being achieved and key management issues are being addressed. Stakeholder experience and feedback, information gathered through other evaluation processes and science assessments are used to identify and determine key issues and objectives, as well as potential strategies for achieving outcomes.

11. Glossary

Abundance: Number of individuals in a stock or a population.

Age composition: Proportion of individuals of different ages in a stock or in the catches.

Biomass: total weight of all individuals in a stock or a population.

Bycatch: The unintentional catch of one species when the target is another.

Catch per Unit Effort (CPUE): The amount caught for a given fishing effort. Ex: tonnes of shrimp per tow, kilograms of fish per hundred longline hooks.

Communal commercial licence: Licence issued to Indigenous organizations pursuant to the Aboriginal Communal Fishing Licences Regulations for participation in the general commercial fishery.

Discards: Portion of a catch thrown back into the water after they are caught in fishing gear.

Dockside Monitoring Program (DMP): A monitoring program that is conducted by a company that has been designated by the Department, which verifies the species composition and landed weight of all fish landed from a commercial fishing vessel.

Ecosystem-based management: Taking into account species interactions and the interdependencies between species and their habitats when making resource management decisions.

Fishing effort: Quantity of effort using a given fishing gear over a given period of time.

Fishing mortality: Death caused by fishing, often symbolized by the mathematical symbol F.

Fixed gear: A type of fishing gear that is set in a stationary position. These include traps, weirs, gillnets, longlines and handlines.

Food, social and ceremonial (FSC): A fishery conducted by Indigenous groups for food, social and ceremonial purposes.

Gillnet: Fishing gear: netting with weights on the bottom and floats at the top used to catch fish. Gillnets can be set at different depths and are anchored to the seabed.

Groundfish: Species of fish living near the bottom such as cod, haddock, halibut and flatfish.

Landings: Quantity of a species caught and landed.

Maximum sustainable yield (MSY): Largest average catch that can continuously be taken from a stock.

Mesh size: Size of the mesh of a net. Different fisheries have different minimum mesh size regulation.

Mobile gear: A type of fishing gear that is drawn through the water by a vessel to entrap fish. These include otter trawls and Danish/Scottish Seines.

Natural mortality: Mortality due to natural causes, symbolized by the mathematical symbol M.

Observer coverage: When a licence holder is required to carry an officially recognized observer onboard their vessel for a specific period of time to verify the amount of fish caught, the area in which it was caught and the method by which it was caught.

Pelagic: A pelagic species, such as herring, lives in midwater or close to the surface.

Population: Group of individuals of the same species, forming a breeding unit, and sharing a habitat.

Precautionary Approach: in fisheries management is about being cautious when scientific knowledge is uncertain, and not using the absence of adequate scientific information as a reason to postpone action or failure to take action to avoid serious harm to fish stocks or their ecosystem. This approach is widely accepted as an essential part of sustainable fisheries management.

Quota: Portion of the total allowable catch that a unit such as vessel class, country, etc. is permitted to take from a stock in a given period of time.

Recruitment: Amount of individuals becoming part of the exploitable stock e.g. that can be caught in a fishery.

Research survey: Survey at sea, on a research vessel, allowing scientists to obtain information on the abundance and distribution of various species and/or collect oceanographic data. Ex: bottom trawl survey, plankton survey, hydroacoustic survey, etc.

Species at Risk Act (SARA): The Act is a federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides the legal protection of wildlife species and the conservation of their biological diversity.

Spawner: Sexually mature individual.

Spawning stock: Sexually mature individuals in a stock.

Stock: Describes a population of individuals of one species found in a particular area, and is used as a unit for fisheries management. Ex: NAFO area 4R herring.

Stock assessment: Scientific evaluation of the status of a species belonging to a same stock within a particular area in a given time period.

Total allowable catch (TAC): The amount of catch that may be taken from a stock.

Tonne: Metric tonne, which is 1000kg or 2204.6lbs.

Trawl: Fishing gear: cone-shaped net towed in the water by a boat called a "trawler". Bottom trawls are towed along the ocean floor to catch species such as groundfish. Mid-water trawls are towed within the water column.

Validation: The verification, by an observer, of the weight of fish landed.

Vessel size: Length overall.

Year-class: Individuals of a same stock born in a particular year. Also called "cohort".

Annexes

Annex A - History of the Northern shrimp fishery

Historical overview

The Northern shrimp fishery began back in the early 1970s when DFO conducted exploratory cruises that verified the presence of shrimp stocks off Newfoundland and Labrador.

In 1977, four Canadian companies (all with Gulf–based processing facilities) were licensed to prosecute the Labrador shrimp fishery under co-operative arrangements to determine the commercial feasibility of harvesting these stocks.

Landings continued to increase significantly into the 1980s and 1990s, and additional offshore licences were added; by 1991 there were 17, and no additional offshore licences have been issued since this time.

In 1989 the Enterprise Allocation (EA) regime, which was introduced in 1987 on a trial basis was adopted permanently, with the introduction of mandatory, industry paid, observer coverage.

During the early years, many licence holders reduced their risk by using foreign vessels to harvest allocations of Northern shrimp. By 1990, all licence holders were required to use Canadian flagged vessels with Canadian crews to harvest all allocations. The exception to this rule is the use of replacement vessels on a temporary basis.

In 1996, then Minister Mifflin announced that DFO was calling for proposals on principles for the sharing of potential quota increases as the fishery expanded to include inshore and special allocation holders.

In 1996, the >100' shrimp sector held quota in all SFAs except for SFA 7; these 1996 amounts in each SFA were the thresholds below which sharing to no offshore entities would cease and formed the foundation of the LIFO policy. Additionally, the total 1996 quota (36,700t) was considered an overall threshold, meaning that if a TAC fell below the threshold in one area, it could preclude sharing in another.

In 1997, existing licence holders supported the sharing of quota increases as the fishery opened to other stakeholders and Indigenous groups.

In 2010, due to a declining biomass in SFA 6, the LIFO principle was triggered for the first time resulting in the complete removal of two special allocation holders. The remainder of the reductions was shared by the inshore and >100' shrimp sectors at 10% and 90% respectively. The remaining special allocation holders were not affected. With the exception of 2015, LIFO continued to be triggered every year in SFA 5, 6 and / or 7 until it was abolished in 2016, which resulted in the full or partial removal of several special allocation holders.

The reductions and the consequent application of LIFO in 2010 and 2011 lead to an external review of the principles, policies and methodologies used to apply the reductions was carried out by Ernst & Young. They concluded that the Department did correctly interpret and apply the appropriate principles, policies and methodologies to the reductions; however they noted the Department should endeavour to increase communication with stakeholders and Indigenous groups in the future.

The Northern shrimp fishery first achieved Marine Stewardship Council certification in 2008, and by 2012, the full > 100' sector and inshore portions of

the Northern shrimp fishery attained joint Marine Stewardship Council Certification.

In 2013, the boundaries in the North (SFAs 2 and 3 at the time) were modified to align with scientific surveys and land claim areas. For the first time, allocations were granted to Nunavik proper in the Nunavik Marine Region. The boundary change included new allocations for both species to both Nunavut and Nunavik inside the respective settlement areas, which comprise the WAZ. The management boards representing Nunavut and Nunavik agreed to share the TACs 50/50.

Also as a result of the boundary changes in 2013, new commercial and exploratory allocations for borealis and montagui were created for the Eastern Assessment Zone, and were granted to the >100' sector, as well as Nunavut and Nunavik. The new TACs and allocations in the EAZ and WAZ are not comparable to 2012 levels or earlier in SFAs 2 and 3.

For the 2013/14 season, 1,700t of the increased TAC in SFA 4 was allocated off the top to the Northern Shrimp Research Foundation survey through the use of fish provision in the Fisheries Act. Additionally, a cap of 4,033t was first placed on montagui bycatch in SFA 4.

In 2016, LIFO was replaced by proportional sharing in SFAs 4 – 6, with allocation holders receiving a percent share of the respective TAC. Decisions in the North will be made on a case by case basis considering Land Claims obligations.

Annex B – Profile of access

The profile of access is available online.

Annex C – Information on the Last In, First Out (LIFO) Policy

The Last In, First Out (LIFO) principle was a key allocation tool the Department used between 1996 – 2016. LIFO had been described in principle in all Northern shrimp IFMPs since 1997, however the term "LIFO" was first used in the 2003 IFMP. The sharing arrangements and principles agreed to in 1997 formed the basis of LIFO, which recognized the exploratory work and dependence of the offshore fleet. During the late 1990s, when the shrimp stocks continued to increase, the fishery opened up to other participants in SFAs 4 – 6. Participation in northern areas began to expand in 1999.

LIFO was an approach to sharing the changes in TAC depending on the SFA, and was described as follows:

To ensure the viability of the traditional, >100' shrimp sector was not jeopardized, the 1996 quota levels in each SFA were set as thresholds. Sharing will only take place in a particular SFA if the quota rises above the threshold of that Area. If

quotas decline in future years back down to the thresholds, the sharing will end and the new, temporary entrants will leave the fishery. The overall 1996 quota (37,600t) for all Areas combined will also be used as a threshold to determine sharing. Thus a major decline in one or more SFAs could preclude further sharing in any Area. Should there be a decline in the abundance of the resource in the future, temporary participants will be removed from the fishery in reverse order of gaining access – last in, first out. Temporary licences and temporary allocations will only continue as long as the overall threshold level or individual threshold levels are maintained when quotas are set.

In 2006, DFO announced that additional access to the shrimp fishery would be frozen to encourage stability in the short term. In 2007, the Newfoundland and Labrador's inshore fleets' temporary licences were converted to regular licences to facilitate the rationalization of the inshore shrimp fishery through Enterprise Combining.

LIFO was applied to manage changes in quotas when the TAC fell to a range below the threshold for that SFA. . When this occurred, special allocation holders were removed first from the fishery, with the remainder of the reductions shared among the > 100' sector and inshore fleet according to prearranged sharing formulas, (proportional to how quota increases had been received) , which varied by SFA.

A special allocation was a maximum amount for that group at that TAC level or greater, with the premise that the special allocation holder entered the fishery at the previous TAC level, at which point their allocation would have been 0. Therefore, the LIFO policy recognized that a special allocation holder would hold a proportional level of quota if the TAC was between these two levels.

Beginning in 2010, decreases began occurring in the southern range of the Northern shrimp fishery, triggering the LIFO policy each year in one or more SFAs. LIFO was applied in 2010 and 2011 in SFA 6. In 2012, LIFO was applied in SFA 6 as a proportionate increase and in SFA 7 as a proportionate decrease. In 2013, LIFO was applied to reductions in SFAs 5 and 6. In 2014, the TAC and all allocations were fully reinstated in SFA 5.

In terms of LIFO, SFA 7 was unique in that the fishery began in 2000, after the LIFO thresholds were announced in 1997. Three allocation holders entered the SFA 7 fishery at the same time, unlike the other SFAs, and therefore no threshold existed. However, to be consistent with the management measures in other SFAs, the same principles applied governing access and allocations in SFA 7. By 2014, the TAC in SFA 7 fell to a level at which the Miawpukek First Nation held no quota, leaving only the original three stakeholders; their quotas were reduced to the same proportions as when they first entered the fishery. Beginning in 2015, the SFA 7 fishery was closed to commercial fishing.

Independent Review

The 2010 and 2011 application of LIFO to the reductions in SFAs 6 and 7 led to several stakeholders in the fishery criticizing the Department's approach publicly and at NSAC meetings. An independent reviewer (Ernst & Young) was tasked with analyzing whether the policies, methodologies and principles on applying TAC reductions amongst fleets and special allocation holders were respected and appropriately applied to the decision making process for Northern shrimp. Participation in the review was high, with all relevant stakeholders and Indigenous groups in the fishery, including the > 100' sector and inshore fleet, special allocation holders, provincial and territorial governments and agencies, and relevant land claims Management Boards and Inuit organizations, were provided the opportunity to participate in the process through interviews, open forum discussions, conference calls, meetings and/or written submissions.

The final report determined that the appropriate departmental policies, principles and methodologies were used in both the TAC reductions that occurred in SFA 6 and with the application of the LIFO principle as it is defined. It also recommended increased transparency in the establishment of policies and principles and in their application and interpretation.

More information on the independent review can be found online.

Ministerial Advisory Panel (MAP)

LIFO remained a highly contentious issue with varying perspecitives from stakeholders and Indigenous groups especially when reductions were first applied in 2010. Given the complexity of the issue and need for a broad range of expertise, a Ministerial Advisory Panel (MAP) comprised of four individuals was appointed by the Minister in April 2016, tasked with providing advice on whether the LIFO policy specific to the Northern shrimp fishery should be continued, modified or abolished.

The MAP operated as an independent, external body, however the Department provided operational and logistic support to their process. The MAP held five public stakeholder meetings in Newfoundland and Labrador, and one each in Iqaluit and Halifax. It received 41 written submissions and over 100 in-person presentations in an open and transparent process. All relevant interests in the fishery participated in the review.

In the final report delivered to the Minister in June, 2016, the MAP concluded that LIFO was not a sustainable instrument of public policy. Their principle recommendation was that LIFO should be replaced by proportional percent shares. The recommendation to move to percentage shares was approved by the Minister after additional NSAC consultations with stakeholders and Indigenous groups on the abolishment of LIFO in SFAs 4 – 6. Percent shares

allow for increased predictability in allocations, and for participants to share equitably in any changes in TAC. In the northern SFAs, proportional percent shares were not implemented, rather access and allocation decisions will continue to be made through the appropriate consultative processes in a manner consistent with the Land Claims Agreements, on a case by case basis.

In establishing the percent shares for the southern areas, adjacency, fairness and Indigenous access were among the key considerations for the Department.

Information related to the MAP process, including Terms of Reference, written submissions, supplementary MAP recommendations and the MAP's final report and conclusions can be accessed online.

Annex D – Northern shrimp licence holders and their respective organizations

Year issued	# of Licences	Licence holder	Representative organization
1978	2	Labrador Fishermen's Union Shrimp Co. Ltd.	Northern Coalition (NC)
1978	2	Ocean Choice International Inc.,	Canadian Association of Prawn Producers (CAPP)
1978	2	Mersey Seafoods Ltd.,	CAPP
1978	1	M.V. Osprey Ltd,	CAPP
1978	1	Crevettes Nordiques,	CAPP
1978	1	Atlantic Shrimp Co. Ltd.,	CAPP
1978	1	Torngat Fish Producers Coop Society Ltd.,	NC
1978	1	Caramer Ltd.,	CAPP
1979	1	Makivik Corp,	NC
1987	1	Pikalujak Fisheries Ltd.,	independent
1987	1	Qikiqtaaluk Corporation,	NC
1987	1	Harbour Grace Shrimp Co.,	CAPP
1987	1	Unaaq Fisheries Inc.,	NC
1991	1	Newfound Resources Ltd.	CAPP

Annex E – Coordinates of the fishery

Subject to conditions of licence, and not including closed area coordinates, the waters of the management units in which fishing for shrimp is permitted are:

(a) In the waters of Management Unit 0: Canadian Fisheries Waters in Davis Strait and Baffin Bay that lie north of latitude 66°15'N, south of latitude 78°10'N, west of longitude 60°30'W, and east of longitude 80°W.

(b) In the waters of Management Unit 1: Canadian Fisheries Waters in Davis Strait and Baffin Bay that lie north of latitude 66°15’N and east of longitude 60°30’W.

(c) In the waters of Management Unit **Davis Strait East (DS E):** between 61°N and 66°15’N, east of 63°W and east of the Nunavut Settlement Area.

(d) In the waters of Management Unit **Davis Strait West (DS W):** between 60°30’N and 66°15’N west of 63°W and east of the Nunavut Settlement Area and Nunavik Marine Region.

(e) In the waters of Management Units Nunavut East (NU E) and/or Nunavik East (NK E): the area inside the Nunavut Settlement Area east of 66°W; and the area inside the Nunavik Marine Region east of 66°W and north of 60°30'N. Access to the NSA or the NMR is limited to those enterprises which have been allocated quotas in these areas, which is amended from time to time.

(f) In the waters of Management Units Nunavut West (NU W) and/or Nunavik West (NK W): the area inside the NSA bounded by 70°W and 66°W; and the area inside the NMR bounded by 70°W and 66°W to 60.30°N. Access to the NSA or the NMR is limited to those enterprises which have been allocated quotas in these areas, which is amended from time to time.

(g) In the waters of Management Unit 4: Canadian Fisheries Waters adjacent to the Coast of Labrador that lie north of latitude 57°15'N, south of latitude 61°00'N excluding that portion north of 60.30N, east of the Nunavik Marine Region and Nunavut Settlement Area and west of 63W longitude.

(h) In the waters of Management Unit 5: Canadian Fisheries Waters adjacent to the Coast of Labrador that lie north of a line drawn from shore at latitude 53°45'N, east to longitude 55°00'W, thence north to latitude 54°45'N, thence east to the outer limits of Canadian Fisheries Waters and south of latitude 57°15'N.

(i) In the waters of Management Unit 6: Canadian Fisheries Waters adjacent to the Coast of Southern Labrador and Northern Newfoundland that lie north of latitude 49°15'N and south of a line drawn from shore at latitude 53°45'N, east to longitude 55°00'W, thence north to latitude 54°45'N, thence east to the outer limits of Canadian Fisheries Waters.

Annex F- Northern shrimp Enterprise Allocation program

Establishment and utilization of enterprise allocations

Access and quotas allocated to > 100' sector licence holders are known as Enterprise Allocations (EA), and those licence holders shall participate equally in such access and quotas.

EAs shall be based on the total allowable catch (TAC) established for the respective Northern Shrimp Fishing Areas.

EAs to individual licence holders will be in the form of "licence quotas" which are equal allocations of shrimp expressed in absolute amounts or tonnages.

>100' sector licence holders will have equal access to all Northern shrimp stocks and fishing areas for which the sector has EAs (SFAs 0, 1, 4-6 and MUs Davis Strait. The EA for each licence, for each SFA, is determined by dividing the quota set for the >100' sector in that SFA by seventeen (the number of > 100' sector licences in the fishery).

Administrative guidelines for Enterprise Allocations in the Northern shrimp fishery

1. No permanent transfers of EAs between enterprises are permitted.
2. Inter-enterprise transfers of EAs are permitted on a temporary basis. Quota is freely transferable between and within enterprises provided that:
    - the transfer applies only to the current season;
    - notification of the transfer registered in the EA temporary transfer system (EATTS)
3. Licence holders will have 30 days following the end of the fishing season to complete transfers in order to cover any inadvertent overruns of their EAs.

Annex G – Northern Shrimp Advisory Committee membership and terms of reference

Chair

Director General, Resource Management Operations, DFO – Ottawa or by another representative of Fisheries and Oceans Canada

Members

Atlantic Shrimp Company Ltd.
Baffin Fisheries Coalition
Canadian Association of Prawn Producers (CAPP)
Caramer Limited

Crevettes Nordiques Ltée.
Imakpik Fisheries
Ocean Choice International
Harbour Grace Shrimp Company Ltd.
Labrador Fishermen's Union Shrimp Company
Nunatsiavut Government
Makivik Corporation
Mersey Seafoods Ltd.
M.V. Osprey Ltd.
Newfound Resources Ltd.
Northern Coalition
NunatuKavut Community Council
Nunavut Offshore Allocation Holders Association (NOAHA)
P.E.I Atlantic Shrimp Corp.
Pikalujak Fisheries Ltd.
Qikiqtaaluk Corporation
Torngat Fish Producers Cooperative Society Ltd.
Unaaq Fisheries Inc.
Department of Fisheries, Aquaculture, and Environment P.E.I.
Department of Environment, Government of Nunavut
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
New Brunswick Department of Agriculture, Fisheries, and Aquaculture
Newfoundland and Labrador Department of Fisheries and Land Resources
Nova Scotia Department of Agriculture and Fisheries
DFO - Newfoundland and Labrador Region
DFO - Quebec Region
DFO - Maritimes Region
DFO – Gulf Region
DFO - Central and Arctic Region
DFO – Ottawa NHQ
Nunavut Wildlife Management Board
Nunavik Marine Region Wildlife Board
Nunatsiavut Government
Torngat Joint Fisheries Board (TJFB)
Association of Seafood Producers (ASP)
Fish, Food and Allied Workers Union (FFAW)
Fogo Island Co-operative Society
Innu Nation – Labrador
Qikiqtani Inuit Association
Nunavut Tunngavik Inc
Regroupement des Associations de Pêcheurs de la Basse Côte Nord
St. Anthony Basin Resources Inc. (SABRI)
One representative from each FFAW inshore fleet - 2J, 3K north, 3K south, 3L, 4R, and the Association des Capitaines Proprietaires de la Gaspésie

Purpose

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.

Scope

NSAC will provide input on Integrated Fisheries Management Plans respecting Northern shrimp, including but not limited to advice on:

- quota allocations and other regulatory measures (such as seasons, size limits and gear restrictions) and amendments thereto;
- conservation and compliance issues; and
- licencing policy.

Membership

Membership on the NSAC shall be limited to:

- one representative of each company that holds a >100' sector Northern shrimp fishing licence;
- one representative of each area and fishers receiving special allocations or holding inshore fishery licences;
- one provincial or territorial or land claim-government representative from each of New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, Quebec, Nunavut Territory, Nunatsiavut and Nunavik Inuit;
- one representative of recognized industry associations/groups; and
- representatives from Fisheries and Oceans Canada.

Procedures

No formal voting procedures will be entrenched in the conduct of the NSAC; rather it will seek to operate on a consensus basis.

Meetings will be convened at dates and times agreed upon by the chair and there will be at least one meeting every second year. The NSAC may determine that additional meetings are necessary and request the chair to make arrangements accordingly. The chair shall be responsible for notifying all members of any meeting.

The chair shall establish, in consultation with the NSAC members, agenda items for NSAC meetings. These items will be subject to the consensus of NSAC members at the commencement of each meeting.

Ad hoc working groups may be established by the NSAC to review specific issues and report their findings to NSAC as a whole.

If a member cannot attend an NSAC meeting, that member may nominate an alternate by notifying the chair as far in advance of the meeting as possible.

Non-members may attend NSAC meetings. They may not sit at the table but can participate in discussions following input from members.

Administration

Summary minutes of each meeting will be prepared in both official languages (French and English). The summary minutes will be distributed by Fisheries and Oceans Canada after they are reviewed and accepted by the chair. Minutes of NSAC meetings can be found online.

Annex H – Stock assessment and precautionary approach framework

Stock assessment and precautionary approach

The Science advisory reports for northern shrimp are available on the DFO Canadian Science Advisory Secretariat website:

An assessment of Northern shrimp (Pandalus borealis) in Shrimp Fishing Areas 4-6 and of Striped shrimp (Pandalus montagui) in Shrimp Fishing Areas 4 in 2016

Assessment of Northern shrimp, Pandalus borealis, and Striped shrimp, Pandalus mondagui, in the Eastern and Western Assessment Zones, February 2017

SFA 7 is assessed and managed by the Northwest Atlantic Fisheries Organization (NAFO). NAFO 0 + 1 is assessed by NAFO but managed independently by Canada and Greenland. Science advice can be found on the NAFO website:

In order to find the advice for SFA 7, follow NAFO Stocks tab. The information for SFA 7 is entitled: Northern Shrimp in Div. 3LNO.
In order to find the advice for NAFO 0 + 1, follow the Coastal Stocks tab. The information for NAFO 0 + 1 is entitled: Northern shrimp in SA 0+1.

Annex I – Harvest decision rules SFA 4 – 6, EAZ, SFA 1

Harvest decision rules (HDRs) SFA 4 – 6, EAZ

The following provisional rules are to be used when setting TACs.

When SSB is Above the upper stock reference (USR):

- Measures should generally promote the SSB remaining above the URP.
- 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.
- 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. Changes in the TAC should generally not exceed 15% of the previous TAC, unless the stock is declining precipitously.
- Government should not facilitate any increase in industry capacity/infrastructure during any period.

When SSB is between the limit reference point (LRP) and the upper stock reference (USR) (i.e. in the Cautious Zone):

- Measures should generally promote the SSB rebuilding towards the URP, subject to natural fluctuations that may be expected to occur in biomass and survey results.
- If SSB is in the upper half of the Cautious Zone, the exploitation rate should not exceed 2/3 FMSY, thought to be significantly above 15% of exploitable biomass
- If SSB is in the second lowest quadrant of the Cautious Zone, the exploitation rate should not exceed 1/2 FMSY, thought to be above 15% of exploitable biomass
- If SSB is in the lowest quadrant of the Cautious Zone, the exploitation rate should not exceed 15% of exploitable biomass
- The TAC should not be increased if the SSB is projected to decline or is within a declining trend
- Changes in the TAC should generally not exceed 15% of the previous TAC, unless the stock is declining precipitously.

When SSB is Below the limit reference point (LRP):

- Measures must explicitly promote an increase in the biomass above the LRP within 6 years of falling below the LRP.
- Any fishing mortality must be in the context of a rebuilding plan, and should not exceed 10%.

Harvest strategy SFA 1

Preamble

Shrimp Fishing Area (SFA) 1 is the Canadian management unit that is part of a trans-boundary stock that is harvested and managed separately by both Greenland and Canada. While an agreement with respect to TAC-setting or quota shares has not yet been reached, there is full cooperation with respect to scientific research, surveillance and enforcement, and a full exchange of information between the two jurisdictions. Both States refer to the NAFO/ICES Pandalus Assessment Group (NIPAG) for formal scientific advice, which is provided annually. The stock is assessed as a single population.

Stock assessment

The assessment framework incorporates a logistic stock-recruit model, fitted by Baysian methods, that uses CPUE and survey series as biomass indicators, and includes as removals catch data, assumed free of error, as well as a term for predation by Atlantic Cod, using available series of cod biomass. The model is used to provide short term (1 year) and medium term (5 year) projections.

Stock status deficiencies

After a decade of increasing biomass and expanding distribution in the 1990's, both the biomass and the fishery have contracted back towards the north. Fishable biomass has declined since its 2003 peak, but is currently estimated to remain above Bmsy; the risk of being below Blim (30% of Bmsy) is very low (<1%).

Harvest decision rules (HDRs)

Preamble

In the absence of a TAC-setting and quota-sharing agreement with Greenland on this trans-boundary stock, the approach outline below will be taken by Canada. Reference points and scientific advice are based on a quantitative assessment model and stock composition indices as articulated by the Scientific Council (SC) of the Northwest Atlantic Fisheries Organization (NAFO). Previous work by the SC has shown that a maintained mortality risk of 35% is low enough to keep stock levels safely at or above $B_{MSY.}$

The harvest strategy will remain in place until such time that Canada and Greenland may adopt common harvest decision rules.

Objectives

- Achieve/maintain the stock in the Healthy Zone (>80% of B_{MSY})
- Avoid serious harm to the reproductive capacity of the stock by maintaining biomass >30% of B_{MSY}
- Avoid total removals in excess of maximum sustainable yield
- Manage the TAC and quotas to facilitate a balance of opportunity and stability in the industry, subject to the need to respond to precipitous biomass declines
- Maintain Canada's quota share of this trans-boundary stock.

Reference points

- Healthy Zone = >80% of B_{MSY}
- Cautious Zone= >30%Bmsy and < 80% B_{MSY}
- Critical Zone is <30%Bmsy
- Limit Reference Point for biomass (Blim) = 30% of B_{MSY}

Limit Reference Point for total mortality = Z_{MSY}

Harvest decision rules (HDRs)

The Canadian quota will be 17% of 5/6 of the TAC designated by Canada, or 14.2% of the entire designated TAC.

- When the biomass is above 80% of B_{MSY}, the risk of being above Z_{MSY} should be less than 35%, based on the 3-year projections.
- When the biomass is between 30-80% of B_{MSY}, the risk of being above Z_{MSY} based on the 3-year projections should not exceed 17-35%, with the risk tolerance being lower the closer the biomass is to Blim, with 17% at the lower end and 35% of the upper end of this range.
- If the biomass is below the Healthy Zone and approaching Blim (middle of the Cautious Zone) then a special meeting will be sought with Greenland to develop actions that endeavor to mitigate or reverse the decline (e.g. a rebuilding plan). In the absence of agreement on measures to be taken, special conservation measures may be taken unilaterally by Canada.

Notes:

- Biomass refers to fishable biomass as calculated by the assessment model. Biomass values are to be based on point estimates.
- Precipitous decline: When the biomass decreases by more than 25% in the Cautious Zone; a special NSAC discussion will be held to evaluate all available biomass signals and the recent stock trend to determine if special conservation measures are required and/or consultations with Greenland on appropriate measures will be triggered
- Canadian quotas that are uncaught in one year may be carried forward to the following year in accordance with criteria and levels to be agreed between

DFO and quota holders as long as the harvest level is consistent with the HDRs above.

- These HDRs are subject to change as Canada further develops guidance on the application of the PA framework on its domestic fisheries. This could include rules that provide stability in TAC (i.e. a maximum and minimum percentage change).

Annex J – Rebuilding plan for Northern shrimp SFA 6

Precautionary Approach framework - Rebuilding Plan Northern Shrimp SFA 6

Introduction

- This rebuilding plan is relevant to the Pandalus borealis (Northern shrimp) fishery in Shrimp Fishing Area 6 (SFA), effective as of the 2018/19 fishing season.
- Fisheries and Oceans Canada (DFO) has developed "A Fisheries Decision-Making Framework Incorporating the Precautionary Approach" (PA Framework) under the auspices of the Sustainable Fisheries Framework. It outlines the departmental methodology for applying the precautionary approach (PA) to Canadian fisheries. A key component of the PA Framework requires that when a stock has reached or fallen below a limit reference point (LRP), a rebuilding plan must be in place with the aim of having a high probability of the stock growing above the LRP within a reasonable timeframe.
- The purpose of this rebuilding plan is to identify the main objectives and requirements for P. Borealis in SFA 6, as well as the management measures that will be used to achieve these objectives. This document also serves to communicate the basic information on the stock and its management to DFO staff, legislated co-management boards and other fishery interests. This plan provides a common understanding of the basic "rules" for rebuilding the stock. The objectives and measures outlined in this plan are applicable as long as the stock is below the LRP. Once the stock grows and remains consistently above the LRP, noting that the current LRP may be modified based on a revised PA as an outcome of the modeling process, the stock will be managed through the standard Integrated Fisheries Management Plan (IFMP) process. Management measures outlined in this rebuilding plan are mandatory, and may be modified to include additional catch restrictions if they fail to result in stock rebuilding.
- This rebuilding plan is not a legally binding instrument which can form the basis of a legal challenge. The plan can be modified at any time and does not fetter the Minister's discretionary powers set out in the Fisheries Act. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the rebuilding plan in accordance with the powers granted pursuant to the Fisheries Act.

Precautionary Approach Framework -
Rebuilding Plan Northern Shrimp SFA 6

The following required information to be included in an official rebuilding plan is described in the IFMP in the following sections:

Overview of the fishery – Section 1
Biological synopsis – Section 2.1
Stock status – Section 2.5
Socio-economic and cultural importance – Section 3
Access and allocation – Section 6.1
Management measures – Section 7
Shared stewardship – Section 8
Compliance – Section 9

1. Management issues

This section of the rebuilding plan provides an overview of the factors believed to have led to the reduction of Northern shrimp in Shrimp Fishing Area (SFA) 6 and those issues that might influence rebuilding.

Stock Decline:

Shrimp per-capita net production (after factoring in natural mortality and fishing pressure) has declined since the mid-2000s. Environmental conditions and increasing predation pressure appear as important drivers for the decline. The decline in shrimp production has been associated with environmental forcing, increasing biomass of predatory fishes and commercial fishing. The warming trend in environmental conditions has had a negative impact on shrimp production. While currently water temperatures have returned to near their 1981-2010 average, statistical analyses suggest that the cumulative effects of past warmer conditions will likely continue to negatively affect shrimp stock production, and climate forecasts predict a continued long term warming on the shelf. The fishable biomass index is expected to remain low, or decline further, in the short-term.

Given declining per-capita net production of shrimp, fishing pressure may now be affecting stock dynamics more than it did in the past. Fishery removals appear to be small relative to removals by predators, but as predators may be already consuming the bulk of new shrimp biomass production, additional removal of biomass by the fishery may be important in determining whether the stock increases, stabilizes, or decreases over time.

Predation and Prey Considerations:

As a forage species, shrimp is an important prey item for several species, including Atlantic Cod (Gadus morhua), Greenland Halibut (Reinhardius hippoglossides), redfish (Sebastes spp.), skates (Raja radiate, R. spinicauda), wolffish (Anarhichas spp.), and Harp Seals (Phoca groenlandica).

In SFA 6, the total biomass of fish that are known to prey on shrimp has increased. As a consequence, fish consumption of all types of food is estimated to have increased since the late-1990s. Because capelin remains below pre-collapse levels, shrimp remains an important forage species. Predation on shrimp, and the associated predation mortality rate, showed an increasing trend until 2011, and has decreased since. This decrease is associated with an increase in consumption of capelin by predators in conjunction with the combined biomass of shrimp predators remaining relatively steady since 2011. The ratio between predation and shrimp biomass is a relative index of predation mortality and is currently around double the level in the mid-1990s and 2000s.

The trend in shrimp predation mortality in the near future appears highly associated with the availability of capelin as alternative prey. Capelin appears as a fundamental driver of groundfish rebuilding, while shrimp appears as an important food source for the subsistence of groundfish during low capelin periods. Shrimp predation mortality in the near future is expected to remain high unless abundance of alternative prey increases.

Suitability of Limit Reference Point (LRP):

In absence of a modelled B_{MSY} (the biomass which can produce maximum sustainable yield), the reference points for Northern shrimp in SFA 6 were defined based on the mean of the spawning stock biomass index over a productive period (1996-2003), consistent with the Department's Precautionary Approach (PA) framework. Since the reference points were developed, there have been changes in environment, ecosystem and predation; factors that can have negative impacts on Northern shrimp.

Some stakeholders have expressed concern that the limit reference point (LRP) in SFA6 may be too high given the recently observed climate and ecosystem changes (including higher biomass of shrimp predators) and considering that it was established based on what was thought to be a higher productivity period (post-1995). As a result, a science response process was held in January 2017 to review the reference points used in the PA framework for Northern shrimp in SFA 6. During that meeting, DFO Science concluded that due to the absence of a Northern shrimp assessment model, the importance of shrimp to other species as a forage species, and changing environmental and ecosystem conditions, DFO Science did not have sufficient evidence to recommend alternative interim reference points. Science also noted that there was not enough information to

determine whether shrimp are experiencing a new productivity regime, and it was not yet clear whether there were low or high productivity regimes in the past. It was concluded that the current biomass reference points used in the Northern shrimp PA would remain unchanged until additional information and / or analyses were available. It was also concluded that a peer-reviewed quantitative population model for Northern shrimp stocks, incorporating the effects of climate, ecosystem and fishing mortality changes, is needed to develop new reference points going forward.

Impacts on Other Species

Given the current and anticipated environmental and ecosystem conditions, it is acknowledged that rebuilding shrimp in SFA 6 may not be possible in the short-medium term.

It is further acknowledged that it may not always be possible to simultaneously grow multiple species within a single ecosystem out of the critical zone and into the healthy zone due to multispecies interactions (e.g. predator/prey relationships). Hence, rebuilding objectives for shrimp should take into consideration rebuilding objectives for other species (e.g. groundfish).

While there are currently no peer-reviewed estimates of shrimp abundances across the Newfoundland shelf prior to 1995, shrimp catch per unit effort was lower in SFA 6 prior to the decline in cod in the early 1990s, and the decline in Northern shrimp abundance in SFA 6 has coincided with increased cod abundances (although cod has still not returned to near its pre-1990 levels according to the most recent stock assessments for this species). Diet analyses also indicate that shrimp is a major component in the diet of cod and other major groundfish stocks, and that therefore it is important to consider the availability of shrimp as a food source when determining how changes in Northern shrimp abundances may affect the shelf ecosystem.

2. Objectives of the rebuilding plan

Preamble:

The short-term focus (within 3 years) of this rebuilding plan is largely centred on developing a model for the stock in SFA 6, which will provide a more solid knowledge base for both Science and Management. The development of a model will allow for a re-evaluation of the PA Framework, including the LRP and upper stock reference point (USR), which will in turn allow for the further development of management measures (harvest control rules, total allowable catch (TAC) setting) that will support sustainability. This is a short-term exercise, expected to be available within three years.

The Department commits to ensuring the science advisory process includes the opportunity to provide advice, where feasible and appropriate, on possible interim measures that could be considered by management in the short term (i.e. prior to the development of a model(s)) that could lessen the impacts of fishing on stock trajectory.

Long-term actions and objectives are to be determined and will likely be informed by and predicated on modelling results, including how the management of the Northern shrimp stock in SFA 6 interacts with other species, such as cod and capelin. Once the short-term objectives have been achieved, a time frame for long-term objectives can be better determined.

Short-term Objectives – Within 3 Years

Short-term Objective 1: Ensure harvest levels remain consistent with conservation goals and the precautionary approach for SFA 6 shrimp while in the Critical zone (ongoing for next 3 years). Probability of success is high.

- Milestone 1: Review exploitation rates through the annual stock assessment process to set the ER at a level that would be expected to promote rebuilding and not impair future recruitment, subject to climate and ecosystem drivers.
- Milestone 2: Review exploitation rates each year at the annual Northern Shrimp Advisory Committee (NSAC) meeting considering the model under development and the science stock assessment referenced in Milestone 1.

Short-term Objective 2: Development of population models within the next 3 years, which may be used to determine reference points and evaluate how the stock is expected to change under different environmental conditions. (Anticipated completion in 2020).

- Milestone 1: initial model development and testing
- Milestone 2: framework meeting and peer-review of models
- Milestone 3: if model is accepted, it may be used to determine reference points and evaluate how the stock is expected to change under different environmental conditions

Short-term Objective 3: Re-examine the rebuilding plan once a model has been accepted and used to confirm/revise reference points. A new rebuilding plan may be required to address the results of the new population model and potentially revised reference points. (Anticipated completion 2020)

- Milestone 1: hold workshop to determine required changes to the rebuilding plan to address new model results.
- Milestone 2: if required, develop new rebuilding plan incorporating new model results.
- Milestone 3: if a new model is not developed by 2020, this rebuilding plan will be revisited and science advice will be sought on maintaining the maximum 10% ER.

Long-term Objectives

Long-term objectives (and associated timelines) are those that will be implemented once the modelling exercise has been completed for the stock. If no longer applicable or appropriate at that time, the long-term objectives may be modified to better suit the needs and realities of the stock. Additionally, the outcomes of the short-term objectives will inform appropriate timelines for longer term objectives. At year 3, timelines for long-term objectives can be better determined.

Long-term Objective 1: Stock biomass above the LRP (with 75% probability, noting that the current LRP may be modified based on a revised PA as an outcome of the modeling process).

- Milestone 1: stock decline is reduced and/or stock has a stable trajectory
- Milestone 2: stock has a positive trajectory
- Milestone 3: stock biomass is above the potentially revised LRP (with 75% probability)

Long-term Objective 2: Through the Integrated Fisheries Management Plan (IFMP) process, continued stock growth into the Healthy zone.

3. Management measures

See Section 7 of the IFMP for a complete list of management measures for this fishery.

Planned Management Approach

In light of the above concerns, and in order to achieve increased confidence in the ‘regular’ productivity of Northern shrimp in the ecosystem and related management decisions such as appropriate exploitation rates, a research plan is underway to develop a shrimp model which will require approximately two more years for completion as previously described. Until a model is available, the Department’s planned management approach, based on the best available science, is to maintain compliance with the current PA and harvest control rules

for the SFA 6 stock in the Critical zone, which specifies that the exploitation rate shall not exceed 10%. The development of a model will provide the information needed to confirm the accuracy of LRP position and enable the Department to better understand and manage the stock in the longer term. The commitment to develop a model therefore renders this rebuilding plan as interim in nature, with the completion of the model representing an important milestone in the advancement of scientific knowledge for this stock.

The PA framework requires that rebuilding plans be associated with appropriate monitoring of stock condition to confirm the success of rebuilding. The current monitoring protocols as described in the IFMP will be maintained, including 100% At-Sea Observer coverage for the offshore fleet and 100% dockside monitoring for the inshore fleet. The Department will request that Science undertake a full stock assessment for SFA 6 annually until such time that the stock clears the Critical zone, based on current or potential future reference points. The information derived from full stock assessments will contribute to the monitoring of the stock condition to determine appropriate exploitation rates for this interim rebuilding plan.

Discussions at the annual NSAC meeting will provide an additional opportunity for stakeholders to discuss possible management options that could potentially contribute to improvements in the stock trajectory. Additionally, in the review of the fishery and outside of this annual meeting, NSAC (or other appropriate working groups of NSAC) could recommend that Resource Management make requests to science to undertake research that could lead to a better understanding of ecosystem dynamics or other aspects thought to influence the productivity of the stock.

4. Cost/benefit analysis

The interim rebuilding plan is predicated on continuing to apply the best available knowledge and maintain compliance with the current PA for SFA 6 shrimp, which specifies that the exploitation rate should be set at a maximum of 10%. Given declining per-capita net production of shrimp, fishing pressure could be influencing the stock more than it did in the past. Fishery removals appear to be small relative to removals by predators, but could be pivotal in determining whether gains (production) exceed losses (predation and fishing) and hence whether the stock increases or decreases.

Costs of stock rebuilding:

The Department remains committed to conservation and the long-term sustainable use of the resource in SFA 6. It remains highly unlikely that the stock will be rebuilt to previous levels in the short-medium term due to dominant climate and ecosystem influences. However, considering the stock is situated in the Critical zone of the PA based on the current reference points, the Department

remains duly committed to ensuring that decisions are based on the best available information. Thus, the first step is to develop population models which may be used to determine reference points and evaluate how the stock is expected to change under different environmental conditions. Costs associated with this exercise are primarily related to the development of the model and the resulting work to revise, if necessary, reference points, harvest decision rules etc. Costs of rebuilding will be contingent on the new information derived from the results of the research plan.

The cost of implementing this interim rebuilding plan is largely a function of any potential loss of TAC resulting from a maximum 10% exploitation rate. However, this exploitation rate is consistent with the existing harvest decision rule for the SFA 6 stock, which prescribes a maximum 10% exploitation rate in the Critical zone. Therefore, it is anticipated that the rebuilding plan does not incur additional costs.

Stakeholder / industry perspectives on this interim rebuilding plan

The Food Fish and Allied Workers Union (FFAW), representing the inshore fleet, recognizes the value of rebuilding plans. In the case of SFA 6, where current biomass levels are considered comparable to those pre-1996 and for which there is considerably more information than when the reference points were established, FFAW does not support the consequent 2-3 year delay of revisiting the reference points for this stock. Moreover, they note that reference periods established for Atlantic cod (2J3KL: 1980s) and for Northern shrimp (SFA 6: 1996-2003) are inconsistent despite the geographic overlap of these species, and their predator-prey relationship. FFAW emphasized that this inconsistency negatively impacts the Northeast Coast of Newfoundland and Southern Labrador and impedes fish harvesters' ability to transition from shrimp to a mixture of shellfish and groundfish fisheries. They emphasized that there are negative economic impacts of TAC reductions on their industry, with consequences for communities throughout the province of Newfoundland and Labrador.

The offshore fleet is supportive of the development of this rebuilding plan. The Canadian Association of Prawn Producers, representing most offshore licence holders, noted that a harvest decision rule specifying a 10% maximum ER in the Critical zone was established more than 10 years ago in order to avoid future debate on levels should the stock enter into the Critical zone. This level was agreed upon with the view that it should promote stock growth subject to climate and ecosystem drivers and should not impair recruitment. Until the availability of a quantitative assessment model, the harvest decision rules must be followed.

Further, the Northern Coalition, representing northern based offshore licence holders, noted that implementing a rebuilding plan is required as per departmental policy under the PA Framework and also serves the requirements of the MSC sustainability certification for shrimp. This interim rebuilding plan is

predicated on the expectation that a model can be developed/ applied, with available or accessible data for shrimp that will permit development of LRPs that are reflective of the shifting ecosystem and environmental factors, including predator-prey interactions. This implies that is possible to develop an ecosystem model that, ambitiously, is able to monitor and predict single species growth/decline/stability relative to all other species interactions and environmental influences. The Northern Coalition noted the high level of ambition associated with the development of the population model, and the possibility that one might not be available by 2020.

5. Evaluation and performance review

Short-term timelines and objectives:

In the short-term, the Department has committed to developing a quantitative model that can be used by management to simulate the impact of harvest levels on the stock leading to increased confidence in management actions and harvest levels. This model is expected to be completed by 2020 and will form the basis of determining long-term timelines and objectives.

A Rebuilding Plan Working Group (RPWG) was established in June, 2017. The working group consists of members of NSAC, many of whom are members of the Marine Stewardship Council Working Group and the Science / Resource Management Working Group. The RPWG is tasked with developing a reasonable and meaningful rebuilding plan that describes the way forward for Northern shrimp in SFA 6, notwithstanding the interim nature of the plan and the development of the model. The RPWG will act as a monitoring body to this plan in addition to NSAC, and will continue to convene as required to address any aspect of the rebuilding plan in the short and long term.

The RPWG consists of stakeholders with interests in SFA 6 shrimp, including special allocation holders, the inshore fleet, offshore licence holders, processors, the Government of Newfoundland and Labrador and representatives from DFO Science and Resource Management. This rebuilding plan was drafted based on consultation with stakeholders, who were given opportunity to provide input.

In addition to the activities of the RPWG, it can be expected that the general cycle to address the SFA 6 stock and otherwise provide a monitoring function to the interim rebuilding plan's effectiveness will occur annually from 2018 – 2020. Generally, the timeline to monitor and review the performance of the SFA 6 stock beginning in 2018 will be as follows:

- April 1. Fishery opens. Establish the TAC based on a maximum 10% exploitation rate, consistent with the PA for this stock.

- February: Full Science stock assessment each year for SFA 6. Science to consider assessment results in the context of the rebuilding plan and offer supplementary advice, if possible.

- March: NSAC convenes and monitors the fishery's performance and considers science advice, and can recommend additional options and management measures for SFA 6, if appropriate.

2020 – in the event that a new model is not available, Resource Management will request that Science provide advice specific to sustainable harvests levels considering the maximum 10% exploitation rate from 2017- 2020, and this plan may be revisited based on this advice. Additionally, in the absence of a model by this time, Resource Management will request that Science revisit the LRP based on the best information available. If a model is available, this plan will be updating accordingly.

Annex K – Northern shrimp research (provisional and subject to change)

On-going research (as of 2016):

- In SFAs 5, 6 and 7, continue with the autumn DFO survey in 2HJ3KLNO, and the spring DFO survey in 3LNOPsn.
- In SFA 4, WAZ and EAZ continue with summer DFO-NSRF survey on an annual basis in order to determine and update shrimp biomass indices. Also, continue to collect data on environmental covariates with the intent of developing relationships with the shrimp distribution.
- In WAZ, DFO will attempt to analyze spatial/temporal variability of shrimp distribution. Two cruises, in addition to the annual DFO-NSRF survey, will be performed to study seasonal variability in shrimp biomass distribution.
- Continue to conduct genetic analysis to delineate stock assessment area(s), especially for use in modeling. Preliminary results from completed work indicate shrimp are genetically similar along the eastern coasts of NL (SFAs 4-7).
- Continue efforts to develop age-length keys for Northern shrimp.
- Continue efforts to develop an assessment model.
- Continue to gather and analyze information related to corals, sponges and other vulnerable marine ecosystems.
- Continue to analyze trends in the fish community (including shrimp).
- Continue diet studies of major groundfish species (predators of shrimp).

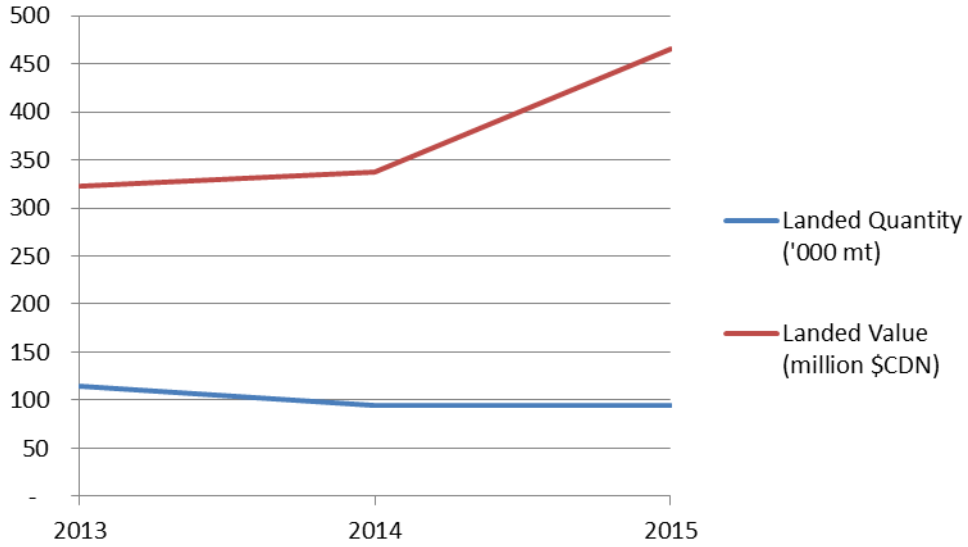
Potential future research

- Conditional on the development of an accepted assessment model, to begin a management strategy evaluation in order to develop modeled harvest decision rules.
- To determine trophic level for key species (including shrimp) using diet composition and stable isotopes.

- To develop fisheries production potential models.
- To analyze relationships between shrimp catch survey results and measured environmental covariates to seek potential linkages (responses) of the stock to large scale oceanographic variability.
  Explore relationships/correlations between groundfish and shrimp, including various size classes of both, from available survey data.

Annex L – Economic information

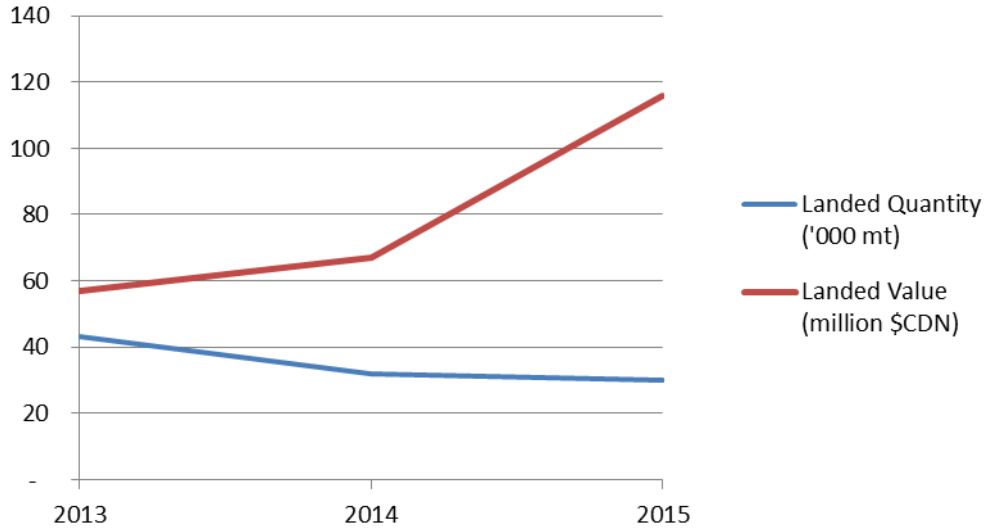
Figure 1: Canadian Northern shrimp fishery, total domestic landings, 2013-2015[iii]



Inshore fleet landings

Annual landed quantities by the inshore fleet declined 30% between 2013 and 2015 in parallel with TAC declines, while annual landed value more than doubled (Figure 2). Annual average landed prices for unprocessed shrimp increased by 191% from $1.33/kg in 2013 to $3.87/kg in 2015. Cumulatively, from 2013 to 2015, the inshore fleet's landed quantities accounted for 34% of the total taken from the Northern shrimp fishery.

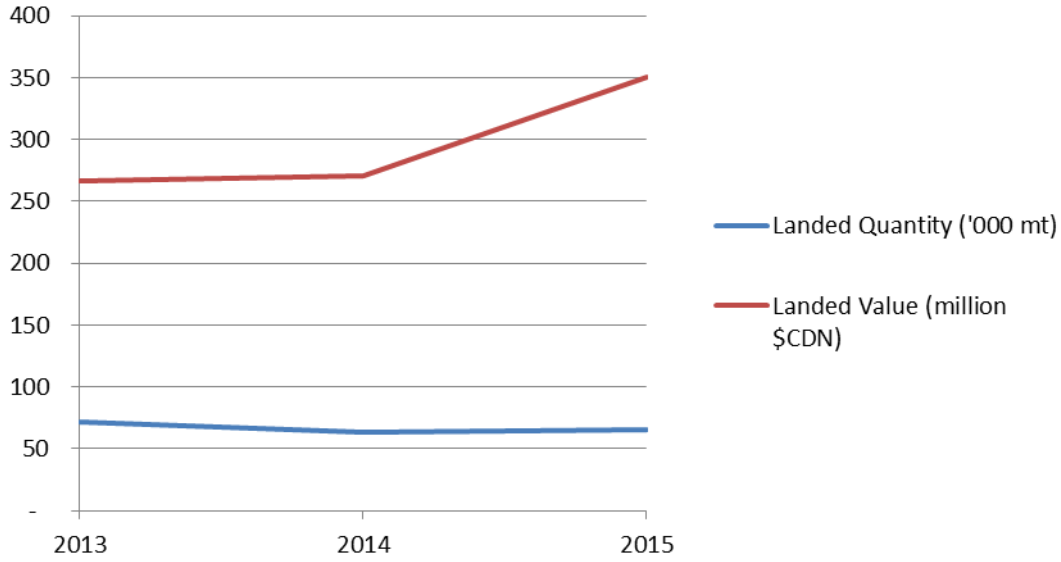
Figure 2: Canadian Northern shrimp fishery, inshore fleet landings, 2013-2015



>100' fleet landings

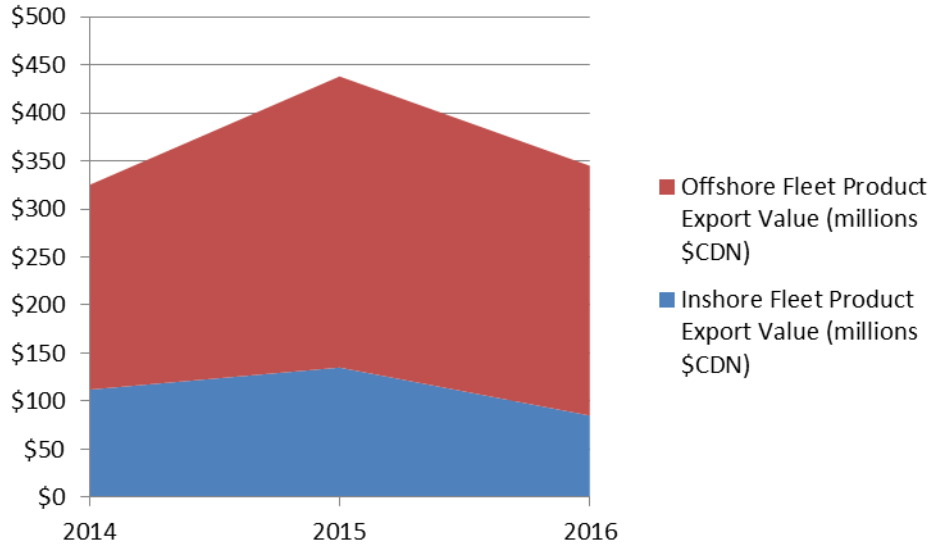
Annual landed quantities by the >100' fleet, which include quotas from special allocations, declined 10% from 2013 to 2015 in parallel with TAC declines, while annual landed values increased by 32% (Figure 3). Increases in annual landed values were primarily driven by year-over-year increases in the annual average landed price. For the majority of landings, average landed prices for the >100' fleet product, which is processed at sea, increased 46% from $3.69/kg in 2013 to $5.38/kg in 2015. Cumulatively, from 2013 to 2015, the >100' fleet's landed quantities accounted for 66% of the total taken from the Northern shrimp fishery.

Figure 3: Canadian Northern shrimp fishery, >100' fleet landings, 2013-2015

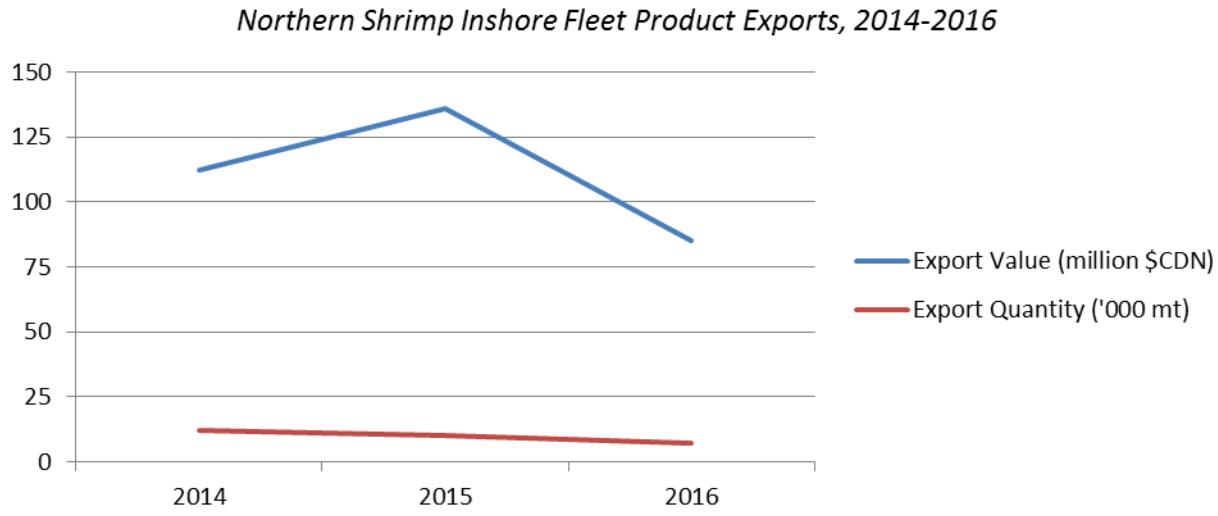


Exports[ivv]

Canadian total Northern shrimp export value 2014-2016



Inshore fleet exports

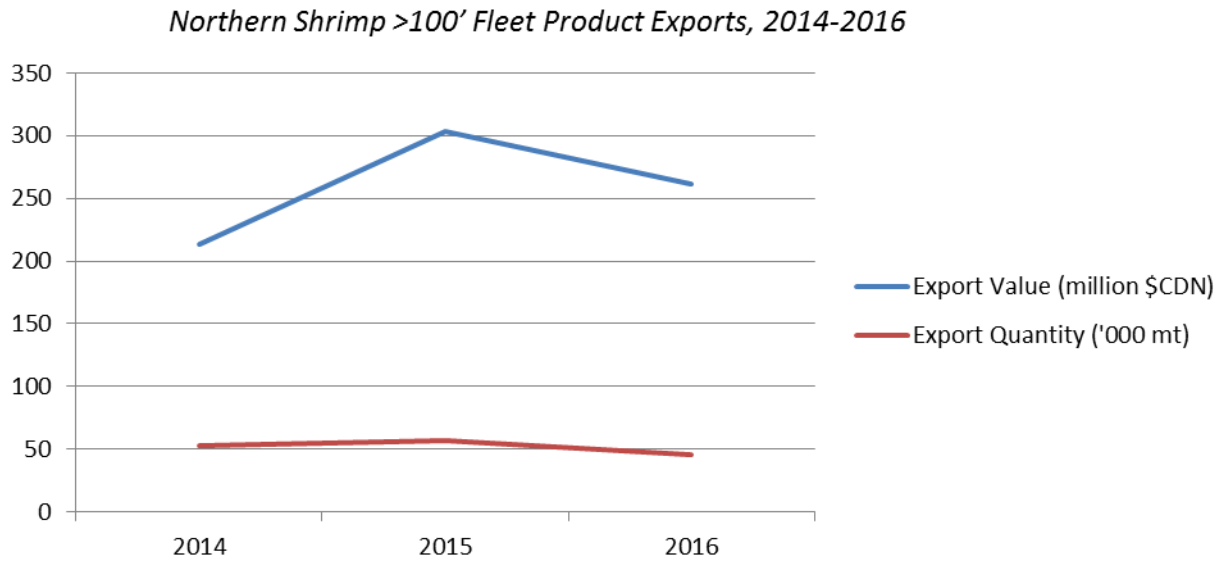


The inshore fleet focuses on the cooked and peeled product, which is processed on shore. The market for this product is predominately Europe. Annual exports of Canadian cooked and peeled product of Northern shrimp averaged 9,600 mt from 2014 to 2016, with an annual average value of $111M. Canada's main destinations for this product are the United Kingdom, Denmark, and the United States, accounting for 62%, 17% and 14% respectively, of total cooked and peeled product shrimp export value in 2016.

Northern shrimp inshore fleet product exports, 2014-2016

	2014	2015	2016
Quantity (‘000 mt)	12	10	7
Value (millions $CDN)	112	136	85

>100’ fleet exports



The >100’ fleet focuses on a frozen at sea, shell-on product (cooked or raw). The product has strong markets in Asia and Western Europe. Annual export volumes of Canadian frozen shell-on Northern shrimp averaged 52,000 mt from 2014 to 2016, valued at $259M annually. The >100’ fleet’s product was largely exported to China, Denmark and Iceland, accounting for 48%, 15% and 10% respectively of Canada’s total frozen shell-on shrimp export value in 2016.

Northern shrimp >100’ fleet product exports, 2014-2016

	2014	2015	2016
Quantity (‘000 mt)	53	57	46
Value (million $CAN)	213	303	261

Employment

Approximately 200 inshore NL vessels harvest shrimp, with each vessel having at least five crew members plus the captain onboard. Additionally, between 2013 and 2015 the inshore fleet supplied shrimp to 10 processing plants, resulting in onshore employment to approximately 2,000 people. The >100’ shrimp sector licence holders double-crew their vessels (24 to 28 crew depending on the size of the vessel) employing approximately 520 crew for the entire fleet. The

Northern shrimp fishery also provides indirect employment for goods and service providers that support harvesting, processing and distributional activities.

Annex M – Marine conservation targets

The Government of Canada is committed to protecting 5% of Canada's marine and coastal areas by 2017 and 10% by 2020. The 2020 target is both a domestic target (Canada's Biodiversity Target 1) and an international target as reflected in the Convention on Biological Diversity's Aichi Target 11 and the United Nations General Assembly's 2030 Agenda for Sustainable Development under Goal 14. The 2017 and 2020 targets are collectively referred to as Canada's marine conservation targets. More information on the background and drivers for Canada's marine conservation targets is available online.

To meet these targets, Canada is establishing Marine Protected Areas (MPAs) and "other effective area-based conservation measures" ("Other Measures"), in consultation with industry, non-governmental organizations, and other interested parties. An overview of these tools, including a description of the role of fisheries management measures that qualify as Other Measures is available online.

Some protected areas that contribute to Canada's marine conservation targets are located in waters where the Northern shrimp fishery occurs. These areas are:

- Davis Strait Conservation Area
- Disko Fan Conservation Area
- Hatton Basin Conservation Area
- Funk Island Deep Closure
- Hawke Channel Closure
- Hopedale Saddle Closure
- Northeast Newfoundland Slope Closure

A map of marine areas that are protected across the country can be found online.

End notes

[i] Source: Canadian Atlantic Quota Reports
[ii] Source: DFO EXIM Trade Database: Statistics Canada, International Trade Division.
[iii] Data source: Canadian Atlantic Quota Reports
[iv] Source: DFO EXIM Trade Database: Statistics Canada, International Trade Division.
[v] Export data presented in this section may include a small amount of Gulf of St. Lawrence shrimp exports since these are captured in the same Harmonized System (HS) export codes. Inshore fleet exports include products exported directly from Newfoundland and Labrador. A small amount of inshore exports may be excluded due to transprovincial shipment prior to international export.