Marine Stewardship Council 1st Surveillance Report

For The

Scotian Shelf snow crab trap

Facilitated By the

Affiliation of Seafood Producers Association of Nova Scotia (ASPANS)

Assessors: Géraldine Criquet, Lead Assessor
Vito Romito, Assessor
Jerry Ennis, Assessor
Paul Knapman, Assessor

Certificate Code: F-SAI-005
Report Code: MSC005/SUR01/01
Report Date: 28th February 2018

SAI Global
3rd Floor, Block 3,
Quayside Business Park,
Mill Street,
Dundalk,
Co. Louth,
Ireland.
T + 353 42 932 0912
F + 353 42 938 6864
www.saiglobal.com/

Foreword

The Scotian Shelf snow crab trap fishery was re-certified on 15th September 2017.

An expedited audit was launched in November 2017 as SAI Global became aware of major changes in relation to the circumstances of the fishery. The outcome of this audit was that the combined effects of the MSC UoAs on the North Atlantic right whale (ETP species) was outside the national limits required for the protection of the species and that the fishery was likely to hinder the recovery of the species.

Therefore, conditions were raised and ASPANS provided SAI Global with a client action plan which was included in the expedited audit report posted on the 29th March 2018.

This reports contains the findings of the 1st surveillance audit, the objectives of which were:

1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation;

2. To evaluate the progress of the fishery against Conditions of Certification raised during the Expedited Audit.;

3. To review any developments or changes within the fishery which impact traceability and the ability to segregate MSC from non-MSC products; and

4. To review any other significant changes in the fishery.

The MSC Fisheries Standard sets out requirements that a fishery must meet to enable it to claim that its fish come from a well-managed and sustainable source. The standard applies to wild-capture fisheries that meet the scope requirements. The MSC Fisheries Standard comprises three core principles:

Principle 1: Sustainable target fish stocks
A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Principle 2: Environmental impact of fishing
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Principle 3: Effective management
The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

A full description of the MSC Fisheries Certification Requirements and Processes followed during this surveillance audit can be found in MSC Fisheries Certification Requirements and Guidance. This audit uses the version of the MSC Standard outlined in the MSC Fisheries Certification Requirements v2.0 published on 1st October, 2014 and effective on 1st April, 2015. The definitive version of all documents are maintained on the MSC's website www.msc.org. Any discrepancy between copies, versions or translations shall be resolved by reference to the definitive English version.

Readers should verify that they are using the copy of the MSC FCR (and other documents) that are relevant to this assessment. Updated documents, together with a master list of all available MSC documents, can be found on the MSC's website.

Table of Contents

Table of Figures

Table of Tables

Glossary

ASPANS	Affiliation of Seafood Producers Association of Nova Scotia
CFA	Crab Fishing Area
C&P	DFO Conservation and Protection
CPUE	Catch Per Unit Effort
DFO	Fisheries and Ocean Canada
ETP	Endangered, Threatened and Protected species
F	Fishing mortality
GSL	Gulf of St Lawrence
HCR	Harvest Control Rules
LRP	Limit reference point
MLS	Minimum Landing Size
MSC	Marine Stewardship Council
NARW	North Atlantic right whale
NB	New Brunswick
NS	Nova Scotia
PA	Precautionary Approach
PI	Performance Indicator
SARA	Species at Risk Act
SSB	Spawning stock biomass
UoA	Unit of Assessment
UoC	Unit of Certification
USR	Upper stock reference
VME	Vulnerable Marine Ecosystem
WG	Working Group

1 Executive Summary

This report contains the findings of the 1st surveillance audit after re-assessment in relation to the Affiliation of Seafood Producers Association of Nova Scotia (ASPANS) of the Scotian Shelf snow crab trap.

The 1st surveillance audit focused on any changes to the fishery and its management since the re-assessment. Also, the audit team evaluated progress against conditions raised on PIs 2.3.1 ETP species outcome and 2.3.2 ETP species management as a result of an expedited audit.

SAI Global determines that:

- **The Scotian Shelf snow crab trap fishery continues to operate a well-managed and sustainable fishery and therefore, continued certification to the MSC Principles and Criteria for Sustainable Fishing is awarded.**

Table 1 summarizes Performance Indicator (PI) and Principle (P) score as well as condition status.

Updated PI evaluation tables are presented in Appendix 1.

Table 1. Summary of ETP PIs and Principle 2 score at surveillance audit 1.

	Public Certification Report		**Expedited audit**		**1st surveillance audit**	
PI	PI score	Principle overall score	PI score	Principle overall score	PI score	Principle overall score
2.3.1 ETP species outcome	80	Principle 2 – Ecosystem 96 PASS	75	Principle 2 – Ecosystem 94.7 PASS with conditions	75	Principle 2 – Ecosystem 94.7 PASS with conditions
2.3.2 ETP species management strategy	85		70		70	
2.3.3 ETP species information	80		80		80	

Condition number	**PI**	**Status at 1st surveillance audit**	**Original score**	**2018 Expedited audit**	**Principle revised score**
1	2.3.1	**Open- on target**	80	75	Principle 2 Ecosystem 94.7
2	2.3.2	**Open- on target**	85	70	

On behalf of the MSC client, ASPANS, SAI Global would like to extend thanks to the management organisations and stakeholders of the Scotian Shelf snow crab trap who took part in this surveillance audit.

• Lead Assessor: Géraldine Criquet is SAI Global's Fisheries Team Leader and is an approved MSC Fishery Team Assessor with extensive experience of shellfish fisheries assessments including in Canada Atlantic.
• Assessors: Jerry Ennis is a contractor for SAI Global with an extensive experience in shellfish stock assessment in Canada Atlantic. Paul Knapman has extensive experience of MSC related work and has been involved in numerous MSC audits and assessments in Canada. Vito Romito has extensive experience in fisheries impacts on ecosystems.

Jerry Ennis were part of the re-assessment team, and Géraldine and Paul were part of the expedited audit team. Skills and experience are summarized below.

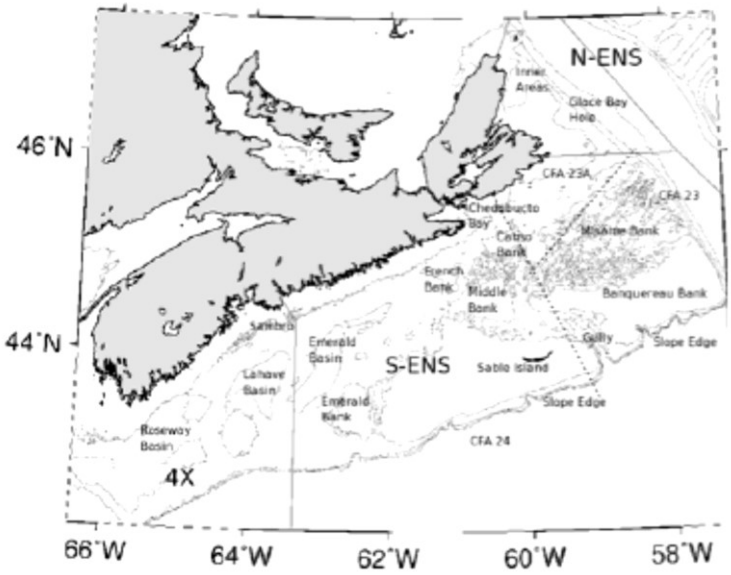
Géraldine Criquet (Lead Assessor, responsibilities in Principle 2 and Traceability)
Géraldine is an MSC approved Fisheries Team Leader for SAI Global - experienced fishery scientist in both Finfish and Shellfish fisheries, and ecosystems considerations. Géraldine holds a PhD in Marine Ecology (École Pratique des Hautes Études, France) which focused on fish ecology and ecosystem impacts. She worked 2 years for the Institut de Recherche pour le Développement (IRD) at Reunion Island for studying fish target species growth, connectivity between fish populations in the Indian Ocean and fisheries ecosystem impacts. She served as Consultant for FAO on a Mediterranean Fisheries Program (COPEMED) and developed and implemented during 2 years a monitoring program of catches and fishing effort in a Marine Protected Area in the French Mediterranean. Géraldine is an experienced full time MSC Lead Assessor with SAI Global, successfully leading MSC certifications and assessment teams and acting as Principle 2 expert for multiple MSC Pre, Full and Surveillance audits including full assessments and surveillance audits of Canadian shellfish trap fisheries.

Vito Romito (Assessor, responsibilities in Principle 2)
Vito received a BSc (Hons) in Ecology and a MSc in Tropical Coastal Management from Newcastle University, U.K. after which he spent a year in Tanzania, carrying out biodiversity assessments and monitoring studies of pristine and dynamited coral reef, mangrove, and seagrass ecosystems around the Mafia Island Marine Park. In the following 5 years, he worked at Global Trust Certification/ later SAI Global as Lead Assessor and ecosystem impacts expert for all the fisheries assessments in Alaska, Iceland and Louisiana. He is an ISO14001 Certified Lead Auditor and MSC V2.1 Lead Assessor trained. Vito has also carried out several International Fishmeal and Fishoil Organisation (IFFO) forage fisheries assessments in Chile, Peru, Europe and other various pre-assessments in Atlantic and Pacific Canada. From July 2015, with RS Standards Ltd., Vito was primarily involved with leading the further development of the Alaska RFM Certification Program (and Standard to Version 2.0), and with IFFO RS Improver projects related to South East Asia mixed trawl fisheries. Vito recently joined again SAI Global.

Jerry Ennis (Assessor, responsibilities in Principle 1)
Following undergraduate and graduate degrees at Memorial University of Newfoundland in the 1960s, Dr. Ennis completed a Ph.D. in marine biology at University of Liverpool in the early 1970s. He retired in 2005 following a 37-year research career with the Science Branch of the Department of Fisheries and Oceans. His extensively published work has focused primarily on lobster fishery and population biology and on various aspects of larval, juvenile and adult lobster behaviour and ecology in Newfoundland waters. Throughout his career, Dr. Ennis was heavily involved in the review and formulation of scientific advice for management of shellfish in Atlantic Canada as well as the advisory/consultative part of managing the Newfoundland lobster fishery.

Paul Knapman (Assessor, responsibilities in Principle 3)
Paul is an independent fisheries consultant based in Halifax, Nova Scotia, Canada. He was previously the General Manager of Intertek Fisheries Certification a Conformity Assessment Body (CAB) that focused their work on Marine Stewardship Council (MSC) fisheries and chain of custody assessment / certification. He has extensive experience of MSC related work having been the Lead Assessor / Auditor and/or technical reviewer for 50+ client fisheries throughout the world. He was previously Head of an inshore fisheries management organization in the UK, a senior policy advisor to the UK government on fisheries and environmental issues, a British Fisheries Officer and a fisheries consultant to clients in Europe and Canada.

2 General Information

Fishery name	Scotian Shelf snow crab trap		
Unit(s) of assessment	**Species:** Snow crab, *Chionoecetes opilio* **Geographical range:** eastern Nova Scotia, Atlantic Canada, FAO Fishing Area 21  **Stock:** snow crab stock in N-ENS, S-ENS, 4X **Method of capture:** conical or rectangular baited crab traps **Management system:** DFO Maritimes Region **Client group:** Affiliation of Seafood Producers Association of Nova Scotia (ASPANS) **Other eligible fishers:** there are no other eligible fishers		
Date certified	15th September 2017	**Date of expiry**	14th September2022
Surveillance level and type	Surveillance level 6 (Default Surveillance), on-site surveillance audit.		
Date of surveillance audit	15th and 16th November 2018		
Surveillance stage (tick one)	**1st Surveillance**	**X**	
	2nd Surveillance		
	3rd Surveillance		
	4th Surveillance		
	Other (expedited etc.)		
Surveillance team	Lead assessor: Géraldine Criquet Assessors: Vito Romito, Jerry Ennis and Paul Knapman		
CAB name	SAI Global		
CAB contact details	**Address**	3rd Floor, Block 3, Quayside Business Park, Mill Street, Dundalk, Co. Louth, Ireland	
	Phone/Fax	+353 (0) 42 932 0912	
	Email	niamh.connor@saiglobal.com	
	Contact name(s)	Niamh Connor	
Client contact details	**Address**	745 Sackville Drive, PO Box 612 Lower Sackville, NS	

		Canada
	Phone/Fax	902-482-0984
	Email	pisces@ns.sympatico.ca
	Contact name(s)	Peter Norsworthy

3 Introduction

This report sets out the results of the 1st surveillance audit after re-assessment in relation to the Affiliation of Seafood Producers Association of Nova Scotia (ASPANS) of the Scotian Shelf snow crab trap.

To be awarded a MSC certificate for the fishery, the applicants agreed in a written contract to develop an action plan for meeting the required 'Conditions' against the performance indicators that scored below 80% in the initial assessment. Action Plans for each Condition were submitted by the fishery client and these were approved by SAI Global as the certification body of record.

An expedited audit was launched in November 2017 as SAI Global became aware of major changes in relation to the circumstances of the fishery. The outcome of this audit was that the combined effects of the MSC UoAs on the North Atlantic right whale (ETP species) was outside the national limits required for the protection of the species and that the fishery was likely to hinder the recovery of the species. Therefore, conditions were raised and ASPANS provided SAI Global with a client action plan which was included in the expedited audit report posted on the 29th March 2018.

The applicant also agreed in a written contract to be financially and technically responsible for surveillance visits by an MSC accredited certification body, which would occur at a minimum of once a year, or more often at the discretion of the certification body (based on the applicant's action plan or by previous findings by the certification body from annual surveillance audits or other sources of information).

Announcement of Surveillance Audit
An announcement of the surveillance site visit was published on the MSC website on the 2nd October 2018 to provide an opportunity to stakeholders to meet with or submit information on the fishery to the audit team. Additionally, written notification was sent to the list of stakeholders representing the consultation plan during the initial assessment of this fishery and in many cases follow up mails were also made to ensure that stakeholders had been provided with sufficient opportunity to participate in consultation.

Table 5 provides a list of the stakeholders and management organizations engaged in the process either through meetings, conference call or submission of information. These consultations focused on the questions and evidence that demonstrates the performance of the fishery throughout the year and measures that supported the fulfilment of ASPANS client action plan.

Meetings were held with the following management and scientific organizations responsible for the Scotian Shelf crab trap fishery:

- **Fisheries and Oceans Canada (DFO), Maritimes Region, Dartmouth.**

A number of scientific and meeting reports were also examined by the audit team in producing this report, as detailed in the information sources section.

4 Background

4.1 Fishery Observations

4.1.1 Snow crab landings

A total of 7,587 mt and 6,805 mt of snow crab were caught on the Scotian Shelf in 2017 and 2018, respectively (Table 2).

Table 2. TAC and Catch Data. Source: DFO.

TAC	**Year**	**2017**	**Amount**	**7,665 mt**
	Year	**2018**	**Amount**	**6,841 mt**
UoA share of TAC	**Year**	**2017**	**Amount**	**100%**
	Year	**2018**	**Amount**	**100%**
UoC share of TAC	**Year**	**2017**	**Amount**	**100%**
	Year	**2018**	**Amount**	**100%**
Total catch by UoC	**Year (most recent)**	**2018**	**Amount**	**6,805 mt**
	Year (second most recent)	**2017**	**Amount**	**7,587 mt**

Total landings have been declining since 2010 (Figure 1). For N-ENS and S-ENS, in 2017 they were 819 mt and 6,723 mt, respectively, and they were 80 mt in 4X for the 2016/2017 season from TACs of 825 mt and 6,730 mt in N-ENS and S-ENS, respectively, and 80 mt in 4X. Landings declined in all areas in 2018 and were 742 mt in N-ENS, 6,064 mt in S-ENS and 55 mt in 4X for the 2017/2018 season from TACs of 786 mt, 6,057 mt and 110 mt, respectively.

Past assessments of the resource in 4X now appear to have been overly optimistic and the latest assessment indicates that the stock is in the “critical” zone (see sections 4.3) and, in accordance with the precautionary approach (PA) framework, the fishery has been closed for the 2018/2019 season.

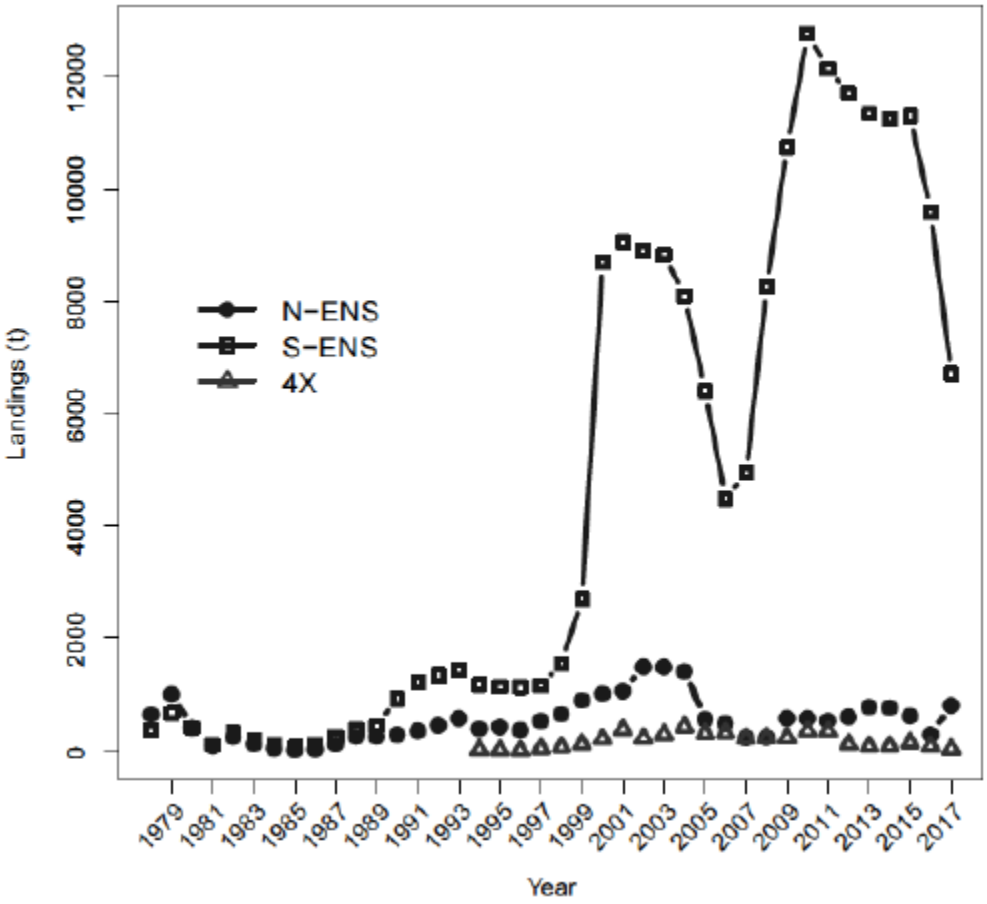


Figure 1. Temporal variations in the landings (mt) of Snow Crab on the Scotian Shelf. The landings follow the Total Allowable Catches (TACs) with little deviation, so the TACs are not shown. For 4X, the year refers to the starting year of the season. Source: DFO 2018a.

Non-standardized catch rates in 2017 were 90 kg/trap haul in N-ENS, 94 kg/trap haul in S-ENS, and 25 kg/trap haul in 4X in 2016/2017, which, relative to the previous year, represents decreases of 18%, 11% and 19%, respectively (Figure. 2).

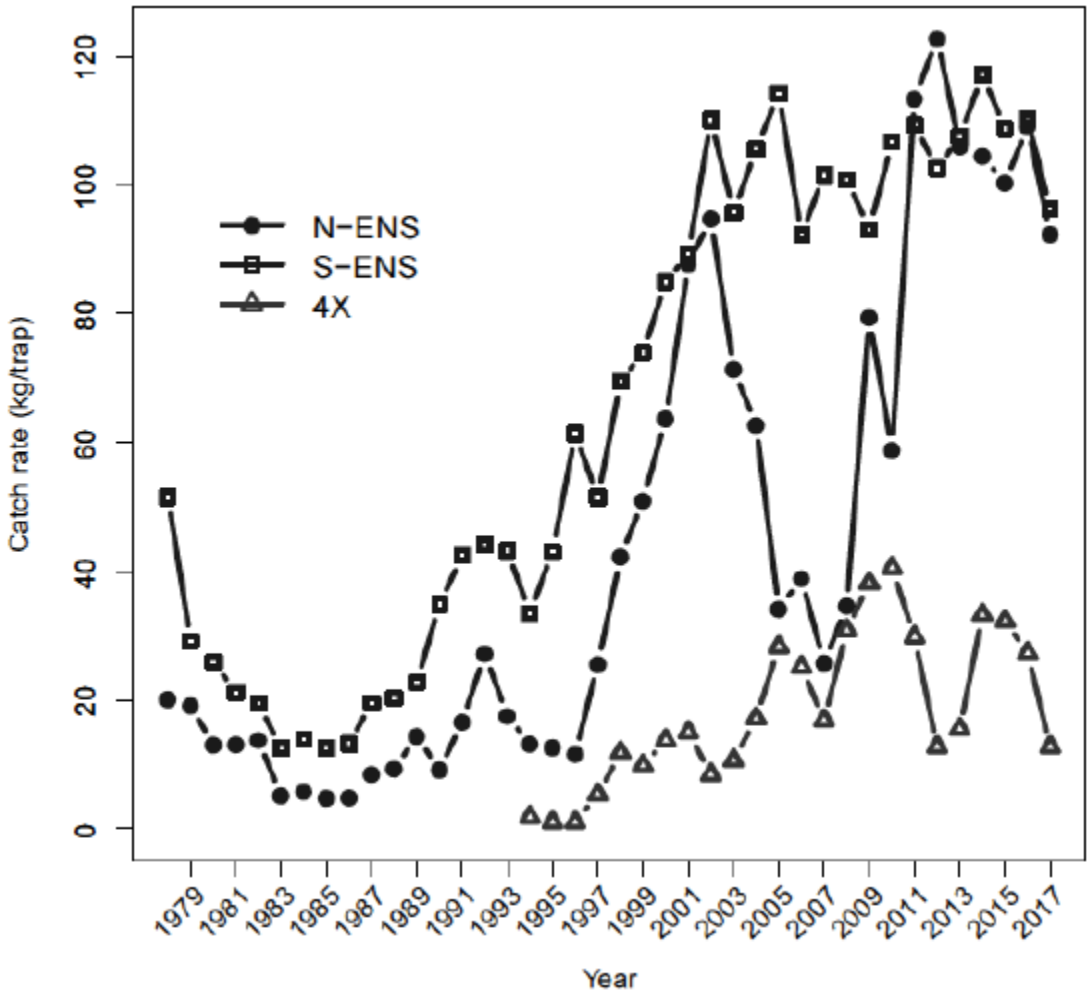


Figure 2. Temporal variations in catch rates of Snow Crab on the Scotian Shelf, expressed as kg per trap haul. Trap design and size have changed over time. No corrections for these varying trap-types nor soak time and bait-type have been made. Source: DFO 2018a.

4.1.2 Number of licences per area

The number of licenses to harvest snow crab have remained relatively static for many years, with some combining being completed. Licences have trap limits that vary by management area, and there are various numbers of traps permitted per licence, which have not changed in 2018. The 2018 stock assessment notes that almost no changes to licenses have occurred since 2008. Accordingly, in 2017 there were:

- 78 licenses in N-ENS
- 115 licenses in S-ENS
- 9 licenses in 4X

4.1.3 Fishing season

There was only a slight modification to seasons in 2018; the 4X fishery was extended through a Notice to Fishers to April 7, 2018 from March 31, 2018 due to inclement weather conditions.

Table 3. 2018 snow crab fishing seasons by fishing areas.

Snow crab fishing area	Spring season		Summer season	
	Start date	End date	Start date	End date
12	April 15	July 31		
20-22	April 14	May 13	July 21	August 18
23	April 1	August 31		
24	April 1	August 31		
19			July 15	September 15
4X	November 1	April 7	Fishery is closed	

DFO stated that fishing in 2018 ended well before the August 31st date[1] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken.

4.2 Relevant changes to Regulations

There was no Conservation Harvesting Plan for snow crab in Maritimes Region in 2018.

Risk of interactions with the North Atlantic right whale

New management measures to minimise the risk of interactions with the North Atlantic right whale (NARW) have been implemented in the Maritimes in 2018, and are presented in section 4.4.2.

4.3 Updates on snow crab stock status

4.3.1 Model development

The fishable biomass (Figure 3) is defined as that segment of the snow crab biomass that is male, mature, larger than 95 mm CW. The fishable biomass index is estimated from the area expanded trawl survey results taking into consideration environmental and ecosystem information to define snow crab habitat. A novel modelling approach (lattice-based models, "lbm") was developed specifically for the Scotian Shelf snow crab assessment and introduced in 2016. This method incorporated relationships between snow crab habitat and abundance with environmental (temperature, substrate and depth) and ecosystem (species composition, diversity and metabolic rates) variables while also accounting for spatial and temporal variation. The lbm approach was further refined for the 2017 assessment into a space-time modelling ("stmv"). This refinement simplified model inputs and added localized temporal smoothing. Results from stmv were less erratic than those of lbm. Current and past biomass estimates have been determined through the current methodologies to allow for direct comparison. The resulting annual estimates of fishable biomass from stmv are then used to fit a logistic population model that provides the modelled fishable biomass and reference points (DFO 2018, Zisserson et al 2018).

4.3.2 Biomass

The modelled post-fishery fishable biomass index (from the logistic population model) in N-ENS was estimated to be 3,140 mt in 2017, relative to 2,794 mt in 2016. In S-ENS, the fishable biomass index was 37,640 mt in 2017 relative to 40,100 mt in 2016. In 4X, the fishable biomass index was 120 mt, relative to 149 mt in 2016/2017 (Figure 3). The 4X biomass estimate is generally more uncertain, as this area exhibits more extreme temperature fluctuations than other areas, potentially resulting in increased migration in and out of the area.

[1] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm

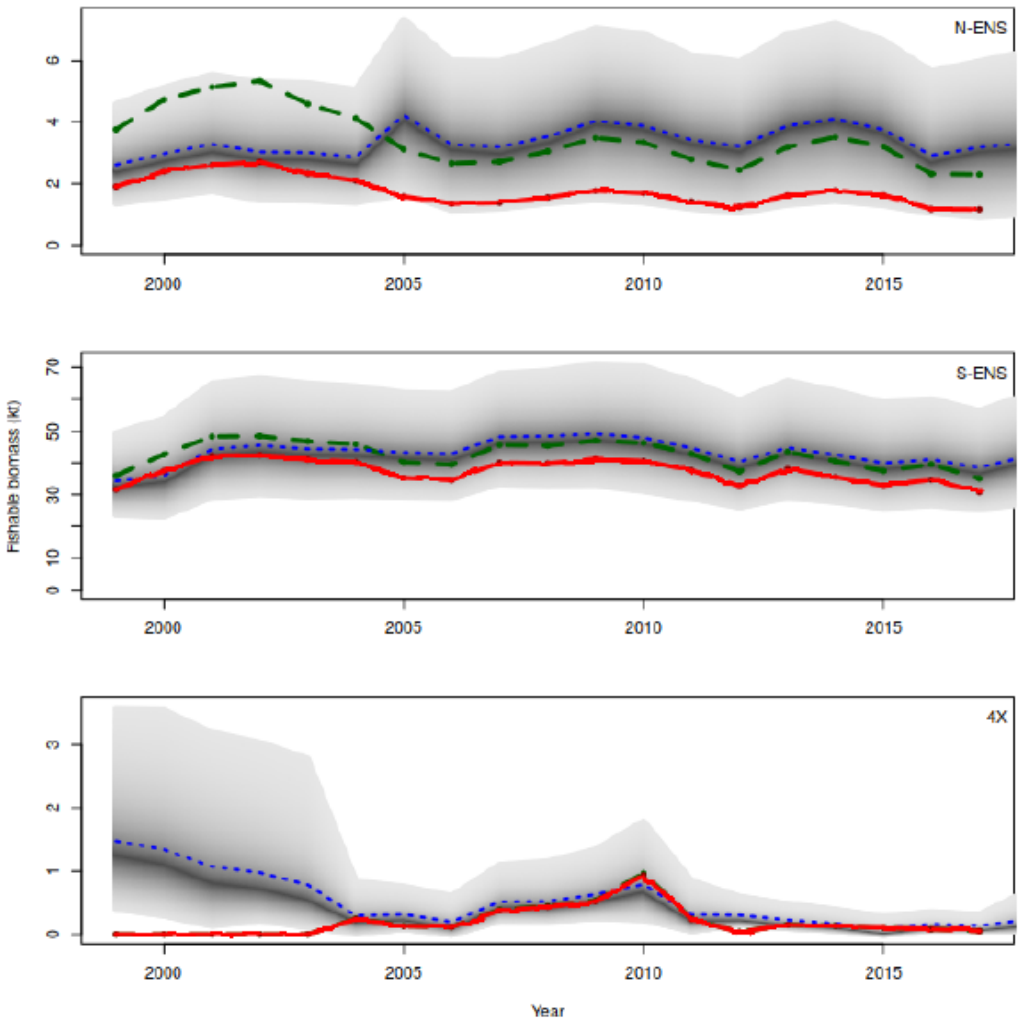


Figure 3. Time series of fishable biomass from the logistic population models. The fishable biomass index is shown in red dashed lines. The q-corrected (model catchability coefficient (CI) fishable biomass index is shown in green dashed lines. The posterior mean fishable biomass estimates from the logistic model are shown in blue stippled lines. The density distribution of posterior fishable biomass estimates are presented with 95% CI (grey) with the darkest area being medians. Source: DFO 2018a.

4.3.3 Recruitment

Based on size-frequency histograms of males, moderate internal recruitment (that is, recruitment from within the same fishing area) to the fishery is expected for the next year in N-ENS and S-ENS (Figure 4). Internal recruitment in 4X is expected to be very minimal. Immigration of crab from outside a given area can represent recruitment to its fishery although this is unreliable based on the episodic nature of immigration. Erratic temperature fields in 4X create strong uncertainties for the future.

In terms of size structure (Figure 4) in N-ENS and S-ENS, the presence of small immature males spanning almost all size ranges (30-95 mm CW) observed by the survey also suggests that internal recruitment to the fishery is possible for the next 4 to 5 years. The survival of these small animals is essential for the fishery to realize this recruitment. Area 4X shows minimal potential for internal recruitment for the next 2-3 years.

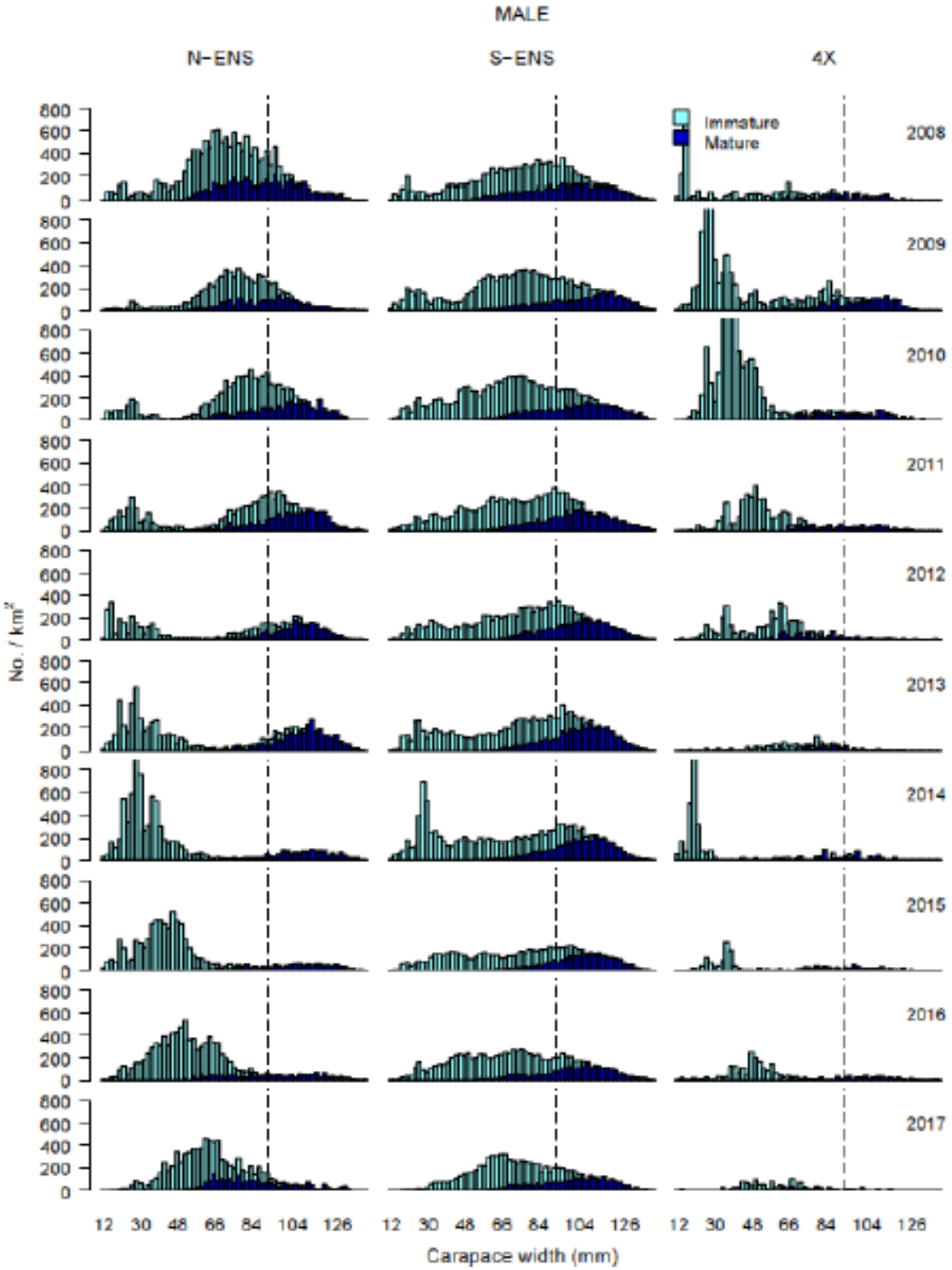


Figure 4. Size-frequency histograms of carapace width of male snow crabs. Note the relatively uniform distribution of adolescent crab across all size classes in S-ENS as compared to other areas and previous patterns in S-ENS. This figure provides information about the relative numbers within a given year. The vertical line represents the legal size (95 mm). Source: DFO 2018a.

In N-ENS and S-ENS, maturation of a recruitment pulse of female crab began in 2016 and continued in 2017, creating substantial increases in the abundance of mature female crab (Figure 5) and the proportion of mature

female to male crab (Figure 6). Area 4X also saw substantial female maturation in 2017 though at density levels substantially lower than other areas. The majority of female crab in all areas are now mature.

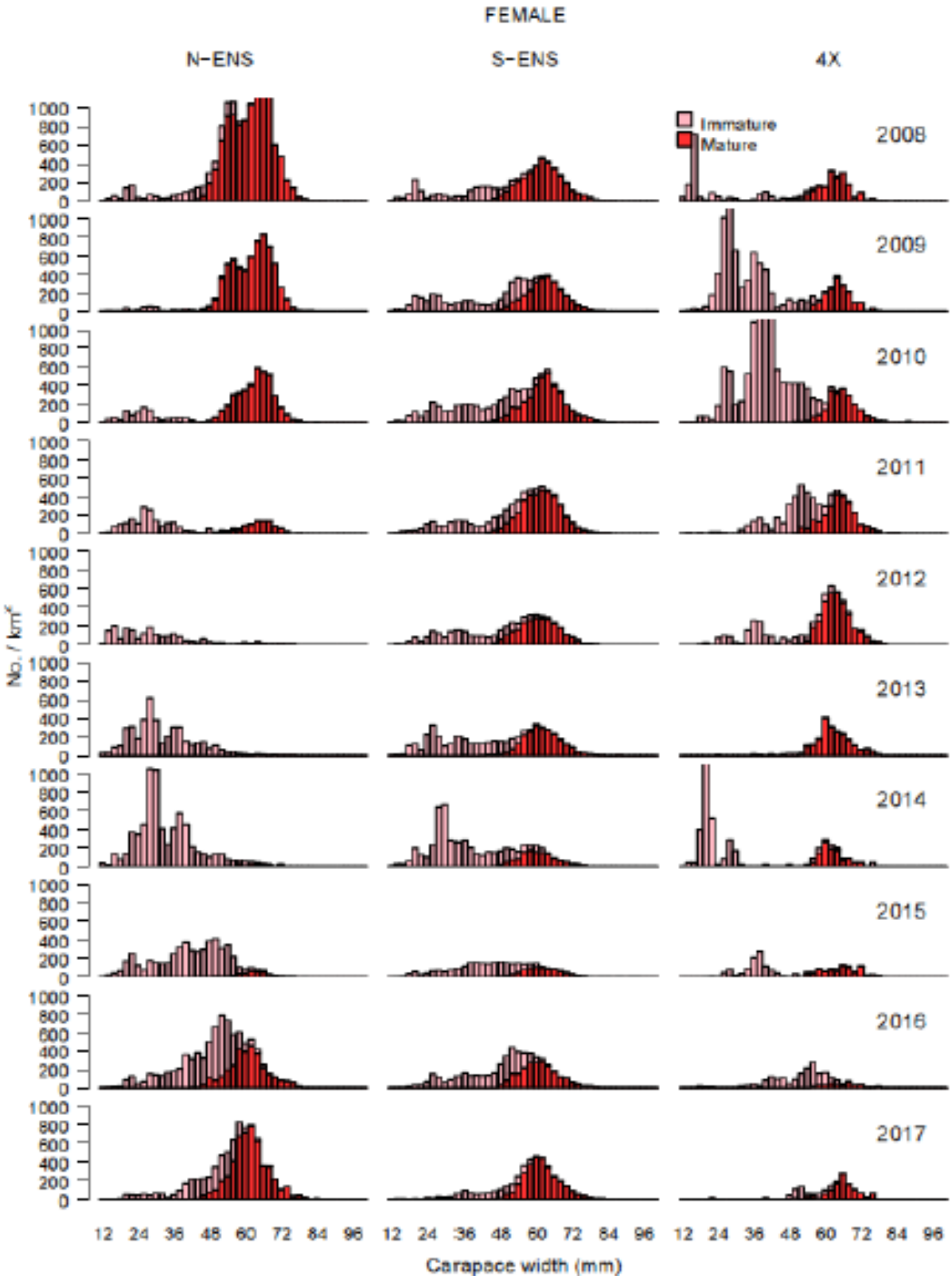


Figure 5. Size-frequency histograms of carapace width of female snow crabs. This figure provides information about the relative numbers within a given year. Source: DFO 2018a.

4.3.4 Reproduction

Mature female abundance has increased after 10 years of a declining trend in N-ENS and S-ENS and is expected to continue rising for the next year (Figure 5). Associated egg production is expected to increase due to increased number of mature females as well as larger egg clutch size in multiparous females from subsequent breeding events (Figure. 6). Concentrations of mature females now exist in all areas.

Visual examination of population composition (Figures 4, 5 and 6) supports the idea that the timing of high fecundity is followed by high abundance of mature females (7-9 years later) and males (9-10 years). This is expected given that female crab are believed to mature earlier than males of the same cohort. Additionally, the cyclical nature of Scotian Shelf snow crab populations, both male and female, are asynchronous with that of neighbouring crab populations in the Gulf of St. Lawrence and Newfoundland. This strongly supports the idea of internal recruitment on the Scotian Shelf. Additionally, the lag between male and female maturation of a cohort allows a broad-scale maturation of the current female population to serve as a signal of potential near-future male maturation and recruitment to the fishable biomass.

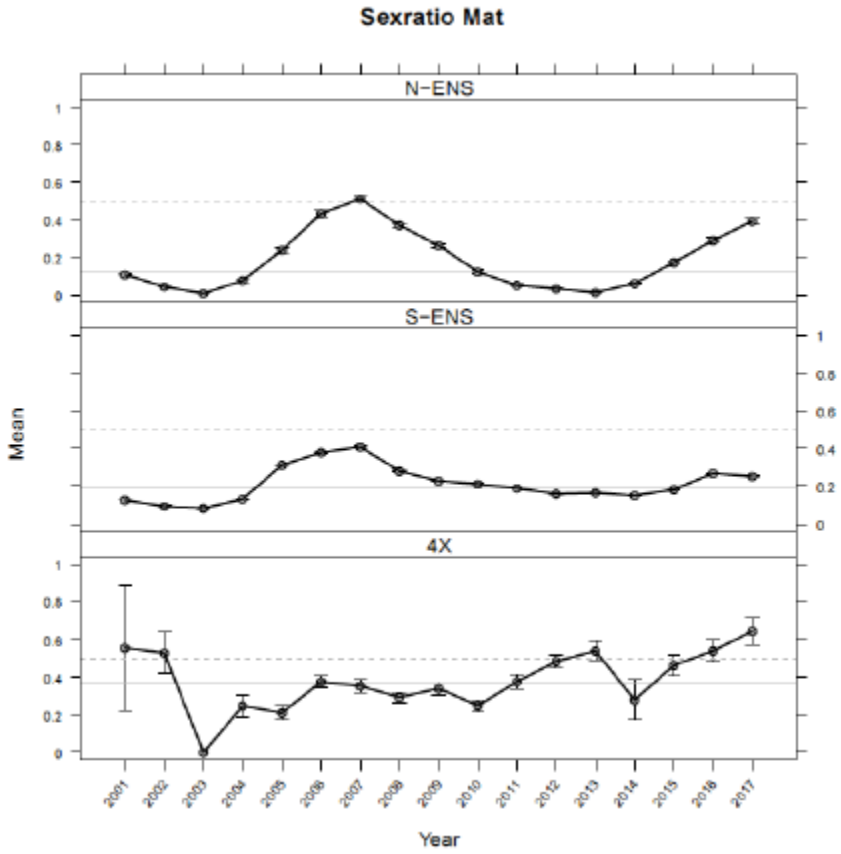


Figure 6. Sex ratios (proportion female) of mature snow crab. Since 2000, the Scotian Shelf is generally male dominated. Source: DFO 2018a.

4.3.5 Fishing mortality

The N-ENS fishing mortality (F) in 2017 was estimated to have been 0.18 (exploitation rate 0.16), a decrease from 0.33 in 2016 (Figure 7), and below the long-term mean.

The S-ENS fishing mortality (F) in 2017 was estimated to have been 0.25 (exploitation rate 0.22), a moderate increase from 0.23 in 2016 (Figure 7), and above the long-term mean. Localized exploitation rates are likely higher, as not all areas where biomass estimates are provided are fished (e.g., continental slope areas and western, inshore areas of CFA 24) and there are reports of illegal landings in this area.

The 4X fishing mortality (F) in 2016/2017 was estimated to have been 0.36 (exploitation rate 0.30), a sharp increase from 0.22 in 2015/2016 (Figure 7), and above the long-term mean. Localized exploitation rates are likely to be higher, since the computed exploitation rates incorporate biomass from throughout the 4X area and not just the fishery grounds.

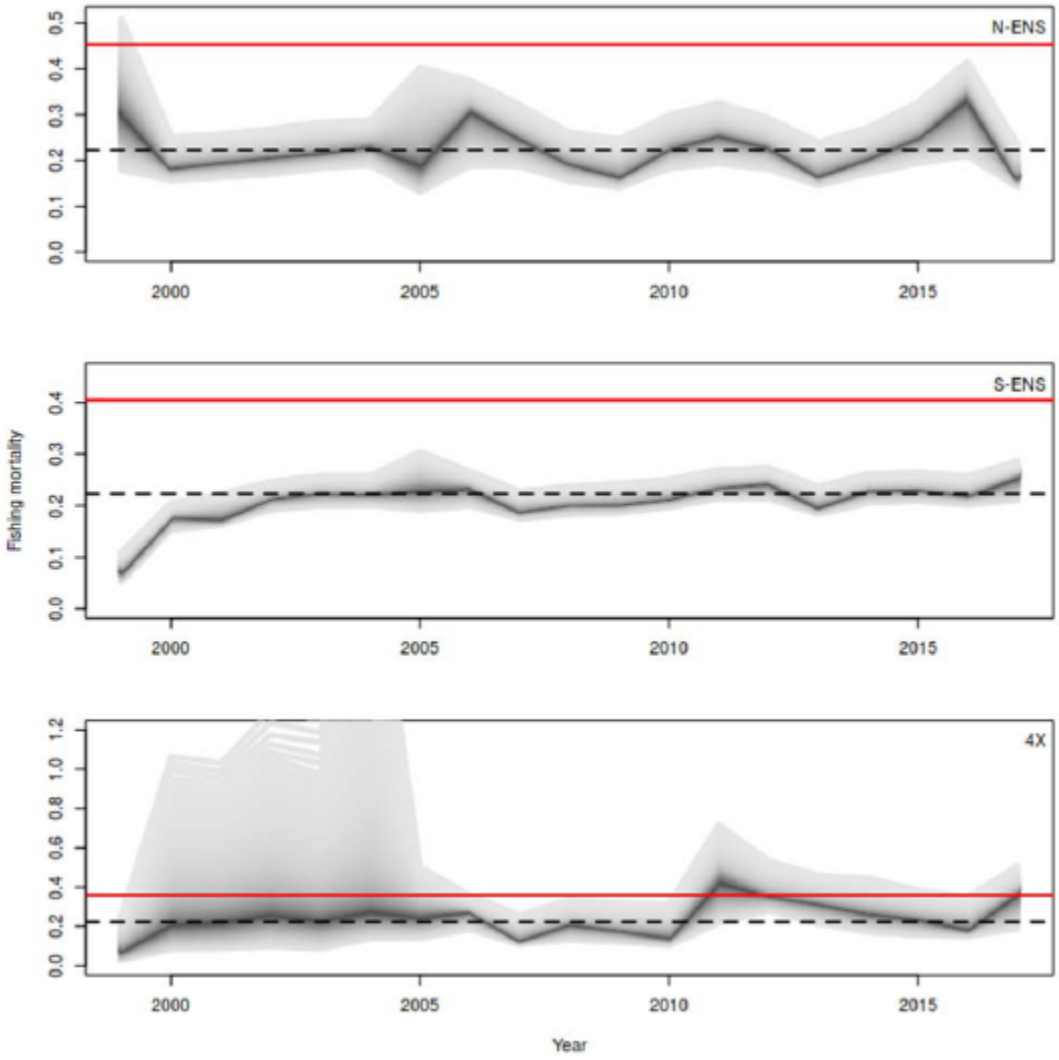


Figure 7. Time-series of fishing mortality from the logistic population models for N-ENS, S-ENS and 4X, respectively. Posterior density distributions are presented in grey, with the darkest line being the median with 95% Confidence Interval. The red solid line is the estimated fishing mortality at maximum sustainable yield and dark stippled line is the 20% harvest rate. Source: DFO 2018a.

4.3.6 Environmental variability

Average bottom temperatures in the 2017 snow crab survey were lower than 2016 values in all areas (Figure 8), which varies from the general warming trend observed since the early 1990s. Temperatures are more stable in N-ENS than S-ENS. Area 4X exhibits the most erratic annual mean bottom temperatures. Overall, the potential Snow Crab habitat in the SSE for 2017 was below the long-term mean. All areas have potential habitat at the lowest level observed in the past 20 years (Figure 9).

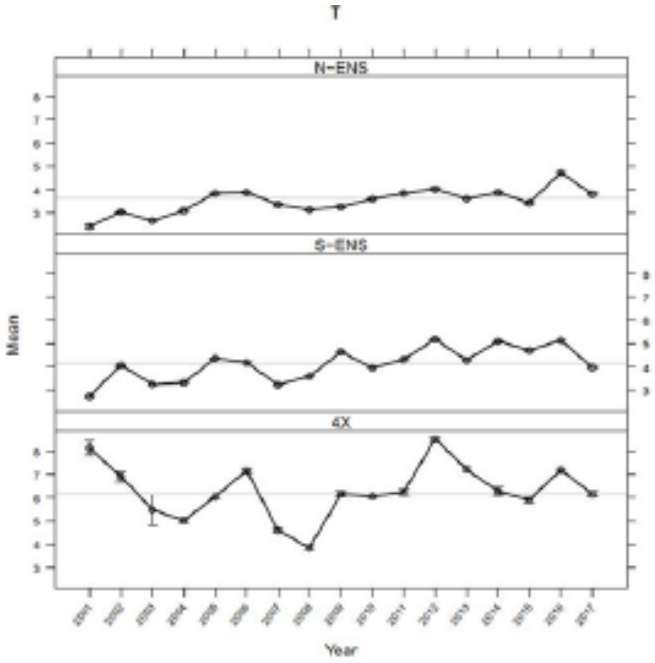


Figure 8. Annual variations in bottom temperature observed during the Snow Crab survey. The horizontal line indicates the long-term median temperature within each subarea. Error bars are standard errors. Source: DFO 2018a.

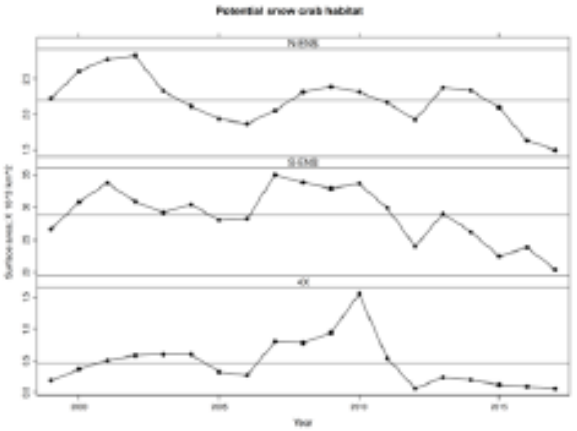


Figure 9. Annual variations in the surface area of potential Snow Crab habitat. The horizontal line indicates the long-term median surface area within each subarea. The estimates for the period from 1998 to the present are based upon Snow Crab surveys while those prior to 1998 are projected using incomplete data (and so less reliable). Source: DFO 2018a.

4.3.7 Precautionary approach

The N-ENS population is considered to be in the "Healthy" zone of the PA framework (FB > USR, Figure 10). Current fishable biomass estimates are below the long-term mean. Recruitment is expected to continue in coming years but past expectations of recruitment in N-ENS have not always materialized, likely due to emigration, high predation or other sources of mortality. A moderate TAC reduction is recommended.

The S-ENS population is considered to be in the "Healthy" zone of the PA framework (FB > USR, Figure 10). Current fishable biomass estimates are below the long-term mean. As recruitment is expected for at least the next three to four years, there remains scope for flexibility. A moderate TAC reduction is recommended.

Area 4X is the southern-most area of snow crab distribution, existing in more "marginal" environments relative to the "prime" areas of S- and N-ENS, an explicitly PA towards this fishery is therefore essential. Low recruitment, high inter-annual temperature fluctuations and overall high water temperatures create uncertainties about this population. The extreme high bottom temperature event of 2012/2013 was very detrimental to the snow crab populations in 4X. Indeed, they have yet to recover to previous abundance levels. The previous assessment methodology provided fishable biomass index estimates that appear to be unrealistically erratic and, for 4X, overly optimistic based on the current modelling approach as well as fishery performance. Current assessment methodologies indicate that the stock is in the "critical" zone of the PA framework (FB < LSR, Figure 10).

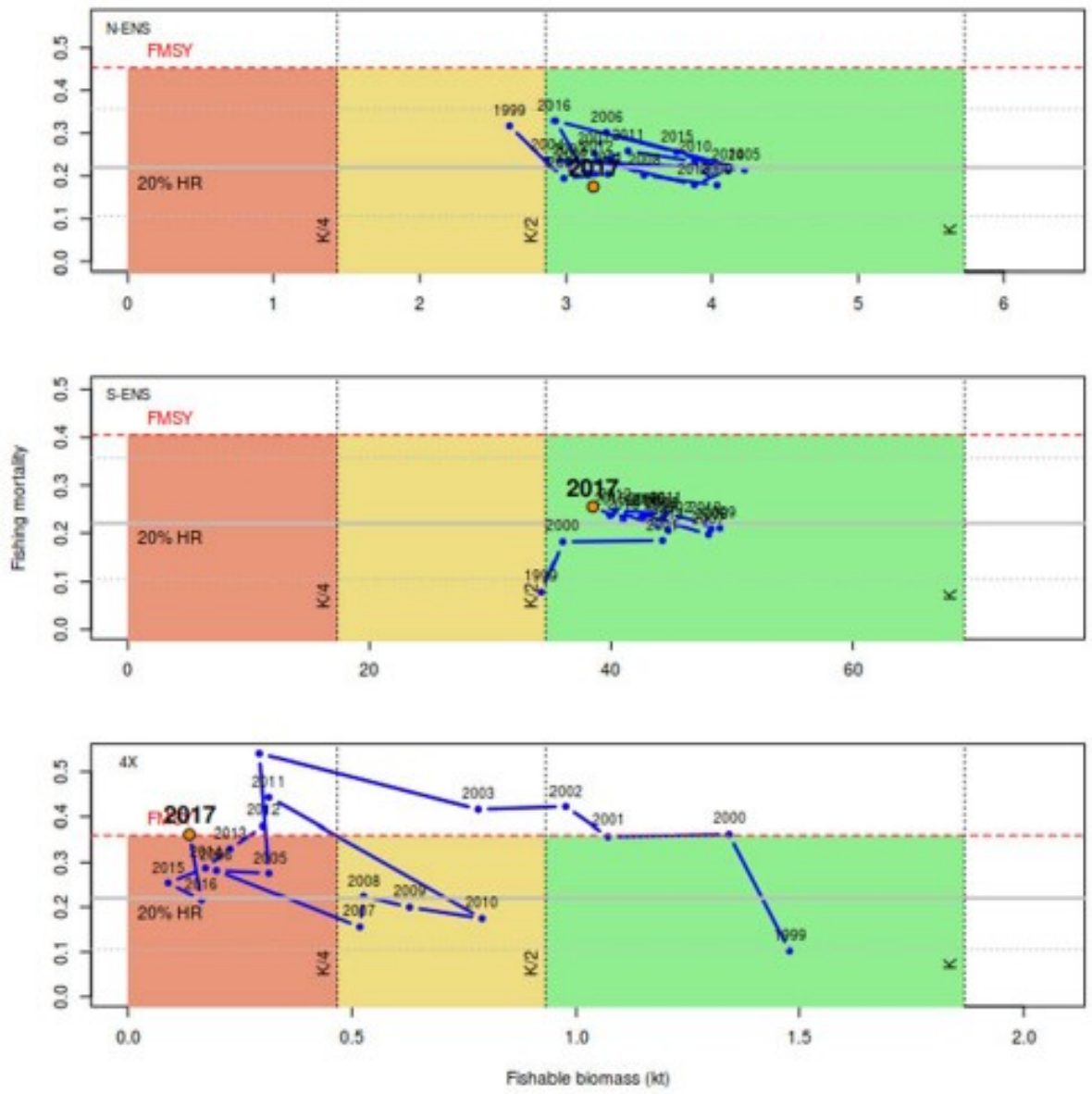


Figure 10. Time series of fishing mortality and fishable biomass for N-ENS (top), S-ENS (middle) and 4X (bottom) as obtained from the logistic population models. The large red dot indicates current (2017) year. Source: DFO 2018a.

Snow crab on the Scotian Shelf are assessed on the basis of three areas to conform with fishery management needs. However, populations there are best considered as a single biological unit, the vast bulk of which is within the S-ENS management area. As of the latest stock assessment, the portion of the stock in 4X is considered to be in the critical zone of its PA framework, although it remains in the healthy zone for both S-ENS and N-ENS. The LSR for the three areas combined is currently 19,046 mt and the lower 95% CI for the S-ENS fishable biomass is well above that number (Fig. 3). Similarly, the combined USR is currently 38,090 mt and the combined fishable biomass is 40,900 mt. It is considered unnecessary, therefore, to re-score Principle 1 PIs because of current conditions in the 4X management area.

4.4 Updates on ecosystem considerations

4.4.1 Primary and secondary species

There are no substantial changes for this surveillance assessment since there are no main primary and secondary species caught in this fishery.

Estimates of bycatch levels in the Scotian Shelf Ecosystem (SSE) Snow Crab fishery have been extremely low over the long-term, as extrapolated from at-sea observer estimates[2]. In ENS, estimates of bycatch were 0.03% of snow crab landings (5.7% observer coverage in 2017; 5% target). Area 4X shows bycatch rates at 0.2% of Snow Crab landings (6.2% observer coverage in 2016/2017; 10% target).

The majority of bycatch for all areas is composed of other invertebrate species (e.g., Northern stone crab, Jonah crab and American lobster) for which higher survival rates can be expected after being released as compared to finfish discards.

Species used as bait

Northwest Atlantic mackerel

The last stock assessment report for Northwest Atlantic (Subareas 3 and 4) mackerel stock was published in 2017 (DFO 2017a). A censored statistical catch-at-age model, calibrated with the abundance index from the egg survey and taking into account the uncertainty due to unrecorded catches, shows that the recent catch levels have allowed mackerel spawning biomass (SSB) to slowly increase from its historical minimum in 2012 at 20,000 mt to a 2016 SSB at 40,000 mt (Figure 11). SSB in 2016 was about 40% of the 103,000 mt LRP. Although no significant recruitment episode has been observed since 1999, catch-at-age date indicate a slight improvement in the age structure and there were signs that recruitment was higher in 2015 than observed in recent years.

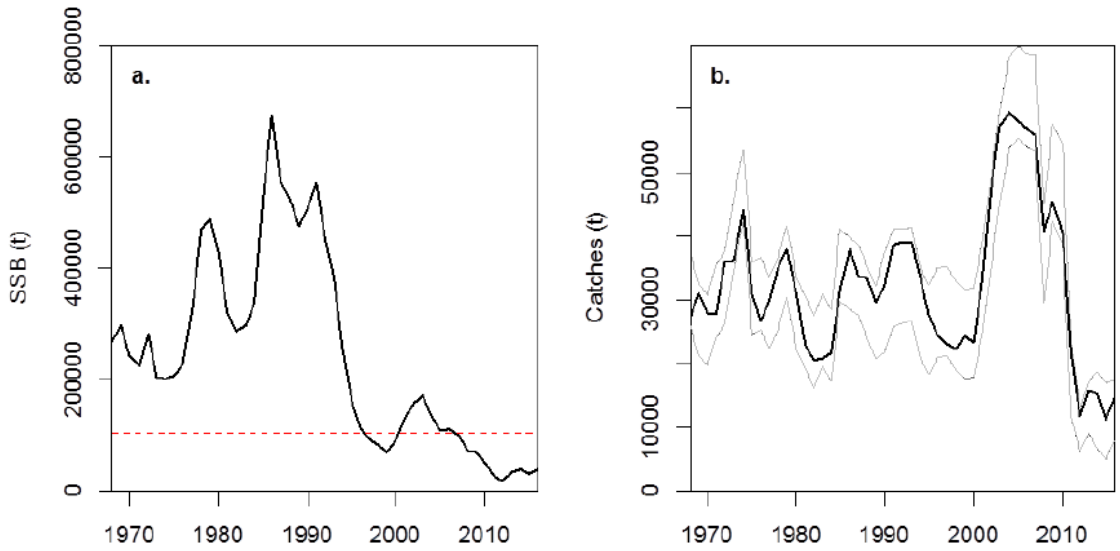


Figure 11.a) Mackerel spawning stock biomass in NAFO subareas 3 and 4 for 1968–2016 estimated by a censored catch-at-age statistical model; dotted red line: limit reference point (b). Estimated catches for NAFO subareas 3 and 4. Lower grey line: lower limit of censored model (= reported catches); upper grey line: upper limit (based on bait needs and recreational fishery estimate); black line: total catches (reported + unreported) as estimated by the model. Source: DFO 2017a.

[2] http://waves-vagues.dfo-mpo.gc.ca/Library/40726320.pdf

Southern GSL herring fall component

The last stock assessment report was published in May 2018 (DFO 2018b). SSB has been in the cautious zone, below the USR since 2015, and remains well above the LRP (Figure 12). F is below the removal rate reference since 2011.

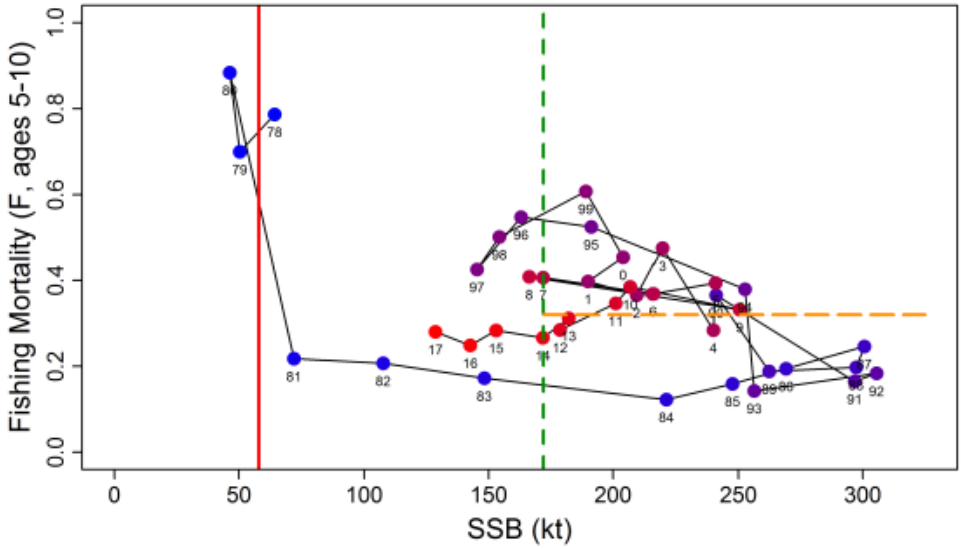


Figure 12. The southern Gulf of St. Lawrence Atlantic Herring fall spawner component trajectory in relation to spawning stock biomass (SSB, kt = thousand mt) and fishing mortality reference levels. The solid red vertical line is the LRP (58,000 mt), the green dashed vertical line is the Upper Stock Reference (USR = 172,000 mt), and the dashed horizontal line is the removal rate reference value (F0.1 = 0.32). Point labels are years (83 = 1983, 0 = 2000). Colour coding is from blue in the 1970s and early 1980s to red in the 2000s. Source: DFO 2018b.

Canadian Squid

Squid catches in Atlantic Canada are nominal and recorded at 152 tonnes in 2016[3].

Longfin squid (*Loligo pealei*)

Almost the entire world catch of longfin squid is taken by vessels from Fishing Area 21 (Northwestern Atlantic). Fishing operations are most intensive from November to March along the outer continental shelf of the New England and mid-Atlantic states where the overwintering stock is exploited. Global catches in 2014 where 12'000 tonnes[4].

Longfin squid are distributed in continental shelf waters located between Newfoundland and the Gulf of Venezuela (Cohen 1976; Dawe et al. 1990). In the Northwest Atlantic Ocean, longfin squid are most abundant between Georges Bank and Cape Hatteras, North Carolina. The Northwest Atlantic population of longfin squid is managed as a single stock based on the results of genetics studies conducted on squid samples collected between Cape Cod Bay and the Gulf of Mexico (Arkhipkin et al. 2015)[5]. Longfin squid are a short-lived species (~9 months)[6] that have been targeted along the north-eastern coast of the US/Canada since the 1880s, first as bait and now as food for humans and bait. According to the 2017 stock assessment from NMFS, longfin

[3] http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2016aq-eng.htm
[4] http://www.fao.org/fishery/species/2714/en
[5] https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/59073cc9be65945087783a84/1493646537724/Doryteuthis_update_April_2017.pdf
[6] http://www.seafoodwatch.org/-/m/sfw/pdf/reports/s/mba_seafoodwatch_squidlongfinshortfinreport.pdf

squid are not overfished. However, there is currently not enough information to determine whether the stock is subject to overfishing.

Shortfin squid (*Illex illecebrosus*)
This species is almost exclusively fished in the Northwestern Atlantic. Catches deteriorated from a 1979 peak of almost 180,000 mt to only about 38 000 mt in 1981 (FAO, 1983). Two large international fisheries exist: one in the bays of Newfoundland using jigs and jigging machines in depths from 0 to 30 m, and occasionally otter trawls (during summer and early autumn); and an extensive otter trawl fishery along part of eastern Canada and the USA on the shelf and upper slope, and around submarine canyons in depths from 100 to 250 m. Japan and Canada are the two countries taking the greatest share of these catches. The species is in high demand as bait in the autumn cod fishery off Newfoundland because it does not soak and fall off the hooks as fast as finfish bait. The total catch reported for this species to FAO for 1999 was 7,950 mt. The countries with the largest catches were USA (7,334 mt) and Canada (313 mt). 2014 global catches were just over 11,000 mt[7].

Two general levels of productivity have been identified for the NAFO Subareas 3+4 stock component based on trends in relative biomass indices and squid mean body weights derived from the Canadian bottom trawl surveys conducted during July in Division 4VWX. A period of high productivity (1976-1981) occurred between two low productivity periods (1970-1975 and 1982-2014). Relative biomass indices generally declined after 2004 and were below the low productivity period average during 2010-2014. During 2015, the biomass index was the third lowest value in the time series (0.2 kg per tow). Trends in the biomass indices for fall bottom trawl surveys conducted in Division 4T and Subarea 5+6 were compared with those for Division 4VWX because all three time series are correlated, as are the mean body weights for the Subareas 5+6 and Division 4VWX surveys. Since 1999, there has been no directed fishery in Subarea 4 and the majority of catches from Subareas 3+4, during 2000-2011, were from the Subarea 3 inshore jig fishery. Jig fishery catches have been well below the 1982-2014 average (205 mt) since 2007 and there were no catches of squid during 2013-2015. Relative fishing mortality indices in Subareas 3+4 were generally well below the average for the low productivity period during 2001-2015. Based on these trends, the NAFO Subareas 3+4 (Canadian) stock component remained in a state of low productivity during 2015[8].

4.4.2 Endangered, Threatened and Protected (ETP) species

Wolffishes
DFO noted after reviewing the SARA log reports from the Scotian Shelf snow crab fleet that 3 spotted wolffish (*Anarhichas minor*) (listed as threatened under SARA) were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the logbooks in 2018.

Leatherback turtle (*Dermochelys coriacea*) (Listed as endangered under SARA)
A 2017 study by Hamelin et al. [9] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, the authors pointed out that changes in fishing effort may reduce entanglement rates.

[7] http://www.fao.org/fishery/species/2720/en
[8] https://archive.nafo.int/open/sc/2016/scr16-034.pdf
[9] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733

In this respect, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions.

Snow crab fishing in CFA 24W ended on April 7, 2018[10]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the end of August 31st date[11] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018.

From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions.

Fin whale

No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[12]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018.

The Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada was published in 2017[13]. The objective of the management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently known distribution range in Canada. To reach this objective, several measures are proposed through four approaches: conservation, stewardship and protection of individuals, education and outreach, research and monitoring.

Blue whale

No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[14]. Three entanglements were reported in US waters in 2017[15]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018.

In 2018, DFO published the Action plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada[16].

The action plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. The first set of recovery measures will be undertaken by Fisheries and Oceans Canada, sometimes with the collaboration of partners. These are primarily research measures to estimate the population's size and its use of Canadian waters. They also aim to implement or enforce legislation or policies to protect Blue Whale habitat and mitigate threats. The second set of measures will be undertaken by the Department in partnership with the various stakeholders involved in the Blue Whale's recovery. For example, these measures include research on krill and the use of

[10] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[11] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm
[12] https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf
[13] https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/Mp-FinWhaleAtlantic-v00-2017Jan24-Eng.pdf
[14] https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf
[15] https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017
[16] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/action-plans/blue-whale-northwest-atlantic-population.html#toc2

hydroacoustics to document the presence of these whales. The third set presents measures that concerned stakeholders could undertake voluntarily. Such measures include gathering observations of the Blue Whale, photo-identification and raising awareness among marine users.

The Recovery Strategy for the Northwest Atlantic Blue Whale (Beauchamp et al. 2009) presents the various threats facing the population. The long-term goal of this Recovery Strategy is to reach a total of 1,000 mature individuals. To reach this recovery goal, three objectives were set for the Canadian range:

Objective 1: Define and conduct a long-term assessment of the size, structure and trends of the Northwest Atlantic Blue Whale population, and determine their range and critical habitat within Canadian waters.

Objective 2: Implement control and monitoring measures for activities that could hinder the recovery of the Blue Whale in its Canadian range.

Objective 3: Increase knowledge of the main threats to the recovery of the Blue Whale in Canadian waters both to determine their true impact and to identify effective measures to mitigate the negative consequences for the population's recovery.

North Atlantic right whale (NARW)

Expedited Audit Findings Re-Cap

The Scotian Shelf snow crab trap fishery was re-certified on September 15th, 2017. SAI Global became aware of significant new information describing a major impact of the fishery. This major impact constitutes a major change which is defined, according to MSC Fisheries Certification Requirements (FCR) 7.23.22.1.a, as follow:

- A major change is one that is likely to be material to the certification status. A change in scope, a Performance Indicator (PI) score falling below 60 or outcome PI score falling below 80, or a change that could bring about a Principle Level aggregate score to drop below 80, shall be considered material to the certification status.

The expedited audit focused on the North Atlantic Right Whale (NARW) mortality and entanglement event that occurred in spring and summer 2017 in the Gulf of St Lawrence (GSL) and for which it was determined that the MSC certified Gulf of St Lawrence snow crab trap fishery was involved. Given the migration of NARW to and from the GSL , which likely includes transit via the east coast of Canada and the Scotian Shelf area, the audit team reviewed all significant new information available at the time of the audit to determine whether or not the NARW mortality event affects the scoring of Principle 2 and Principle 3 and possibly the MSC certification status of the Scotian Shelf snow crab trap fishery. The expedited audit was announced on the MSC website on November 14th, 2017.

As a result of the expedited audit 2 new conditions were opened relating to the following MSC PIs:

- 2.3.1 ETP species outcome, and
- 2.3.2 ETP species management strategy

NARW Mortalities

During 2018, DFO, Transport Canada and industry took numerous actions to avoid mortality of NARW, and to mitigate negative risk of entanglements from all fixed gear fisheries.

- In 2018, DFO reported **zero** NARW mortalities on the Scotian Shelf [17] [18] and throughout eastern Canada (see figure below).

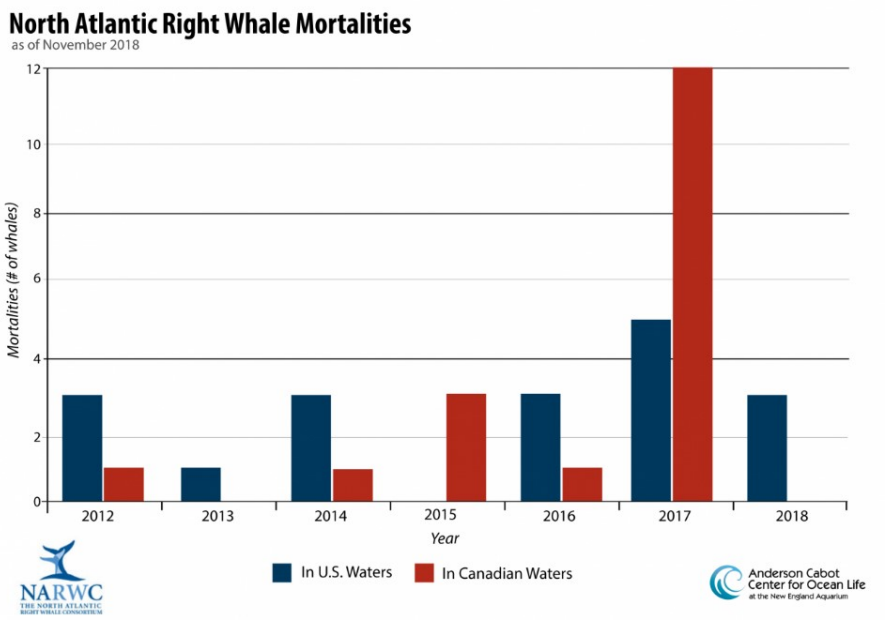


Figure 13. 2012-2018 confirmed NARW mortalities in U.S. waters (dark blue) and Canadian waters (red). Data from NOAA Fisheries.

Canadian NARW Entanglements

In November 2018, DFO reported **3 entanglements incidents for 2018** (2 in the GSL and one from either the GSL or Bay of Fundy) as well as noting two additional NARWs with fresh entanglement scars. The two additional NARWs with fresh entanglement scars may have become entangled and disentangled without notice from fishermen or authorities. The gear responsible for the wounds/scars is unknown.

Of the 3 recorded entanglements, DFO scientists indicated that 2 NARWs were disentangled, whereas the third whale was not observed again[19]. A detailed description of 2018 Canadian entanglements is provided below using:

a) Stakeholders submitted data (see in Appendix 3) as presented at the NARW Consortium meeting in November 2018, and
b) Information from the NARW Consortium 2018 Annual report Card, published in late January 2019.

[17] https://www.fisheries.noaa.gov/media-release/third-north-atlantic-right-whale-mortality-2018-confirmed
[18] https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/
[19] Observations made during the November 2018 site visits.

Scotian Shelf Potential Entanglements in 2018 – Detailed Information

Right Whale 3843 – GSL or Bay of Fundy?

RW# 3843 - seen in GSL then 53 days later in Bay of Fundy, Canada, entangled in gear with 5/8" line with lead core. Described as attached to something "heavy" and was last seen with line attached.

About this whale, the 2018 NARW Consortium Report Card further mentioned that the date of first sighting was July 30th 2018, Bay of Fundy, Canada, and that: "[*the whale was] Observed entangled in the Bay of Fundy trailing a buoy approx. one body length aft of the flukes. Whale was very thin and had severe wounds and significant aggregations of cyamids around the peduncle. Whale was partially disentangled on 8/5/2018 (including the attached buoy). There is likely some remaining line on the whale that will hopefully shed over time. Resighted (almost 5 months later) on 12/30/2018 southeast of Nantucket. Line remains, exiting left mouth and there may be a rostrum wrap.*"

The Audit Team notes that RW 3843 appears to be still entangled based on the 2018 NARW Consortium Report Card description. Also, at this point it is unclear whether this entanglement should be assigned to the GSL or the Bay of Fundy, since the gear and region RW 3843 was entangled in is unknown. However, based on available information we know that this whale has likely remained entangled for at least 5 months, has been severely wounded and was last sighted in very poor health condition[20]. All these factors may collectively affect the survival of this whale.

Reflecting the outcome of the previous expedited audit and the conditions raised therein, relevant information about Canadian entanglement incidents in other Canadian Regions is provided here because it has a bearing on the cumulative effects of MSC UoAs on the recovery of NARW.

Southern Gulf of St Lawrence (sGSL) Entanglements in 2018 – Detailed Information

Right Whale 3312 - sGSL

July 13 2018 sGSL: RW# 3312 - seen in the GSL in the morning without gear and seen 3 hours later entangled - not relocated and no further sightings.

About this whale, the 2018 NARW Consortium Report Card[21] further mentioned that: "*at a minimum, the whale had yellowish line through the mouth and trailing at least a few body lengths behind. One of the trailing lines may sink and the aerial team noticed what may have been floats or tackle subsurface. The whale appeared agitated, and was*

20 https://www.researchgate.net/publication/237973508_Visual_health_assessment_of_North_Atlantic_right_whales_Eubalaena_glacialis_using_photographs

21 https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

writhing at the surface and defecating. Raw rope burns were apparent across the back and peduncle. Whale has not been resighted."

The Audit Team notes that RW# 3312 was clearly entangled in the GSL based on the 3 hours it took to record its entanglement. We also note that the GSL snow crab fishery was closed by July 1st 2018 in Crab Fishing Areas 12, 12E, 12F, while in CFA 19 the fishery opened on July 11th with the last crab landing recorded on August 1st 2018 (see table 6 for details). Since the fishery in CFA 12, 12E and 12F ended by July 1st the team notes that the whale became entangled 13 days after the closure, likely by lost gear from these CFAs. We also note that the likelihood of the whale getting entangled in CFA 19 (yellow box on the right of Prince Edward Island (PEI)) may have been low since most of the NARW presence in 2018 was detected outside CFA 19. By July 2018 all of the Lobster fisheries in the GSL were closed.

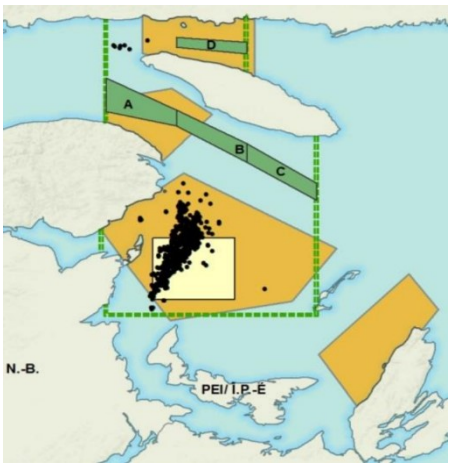


Figure 14. 2018 NARW Sightings in the sGSL.

Physical and other related harm (e.g. feeding ability, depletion of blubber stores) resulting from this entanglement incident is unclear. The whale may still be entangled since it was not re-sighted disentangled.

Right Whale 3960 - GSL

August 20 2018 sGSL: RW# 3960 - seen in GSL without gear and again in the GSL entangled in a 14 hour period. Freed itself but severe damage to its baleen (the filter-feeder system inside the mouths of baleen whales used to filter their prey from the sea water).

About this whale, the 2018 NARW Consortium Report Card further mentioned that: "*Whale observed with multiple wraps of the rostrum, damaged baleen, and no line trailing, although the sighting team felt that there was likely weight attached. Throughout the sighting the whale was thrashing at the surface and the configuration of the entanglement changed often. This behavior, the condition of the whale and changing entanglement configuration, led the team to believe that it was likely a new entanglement. As the team on scene was consulting and documenting the whale, its entanglement configuration continued to change and the whale picked up speed swimming at ~8kts. After more observations, the team felt that the whale might have shed the entanglement. No additional sightings of this whale have been reported. While observers noted that no gear was visible at the end of the sighting, they could not see all body areas and the whale was relatively distant and therefore the whale is considered still entangled.*"

The Audit Team notes that RW# 3960 was likely entangled in the GSL based on the 14 hours it took to record its entanglement. We also note that the GSL snow crab fishery was closed by July 1st 2018 in CFA 12, 12E, 12F, while in CFA 19 the fishery opened on July 11th with the last crab landing recorded on August 1st 2018 (see

table 6). Therefore, since this whale was recorded on August 20th and the GSL snow crab fishery in CFA 12, 12E, 12F closed 50 days earlier (and had ended almost 20 days before in CFA 19) it is likely that this entanglement was caused by lost fishing gear in the GSL. We also note that by July 2018 all of the lobster fisheries in the GSL were closed and the vast majority of NARW sighting between May and September 2018 occurred in the North West part of CFA 12 (see map provided under RW# 3312).

Because of the high concentration of GSL snow crab traps in the region (when compared to lobster pots) it is possible that RW 3960 became entangled outside the snow crab fishing season by lost snow crab fishing gear from Area 12. We note the reported severe damage to this whale's baleen that may have impaired its feeding ability. The whale is considered still entangled based on the description provided in the NARW 2018 Report Card.

2016 calf of Right Whale 3101 – GSL

2016 calf of RW#3101- seen in GSL without gear and then 15 days later seen with deep entanglement scars on rostrum, damaged blowholes and evidence of body and flipper wraps.

The Audit Team notes that the 2016 calf of RW#3101 appears to be one of the "two additional NARWs with fresh entanglement scars" reported by DFO in addition to the 3 Canadian[22] reported entanglements of 2018. Although it is referred to as being seen in the GSL, the specific date of this 2018 sighting in unclear. Because this is not classified as a formally reported entanglement there is no additional information about this whale in the 2018 NARW Commission Annual Report Card.

Entanglement effects on the NARW population

The unprecedented 20 NARW documented deaths over 2017 and 2018 represented a loss of more than 4% of their depleted population. In 2017, 12 deaths were reported in Canadian waters and five in U.S. waters. Using data as of September 4, 2018 (2018 NARWC Annual Report Card) the NARW population estimate for the end of 2017 is 411 (95% confidence range +/- 22 and 19 respectively).

The detection of no NARW mortalities in Canadian waters in 2018 suggest that the 2018 mitigation efforts have been successful. There were, however, four entanglements detected in Canadian (3) and U.S. (1) waters in 2018 and three reported mortalities in the U.S. attributed to entanglements. The authors of the NARW Consortium 2018 Report card further state that: "continued timely and effective efforts to reduce both entanglement and vessel strike mortalities must be a priority for both the U.S. and Canada if this species is to survive. " [23] [24].

Species At Risk Act (SARA) non-lethal harm scope

Under the Species At Risk Act (SARA) regulation it is prohibited to kill, harm, harass, capture or take a SARA listed species, such as NARW and also to destroy any part of its critical habitat. There has been non-lethal harm through entanglements events in 2018. An analysis of this issue is provided below.

In the 2007 NARW Recovery Potential Assessment (RPA)[25] it was determined that scope for allowable human-induced mortality does not exist, and that the population has to stabilize (cease declining) first. Hence, what level of non-lethal harm may be permissible is not apparent and nearly impossible to evaluate with confidence.

[22] https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf
[23] https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event
[24] https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf
[25] http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf

As such, any level of non-lethal harm that may impede population productivity would put recovery at risk, given the population's trajectory toward extinction.

From this text it would appear that non-lethal harm (e.g. as caused by some entanglement events) that may impede population recovery is mostly not permissible. However, this was not explicitly stated back in 2007.

Recent peer-reviewed scientific information (i.e. post RPA publication in 2007) on NARW survival after entanglement

Robbins *et. al.* (2015)[26] results from a study on mark–recapture estimate of whale entanglement survival indicated that that both juveniles and adult NARW have a lower probability of survival after a reported entanglement. The study analysed three basic aspects of entanglement that can be assessed at the time of the first report for many individuals: the likely risk posed by the entangling gear, the severity of sustained injuries and health impacts from the event.

Their multistate models estimated the apparent survival of entangled adults to be 23% lower than other adult females and 26% lower than other adult males. The post-entanglement survival of entangled juveniles was comparable to entangled adults and 25% lower than con-specifics.

The authors of the study highlighted in their analysis that calculated survival is over-estimated because some individuals die before their entanglement is documented and such individuals could not be accounted for in their study. Furthermore, the study only examined reported entanglements, but NARW are also considered to be involved in unreported/unobserved events or incidents resulting in mortality. The study indicated that most deaths from entanglement likely occur within the first year of entanglement (although two NARW entanglements in the study were detected after the death of the whale) and so early intervention is considered to be particularly effective in mitigating potential post-entanglement mortality. This highlights the importance of early detection of entangled whales, maximizing disentanglement opportunities and the continued improvement of disentanglement techniques.

Van der Hoop *et. al.* (2017)[27], in their bioenergetics based study on NARWs, summarised that entanglement in fishing gear is an unpredictable event that can be extremely costly on the animal and last for days to years. Even over the wide range of fishing gears, entanglement durations, and fates of individuals in the study, their results suggested that drag from entanglement can impact blubber stores and require energy investment on the order of magnitude as a reproductive event or migration.

Recovery from such physiological stress and disturbance may limit an individual's future reproductive success, making entanglement a potential contributor to fluctuations in population growth.

Kenney (2018)[28] analysed the NARW population trajectories without entanglement mortality. In his study he reported that mortality and serious injury from entanglement in commercial fishing gear have had a significant impact on recovery. By using National Marine Fisheries Service (NMFS) Mortality and Serious Injury (SI) data and a relatively simple approach to estimate what the population trajectory since 1990 might have been under 4 different scenarios of reduced entanglement mortality, he found that, under the best-case scenarios, the population at the end of the time-series would have been 25-30% higher than observed at present, and much more resilient to high mortality years like 2017.

[26] https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306
[27] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/
[28] https://www.int-res.com/articles/esr2018/37/n037p233.pdf

NMFS Serious Injury Definition

The NMFS "Policy and Process Distinguishing Serious from Non-Serious Injury of Marine Mammals"[29] (2012) enabled NMFS to interpret the regulatory definition of serious injury as any injury that is "more likely than not to result in mortality, or any injury that presents a greater than 50% chance of death to a marine mammal". Accordingly, a non-serious injury is more likely than not to not result in mortality, or any injury that presents a lesser than 50% chance of death [30]. Serious Injury determinations for the US and Canada incidents have been carried out by the NMFS since 2012.

NMFS definition of Serious Injury versus DFO description of "non-lethal harm"

As explained above, the DFO 2007 NARW RPA stated that: "The population has to stabilize (cease declining) first, and what level of non-lethal harm may be permissible is not apparent and nearly impossible to evaluate with confidence. Any level of non-lethal harm that may impede population productivity would put recovery at risk, given the population's trajectory toward extinction.

As such, the NMFS Serious Injury definition appears to be equivalent in meaning and intention to the less precise but seemingly corresponding DFO contextual description of non-lethal harm (i.e. any level of non-lethal harm that may impede population productivity would put recovery at risk).

2017 Entanglement incidents: relevance to NARW population recovery and the relevance to 2018 Audit

Serious Injury determinations are the product of a transparent and objective methodology, resulting from evidence and collective expert input. The most recent data available on Serious Injury and Non-Serious Injury determination for Canada is for 2017, as shown in a NMFS fall 2018 update[31].

Table 4. 2017 US and Canada NARW Serious Injury (SI) determinations.

Date 1st Observed	Animal ID #	Country of Origin	Gear	SI/M Determination
1/05/2017	3530	CN	Snow crab trap/pot	SI
4/23/2017	4146	US	Unknown	Non-SI
6/21/2017	3603	CN	Snow crab trap/pot	SI
7/05/2017	4510	CN	Snow crab trap/pot	Non-SI
7/08/2017	1317	CN	Snow crab trap/pot	Non-SI
7/09/2017	4123	CN	Snow crab trap/pot	Non-SI
7/19/2017	4094	CN	Snow crab trap/pot	SI
8/28/2017	3245	CN	Unknown	Non-SI
9/15/2017	4504	CN	Snow crab trap/pot	SI

[29] Distinguishing Serious from Non-Serious Injury of Marine Mammals: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations

[30] See 2012 Policy for Distinguishing Serious from Non-Serious Injury of Marine Mammals available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations

[31] https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

Based on the table above, in 2017 there have been:

- 4 Canadian Serious Injuries reported from snow crab trap/pot,
- 3 Canadian Non Serious Injuries reported from snow crab/ pot gear,
- 1 Canadian Non Serious Injury from unknown gear.

However, we note that information from the November 2017-March 2018 Expedited Audit specified the following about the entanglements that occurred in 2017: "NARW mortality and entanglement incidents involving the Scotian Shelf snow crab trap fishery have not been reported in 2017." Therefore, no NARW Serious Injuries appear to have been caused by the Scotian Shelf snow crab fishery in 2017.

In addition to the scientific information on NARW survival/mortality after entanglements incidents summarised previously (i.e. Robbins *et. al.* (2015), Van der Hoop *et. al.* (2017) and Kenney (2018)) this report uses the Serious Injury determinations for 2017 to clarify that this surveillance assessment explicitly accounts for:

1. Formally recorded Canadian NARW mortality for 2018, and
2. Recorded Canadian NARW entanglements for 2018 which may have significant effects (or potentially cause mortality).

Measures implemented for the 2018 fishing season

The DFO outlined the following management measures for the protection of NARWs:

- **Shortening of line between buoys:** Harvesters were asked to shorten the line between the primary and secondary buoy beyond the requirements outlined in their licence conditions (if applicable) to further reduce the risks of NARW and other marine mammal entanglements.

- **Mandatory reduction of floating rope at surface:** Harvesters were asked not to have rope attaching fishing gear to a primary buoy floating on the surface of the water after the gear has been set. This is to further reduce the risks of NARW and other marine mammal entanglements.

- **Reporting Sightings of NARW and Marine Mammals:** Harvesters were also asked to report all sightings of NARW and Marine Mammals that are in distress or dead.

- **Mandatory reporting of lost crab gear**

- **Modified reporting requirements for SARA logs** (note, SARA logbook reporting continues to be required for the snow crab fleet. The SARA logbooks have been updated for all fleets in Maritimes Region, though the updated log introduces no significant changes to requirements for the snow crab fishery).

DFO reinstated disentanglement by response organizations. Funding from DFO was increased in 2018 to support marine mammal response groups.

Requirement to Report Lost Gear

Licence holders will be required to report lost gear. This new management measure will help quantify the amount of gear lost annually and identify the need to increase efforts to retrieve gear that has been lost, which would reduce the risks of whale entanglements.

The information specified below must be reported by email to DFO within a 72-hour of noticing that the gear has been lost with the following information:

- sequence number of tag attached to the lobster trap that has been lost;
- vessel registration number or vessel identification number in case of Aboriginal licence conditions;
- latitude and longitude of last known position of lost lobster trap; and
- date the lobster trap was last fished.

Marine mammal interaction reporting

In order to comply with the implementation of the US Marine Mammals Protection Act (MMPA) regulations, licence holders must now provide information regarding all interactions with a marine mammal including: bycatch, collisions and all sightings of entangled marine mammals that occur during fishing expeditions.

A Marine Mammal Interaction Form (included with licence conditions and presents in Appendix 3 section 9.3.4) must be completed and submitted by email to DFO within 48 hours after the end of a fishing trip.

The information provided on this form will be used by the Department of DFO to estimate levels of accidental mortality and injury to marine mammals. This information will allow DFO to better assess the types of threats that may affect Canada's marine mammals and to develop mitigation strategies.

Requirement to report sightings of live whales

Sightings of live, free-swimming whales must be reported to DFO by phone or email.

Closures

In addition to the above measures, a protocol for temporary fisheries closure due to the presence of the NARW has been in implemented. On June 21st 2018, a temporary fisheries closure was applied in the Gran Manan NARW critical habitat area (Figure 15). The area was re-opened on July 7th, 2018[32].

[32] http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/right-whale-baleine-noires-0707-en.html

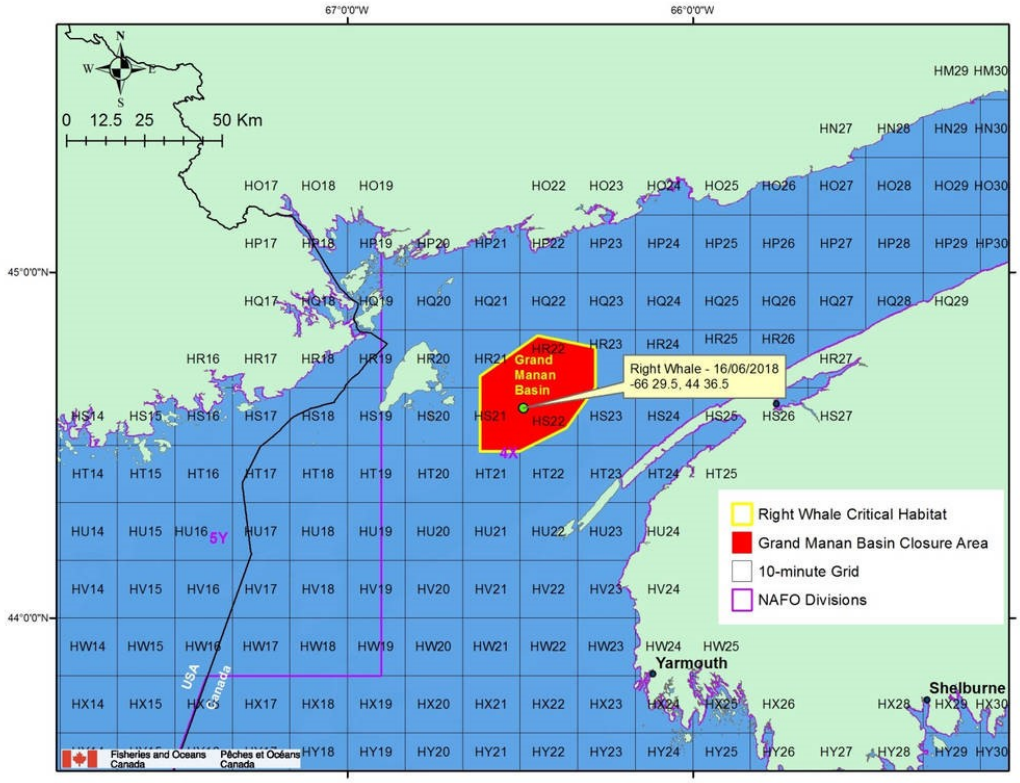


Figure 15. Map identifying grid closure area for Grand Manan Basin due to the confirmed presence of NARW.

2018 North Atlantic Right Whale Consortium (NARWC) meeting

The 2018 North Atlantic Right Whale Consortium (NARWC) meeting took place in New Bedford, MA, USA on November 7th and 8th 2018. One of the most effective ways to carry out the Consortium mission is the annual meetings at which research, new techniques, management strategies, and other facets of right whale conservation are shared and discussed. The Annual Meeting of the NARWC is the only annual event during which all stakeholders have the opportunity to gather and exchange ideas and information, an invaluable resource to the management and conservation of this species. Presenters and attendees in 2018 discussed updates on incidents and management responses in US and Canada, NARW, physiology, population, distribution and monitoring, NARW ecology, human caused mortality, mitigation approaches, acoustics, conservation and management. Furthermore, the Ropeless Consortium meeting took place the day before the NARWC Annual Meeting on November 6th, at the New Bedford Whaling Museum. The meeting included presentations on available ropeless fishing products, prototypes in development, and testing results from 2018, as well as discussion of progress overcoming regulatory challenges, fisheries outreach, establishing experimental fisheries, and funding opportunities and challenges.

2018 NARW Monitoring Activities

In 2018, a very extensive area was monitored by DFO (including Control and Protection) from April 1st to September 15th 2018 using a suit of different planes (i.e. DFO Science Twin Otter, Partenavia, Cessna, TC Dash 7/8, NOAA Twin Otter). In this period about 2000 survey hours of flights were logged, about 5 times more hours than 2017.

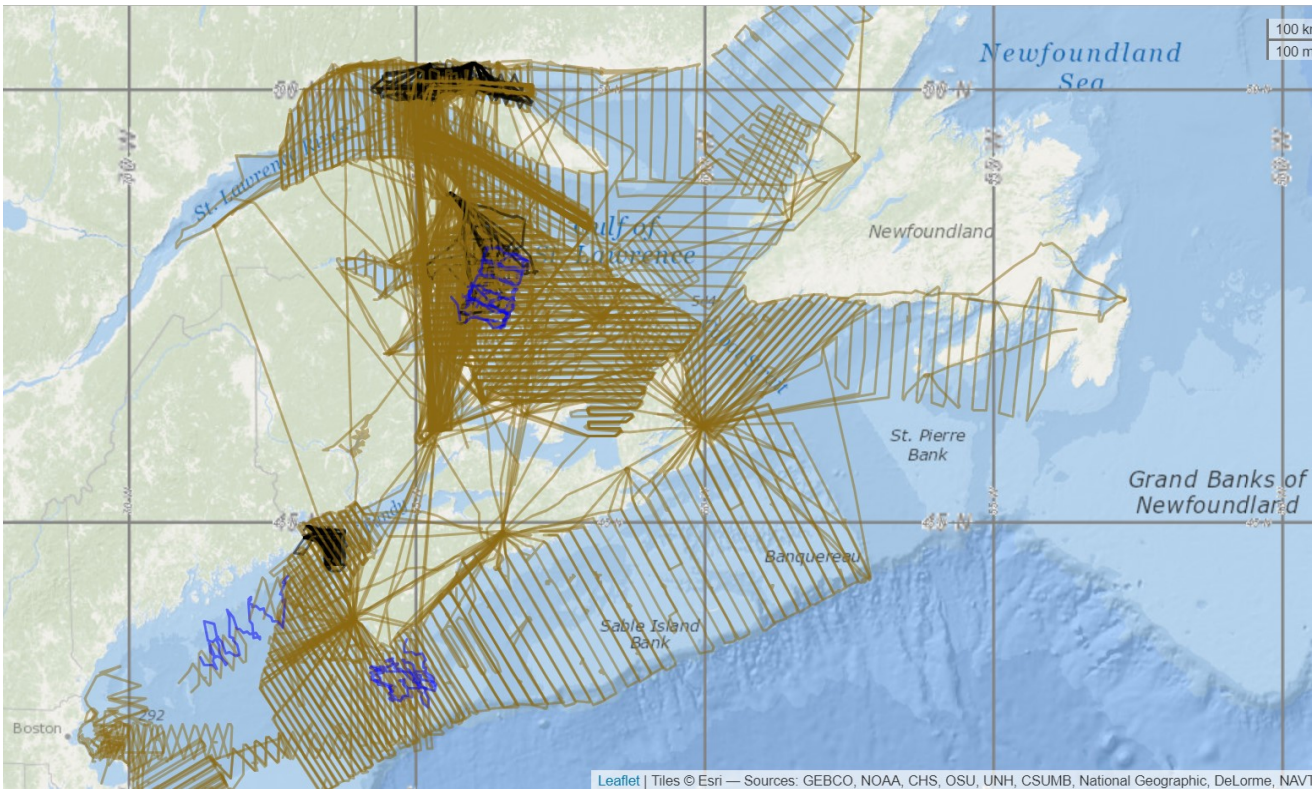


Figure 16. 2018 survey lines from DFO monitoring activities (Source: DFO 2018 DFO Science Efforts in support of mitigation measures to protect the NARW in Canadian Waters).

In addition to the aerial surveys, DFO Science deployed Marine Mammal Observers that totalled about 1'000 hours of observation on a number of different research vessels.

Near real time and autonomous Passive Acoustic Monitoring (e.g. including hydrophones and gliders) systems were also set up to track for presence of NARW.

Based on the monitoring activities the following NARW sightings were recorded in 2018.

2017 and 2018 summary of Sightings

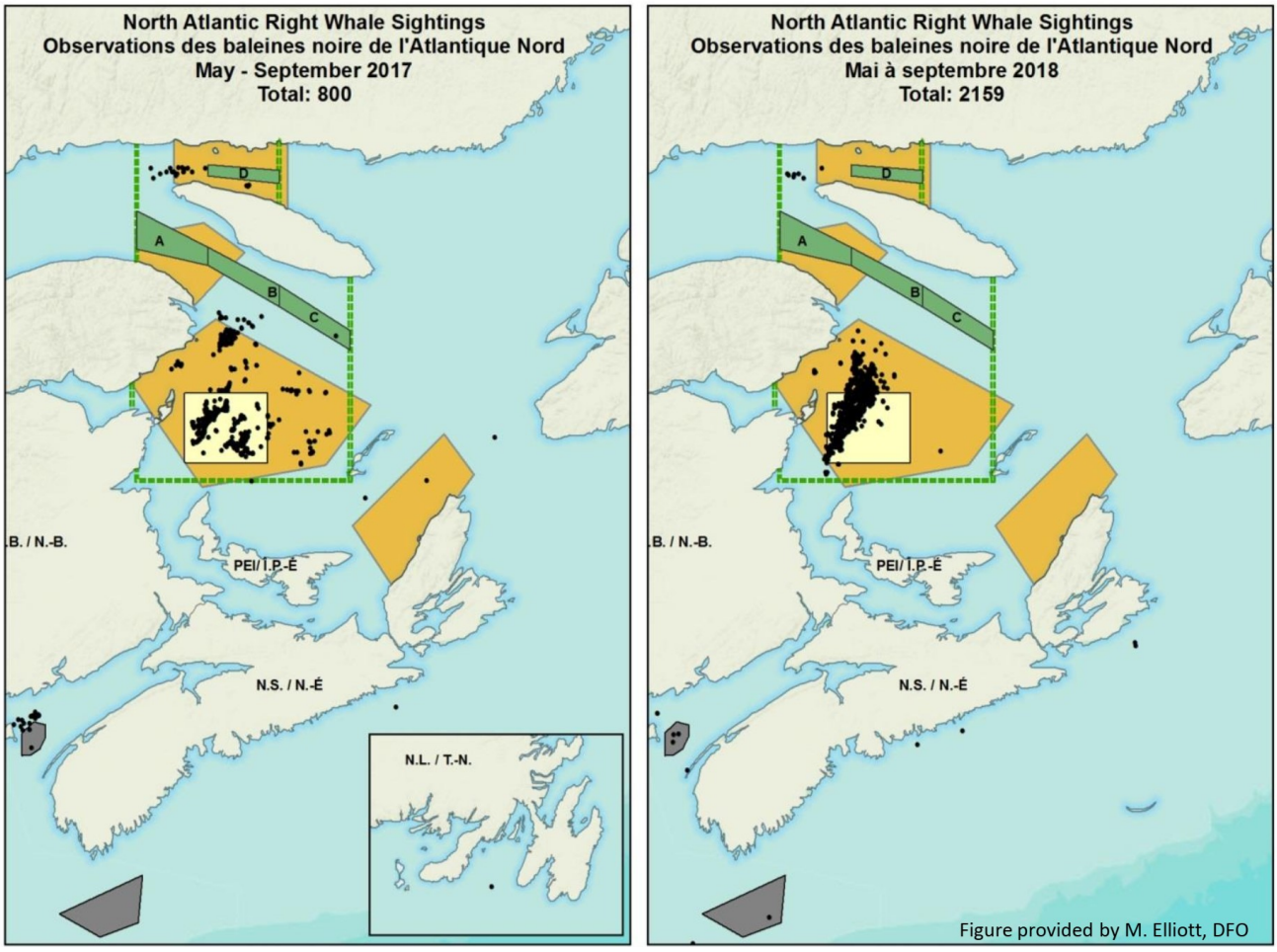


Figure 17. NARW sightings in 2017 and 2018. The dotted green area delineates the extent of the reduced speed zone. The static fishery closures is marked as pale yellow where most of the sightings have been detected. The light orange areas represent the areas subject to the temporary fishery closure protocol. Green areas (A, B, C, D) represent the dynamic shipping areas[33].

DFO lead research activities during 2018

DFO has undertaken numerous initiatives to increase knowledge regarding NARW including the following activities and commitments to further identify mitigation measures.

- DFO has hired a research scientist (Ed Trippel, in NHQ) with expertise in gear technology to help investigate gear technologies and in the evaluation of pilot projects

- DFO is collaborating with the Natural Sciences and Engineering Research Council of Canada (NSERC) to provide funding to support research that will aid the recovery of Southern Resident Killer Whales, North Atlantic Right Whales, and St. Lawrence Estuary Belugas. To date, proposals have been submitted to NSERC. Funding has been committed.

- Ongoing research initiatives related to enhancing real-time detections of right whales (related to the Oceans Protection Plan) are in progress. DFO Science plans to test some real-time detection

[33] https://whalemap.ocean.dal.ca/WhaleMap/

equipment in February on the west coast.

- Ongoing work to better understand prey distribution (e.g. factors affecting aggregation, quality, predictability, etc., is in progress) is being led by Catherine Johnson and Stephane Plourde at DFO.

DFO conducted extensive NARW related research and monitoring activities during 2018. During the site visits, the science Ocean Protection Program reported to have funding for 5 years for monitoring the effects of noise pollution on NARW and for real time detection systems to prevent vessel strikes. Specific NARW related research from DFO includes the following (although not a complete list of research projects currently underway):

- Satellite tagging project (2018-2021);
- Effort-weighted distribution of NARW in the GSL using DFO aerial and vessel based surveys (up to July 2018);
- Habitat suitability for NARW predictions based upon a bioenergetics model and zooplankton biomass in the GSL;
- NARW encounter rates with the GSL snow crab gear (2015-2017);
- Species distribution model based only on opportunistic sightings of NARW, and bathymetry / oceanographic variables that include NS and NFLD, and Labrador waters;
- Species distribution model that also incorporates water mass structures, tidal current magnitude, and two prey data layers for NS waters only;
- *Calanus* distribution and changes in abundance,
- Testing whale-detection technologies, including profiling buoys and instrumenting existing oceanographic buoys with acoustics packages, to inform the development of real-time detection system that would inform mariners of right-whale presence;
- Ocean Protection Program Marine Environmental Quality (OPP MEQ) Impact of shipping noise on NARW research program.

DFO Management Plans for 2019

On February 7, 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard, along with the Minister of Transport, and Member of Parliament for Acadie—Bathurst, announced how the Government of Canada will protect the endangered NARW during the 2019 season[34]. To reduce the probability of vessel strikes the Government is:

- Re-introducing a mandatory speed restriction for vessels 20 metres or longer to a maximum of 10 knots when travelling in the western Gulf of St. Lawrence starting on April 28th 2019.
- Continuing to allow vessels to travel at safe operational speeds in parts of two shipping lanes north and south of Anticosti Island when no NARW are spotted in the area.
- Adjusting the areas where the mandatory speed restriction applies to reflect NARW sightings to minimize impacts on the cruise ship industry and on community resupply.

To address the possibility of entanglements in fishing gear the Government is:

- Adjusting the area closed to snow crab, lobster fisheries and all other non-tended fixed-gear fisheries in Atlantic Canada and Quebec to include the area where 90% of the NARW were sighted last year during the prime fishing season (Figure 18). This area is a little less than half the size it was in 2018 and is more elongated North-to-South than in 2018.

[34] https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html

- Keeping the overall protection area the same in terms of the combined season-long closure area and the area where temporary 15-day closures may occur for snow crab, lobster fisheries and all other non-tended fixed-gear fisheries following a sighting of one or more NARW.
- Adjusting the protocol for temporary closures to include provisions for sightings of NARW in shallow waters less than 20 fathoms (approximately 36.5 metres deep). A 15-day closure will be triggered in waters less than 20 fathoms only if one or more NARW are spotted in shallow waters.

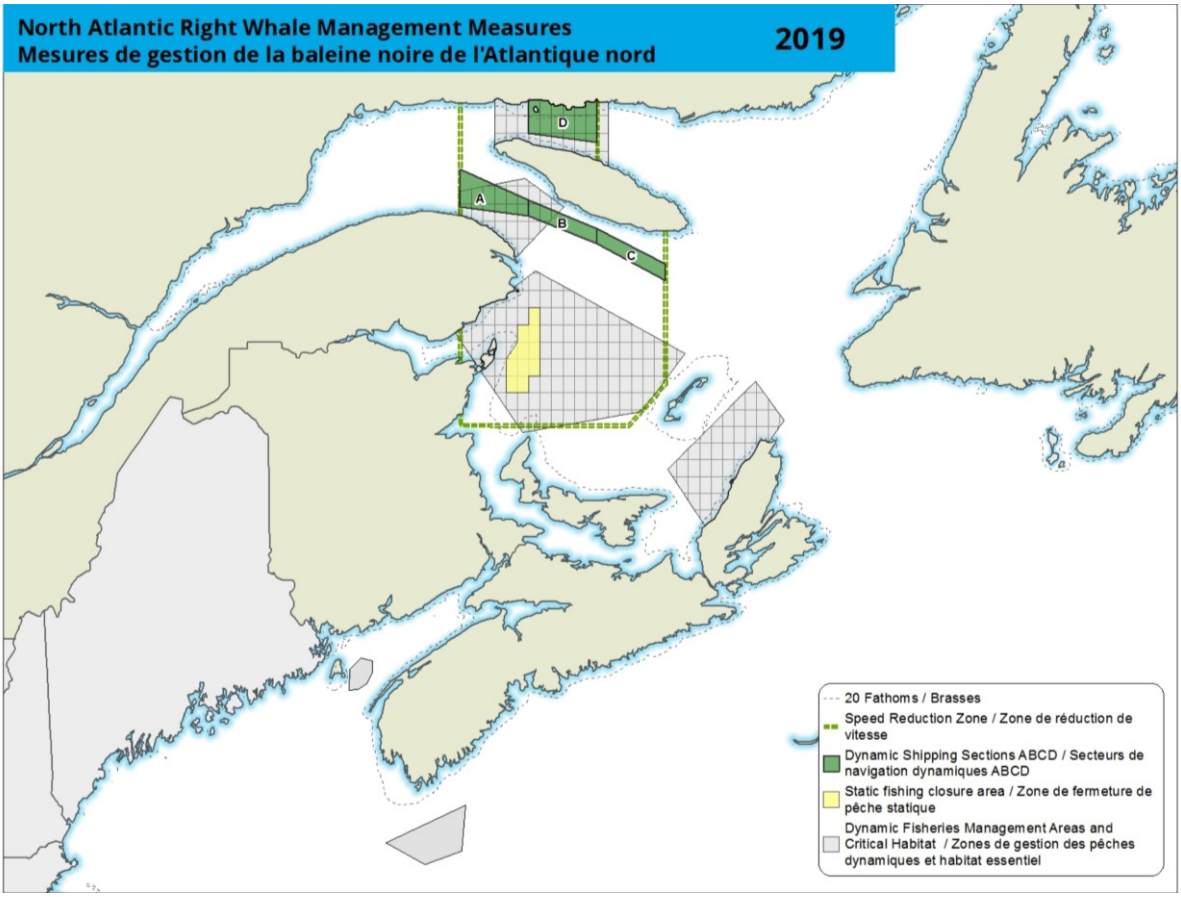


Figure 18. North Atlantic Right Whale Management Measures for 2019[35].

These advanced measures were developed by the Government of Canada in extensive consultations with harvesters, communities, Indigenous leaders and industry. This includes what has been shared over the past months in regional meetings through Quebec and Atlantic Canada and a pan-Atlantic roundtable in Dartmouth with partners in October 2018 as well as new scientific advice resulting from the November CSAS process.

Once properly agreed and formalised as fishery regulations, these measures or potentially, some variation of them, will be published in formal Notice/s to Fish Harvesters to be implemented in the 2019 snow crab season.

Similar to 2018, the Government will continue to monitor for NARW and work with harvesters to minimize the amount of rope in the water, track rope and buoys, and to improve reporting of lost gear.

[35] http://www.dfo-mpo.gc.ca/species-especes/documents/mammals-mammiferes/narightwhale-baleinenoirean/2019/2019-NARW-Management-Measures.pdf

These measures complement the existing recovery efforts of the Species at Risk Act which include the North Atlantic Right Whale Recovery Strategy and Action Plan, as well as requirements pursuant to the Marine Mammal Regulations.

The Minister also mentioned that, five calves have been recently spotted in U.S. waters[36].

The Government of Canada's Budget 2018 included $167.4 million over five years to help protect and recover endangered whale species in Canada, notably the Southern Resident killer whale, the NARW and the St. Lawrence Estuary beluga. This includes funding for science activities to help better understand factors affecting the health of whale populations, as well as actions to help address the threats arising from human activities.

4.4.3 Habitats

The designation and protection of the Western/Emerald Banks Conservation Area (WEBCA) to protect productivity for groundfish species, particularly haddock, has been added to the licence conditions. This area (10,234 km^2) has been closed to all bottom contacting fishing (Figure 15). This overlaps with Crab Fishing area 24:

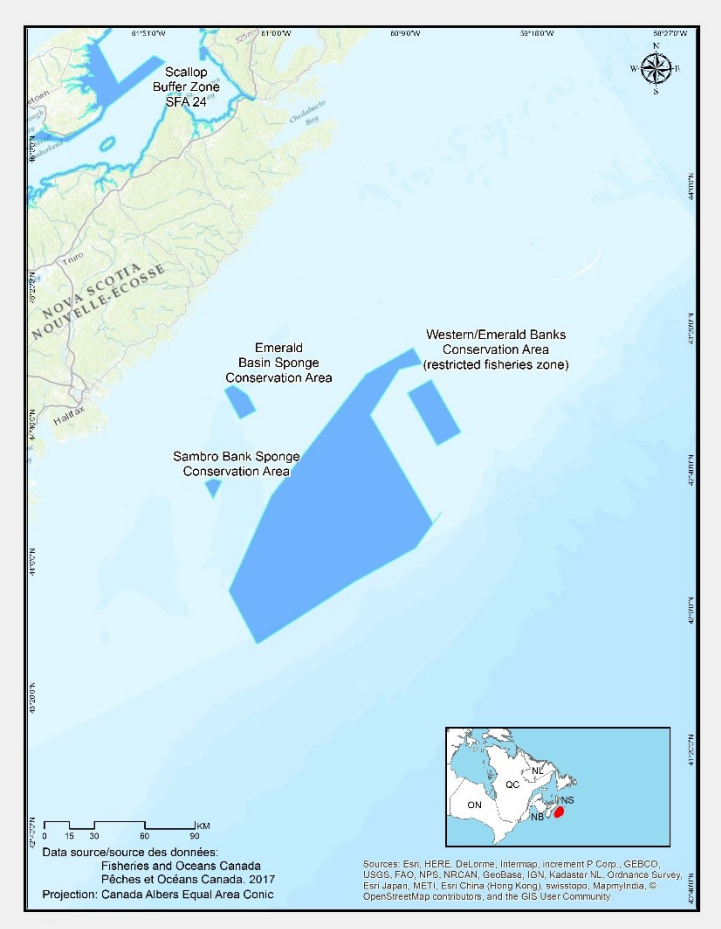


Figure 19. Western/Emerald Banks Conservation Area. Source: http://www.dfo-mpo.gc.ca/oceans/oeabcm-amcepz/refuges/westernemerald-emeraudewestern-eng.html)

36 https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html

4.5 Update on the management system

4.5.1 Relevant changes to Legislation

New requirements were added to the condition licences regarding the NARW, they are presented in section 4.4.2.

4.5.2 Relevant changes to the Management Regime

Changes in management of the fishery in response to the potential interaction of the fishery with NARW are described above.

4.5.3 Changes in staff within DFO science and management

DFO have appointed a gear technologist who is based in Ottawa. They will be heavily involved in the on-going work on innovations to mitigate the risk of entanglement of marine mammals in static fishing gears. There were no other reported changes in key personnel involved in the science or management of the fishery, or within the industry representatives that participate in the advisory process that would have any effect on the management of the Scotian Shelf snow crab fishery.

4.5.4 Compliance and Enforcement

DFO provided the client with a summary of enforcement activities for the Scotian Shelf snow crab fishery. A total of 2,160 fishery patrol hours were dedicated to the fishery. There were a total of 12 violations, of which 7 incurred fines totalling $27,000. Conservation and Protection (C&P) did not consider the numbers of violations to be unusually high or serious and are not an indication of systematic non-compliance.

Violation type	Number of violations Jan 1st – Dec 31st 2017	Number of fines
Area / time	1	1
Other Legislation	1	0
Illegal buy/sell/posses		1
Registration/licence	2	0
Reporting	8	5

4.5.5 Consultation processes regarding the 2019 management measures to minimise the risks to NARW

The expedited audit conducted of the Scotian Shelf snow crab fishery in December 2017 highlighted DFO had conducted engagement meetings with static gear fishermen in the Maritimes region, notifying them of the NARW entanglements in the Gulf of St Lawrence, highlighting that the whales migrate through the regions waters to their overwintering grounds off the US coast, that whale behaviour may be changing in response to environmental change and, in so doing, there could be an increased risk of encountering the whales while fishing within the DFO Maritimes Region. Follow up workshops were held throughout 2018 either in person or by phone (9 in-person and 6 call-ins) to discuss management measures for reducing entanglement risk; conservation issues; critical habitat for whales; and, dynamic areas management protocols (i.e. management measures if NARW are sighted inside critical habitat areas). The audit team were provided with the Powerpoint presentation that accompanied these workshops.

Further consultations with the fishing industry are being planned for the winter of 2019 to refine measures as necessary to reduce entanglement risk while minimizing effects on the fishery. DFO also plan to review current measures internally, as well as with other partners, e.g. NOAA, to optimise effectiveness. This work is to be coordinated across all DFO Atlantic Regions. Members of the audit team spoke with a representative from the Ecology Action Centre (EAC) during the audit process and they confirmed that they had participated in the regional DFO workshops and that the working relationship on the NARW entanglement issue between the ENGOs / DFO / fishing industry in Canada is good and apparently more positive than the relationship between

similar organisations / sectors in the U.S. They did, however, highlight that communication between DFO and the fishing industry on some of the dynamic closures in the sGSL snow crab fishery had caused problems and concerns with the industry there.

Two rounds of Scotian Shelf Snow Crab Advisory Committee Meetings were held in 2018 (for a total of 7 meetings held pre and post season for each CFA). The minutes of the meetings were provided to the audit team.

4.6 The General Conditions of Certification

The general 'Conditions' set out for the ASPANS as the certificate holder at initial full assessment were as follows:

- The Client must recognize that MSC standards require regular monitoring inspections at least once a year, focusing on compliance with the 'Conditions' set forth in this report (as outlined below) and continued conformity with the standards of certification;

- The Client must agree by contract to be responsible financially and technically for compliance with required surveillance audits by an accredited MSC certification body, and a contract must be signed and verified by SAI Global prior to certification being awarded;

- The Client must recognize that MSC standards require a full re-evaluation for certification (as opposed to yearly monitoring for update purposes) every five years;

- During the expedited audit, the Clients fulfilled the requirement to document an 'Action Plan' for Meeting the Conditions for Continued Certification' and have these approved by SAI Global; and

- The Client must provide a list of all the entities eligible for certification as well as a list of active vessels fishing under one the certificate. This list must be updated annually prior to each annual surveillance audit activity.

Fulfilment of General Conditions – Surveillance Audit 1

- An Action Plan was submitted and accepted during the expedited audit following an expedited audit carrying out in 2018 and actions undertaken against the milestones of each Condition in the intervening period are reported upon in the next following sections.

- An up-dated list of client group members was provided to SAIG surveillance team during the site visit.

4.7 The Specific Conditions of Certification

During the 2018 expedited audit, a conditional score was allocated for PI 2.3.1 ETP species outcome and 2.3.2 ETP species management strategy.

Tables 5 summarises the status of each condition.

Table 5. Summary of Assessment Conditions.

Condition number	PI	Status at 1st surveillance audit	Original score	2018 Expedited audit	Principle revised score
1	2.3.1	**Open- on target**	80	75	Principle 2 Ecosystem 94.7
2	2.3.2	**Open- on target**	85	70	

5 Assessment Process

The Surveillance Audit followed the current version of MSC procedures implemented by SAI Global's accredited MSC Procedures (QP).

MSC Scheme Document	Issue Date	Implementation
MSC FCR and Guidance v2.0	October 1st, 2014	Standard and Process
General Certification Requirements v.2.2	March 1st, 2018	Process
Surveillance Reporting Template v1.0	October 8th, 2014	Process

Table 5.3. Fishery Surveillance Program.

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 6	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & re-certification site visit.

The surveillance audit was conducted as a normal onsite audit.

The Surveillance Audit was comprised in general of:

1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation;

2. To evaluate the progress of the fishery against Conditions of Certification raised during the Expedited Audit.;

3. To review any developments or changes within the fishery which impact traceability and the ability to segregate MSC from non-MSC products; and

4. To review any other significant changes in the fishery.

The surveillance audit consisted of the announcement to stakeholders and interested parties as required through the MSC website and more direct stakeholder contact with the original stakeholders that took part in the re-assessment and management organizations that comprise the management system and regime for the Scotian Shelf snow crab trap fishery. Through this process, a stakeholder consultation plan was developed as part of the on-site assessment.

Emails and information on objectives of the surveillance audit were sent to stakeholders and management agencies. From this, a surveillance on-site meeting plan was organized and appointments for each individual meeting set. Due to the nature of the management of the Scotian Shelf snow trap fishery, and the geographic location of the respective clients and stakeholders, the on-site audit meeting was proposed to be in Moncton, New Brunswick, and Dartmouth, Nova Scotia.

- On site Surveillance Audit date was 15th and 16th November 2018.
- On-site audit was performed by Géraldine Criquet (Lead Auditor), Vito Romito (Assessor), Jerry Ennis (Assessor) and Paul Knapman (Assessor)

The surveillance audit meeting was informed by a pre-determined agenda. The agenda was set out so as to allow specific stakeholder interests and concerns to be covered through a structured approach.

Information and notes from the consultation phase of the assessment were combined with a review of formal documentation from science and management agencies, regulatory amendments and the direct evidence collected during each consultation meetings.

5.1 Summary of stakeholder and client meetings

Arising out of the stakeholder consultation plan preparation a considerable number of stakeholders were contacted directly by e-mail and a final direct consultation plan for the audit was prepared. Table 6 details the dates, meeting locations and organisations that were consulted through direct meetings or conference calls during the on-site surveillance assessment.

All meetings were conducted by the Surveillance Audit Team.

Table 6. Consultation Meetings during the On Site Surveillance Assessment of Scotian Shelf snow crab trap fishery.

Name of Organisation	Present at Meetings	Location	Venue	Date/Time	Purpose
ASPANS	SAIG audit team ASPANS: Peter Norsworthy, Gilles Thériault	Moncton	Hotel Chateau Moncton	15th November 2018 8.30 am	Updates on bait use NARW: management measures implemented, industry initiatives, collaboration with DFO through funding for pilot projects, trial of gear modifications, long-term solutions, Dec 2018 post-season review
DFO Maritimes	SAIG audit team DFO: Scott Coffen-Smout, Ben Zisserson, Angelia Vanderleer, Tim Hayman, Katherine Hastings, Anna Eyrich, Laura Hussey-Bondt, Stacey Bieren, Thomas Wheaton ASPANS: Peter Norsworthy	Dartmouth	Bedford Institute of Oceanograhy	16th November 2018 9.00 am	Fishery updates: fishing season, spatial distribution of fishing season, number of licences and traps allocation per area. Principle 1 new biomass estimation methodology, recruitment, outcomes of 2018 stock assessment Principle 2: management measures to minimise interactions with NARW, NARW monitoring, DFO long-term plan to address NARW interactions, review process of 2018 management measures, NARW research projects. Principle 3 updates: change in DFO staff, changes in legislation, enforcement activities and compliance, revision of IFMP to include management measures for NARW.
ASPANS	SAIG audit team ASPANS: Peter Norsworthy	Halifax	Over lunch	16th November 2018 12.00 pm	Closing meeting Recap of site visit meetings Additional information requested Next step and timeline

6 Results

6.1 Evaluation tables for conditions

6.1.1 Condition 1 of 2

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	**2.3.1 ETP species outcome**	**Scoring issue a** **Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.**	**75**
Condition	Evidence should be provided by the second annual audit that the combined effect of the MSC UoAs on the NARW population are highly likely to be within national limits.		
Client action plan and agreed Milestones	**Action Plan** 1. The client shall immediately contact the DFO regions and certificate holders of other MSC certified V2.0 fisheries to inform them of the requirement to jointly develop a comprehensive strategy for the conservation of NARW. 2. The client shall request an update from DFO in the Maritimes and Gulf regarding the status of activities detailed in the Recovery Measures Implementation Schedule of the SARA Action Plan. 3. The client will collaborate with DFO, other certificate holders and harvesting groups to gather and document information regarding research activities proposed or being undertaken that supports further fishing mitigation measures. 4. The client will engage NGO's to solicit expert advice regarding current and proposed measures and research activities. This expert advice will be shared with DFO, harvesters and other MSC certificate holders. 5. The client will support DFO to document current measures and results to document the performance measures of the SARA action plan. 6. The client shall gather and analyze fishing activity effort information and NARW sighting information to illustrate on an interactive map the spatial and temporal overlap fishing activity with NARW presence. 7. The client will work with DFO, harvesters and NGO's to determine if the impact of fishing activities on NARW are within national limit, and gauge the change of degree of risk, as possible. **Milestones** By Year 1: the CAB will be presented with evidence that a comprehensive strategy for the conservation of NARW has been implemented (score remains unchanged). By Year 2: By the second surveillance audit the CAB will be presented with evidence that the combined effect of the MSC UoA's on the NARW population are highly likely to be within national limits (score reaches 80).		

Progress on Condition [Year 1]	Management measures have been implemented in 2018 in Canada to curb NARW mortalities and avoid entanglement events. Based on the fact that the Canadian limit is zero take and 0 mortalities have been recorded in Canada for 2018 (and taking into account uncertainties), the combined effects of relevant MSC UoAs (V2 of the Standard) on the NARW population/stock are likely known but it is unclear if they are highly likely (>80th percentile as for MSC Table SA9) to be within these limits.
Evidence for Year 1	**NARW Interactions during the 2018 fishing season** The DFO and Transport Canada took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. The key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality. **Canadian NARW Mortalities** During 2018 there were zero NARW mortalities in Canada. However, it is worth pointing out that there are uncertainties about whale #3893 (see table below) and whether its mortality was due to entanglement from US or Canadian gear. Data submitted through the Stakeholder Submission (see in Appendix) of the Whale and Dolphin Conservation, North America, claims that the January 22nd 2018 whale mortality in the US should be attributed to a Canadian snow crab fishery. However, this claim has not been confirmed by DFO or any other agency sources in the US, or in the 2018 NARWC Report Card. **Canadian NARW Entanglements** In November 2018, DFO reported **3 entanglements incidents for 2018** (2 in the GSL and one from either the GSL or Bay of Fundy) as well as noting two additional NARWs with fresh entanglement scars. The two additional NARWs with fresh entanglement scars may have become entangled and disentangled. The gear responsible for the wounds/scars is unknown. **Right Whale 3843 – GSL or Bay of Fundy?** *RW# 3843 - seen in GSL then 53 days later in Bay of Fundy, Canada, entangled in gear with 5/8" line with lead core. Described as attached to something "heavy" and was last seen with line attached.* About this whale, the 2018 NARW Consortium Report Card further mentioned that the date of first sighting was July 30th 2018, Bay of Fundy, Canada, and that: "[*the whale was] Observed entangled in the Bay of Fundy trailing a buoy approx. one body length aft of the flukes. Whale was very thin and had severe wounds and significant*

	aggregations of cyamids around the peduncle. Whale was partially disentangled on 8/5/2018 (including the attached buoy). There is likely some remaining line on the whale that will hopefully shed over time. Resighted (almost 5 months later) on 12/30/2018 southeast of Nantucket. Line remains, exiting left mouth and there may be a rostrum wrap." The Audit Team notes that RW 3843 appears to be still entangled based on the 2018 NARW Consortium Report Card description. Also, at this point it is unclear whether this entanglement should be assigned to the GSL or the Bay of Fundy, since the gear and region RW 3843 was entangled in is unknown. However, based on available information we know that this whale has likely remained entangled for at least 5 months, has been severely wounded and was last sighted in very poor health condition[37]. All these factors may collectively affect the survival of this whale. For the other 2018 entanglements please refer to the background section for an in depth description. Based on the fact that the Canadian limit is zero take and zero mortalities have been recorded in Canada for 2018 and, taking into account the uncertainty about whale #3893's death and injuries of entangled whales that may result in mortality, the combined effects of relevant MSC UoAs (V2 of the Standard) on the NARW population/stock are likely known but it is unclear if they are highly likely (>80th percentile as for MSC Table SA9) to be within these limits.
Conclusion and Outcome on Condition 1 from 1st surveillance audit	The CAB has been presented with evidence that measures in support of a comprehensive strategy for the conservation of NARW have been implemented in 2018. The fishery retains the score of 75 and meets the year one milestone.
Status of condition	**Open – on target. No change in score.**

37 https://www.researchgate.net/publication/237973508_Visual_health_assessment_of_North_Atlantic_right_whales_Eubalaena_glacialis_using_photographs

6.1.2 Condition 2 of 2

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	**2.3.2 ETP management strategy**	**Scoring issue a - There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimize mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.** **Scoring issue c - There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.** **Scoring issue d - There is some evidence that the measures/strategy is being implemented successfully.** **Scoring issue e - There is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species and they are implemented as appropriate.**	**70**
Condition	• Evidence should be provided that there is strategy in place for managing the UoA's impact on NARW which is designed to be highly likely to achieve national and/or international requirements for the protection of the NARW. • Evidence should be provided that there is objective basis for confidence that the partial strategy will work and is being implemented successfully. • Evidence should be provided that there is a regular review of the potential effectiveness and practically of alternative measures to minimise UoA-related mortality of the NARW and they are implemented as appropriate.		
Client action plan and agreed Milestones	**Action Plan** 1. The client shall request an update from DFO regarding the status of activities for NARW as per related SARA Recovery Strategy and Action Plan. 2. The client will support DFO to document current measures and results to document the performance measures of the relevant SARA Action Plan. 3. The client will work with DFO, harvesters and NGO's to determine if the impact of fishing activities on NARW are within national limits, and gauge the change of degree of risk, as possible. **Milestones** By Year 1: the CAB will be presented with evidence that a strategy for managing the UoA's impact on NARW has been implemented. By Year 2: the CAB will be presented with evidence that the strategy has been successfully implemented. (score reaches 80).		

Progress on Condition [Year 1]	The CAB has been presented with evidence that management measures in support of the development of a comprehensive strategy for the conservation of NARW have been implemented in 2018. Plans for the 2019 season have been announced but remain to be formally agreed as management rule in the Fish Harvester Notices. If these measures and other expected developments (rope-less gear) continue to be successfully implemented (in 2019 and beyond) and become important components of a comprehensive strategy for NARW conservation the fishery will be on track to meet the year 2 milestone.
Evidence for Year 1	**NARW Interactions during the 2018 fishing season** The DFO and Transport Canada took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. The key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality. **Key management measures implemented for the 2018 fishing season** The DFO outlined the following key management measures for the protection of NARWs: • **Shortening of line between buoys:** Harvesters were asked to shorten the line between the primary and secondary buoy beyond the requirements outlined in their licence conditions (if applicable) to further reduce the risks of NARW and other marine mammal entanglements. • **Mandatory reduction of floating rope at surface:** Harvesters were asked not to have rope attaching fishing gear to a primary buoy floating on the surface of the water after the gear has been set. This is to further reduce the risks of NARW and other marine mammal entanglements. • **Reporting Sightings of NARW and Marine Mammals:** Harvesters were also asked to report all sightings of NARW and Marine Mammals that are in distress or dead. • **Modified reporting requirements for SARA logs** (note, SARA logbook reporting continues to be required for the snow crab fleet. The SARA logbooks have been updated for all fleets in Maritimes Region, though the updated log introduces no significant changes to requirements for the snow crab fishery). • **Mandatory reporting of lost crab gear.** DFO also reinstated disentanglement by response organizations. Funding from DFO was increased in 2018 to support marine mammal response groups.

Accordingly, there were dynamic area closures on a grid-by-grid basis in both the Roseway and Grand Manan Basin critical habitat areas when any NARW were spotted in these areas. The effect of these NARW management measures on fishing activity could vary on a daily basis as dynamic closure management measures were imposed.

Closures to reduce the risk of interactions of NARW with fishing gear only occurred in Roseway and Grand Manan Basins, and those were outside of the snow crab fishing season in that area, so there were no NARW closures affecting the snow crab fishery in the Scotian Shelf.

NARW Monitoring in 2018

In 2018, a very extensive area was monitored by DFO (including Control and Protection) from April 1st to September 15th 2018 using a suit of different planes. In this period about 2'000 survey hours of flights were logged, about 5 times more hours than 2017.

In addition to the aerial surveys, DFO Science deployed Marine Mammal Observers that totalled about 1,000 hours of observation on a number of different research vessels.

Near real time and autonomous Passive Acoustic Monitoring (e.g. including hydrophones and gliders) systems were also set up to track for presence of NARW.

Industry Action/research

Funding through the DFO's joint federal-provincial Atlantic Fisheries Fund (AFF) has been announced to the Coldwater Lobster Association (CLA) to conduct a pilot study on the effectiveness and practicality of rope-less fishing gear technology for the commercial lobster industry within lobster Fishing Area 34 (LFA 34). CLA is partnering with an oceans technology company, to research, test, explore, demonstrate and/or sea trial rope-less fishing gear, acoustic receivers and related technology to reduce some risks to the endangered NARW population, as well as for other marine mammals.

Furthermore, through DFO's AFF, the Association des Crabiers Acadiens Inc. (ACA) in coordination with the Association des Pêcheurs Professionnels Crabiers Acadiens and the Crabiers du Nord-est have received funding over three years to implement a series of initiatives to research, test, explore, demonstrate and/or sea trial, technologies and processes to mitigate the risks of right whale entanglements in snow crab fishing gear. There were 13 initiatives outlined by these groups, all of which were described and included in the Corrective Action Plan. An update regarding each of these 13 initiatives by industry, progress against timelines, etc. is provided in this report.

DFO lead research activities during 2018

DFO has undertaken numerous initiatives to increase knowledge regarding NARW including the following activities and commitments to further identify mitigation measures. During the site visits, the science Ocean Protection Program reported to

	have funding for 5 years for monitoring the effects of noise pollution on NARW and for real time detection systems to prevent vessel strikes. **Management Plans for 2019** On February 7, 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard, along with the Minister of Transport, and Member of Parliament for Acadie—Bathurst, announced how the Government of Canada will protect the endangered North Atlantic Right Whale during the 2019 season[38]. To reduce the probability of vessel strikes the Government is: • Re-introducing a mandatory speed restriction for vessels 20 metres or longer to a maximum of 10 knots when travelling in the western Gulf of St. Lawrence starting on April 28th 2019. • Continuing to allow vessels to travel at safe operational speeds in parts of two shipping lanes north and south of Anticosti Island when no NARW are spotted in the area. • Adjusting the areas where the mandatory speed restriction applies to reflect NARW sightings to minimize impacts on the cruise ship industry and on community resupply. To address the possibility of entanglements in fishing gear the Government is: • Adjusting the area closed to snow crab, lobster fisheries and all other non-tended fixed-gear fisheries in Atlantic Canada and Quebec to include the area where 90% of the NARW were sighted last year during the prime fishing season. This area is a little less than half the size it was in 2018 and is more elongated North-to-South than in 2018. • Keeping the overall protection area the same in terms of the combined season-long closure area and the area where temporary 15-day closures may occur for snow crab, lobster fisheries and all other non-tended fixed-gear fisheries following a sighting of one or more NARW. • Adjusting the protocol for temporary closures to include provisions for sightings of NARW in shallow waters less than 20 fathoms (approximately 36.5 metres deep). A 15-day closure will be triggered in waters less than 20 fathoms only if one or more NARW are spotted in shallow waters. Once properly agreed and formalised as fishery regulations, these measures or potentially, some variation of them, will be published in formal Notice/s to Fish Harvesters to be implemented in the 2019 snow crab season.
Conclusion and Outcome on Condition 1 from 1st surveillance audit	On February 7th 2019 the Canadian Minister of Fishery and other Government officials announced planned NARW management measures for 2019. These measures are quite similar to those implemented in 2018. Once properly agreed and formalised as fishery regulations, these measures or potentially, some variation of them, will be published in formal Notice/s to Fish Harvesters to be implemented in the 2019 snow crab season. Furthermore, from a research perspective, DFO was planning a meeting in December 2018 to review 2018 activities and continue to

[38] https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html

	develop research, monitoring activities (in conjunction with its collaborators) and management plans for the 2019 season. The audit team concludes that a strategy made up of a set of management measures is being implemented for managing the UoA impact on the NARW. The fishery is meeting the requirements of the Year 1 milestone.
Status of condition	**Open – on target. No change in score.**

6.2 Summary of Status of Condition

Condition	Performance Indicator	Status
1	2.3.1	**Open – on target**
2	2.3.2	**Open – on target**

6.3 Revised milestones

N/A

6.4 Recommendations

The following recommendation has been set during the surveillance audit.

Recommendation (relating to PI 2.3.3 ETP Information)	While there has been some improvement in the levels of SARA reporting, the client group should continue to encourage fishery participants to comply with the mandatory submission of SARA (nil) logs for each trip as required by license condition so that potential interactions with leatherback turtles and wolffishes are thoroughly recorded. Moreover, the client group should take appropriate steps to encourage Dockside Monitors (who are the first point of contact when crab catches are landed) to notify DFO when SARA logs are not completed in accordance with appropriate licence conditions so that irregularities can be appropriately investigated.

7 Conclusion and Outcome of SAI Global Decision

The assessment team conducting this 1st surveillance audit confirms that the ASPANS has met the general requirements for continued certification to the MSC Principles and Criteria for Sustainable Fishing.

The Assessment Teams notes and commends all the parties involved with what can only be described as an impressive amount of management measures implemented in the 2018 season to curb mortality, reduce entanglements and minimize the UoA-related mortality of ETP species.

The assessment team recommends that continued certification be awarded to the respective client fisheries:

- **The Scotian Shelf snow crab trap fishery.**

7.1 Outcome of SAI Global Decision

SAI Global determines that:

> **The Scotian Shelf snow crab trap fishery continues to operate a well-managed and sustainable fishery and therefore, continued certification to the MSC Principles and Criteria for Sustainable Fishing is awarded.**

8 References

Daoust, P.-Y., Couture, E.L., Wimmer, T., and Bourque, L. 2017. Incident Report: North Atlantic Right Whale Mortality Event in the Gulf of St. Lawrence, 2017. Collaborative Report Produced *by:* Canadian Wildlife Health Cooperative, Marine Animal Response Society, and Fisheries and Oceans Canada. 224 pp. December 29th 2017, modified from October 5th 2017.
http://www.cwhc-rcsf.ca/right_whales.php

DFO. 2007. Recovery potential assessment for right whale (Western North Atlantic population). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/027.
http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf

DFO 2016. Report on the Progress of Recovery Strategy Implementation for the North Atlantic Right Whale (*Eubalaena glacialis*) in Canadian Waters for the Period 2009-2014. *Species at Risk Act* Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. iii + 48 pp.

DFO 2017. Assessment of the Atlantic mackerel stock for the Northwest Atlantic (Subareas 3 and 4) in 2016. Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/034.
http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2017/2017_034-eng.html

DFO. 2018a. Assessment of Nova Scotia (4VWX) Snow Crab. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/046.
Available: waves-vagues.dfo-mpo.gc.ca/Library/40726320.pdf

DFO 2018b. Assessment of the southern Gulf of St. Lawrence (NAFO Div. 4T) spring and fall spawner components of Atlantic herring (*Clupea harengus*) with advice for the 2018 and 2019 fisheries. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/029.
http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2018/2018_029-eng.html

Kenney, R.D. 2018. What if there were no fishing? North Atlantic right whale population trajectories without entanglement mortality. Endangered Species Research 37:233-237. https://doi.org/10.3354/esr00926

Pace III RM, Corkeron PJ, Kraus SD, 2017. State–space mark–recapture estimates reveal a recent decline in abundance of North Atlantic right whales. Ecology and Evolution 7:8730–8741.

Pettis H.M., R.M. III Pace, R. S. Schick and P.K. Hamilon 2017. North Atlantic Right Whale Consortium 2017 Annual Report Card. Report to the North Atlantic Right Whale Consortium, October 2017.

Pettis, H.M. *et al.* 2018. North Atlantic Right Whale Consortium 2018 Annual Report Card. Report to the North Atlantic Right Whale Consortium. www.narwc.org.
https://www.narwc.org/report-cards.html

Pisces Consulting Limited 2018. Surveillance Audit Client Submission November 14-16 2018, Maritimes and Southern Gulf of St Lawrence snow crab pot fishery. Prepared for ASPANS and NB/QU Crab producer client members.

Robbins J., A. R. Knowlton and S. Landry 2015. Apparent survival of North Atlantic right whales after entanglements in fishing gear. Biological Conservation 1991: 421-427.

Van der Hoop, J.M., Corkeron P., Moore M. 2017. Entanglement is a costly life-history stage in large whales. Ecol Evol. 2017 Jan; 7(1): 92–106.

Zisserson, B.M., Cameron, B.J., Glass, A.C., and Choi, J.S.. 2018. Assessment of Scotian Shelf Snow Crab in 2017. DFO Can. Sci. Advis. Sec. Res. Doc. 2018/nnn. v + xxx p.

9 Appendices

9.1 Appendix 1. Scoring evaluation tables

Revised scoring rationale text from the expedited audit from Q1 2018 is highlighted in blue. Any text that has been superseded from the PCR or expedited audit is shaded in light grey. Text in black remains unchanged from the PCR. Text added from this 1st Surveillance audit (Nov 2018-Feb 2019), is shown in deep blue.

The cited references can be found in the PCR at:
https://fisheries.msc.org/en/fisheries/scotian-shelf-snow-crab-trap/@@assessments

9.1.1 PI 2.3.1 ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guidepost	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/stock are known and likely to be within these limits.	Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.
	Met?	Y Wolffishes not scored (see SIb) Y leatherback turtle Y fin whale Y blue whale Y NARW	Y Wolffishes not scored (see SIb) Y leatherback turtle Y fin whale Y blue whale N NARW	N Not scored
	Justification	**Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.** SG 100 is not scored as all SG80 have not been met (FCR 7.10.53). **Wolfffish Human Induced Mortality Limits:** *According to DFO The maximum allowable harm that these species can sustain (while not jeopardizing their survival or recovery) could not be adequately quantified due to limitations in population modeling and uncertainty of their population dynamics. However, given levels of harm that occurred over the past decade, the decline in wolffish abundance has not continued, and has reversed in many areas, which suggests*		

that the current harm is sustainable assuming that future stock productivity is similar to that observed in recent time periods.

Leatherback Human induced Mortality Limits

DFO hosted a Regional Advisory Process (RAP) review in May 2004 to review the estimates of mortality that would not jeopardize survival or recovery of leatherback turtles. As a result of these consultations, a formal document entitled "Allowable Harm Assessment for Leatherback Turtle" was prepared. On this document it states that that a human-induced adult mortality of more than 1% would result in population decline. The initial recovery strategy adopted this conclusion and therefore used invoked this human induced mortality mitigation guideline to provide mitigation efforts to avoid interactions commercial fishing activities in Atlantic Canada that are known to incidentally capture leatherback turtles and those authorized to carry out these activities under the federal Fisheries Act.

Whales Human Induced Mortality Limits

The *human-caused mortality limit (also known as Potential Biological Removal, PBR) for the Western North Atlantic s is set by the National Marine Fisheries Service at 1 for North Atlantic Right whale, 2.5 for fin whale and 0.9 for Blue whale (NMFS 2016) .*

A review was done of confirmed mortalities from 2010-2014 for MSC certified fisheries Units of Assessments (UoAs) with potential interactions for ETP Species. (Please see Table 21 on P2 Section)

Information is based on summaries of MSC public certification reports, and Northeast Fisheries Science Center reports (Henry et al 2016). As for 2010-2014, the low level of confirmed mortalities for wolfffish, whales and leatherback turtles for specific gear or UoA was considered very low enough The effects of different UoAs are known through logbook review and observer records as well from other sources NOAA Fisheries, NARWC. Based on the information provided, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits. It meets 80a.

North Atlantic Right Whale (NARW)

The two major sources of human-induced mortality throughout the range of right whales are vessel strikes and entanglement in fixed fishing gear. These two threats account for all of the known human-induced mortality. For the period from 1970 to October 2006, 73 known mortalities have been documented. Of these mortalities, eight were caused by entanglement in fishing gear, 27 were due to vessel strikes, 21 were of undetermined causes, and 17 mortalities were of calves where the cause of death could not be linked to entanglement or vessel strikes. In addition, from 1986 to 2005 there were 61 confirmed reports of entanglements, including the known entanglement mortalities listed above.

In addition to direct mortality, it is possible that whales surviving vessel strike and entanglement episodes may suffer negative effects such as reduced fertility. Seventy-five percent of all living right whales have scars consistent with entanglement or vessel strike, and scarring rates may have increased during the 1990s. Estimates of human-induced mortality due to both vessel strike and entanglement in fishing gear are underestimates of the actual impact of these activities. Whales struck in offshore areas may never be sighted due to low search effort. It is suspected that chronically

entangled animals may sink upon death. There have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). Thus the risk of lethal mortality is low <2.5% Brilliant et al 2017. It meets the SG80a

NARW mortality and entanglement incidents involving the Scotian Shelf snow crab trap fishery have not been reported in 2017, the fishery meeting SG60. However, as there is a national limit for the protection and the rebuilding of the NARW, the audit team investigated whether the combined effects of the MSC UoAs meet the national requirements for the protection of the NARW population.

The national limit for the protection and rebuilding of the NARW is a zero-take. In the U.S., the PBR has been set as a limit and is 1 per year for NARW. There is no international limit set through an international agreement for the NARW. In this case, according to MSC GCR GSA3.10, the audit team should consider the combined impacts of only Canada UoAs.

In 2017, an unprecedented NARW mortality event occurred in the GSL. Necropsies were performed on 7 of the 12 dead whales, it was confirmed that 2 of the NARW mortalities was caused by an entanglement in commercial snow crab fishing gear. One of the whales was entangled in snow crab fishing gear from Crab Fishing Area 12 and the other was entangled in snow crab fishing gear the origin of which was uncertain although, it's associated old trap tag, was from a Quebec-based snow crab harvester.

Therefore, the combined effects of the Canada UoAs certified or assessed using MSC FCR v.2.0 are not highly likely to within the national limit for the protection and the rebuilding of the NARW, SG80 is not met.

2018 First Surveillance Audit – Updates and Determination

2017 NARW Population Status

The ability to monitor North Atlantic right whale vital rates is entirely dependent on the North Atlantic Right Whale Identification Database (Catalog), curated by the Anderson Cabot Center for Ocean Life at the New England Aquarium. As of September 4, 2018, the database consisted of over a million slides, prints, and digital images collected during the 75,142 sightings of 734 individual right whales photographed since 1935[39]. Each year, 2,000 to 5,000 sightings consisting of 20-30,000 images are added to the identification database. Using Catalog data, a number of methods have been employed to estimate the number of North Atlantic right whales alive annually.

- The **presumed alive method** (PA) counts whales that have been seen at least once in the last six years (Knowlton *et al.* 1994). It is a consistently measureable and easily available value, but it assumes that whales remain alive for six years after their last sighting (which is often not the case) and the estimates for recent years may be artificially low due to delays in data processing. The PA number for 2017 is 465.
- The **Catalog method** (formerly referred to as the "Report Card" method) includes a low, middle and high estimate. The values are based upon the number of photographed whales only; they exclude potential unphotographed whales and therefore should not be considered a "population estimate". This estimate has the weakness of utilizing the PA methodology with its assumptions, but it is the only method that incorporates whales that have been photographed but not yet added to

[39] https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

the Catalog. The Catalog estimates for 2017 range from a low of 343 to a high of 728 with a middle estimate of 511.

- The **Minimum Number Alive** (MNA) is the number that was historically used in National Marine Fisheries Service stock assessment reports and counts whales seen in a given year, plus any whale not seen that year- but seen both before *and* after (see Hayes *et al.* 2017). The MNA number is more accurate than PA for older years, but is also not accurate for recent years for the same reason as the PA method, plus the fact that there have been fewer "after" years to detect a whale. The MNA number for 2017 is 347.
- The **Pace method** analysis was used since 2016 and comes from the Pace *et al.* 2017 model which "adapted a state-space formulation with Jolly-Seber assumptions about population entry (birth and immigration) to individual resighting histories and fit it using empirical Bayes methodology." This model estimate includes whales that have not been photographed. The full methodology is available in the paper. It is important to note that the estimates provided by the Pace *et al.* 2017 methodology represent the estimated abundance at the *start* of the sample period plus all new entries into the population. That number for 2017 is 428. If one wanted an estimate at the end of the interval, one could subtract the number of known dead (or estimated number of dead if a detection rate for carcasses was available).

The best estimate for the population at the end of 2017 was 411[40], and there have been an additional three documented mortalities in US waters in 2018.

NARW Interactions during the 2018 fishing season

The DFO and Transport Canada took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. The key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality.

Canadian NARW Mortalities

During 2018 there were zero NARW mortalities in Canada.

Canadian NARW Entanglements

In November 2018, DFO reported 3 entanglements incidents for 2018 (2 in the GSL and one from either the GSL or Bay of Fundy) as well as noting two additional NARWs with fresh entanglement scars. The two additional NARWs with fresh entanglement scars may have become entangled and disentangled without notice from fishermen or authorities. The gear responsible for the wounds/scars is unknown.

There were dynamic area closures in both the Roseway and Grand Manan Basin critical habitat areas when NARW were spotted in these areas.

[40] https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/

		Since there is no scope for allowable human-induced mortality defined in the Canadian NARW (Recovery Potential Assessment) RPA[41] and the Canadian national limit consists therefore of zero-take for NARW, the effects of the UoA on the population/stock in 2018 are known and likely to be within these limits (i.e. zero mortality recorded in 2018 in Canadian waters[42]). **PI 2.3.1, SG60, Scoring Issue *a* is therefore met.** The national limit for the protection and rebuilding of the NARW is a zero-take in Canada. Since there is no (agreed) international limit set for the NARW and according to MSC GCR GSA3.10, the audit team should consider the combined impacts of Canadian UoAs only. Furthermore, only fisheries in assessment or certified fisheries under V2 of the MSC standard can be considered for "combined effects of the MSC UoAs on…". In July 2016, MSC released the following interpretation regarding the assessment of cumulative impacts for Principle 2 species between FCR v.2,0 and CR v.1.3 fisheries[43]: *"The MSC has noted the points raised in relation to difficulties of assessing cumulative impacts between fisheries on v2.0 and v1.3 of the standard. We have consulted with the MSC Technical Advisory Board (TAB) and Board of Trustees and have reconsidered the language in Table GSA3. Due to the points raised in the request, the first two paragraphs of guidance on 'MSC UoAs and the assessment of cumulative impacts' in Table GSA3 may be taken as a suggestion and does not need to be implemented. The expectation would be that fisheries assessed against v2.0 of the standard shall only be required to consider cumulative impacts with other v2.0 fisheries."* The Western population of NARW is situated along the US and Canadian Coast. The Eastern population's range in in Europe[44]. As such, for this assessment we consider the Canadian MSC Canadian UoAs combined effects on NARW. We consider the same range for fin and blue whales' combined effects of the UoAs. Relevant MSC Fisheries in Assessment as of 25 January 2019 MSC Fisheries in Assessment • AQIP Gulf of St Lawrence Greenland halibut and Atlantic halibut fixed gear fishery • AQIP snow crab trap (Gulf of St Lawrence) No mortality but 3 entanglements recorded in the GSL in 2018. Certified MSC Fisheries as of 25 January 2019 • Newfoundland and Labrador snow crab trap fishery – (no identified issues of NARW entanglements or mortality in 2018) • Gulf of St Lawrence snow crab trap fishery (no mortalities in 2018 but some

[41] http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf

[42] https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/

[43] http://msc-info.accreditation-services.com/questions/assessing-p2-species-cumulatively-between-v2-0-and-1-3-fisheries/

[44] https://www.fisheries.noaa.gov/species/north-atlantic-right-whale

entanglements occurred)

- Iles De la Madeleine lobster trap fishery – (no identified issues of NARW entanglements or mortality in 2018)

However, it is worth pointing out that there are uncertainties about whale #3893 and whether its mortality was due to entanglement from US or Canadian gear.

Data submitted through the Stakeholder Submission (see in Appendix) of the Whale and Dolphin Conservation, North America, claims that the January 22nd 2018 whale mortality in the US should be attributed to a Canadian snow crab fishery. This claim has not been confirmed by DFO or any other agency sources in the US, or in the 2018 NARWC Report Card.

The Canadian limit is zero take and zero mortalities have been recorded in Canada for 2018. In addition, when taking into account the injuries from Canadian entanglements that may result in mortality and the uncertainty about whale #3893, the combined effects of the MSC UoAs on the NARW population/stock are likely known but it is unclear if they are highly likely (>80th percentile as for MSC Table SA9) to be within these limits.

PI 2.3.1, SG80, Scoring Issue *a* is not met.

Leatherback turtle

It is currently listed as 'endangered' under SARA. Incidental entanglement in fishing gear such as pelagic longlines, lines associated with pot gear and gillnets, buoys and anchor lines, and other ropes and cables pose a risk of entanglement to Leatherback Sea Turtles. Entangled turtles are at risk of serious injury, infection, necrosis or death. Entanglement can limit the Leatherback Turtle's ability to feed, dive, breathe or perform other essential behaviors. Until recently, there has been relatively little study of the interaction between Canadian East Coast fisheries and Leatherback Turtles. Based on discussions by a group of experts at a workshop, O'Boyle (2001) rated the relative potential impact of a wide range of gear types used on Canada's East Coast.

Overall, it was considered that gears such as dredges (Scallop and Clams), trawls (groundfish and Shrimp), purse seine and weirs (Herring) were a low threat. Gears which were moored to the bottom, including longline (groundfish and large pelagic), gillnets (groundfish and Herring), traps (Lobster) and pots (Snow Crab) represented a higher risk, somewhat mitigated by the spatial and seasonal distribution of the gear. Since then, a number of studies have been conducted that provide further understanding of the interaction between fishing gear and Leatherback Turtles. One of the most important sources of information on Leatherback – fisheries interactions is the observer program conducted by DFO in each region (Newfoundland, Gulf, Quebec and Maritimes) and SARA logbooks.

The most observed encounters with Leatherback Turtles have been reported by the Maritimes observer program including Scotia Fundy /Eastern Georges Bank. During 2001-2010, a total of 143 Leatherbacks were reported as being encountered (Table 5). Of these, 138 were reported from the large pelagic longline fishery. There have been no reported interactions between this fishery and Leatherback Turtles in the zonal

		observer dataset since 2001. From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. During 2005-2011, there were three reports (one in 2006 and two in 2008) from the Quebec Region. It meets the SG80a score When in Canada, Leatherbacks can be found in coastal, shelf and offshore waters[45] to beyond 50°N[46]. They spend the majority of their time within the photic zone (the sunlit depths) when foraging; however, the species is capable of diving to much greater depths, mostly within 300 metres of the surface. Infrequent deeper dives of up to 1.2 km have also been recorded. Leatherback Sea Turtles do not come on shore in Canada. Leatherback turtles are long-lived, slow to reach maturity such that they exhibit a low rate of population increase; however it is believed they sustain human-induced mortality rates[47] of up to 1%. Incidental captures in Canadian waters appear to account for a small proportion of estimated incidental captures in the Atlantic population. Note, there are no international agreed limits for this species, hence the Canadian effects are taken into account. Assuming current levels of fishing effort within Canadian jurisdiction, the review committee concluded that there was scope for human-induced mortality without jeopardizing survival or recovery of this species. A 2017 study by Hamelin et al. [48] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, changes in fishing effort may reduce entanglement rates. For example, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions. Snow crab fishing in CFA 24W ended on April 7, 2018[49]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the August 31st date[50] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. It meets the SG80a score.

[45] http://www.dfo-mpo.gc.ca/species-especes/profiles-profils/leatherbackturtleatlantic-tortueluthatlantique-eng.html
[46] https://www.iucnredlist.org/species/46967827/46967830#geographic-range
[47] http://waves-vagues.dfo-mpo.gc.ca/Library/281611.pdf
[48] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733
[49] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[50] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm

		Fin Whale Use of fixed gear and gillnets in fisheries constitutes a potential cause of mortality or injury for fin whales. Entanglement in fishing nets and lines can lead to injury, infection and even death through anoxia (absence of oxygen) of fin whales. In some cases, whales entangled in fishing gear experience difficulty moving about and feeding, to the point where reproduction and survival may be compromised (Reeves et al., 1998; Clapham et al., 1999). It is, however, difficult to assess the scope of the threat of entanglements because many probably go unreported or unnoticed. Photo-identification studies have revealed cases of injury and entanglement in fishing gear (Agler et al., 1990). Two fin whales found dead in the Jacques Cartier Strait in 2009 presented signs of entanglement (Banville, 2010). Entanglements have been reported in the St. Lawrence Estuary. Between 1979 and 2008, 11 fin whales entangled off Newfoundland and Labrador have been reported (Benjamins et al., in press). Fin whales could be large enough to extricate themselves from gear when they do become entangled unlike smaller whales such as the Minke whale (B. acutorostrata). Fishing gear can however stay entangled on the whale for extended periods of time, resulting in wounds prone to infections. Nevertheless, there have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). It meets the SG80a score for both areas and all gear types. Note, there are no international agreed limits for this species, hence the Canadian effects are taken into account. No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[51]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It meets the SG80a score. **Blue Whale** The presence of certain types of fishing gear could present a threat to blue whales since the gear can kill animals by anoxia if they become entangled. Even when blue whales manage to escape fishing gear, they can be injured by two parts of the gear (e.g., cables, buoys) over a long time. In 1987, a Blue whale was observed north of Cape Cod trailing a fishing cable and buoy that appeared to be from the lobster fishery (Reeves, et al., 1998). In some cases, entangled whales could have difficulty moving and feeding, to the point that their reproductive activities and survival are compromised (Reeves, et al., 1998; Clapham, et al., 1999). Blue whales are powerful animals that rarely become entrapped in fishing nets. Despite this, three Blue whales caught in gillnets have died in the St. Lawrence since 1979 (Sears and Calambokidis, 2002). There have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). It meets the SG80a score. Note, there are no international agreed limits for this species, hence the Canadian effects are taken into account. No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic

51 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

		Large Whale Take Reduction Plan (ALWTRP) entanglement summary[52]. Three entanglements were reported in US waters in 2017[53]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It meets the SG80a score.		
b	Direct effects			
	Guidepost	Known direct effects of the UoA are likely to not hinder recovery of ETP species.	Known direct effects of the UoA are highly likely to not hinder recovery of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species.
	Met?	Y	Y	Not scored
	Justification	**Known direct effects of the UoA are highly likely to not hinder recovery of ETP species.** SG 100 is not scored as all SG80 have not been met (FCR 7.10.53). **North Atlantic Right Whale** The population in 2015 was estimated to be 524 individuals based on the number of individually-identified photographed whales (Pettis and Hamilton 2016). The 'minimum number alive population index' (the minimum number of live whales in the population calculated from the individual sightings database) provides an estimated average population growth rate of 2.8% for the 1990-2011 period (Waring et al. 2016). However, due to a 40% decrease in the estimated calving rate since 2010 (Kraus et al. 2016), population growth rate in recent years (2012-2015) appears to be declining (Pace, 2016) and two out of the three population assessment methods demonstrate a decline in North Atlantic right whale abundance (Kraus et al. 2016 and references therein). The two major sources of human-induced mortality throughout the range to right whales are vessel strikes and entanglement in fixed fishing gear. These two threats account for all of the known human-induced mortality. For the period from 1970 to October 2006, 73 known mortalities have been documented. Of these mortalities, eight were caused by entanglement in fishing gear, 27 were due to vessel strikes, 21 were of undetermined causes, and 17 mortalities were of calves where the cause of death could not be linked to entanglement or vessel strike. In addition, from 1986 to 2005 there were 61 confirmed reports of entanglements, including the known entanglement mortalities listed above. In addition to direct mortality, it is possible that whales surviving vessel strike and entanglement episodes may suffer negative effects such as reduced fertility. Seventy-five percent of all living right whales have scars consistent with entanglement or vessel strike, and scarring rates may have increased during the 1990s. Estimates of human-induced mortality due to both vessel strike and entanglement in fishing gear are underestimates of the actual impact of these activities. Whales struck in offshore areas may never be sighted due to low search effort. It is suspected that chronically entangled animals may sink upon death. There have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). NARW mortality and entanglement		

52 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

53 https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017

		incidents involving the Scotian Shelf snow crab trap fishery have not been reported in 2017. It meets the SG80b score. **2018 First Surveillance Audit – Updates and Determination** Direct effects are considered to be entanglements that may have significant effects on right whales. In November 2018, DFO reported **3 entanglements incidents for 2018** (2 in the GSL and one from either the GSL or Bay of Fundy) as well as noting two additional NARWs with fresh entanglement scars. The two additional NARWs with fresh entanglement scars may have become entangled and disentangled. The gear responsible for the wounds/scars is unknown. **Right Whale 3843 – GSL or Bay of Fundy?** *RW# 3843 - seen in GSL then 53 days later in Bay of Fundy, Canada, entangled in gear with 5/8" line with lead core. Described as attached to something "heavy" and was last seen with line attached.* About this whale, the 2018 NARW Consortium Report Card further mentioned that the date of first sighting was July 30th 2018, Bay of Fundy, Canada, and that: "[*the whale was] Observed entangled in the Bay of Fundy trailing a buoy approx. one body length aft of the flukes. Whale was very thin and had severe wounds and significant aggregations of cyamids around the peduncle. Whale was partially disentangled on 8/5/2018 (including the attached buoy). There is likely some remaining line on the whale that will hopefully shed over time. Resighted (almost 5 months later) on 12/30/2018 southeast of Nantucket. Line remains, exiting left mouth and there may be a rostrum wrap.*" The Audit Team notes that RW 3843 appears to be still entangled based on the 2018 NARW Consortium Report Card description. Also, at this point it is unclear whether this entanglement should be assigned to the GSL or the Bay of Fundy, since the gear and region RW 3843 was entangled in is unknown. However, based on available information we know that this whale has likely remained entangled for at least 5 months, has been severely wounded and was last sighted in very poor health condition[54]. All these factors may collectively affect the survival of this whale. **Results of 2017 entanglements and relevance to 2018 entanglements** SI determinations are the products of a transparent and objective methodology, resulting from evidence and collective expert input. The most recent data available on Serious Injury and Non Serious Injury determination for Canada is for 2017, as shown in a NMFS fall 2018 update[55]. Based on the update, in 2017 there have been: • 4 Canadian Serious Injuries reported from snow crab trap/pot,

54 https://www.researchgate.net/publication/237973508_Visual_health_assessment_of_North_Atlantic_right_whales_Eubalaena_glacialis_using_photographs

55 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

		• 3 Canadian Non Serious Injuries reported from snow crab/ pot gear, • 1 Canadian Non Serious Injury from unknown gear. However, we note that information from the November 2017-March 2018 Expedited Audit specified the following about the entanglements that occurred in 2017: "*NARW mortality and entanglement incidents involving the Scotian Shelf snow crab trap fishery have not been reported in 2017.*" Based on this, the Scotian Shelf snow crab fishery does not appear to be responsible for any entanglement resulting in Serious Injury that occurred in 2017. Furthermore, because it is unclear whether the Grand Manan Basin entanglement should be assigned to the GSL or the Bay of Fundy, since the gear and region right whale 3843 was entangled in remains unknown and cannot be assigned with confidence to this fishery, there is sufficient evidence to determine that the known direct effects (i.e. entanglements with potential significant effects) of the UoA are likely to not hinder recovery of the endangered NARW population. **As such, PI 2.3.1, SG60, Scoring Issue *b*, is met.** Additionally, because no entanglement resulting in significant NARW injury can be assigned to the Scotian shelf fishery, we can say that direct effects (i.e. entanglements with significant effects) of the UoA are highly likely to not hinder recovery of the NARW population. **As such, PI 2.3.1, SG80, Scoring Issue *b*, is met.** We note that the uncertainties relating to the effect of this entanglement have been accounted for in PI 2.3.1, Scoring Issue *a*. **Wolffish** Very low (<1 mt/annum) catches of wolffish suggest a high degree of certainty that the effects of the fishery are within limits of national and international requirements for the protection of ETP species and that there are no significant detrimental effects (direct) of the fishery on ETP species. It meets SG80b. Since there are no international agreed limits on these species (e.g. between US and Canada) national references are used. Their distribution is quite similar (see maps by clicking on individual species here) and stretches across the GSL, Nova Scotia, Newfoundland, Labrador and north of Labrador (Area 0A, 0B aside from Atlantic Wolfish which extends up to the Labrador coast). As per SARA requirements, Northern and Spotted Wolffish must be released back into the water and only Atlantic Wolffish may be landed[56]. Atlantic Wolffish are considered a resilient species and a good survival rate of live released fish is considered likely. Live release of wolffish remains the most effective method of potentially reducing fishing mortality.

[56] https://www.sararegistry.gc.ca/virtual_sara/files/pr_3loup_wolffish_0813_e.pdf

		The DFO Allowable Harm assessment stated that there is scope for human induced mortality without jeopardizing survival of these species[57]. There are no directed fisheries for wolffish in Canadian waters. Bycatch is the main human related fishing mortality. Between 2014-2016, 10 interactions were noted with the spotted wolffish in the Îles-de-la-Madeleine lobster trap fishery. Post-release survival of wolffish caught in lobster traps are considered to be high[58]. DFO noted after reviewing the SARA log reports from the MSC Scotian Shelf snow crab fleet that 3 spotted wolffish were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with the Newfoundland and Labrador snow crab fishery (2018 re-assessment) from the Newfoundland and Labrador, Gulf, and Maritimes regions. The DFO 2017 Atlantic Coast (All Regions) commercial landings database reported no landings of wolffish[59]. It continues to meet SG80b. **Turtles** Although sea turtle interactions with mobile gear have been observed in waters from the Gulf of Maine (GOM) to the Mid-Atlantic, most of the observed interactions have occurred in the Mid-Atlantic. As few sea turtle interactions have been observed in the Scotian Shelf, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with pot gear trawl gear in these regions and therefore, produce a bycatch estimate for these regions (NEFMC 2015). Given the small number of observed interactions between sea turtles and pot gear in the Scotian Shelf, it is highly unlikely that the snow crab trap fishery is causing unacceptable direct or indirect impacts on sea turtles. It meets SG80b. **Leatherback sea turtles** A 2017 study by Hamelin et al. [60] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, changes in fishing effort may reduce entanglement rates. For example, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions. Snow crab fishing in CFA 24W ended on April 7, 2018[61]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the August 31st date[62] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO

[57] http://waves-vagues.dfo-mpo.gc.ca/Library/284800.pdf
[58] https://fisheries.msc.org/en/fisheries/iles-de-la-madeleine-lobster/@@assessments
[59] http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2017aq-eng.htm
[60] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733
[61] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[62] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm

		also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. It continues to meet SG80b **Fin Whale** Use of fixed gear and gillnets in fisheries constitutes a potential cause of mortality or injury for fin whales. Entanglement in fishing nets and lines can lead to injury, infection and even death through anoxia (absence of oxygen) of fin whales. In some cases, whales entangled in fishing gear experience difficulty moving about and feeding, to the point where reproduction and survival may be compromised (Reeves et al., 1998; Clapham et al., 1999). It is, however, difficult to assess the scope of the threat of entanglements because many probably go unreported or unnoticed. Photo-identification studies have revealed cases of injury and entanglement in fishing gear (Agler et al., 1990). Two fin whales found dead in the Jacques Cartier Strait in 2009 presented signs of entanglement (Banville, 2010). Entanglements have been reported in the St. Lawrence Estuary. Between 1979 and 2008, 11 fin whales entangled off Newfoundland and Labrador have been reported (Benjamins et al., in press). Fin whales could be large enough to extricate themselves from gear when they do become entangled unlike smaller whales such as the Minke whale (B. acutorostrata). Fishing gear can however stay entangled on the whale for extended periods of time, resulting in wounds prone to infections. There have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). From 2012 to 2016, there were no ETP species interaction reported in DFO species-at-risk logbooks and observer reports for the snowcrab fishery. (Colleen Smith DFO personal communication 10/19/2016). It meets the SG80b score. No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[63]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It continues to meet SG80b. **Blue Whale:** Even when blue whales manage to escape fishing gear, they can be injured and tow parts of the gear (e.g., cables, buoys) over a long time. In 1987, a Blue whale was observed north of Cape Cod trailing a fishing cable and buoy that appeared to be from the lobster fishery (Reeves, et al., 1998). In some cases, entangled whales could have difficulty moving and feeding, to the point that their reproductive activities and survival are compromised (Reeves, et al., 1998; Clapham, et al., 1999). Blue whales are powerful animals that rarely become entrapped in fishing nets. Despite this, three Blue whales

63 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

		caught in gillnets have died in the St. Lawrence since 1979 (Sears and Calambokidis, 2002). It is estimated that nearly 10% of Blue whales occurring in the St. Lawrence have scars caused by contacts with fishing gear. There have been few confirmed mortalities from entanglement from 2005-2014 (Henry et al 2016). From 2012 to 2016, there were no ETP species interaction reported in DFO species-at-risk logbooks and observer reports for the snowcrab fishery. (Colleen Smith DFO personal communication 10/19/2016). It meets the SG80b score No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[64]. Three entanglements were reported in US waters in 2017[65]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It continues to meet SG80b.		
c	Indirect effects			
	Guidepost		Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		Y	Not scored
	Justification	**Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.** Indirect effects are likely from disturbances or alterations of seabed by mobile fishing gear; however, consequential severity is unknown. Ecosystem trophic changes may also affect species abundance, structure, and distribution. For Wolffishes, fixed gear (longline, gillnet, and handline) are not known to disturb seabed habitat. There is unlikely to be an overlap with seabed areas of this gear type with rocky areas favored by wolffishes; therefore SG 80 is met. There might be indirect effects from lost gear sediment zones of influence, therefore it cannot be said with a high degree of confidence that SG 100 is met. Atlantic Wolffish are considered a resilient species and a good survival rate of live released fish is considered likely. Live release of wolffish remains the most effective method of potentially reducing fishing mortality. The DFO Allowable Harm assessment stated that there is scope for human induced mortality without jeopardizing survival of these species[66]. There are no directed fisheries for wolffish in Canadian waters. Bycatch is the main human related fishing mortality.		

64 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

65 https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017

66 http://waves-vagues.dfo-mpo.gc.ca/Library/284800.pdf

		DFO noted after reviewing the SARA log reports from the MSC Scotian Shelf snow crab fleet that 3 spotted wolffish were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with the Newfoundland and Labrador snow crab fishery (2018 re- assessment) from the Newfoundland and Labrador, Gulf, and Maritimes regions. The 2017 DFO 2017 Atlantic Coast (All Regions) commercial landings database reported no landings of wolffish[67]. There are no additional updates in regards to this surveillance audit. It continues to meet SG80c. For Whales and Sea Turtles, ecosystem-driven alterations might be the likely indirect effects. For instance, during the pre-moratorium periods the extent of commercial groundfish fisheries (such as for cod, haddock, and redfish) where sufficiently significant to impact abundance of prey species which included sand eels, herring, and capelin. Already there are assumptions of environmental conditions influencing distribution and range of pelagic species in the North West Atlantic (Martin and James, 2005) to change. In addition, recovery action plans (FCO 2016) are in place for the majority if not all of the SARA listed species which include measures to identify and address indirect effects such as marine litter, pollution, or habitat adjustments. Alterations of prey/predator dynamics of pelagic species and environmental conditions which have an effect on krills, plankton, and nutrients are likely to have indirect effects on whales which prey on krill and small pelagics, as well as sea turtles which pray of jelly fish in planktonic rich waters. The moratorium in place is affording the recovery of a number of species with further natural adjustment to prey predator dynamics where the effect of seals and dolphins on pelagic as well as ground fish is likely. There are other issues that may trigger indirect effects from entanglement. There is a summary from the recent DFO review (DFO 2017) of the North Atlantic Right Whale Action plan describing some indirect effects. The energy required to overcome the drag of the gear and the possibility for decreased feeding efficiency significantly contributes to the emaciation that is commonly seen with chronic entanglements (Cassoff et al. 2011). Lacerations and resulting infections are another cause of death in entangled whales as they can have severe tissue and bone damage (Moore and van der Hoop 2012). The length of the time whales are entangled can be years (Moore et al. 2013) and on average it can take six months for an entangled whale to die (Moore et al. 2006). Even if the disentanglement team locates the entangled whale and attempts disentanglement, there is a low probability of success. In a study of 53 North Atlantic right whale entanglements between 1995 and 2008 only 40% of the cases resulted in successful disentanglement (Robbins et al. 2015). Furthermore, sub-lethal entanglements can contribute to declining health and reproductive failure long after the whale is disentangled (Rolland et al. 2016; van der Hoop et al. 2016, 2017). NARW mortality and entanglement incidents involving the Scotian Shelf snow crab trap fishery have not been reported in 2017. It meets 80c.

[67] http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2017aq-eng.htm

References	Daoust, P.-Y., Couture, E.L., Wimmer, T., and Bourque, L. 2017. Incident Report: North Atlantic Right Whale Mortality Event in the Gulf of St. Lawrence, 2017. Collaborative Report Produced *by:* Canadian Wildlife Health Cooperative, Marine Animal Response Society, and Fisheries and Oceans Canada. 224 pp. DFO. 2007. Recovery potential assessment for right whale (Western North Atlantic population). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/027. DFO 2016. Action Plan for the North Atlantic Right Whale (Eubalaena glacialis) in Canada: Fishery Interactions [Proposed]. Species at Risk Act Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 35pp. DFO 2013 Report on the Progress of Implementation of the Recovery Strategy for Northern Wolffish (Anarhichas denticulatus) and Spotted Wolffish (Anarhichas minor), and Management Plan for Atlantic Wolffish (Anarhichas lupus) in Canada for the Period 2008-2013. Species at Risk Act Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa. vi + 16 pp. DFO 2013 Report on the Progress of Recovery Strategy Implementation for the Leatherback Sea Turtle (Dermochelys coriacea) in Canada for the Period 2007-2012. Species at Risk Act Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa NMFS 2017 Hayes SA, Josephson E, Maze-Foley K, Rosel, PE, editors. 2016. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2016. NOAA Tech Memo NMFS NE 241; 274
OVERALL PERFORMANCE INDICATOR SCORE:	80 **75**
CONDITION NUMBER (if relevant):	1

9.1.2 PI 2.3.2 ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guidepost	There are measures in place that minimize the UoA- related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimize mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the UoA's impact on ETP species, including measures to minimize mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	Y	Y Y wolffishes Y leatherback turtle Y fin whale Y blue whale N NARW	N Not scored
	Justification	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimize mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species There are measures in place that minimize the UoA- related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species. SG 100 is not scored as all SG80 have not been met (FCR 7.10.53). Recovery strategies and management action plans are in place by mandatory policies for all ETP species in Canadian waters that are listed within the SARA database. Recovery strategies implemented for the SARA listed species Northern Wolffish, Spotted Wolffish ,Fin Whale, Blue Whale North Atlantic Right whales, and Leatherback Turtle , - mandate licence holders and operators to carry out restricted commercial fishing activities authorized under the Fisheries Act that may incidentally kill, harm, harass, or capture the Northern Wolffish or the Spotted Wolffish or the Leatherback Turtle as per subsection 83(4) of the Act. Goals of the strategy include education and training. For instance, training is provided to operators and observers with reference to ETP identification using photographic images, post-capture release procedures to facilitate high levels of survival, and completing SARA logbooks (and observer logbooks). The strategy also includes a 24hr telephone number for reporting		

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		interactions which triggers DFO's marine mammal response team to assist in releasing animals from snags or entanglements (Brown et al, 2009). The fishery meets SG60 for all ETP species. **Fin and Blue Whale updates** The Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada was published in 2017[68]. The objective of the management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently known distribution range in Canada. To reach this objective, several measures are proposed through four approaches: conservation, stewardship and protection of individuals, education and outreach, research and monitoring. In 2018, DFO published the Action plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada[69]. The action plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. The first set of recovery measures will be undertaken by Fisheries and Oceans Canada, sometimes with the collaboration of partners. These are primarily research measures to estimate the population's size and its use of Canadian waters. They also aim to implement or enforce legislation or policies to protect Blue Whale habitat and mitigate threats. The second set of measures will be undertaken by the Department in partnership with the various stakeholders involved in the Blue Whale's recovery. For example, these measures include research on krill and the use of hydroacoustics to document the presence of these whales. The third set presents measures that concerned stakeholders could undertake voluntarily. Such measures include gathering observations of the Blue Whale, photo-identification and raising awareness among marine users. The Recovery Strategy for the Northwest Atlantic Blue Whale (Beauchamp et al. 2009) presents the various threats facing the population. The long-term goal of this Recovery Strategy is to reach a total of 1,000 mature individuals. To reach this recovery goal, three objectives were set for the Canadian range: **Objective 1:** Define and conduct a long-term assessment of the size, structure and trends of the Northwest Atlantic Blue Whale population, and determine their range and critical habitat within Canadian waters **Objective 2:** Implement control and monitoring measures for activities that could hinder the recovery of the Blue Whale in its Canadian range

68 https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/Mp-FinWhaleAtlantic-v00-2017Jan24-Eng.pdf

69 https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/action-plans/blue-whale-northwest-atlantic-population.html#toc2

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		Objective 3: Increase knowledge of the main threats to the recovery of the Blue Whale in Canadian waters both to determine their true impact and to identify effective measures to mitigate the negative consequences for the population's recovery Wolffish, leatherback turtles, fin and blue whale continue to meet SG80. Other systems for management are believed to be partially implemented in certain cases. For example measures to reduce North Atlantic Right whale entanglement in commercial fishing gears is proposed and implemented but without explicit details of meeting the goals. Information gaps remains a concern in areas where observer coverage is variable, from 100% during the surveys compthe ared to levels during commercial fishing of <1% in 4X5Y, <10% in 3NOPs4VW, and <35% in 5Zjm (Kulka et al, 2007; Mug et al, 2008). Despite recent improvements in observer coverage, it is still not spatially balanced especially among smaller vessels and operators of gillnets or handline. Due to gaps in information and less balanced spatial deployments of observes, it cannot be said that the strategy is comprehensive; therefore SG 100 is not met. However implementation and compliance with the recovery strategy to protect SARA species are in place, therefore SG 80 is met. **NARW** The "*Recovery Strategy for the North Atlantic Right Whale* (*Eubalaena glacialis*) *in Canadian Waters*" was finalized and published in 2009. A further revision, in 2014, provided a more detailed description of the features, functions and attributes of the NARW's critical habitat. Objective 2, of the Recovery Strategy, aims to, "*Reduce mortality and injury as a result of fishing gear interactions*". In 2016, DFO published a proposed "*Action plan for the North Atlantic Right Whale* (*Eubalaena glacialis*) *in Canada*: *Fishery Interactions*". The proposed Action Plan supports the strategic direction set out in the Recovery Strategy and places priority on addressing Objective 2 and presents two approaches to addressing it: 1. Prevention (reduce the probability of NARW interacting with fishing gear), and 2. Response (reduce the severity of entanglements by responding to reported incidents). Measures that address other recovery objectives are also included in the Action Plan as long as they support the Objective 2 aim of reducing fishery interactions. However, until the 2017 NARW mortality event, there were no management measures implemented for fisheries to reach the Objectives 2 of the recovery strategy published in 2009.

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
		Mandatory measures have not been implemented for the Scotian Shelf snow crab fishery. However, in November 2017, DFO sent a letter to lobster, snow crab and groundfish advisory committees distribution lists, notifying them of the NARW entanglements in the Gulf of St Lawrence and highlighting that the whales will migrate to their overwintering grounds off the US coast and, in so doing, there would be an increasd risk of encountering the whales while fishing within the DFO Maritimes Region. The notification highlighted that as NARW are observed, DFO may close defined areas that pose a risk of entanglement (no closures were reported to the audit team) and also asked fishermen to use voluntary practices to help the safe migration of the whales: 1. to be extra vigilant in regularly tending gear; 2. avoid setting or retrieving gear when whales sighted in the area; 3. minimise floating gear/rope in the water. Fishermen were alos asked to report any sightings to DFO and any dead, injured or entangled whales to the Marine Animal Response Society. The letter is attached in Appendix 3 of this report. Although the audit team considers that there is a strategy to manage impacts of woffishes and leatherback turtle, it cannot be said that there is a strategy to manage impacts on large whales as strategies described in the Recovery Strategy and Action Plan are not implemented, preventing SG80 for the NARW. During 2018, DFO, Transport Canada, industry, ENGOs and independent researchers took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. The key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality. DFO, Transport Canada and industry took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. During 2018 there were no NARW mortalities in Canada, but 3 entanglements, one of which may have occurred in the Grand Manan Basin. There were dynamic area closures in both the Roseway and Grand Manan Basin critical habitat areas when NARW were spotted in these areas. The DFO in the Maritimes region have implemented license condition changes including:

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		• Mandatory reporting of lost crab gear. • Mandatory reporting of interaction with NARW (or any other marine mammal, including sightings of entangled animals). • Modified reporting requirements for SARA logs (note, SARA logbook reporting continues to be required for the snow crab fleet. The SARA logbooks have been updated for all fleets in Maritimes Region, though the updated log introduces no significant changes to requirements for the snow crab fishery). **NARW Recovery Strategy** The objective of the recovery strategy for NARW[70] is to: *"achieve an increasing trend in population abundance over 3 generations"* • Objective 2 of Recovery Strategy: reduce mortality and injury as a result of fishing gear interactions • 2 approaches: Prevention and Response • DFO multi-sector working group (Maritimes Region) ✓ Identify measures to reduce risk of injury and mortality from fishery interactions. ✓ Work with commercial fishery Advisory Committees to collect information on gear configuration and Voluntary Standard Practices (VSPs). **NARW Action Plan** There is a proposed SARA action plan (2016) that has not been finalized. This action plan will be expanded to address all remaining threats (e.g. noise, changes in food supply, etc.). The result will be a single comprehensive action plan. Anticipated timeline for external consultation on that document is spring/summer 2019. **DFO interaction with other offices and industry** DFO has worked with other regional offices and international advisory bodies to gather information to aid in assessing the risk associated with NARW when they are present in the area. Further, they have discussed implications and encouraged stakeholders to consider further changes that can mitigate risk of entanglements with NARW. Specific to the DFO Maritimes Region, 26 engagement meetings and workshops (18 in-person; 8 by phone) were convened with fixed gear industry groups between September 2017 and March 2018 (DFO, 2018a). Their purpose was to inform the industry of the situation, highlight that NARW and other whales migrate between the Gulf and the eastern seaboard of Canada and the U.S, whale behaviour may be changing in response to environmental change and that evidence shows that

70 https://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_north_atl_right_whale_0609_e.pdf

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		entanglement in fixed fishing gear and vessels strikes are the main threats to some whale species, in particular the NARW. The workshops were also intended to provide a forum through which recommendations on how operational aspects and management of fisheries could be adapted to mitigate any interactions with whales. DFO confirmed that in the event of entanglement in fixed gear during 2018 they will evaluate the situation and determine if additional measures can be taken and that these measures will be informed by the current on-going dialogue within DFO and with the industry. Extensive consultations with the fishing industry are being planned for fall/winter 2018/19 to refine measures as necessary to reduce entanglement risk while minimizing effects on the fishery. Reviewing current measures internally, as well as with other partners, will also be done, to optimize effectiveness. This work is to be coordinated across all DFO Atlantic Regions. **Key NARW Management Measures** The DFO outlined management measures including: • **Shortening of line between buoys:** Harvesters are asked to shorten the line between the primary and secondary buoy beyond the requirements outlined in their licence conditions (if applicable) to further reduce the risks of NARW and other marine mammal entanglements. The DFO commends these efforts and encourages harvesters to continue these practices. • **Mandatory reduction of floating rope at surface:** Harvesters are asked not to have rope attaching fishing gear to a primary buoy floating on the surface of the water after the gear has been set. This is to further reduce the risks of NARW and other marine mammal entanglements. • **Reporting Sightings of North Atlantic Right Whales and Marine Mammals:** Harvesters are also asked to report all sightings of North Atlantic Right Whales and Marine Mammals that are in distress or dead. DFO reinstated disentanglement by response organizations. Funding from DFO was increased in 2018 to support marine mammal response groups. **Temporary management closures in 2018** DFO has amended the Marine Mammal Regulations under the *Fisheries Act*, providing increased protection to right whales and other whale species by limiting vessel approach distances and prohibiting disturbance to whales. In an effort to reduce the number of entanglements of NARW in fishing gear, in April 2018 DFO announced areas for both static and dynamic fisheries management (e.g., fishery closures) in key areas for NARW; Gulf management areas were based on the area where 90% of the NARW observations occurred in 2017 (static closure) and potential foraging suitability based upon an analysis of historical copepod (*Calanus*

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		finmarchicus) biomass, while Maritime management areas were based on current Critical Habitat boundaries (supporting the following functions: foraging, feeding, nursing, raising calves, resting and socializing)[71] for NARW in the Roseway Basin and Grand Manan. Accordingly, there were dynamic area closures on a grid-by-grid basis in both the Roseway and Grand Manan Basin critical habitat areas when any NARW were spotted in these areas. The effect of these NARW management measures on fishing activity could vary on a daily basis as dynamic closure management measures were imposed. The closures were outside of the snow crab fishing season in that area, so there were no NARW closures affecting the snow crab fishery in the Scotian Shelf. Information on right whale-related fishery closures can be found here. The Western/Emerald Banks Conservation Area was added to the licence conditions as an area closed to fishing in CFA 24. DFO has been undertaking discussions with fish harvesters and processors and Indigenous organizations throughout Quebec and Atlantic Canada to discuss the 2018 measures and to prepare for fishing seasons opening in 2019. **NARW Monitoring in 2018** In 2018, a very extensive area was monitored by DFO (including Control and Protection) from April 1st to September 15th 2018 using a suit of different planes. In this period about 2'000 survey hours of flights were logged, about 5 times more hours than 2017. In addition to the aerial surveys, DFO Science deployed Marine Mammal Observers that totalled about 1'000 hours of observation on a number of different research vessels. Near real time and autonomous Passive Acoustic Monitoring (e.g. including hydrophones and gliders) systems were also set up to track for presence of North Atlantic Right Whales. Based on those monitoring activities a large number of NARW sightings were recorded in 2018. Although some of these sightings were recorded in the Roseway and Grand Manan Basin, the vast majority were recorded in the GSL (please refer to the background section for further details). **Industry measures to mitigate NARW entanglement risk – October 2018 updates**

[71] http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2018/11_26-30-eng.html

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		Funding through the Atlantic Fisheries Fund (AFF) has been announced to the Coldwater Lobster Association (CLA) to conduct a pilot study on the effectiveness and practicality of rope-less fishing gear technology for the commercial lobster industry within lobster Fishing Area 34 (LFA 34). CLA is partnering with an oceans technology company, to research, test, explore, demonstrate and/or sea trial rope-less fishing gear, acoustic receivers and related technology to reduce some risks to the endangered NARW population, as well as for other marine mammals. Furthermore, through DFO's joint federal-provincial AFF, the Association des Crabiers Acadiens Inc. (ACA) in coordination with the Association des Pêcheurs Professionnels Crabiers Acadiens and the Crabiers du Nord-est have received funding over three years to implement a series of initiatives to research, test, explore, demonstrate and/or sea trial, technologies and processes to mitigate the risks of right whale entanglements in snow crab fishing gear. There were 13 initiatives outlined by these groups, all of which were described and included in the Corrective Action Plan. An update on these measures to research and assess the feasibility of ropeless gear, along other measures is provided under Appendix **DFO lead research activities during 2018** DFO has undertaken numerous initiatives to increase knowledge regarding NARW including the following activities and commitments to further identify mitigation measures. • DFO has hired a research scientist (Ed Trippel, in NHQ) with expertise in gear technology to help investigate gear technologies and in the evaluation of pilot projects • DFO is collaborating with the Natural Sciences and Engineering Research Council of Canada (NSERC) to provide funding to support research that will aid the recovery of Southern Resident Killer Whales, North Atlantic Right Whales, and St. Lawrence Estuary Belugas. To date, proposals have been submitted to NSERC. Funding has been committed. • Ongoing research initiatives related to enhancing real-time detections of right whales (related to the Oceans Protection Plan) are in progress. DFO Science plans to test some real-time detection equipment in February on the west coast. • Ongoing work to better understand prey distribution (e.g. factors affecting aggregation, quality, predictability, etc., is in progress) is being led by Catherine Johnson and Stephane Plourde at DFO. During the site visits, the science Ocean Protection Program reported to have funding

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		for 5 years for monitoring the effects of noise pollution on NARW and for real time detection systems to prevent vessel strikes. **NMMPRC Meeting** In November 2018, the National Marine Mammal Peer Review Committee (NMMPRC) annual meeting was held to conduct scientific peer-review of marine mammal issues. Such meetings provide the opportunity for collaborative review of scientific results by marine mammal experts from Fisheries and Oceans Canada (DFO) and from other (non-DFO) organizations. Following NMMPRC peer-review and approval, scientific results are used to provide scientific advice for the management and conservation of marine mammals in Canada[72]. **Plans for 2019** On February 7, 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard, along with the Minister of Transport, and Member of Parliament for Acadie—Bathurst, announced how the Government of Canada will protect the endangered North Atlantic Right Whale during the 2019 season[73]. These measures are quite similar to those implemented during the 2018 fishing season. Once properly agreed and formalised as fishery regulations, these measures or potentially, some variation of them, will be published in formal Notice/s to Fish Harvesters to be implemented in the 2019 snow crab season. **Determination** The Audit Team notes and commends all the parties involved with the 2018 season and impressive management response to mitigate the risk of mortality, reduce entanglements and minimize the UoA-related mortality of ETP species. *These measures are expected to be highly likely to achieve national and international requirements for the protection of ETP*. The outcomes of the 2018 management measures was laudable with zero mortalities, but we note one reported entanglement that could have been caused by snow crab gear in the Grand Manan Basin. It is also worth noting that these measures have been currently set up for one fishing season as a response to the 2017 mortalities in the GSL and that a comprehensive (medium-long term) strategy is currently being planned. 2019 management measures have been announced. **Based on the above rationale PI 2.3.2 SG60, SI a is met.** Noting the above, there is insufficient evidence to substantiate the *existence of a strategy in place for managing the UoA's impact on the endangered and declining NARW population, including measures to minimize mortality, which is designed to be*

[72] http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2018/11_26-30-eng.html

[73] https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html

<table>
<tr><td colspan="2">PI 2.3.2</td><td colspan="3">The UoA has in place precautionary management strategies designed to:
• meet national and international requirements;
• ensure the UoA does not hinder recovery of ETP species.

Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</td></tr>
<tr><td></td><td></td><td colspan="3">highly likely to achieve national and international requirements for the protection of NARWs.

Based on the above rationale PI 2.3.2 SG80, SI a is not met.</td></tr>
<tr><td>b</td><td colspan="4">Management strategy in place (alternative)</td></tr>
<tr><td></td><td>Guidepost</td><td>There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species.</td><td>There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species.</td><td>There is a comprehensive strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.</td></tr>
<tr><td></td><td>Met?</td><td>Y NA</td><td>Y NA</td><td>N NA</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">There is a strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.

Recovery strategies and management action plans are in place by mandatory policies for all ETP species in Canadian waters that are listed within the SARA database. Recovery strategies implemented for the SARA listed species - Northern Wolffish , Spotted Wolffish , Fin Whale, Blue Whale, North Atlantic Right whales , and Leatherback Turtle - mandate licence holders and operators to carry out restricted commercial fishing activities authorized under the Fisheries Act that may incidentally kill, harm, harass, or capture the Northern Wolffish or the Spotted Wolffish or the Leatherback Turtle as per subsection 83(4) of the Act (note exceptions Section 7.2 of the Act). Goals of the strategy include education and training. For instance, training is provided to operators and observers with reference to ETP identification using photographic images, post-capture release procedures to facilitate high levels of survival, and completing SARA logbooks (and observer logbooks).

The strategy also includes a 24hr telephone number for reporting interactions which triggers DFO’s marine mammal response team to assist in releasing animals from snags or entanglements (Brown et al, 2009). Other systems for management are believed to be partially implemented in certain cases. For example measures to reduce North Atlantic Right whale entanglement in commercial fishing gears is proposed and implemented but without explicit details of meeting the goals. Information gaps remains a concern in areas where observer coverage is variable, from 100% during the surveys compared to levels during commercial fishing of <1% in 4X5Y, <10% in 3NOPs4VW, and <35% in 5Zjm (Kulka et al, 2007; Mug et al, 2008).

Despite recent improvements in observer coverage, it is still not spatially balanced especially among smaller vessels and operators of gillnets or handline. Due to gaps in information and less balanced spatial deployments of observers, it cannot be said</td></tr>
</table>

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.		
		that the strategy is comprehensive; therefore SG 100 is not met. However implementation and compliance with the recovery strategy to protect SARA species are in place, therefore SG 80 is met.		
c	Management strategy evaluation			
	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Y	Y Y wolffishes Y leatherback turtle Y fin whale Y blue whale N NARW	N Not scored
	Justification	**There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.** SG 100 is not scored as all SG80 have not been met (FCR 7.10.53). Once protected under SARA, ETP species are subject to recovery strategies and management plan. A mandatory SARA logbook must be completed and submitted to DFO as a condition of license. Training courses in release techniques have been provided to license holders. A recovery strategy detailing procedures for expeditious release of wolfish has been established, industry has been trained, reporting procedures of encounters are in place and research on release methods used are monitored to ensure a high level of survival. Under SARA, a recovery strategy has been implemented for the Atlantic Wolffish, leatherback turtle, fin whale the blue whale and the Northern right whale. However there are some gaps in information: No management strategy have been taken in Canada to reduce the risk of Whale entanglement in fishing gear and levels of observer coverages differs by area and gear. 4X5Y observer coverage is low <4% compared to 5Zjm (20%-35%). Information on gillnets and handline is very scarce. **Wolffishes** DFO noted after reviewing the SARA log reports from the MSC Scotian Shelf snow crab fleet that 3 spotted wolffish were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the		

PI 2.3.2	The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
	logbooks in 2018. From SARA logbooks, there have been no reported interactions with the Newfoundland and Labrador snow crab fishery (2018 re- assessment) from the Newfoundland and Labrador, Gulf, and Maritimes regions. The 2017 DFO 2017 Atlantic Coast (All Regions) commercial landings database reported no landings of wolffish. It continues to meet SG80. **Leatherback turtles** Leatherback turtles are long-lived, slow to reach maturity such that they exhibit a low rate of population increase; however it is believed they sustain human-induced mortality rates[74] of up to 1%. Incidental captures in Canadian waters appear to account for a small proportion of estimated incidental captures in the Atlantic population. Assuming current levels of fishing effort within Canadian jurisdiction, the review committee concluded that there was scope for human-induced mortality without jeopardizing survival or recovery of this species. A 2017 study by Hamelin et al. [75] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, changes in fishing effort may reduce entanglement rates. For example, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions. Snow crab fishing in CFA 24W ended on April 7, 2018[76]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the August 31st date[77] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. It continues to meet SG80. **Fin Whales**

[74] http://waves-vagues.dfo-mpo.gc.ca/Library/281611.pdf
[75] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733
[76] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[77] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		The Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada was published in 2017[78]. The objective of the management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently known distribution range in Canada. To reach this objective, several measures are proposed through four approaches: conservation, stewardship and protection of individuals, education and outreach, research and monitoring. No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[79]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It is possible that some of the management measures implemented for NARWs in the GSL and Maritimes may also benefit fin whales. It continues to meet SG80. **Blue Whales** In 2018, DFO published the Action plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada[80]. The action plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. The first set of recovery measures will be undertaken by Fisheries and Oceans Canada, sometimes with the collaboration of partners. These are primarily research measures to estimate the population's size and its use of Canadian waters. They also aim to implement or enforce legislation or policies to protect Blue Whale habitat and mitigate threats. The second set of measures will be undertaken by the Department in partnership with the various stakeholders involved in the Blue Whale's recovery. For example, these measures include research on krill and the use of hydroacoustics to document the presence of these whales. The third set presents measures that concerned stakeholders could undertake voluntarily. Such measures include gathering observations of the Blue Whale, photo-identification and raising awareness among marine users. The Recovery Strategy for the Northwest Atlantic Blue Whale (Beauchamp et al. 2009) presents the various threats facing the population. The long-term goal of this Recovery

78 https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/Mp-FinWhaleAtlantic-v00-2017Jan24-Eng.pdf

79 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

80 https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/action-plans/blue-whale-northwest-atlantic-population.html#toc2

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
		Strategy is to reach a total of 1,000 mature individuals. To reach this recovery goal, three objectives were set for the Canadian range: **Objective 1:** Define and conduct a long-term assessment of the size, structure and trends of the Northwest Atlantic Blue Whale population, and determine their range and critical habitat within Canadian waters. **Objective 2:** Implement control and monitoring measures for activities that could hinder the recovery of the Blue Whale in its Canadian range. **Objective 3:** Increase knowledge of the main threats to the recovery of the Blue Whale in Canadian waters both to determine their true impact and to identify effective measures to mitigate the negative consequences for the population's recovery. No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[81]. Three entanglements were reported in US waters in 2017[82]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It is possible that some of the management measures implemented for NARWs in the GSL and Maritimes may also benefit Blue whales. Wolffishes, leatherback turtles, fin and blue whale continue to meet SG80 in this surveillance. Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment. Information is equivocal to say that supports high confidence that the strategy will work at this point for North Atlantic Right whales. Recent information states that the measures implemented thus far have been ineffective at reducing the number of North Atlantic right whale entanglements. Between 2009 and 2013 an annual average of 4.3 North Atlantic right whales were killed by human activities, in both Canada and the USA, a level much higher than the Potential Biological Removal (PBR) level of one North Atlantic right whale (Waring et al. 2016). Of 24 records of mortality and serious injury from 2009 through 2013 (both from USA and Canada) 18 were attributable to fishing-gear entanglements (Waring et al. 2016). The average proportion of North Atlantic right whales with newly detected scars each year attributable to fishing gear has not significantly increased over the period of 1980

81 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

82 https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
		through 2009; however, a significant increase in the number of serious entanglements (deep wounds or whales carrying gear) over the same period was documented (Knowlton et al. 2012). Furthermore, there was a significant increase in the number of whales carrying gear that was attributed to an increasing difficulty for the whales to free themselves completely of gear (Knowlton et al. 2012). No reduction of serious or lethal entanglements of large whales, including the North Atlantic right whales, has been observed since North Atlantic right whales were listed as endangered in 2005 under SARA (Knowlton et al. 2012; van der Hoop et al. 2013; Pace et al. 2014). Mandatory measures have not been implemented for the Scotian Shelf snow crab fishery. However, in November 2017, DFO sent a letter to all licensed lobster, snow crab and groundfish harvesters, notifying them of the NARW entanglements in the Gulf of St Lawrence and highlighting that the whales will migrate to their overwintering grounds off the US coast and, in so doing, there would be an increased risk of encountering the whales while fishing within the DFO Maritimes Region. The notification highlighted that as NARW are observed, DFO may close defined areas that pose a risk of entanglement (no closures were reported to the audit team) and also asked fishermen to use voluntary practices to help the safe migration of the whales: 1. to be extra vigilant in regularly tending gear; 2. avoid setting or retrieving gear when whales sighted in the area; 3. minimise floating gear/rope in the water. Fishermen were also asked to report any sightings to DFO and any dead, injured or entangled whales to the Marine Animal Response Society. There is existing information that interactions are low for the Scotian Shelf snow crab trap fishery. Thus, the proposed measures are considered likely to work, based on information directly about the fishery and/or the species involved. SG60 is met. However, there is no an objective basis for confidence that the measures which are not mandatory will work, preventing the fishery from meeting SG80 for the NARW. During 2018, DFO, Transport Canada, industry, ENGOs and independent researchers took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. In a nutshell, the key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality. Further details of the measures implemented in 2018 are listed under PI 2.3.2, SI *a*.

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.		
		The large number of measures that have been implemented in 2018 to improve knowledge, decrease NARW mortality and reduce entanglements are considered likely to work if positive results (zero mortality coupled to no entanglements or non-significant harm/injury caused by entanglements in 2018) can be sustained in the future. The results of the 2018 management measures was zero mortalities and one entanglement that may have originated in the Grand Manan Basin (but potentially the Gulf of St Lawrence). About this whale, the 2018 NARWC Report Card[83] further mentioned that: "[the whale was] observed entangled in the Bay of Fundy trailing a buoy approx. one body length aft of the flukes. Whale was very thin and had severe wounds and significant aggregations of cyamids around the peduncle. Whale was partially disentangled on 8/5/2018 (including the attached buoy). There is likely some remaining line on the whale that will hopefully shed over time. Resighted on 12/30/2018 southeast of Nantucket. Line remains, exiting left mouth and there may be a rostrum wrap." **As such, PI 2.3.2 SG60, SI *c* is met.** Although 2019 management measures have been announced these have not yet been formally agreed and translated into fishery management regulations for the 2019 season. As such, there is an insufficient objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved. **As such, PI 2.3.2 SG80, SI *c* is not met.**		
d	Management strategy implementation			
	Guidepost		There is some evidence that the measures/strategy is being implemented successfully.	There is clear evidence that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).
	Met?		Y Y wolffishes Y leatherback turtle Y fin whale Y blue whale N NARW	N Not scored
	Justification	**There is evidence that the strategy is being implemented successfully for all ETP sepcies except for the NARW**.		

[83] https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		SG 100 is not scored as all SG80 have not been met (FCR 7.10.53). Once protected under SARA, ETP species are subject to recovery strategies and management plan. A mandatory SARA logbook must be completed and submitted to DFO as a condition of license. Training courses in release techniques have been provided to license holders. A recovery strategy detailing procedures for expeditious release of wolfish has been established, industry has been trained, reporting procedures of encounters are in place and research on release methods used are monitored to ensure a high level of survival. Under SARA, a recovery strategy has been implemented for the leatherback turtle, Humpback whale, Sei Shale, Blue whale and the Northern right whale. However there are some gaps in information: No management strategies have been taken in Canada to reduce the risk of Whale entanglement in fishing gear and levels of observer coverages differs by area. 4X5Y observer coverage is low <4% compared to 5Zjm (20%-35%). **Wolffishes** DFO noted after reviewing the SARA log reports from the MSC Scotian Shelf snow crab fleet that 3 spotted wolffish were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with the Newfoundland and Labrador snow crab fishery (2018 re- assessment) from the Newfoundland and Labrador, Gulf, and Maritimes regions. The 2017 DFO 2017 Atlantic Coast (All Regions) commercial landings database reported no landings of wolffish[84]. **Leatherback turtles** Leatherback turtles are long-lived, slow to reach maturity such that they exhibit a low rate of population increase; however it is believed they sustain human-induced mortality rates[85] of up to 1%. Incidental captures in Canadian waters appear to account for a small proportion of estimated incidental captures in the Atlantic population. Assuming current levels of fishing effort within Canadian jurisdiction, the review committee concluded that there was scope for human-induced mortality without jeopardizing survival or recovery of this species. A 2017 study by Hamelin et al. [86] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was

[84] http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2017aq-eng.htm
[85] http://waves-vagues.dfo-mpo.gc.ca/Library/281611.pdf
[86] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, changes in fishing effort may reduce entanglement rates. For example, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions. Snow crab fishing in CFA 24W ended on April 7, 2018[87]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the August 31st date[88] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. **Fin Whales** The Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada was published in 2017[89]. The objective of the management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently known distribution range in Canada. To reach this objective, several measures are proposed through four approaches: conservation, stewardship and protection of individuals, education and outreach, research and monitoring. No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[90]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. It is possible that some of the management measures implemented for NARWs in the GSL and Maritimes may also benefit fin whales.

[87] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[88] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm
[89] https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/Mp-FinWhaleAtlantic-v00-2017Jan24-Eng.pdf
[90] https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

PI 2.3.2	The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
	Blue Whales In 2018, DFO published the Action plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada[91]. The action plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. The first set of recovery measures will be undertaken by Fisheries and Oceans Canada, sometimes with the collaboration of partners. These are primarily research measures to estimate the population's size and its use of Canadian waters. They also aim to implement or enforce legislation or policies to protect Blue Whale habitat and mitigate threats. The second set of measures will be undertaken by the Department in partnership with the various stakeholders involved in the Blue Whale's recovery. For example, these measures include research on krill and the use of hydroacoustics to document the presence of these whales. The third set presents measures that concerned stakeholders could undertake voluntarily. Such measures include gathering observations of the Blue Whale, photo-identification and raising awareness among marine users. The Recovery Strategy for the Northwest Atlantic Blue Whale (Beauchamp et al. 2009) presents the various threats facing the population. The long-term goal of this Recovery Strategy is to reach a total of 1,000 mature individuals. To reach this recovery goal, three objectives were set for the Canadian range: **Objective 1:** Define and conduct a long-term assessment of the size, structure and trends of the Northwest Atlantic Blue Whale population, and determine their range and critical habitat within Canadian waters. **Objective 2:** Implement control and monitoring measures for activities that could hinder the recovery of the Blue Whale in its Canadian range. **Objective 3:** Increase knowledge of the main threats to the recovery of the Blue Whale in Canadian waters both to determine their true impact and to identify effective measures to mitigate the negative consequences for the population's recovery. No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[92]. Three entanglements were reported in US waters in 2017[93]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018.

[91] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/action-plans/blue-whale-northwest-atlantic-population.html#toc2

[92] https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

[93] https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**		
		It is possible that some of the management measures implemented for NARWs in the GSL and Maritimes may also benefit Blue whales. Wolffishes, leatherback turtles, fin and blue whale continue to meet SG80 in this surveillance. **NARW** Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment. Given the most recent survey data, recent articles on gear impact on populations, and the recent evaluation of the NARW Action Plan and Recovery Strategy, there is no clear evidence that is being implemented successfully and is achieving its objective at this time evidence for this is the downward trends in the population growth, declines in calf abundances, and higher increases entanglement events rates in recent years. Nevertheless there is existing information that interactions are low for snow crab trap fishery within each area are low. It meets the SG80d score During 2018, DFO, Transport Canada, industry, ENGOs and independent researchers took numerous actions to become compliant with both national and international limits for the NARW, and to mitigate risk of entanglement from all fixed gear fisheries. The key precautionary management strategies implemented in 2018 were aimed at improving the spatial monitoring of NARWs to avoid interactions with ships and fishing gear, closing of areas and removal of gear where whale presence was detected/probable, and improving and developing fishing gear technology to avoid entanglements. Entanglements and ship strikes are currently the major cause of human induced mortality. Further details of the measures implemented in 2018 are listed under PI 2.3.2, SI *a*. The large number of measures that have been implemented in 2018 to improve knowledge, decrease NARW mortality and reduce entanglements are considered likely to work if positive results (zero mortality coupled to no entanglements or non-significant harm/injury caused by entanglements in 2018) can be sustained in the future. However, since there are no agreed management measures / a clear strategy for the 2019 season and the results of these management measures will be evaluated at the end of 2019, there is an insufficient basis to determine that the measures/strategy is being implemented successfully. **As such, PI 2.3.2 SG80, SI *d* is not met.**		
e	Review of alternative measures to minimize mortality of ETP species			
	Guidepost	There is a review of the potential effectiveness and practicality of alternative measures to	There is a regular review of the potential effectiveness and practicality of	There is a biennial review of the potential effectiveness and practicality of alternative

<table>
<tr><td colspan="2">PI 2.3.2</td><td colspan="3">The UoA has in place precautionary management strategies designed to:
• meet national and international requirements;
• ensure the UoA does not hinder recovery of ETP species.

Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</td></tr>
<tr><td></td><td></td><td>minimize UoA- related mortality of ETP species.</td><td>alternative measures to minimize UoA-related mortality of ETP species and they are implemented as appropriate.</td><td>measures to minimize UoA-related mortality ETP species, and they are implemented, as appropriate.</td></tr>
<tr><td></td><td>Met?</td><td>Y</td><td>Y
Y wolffishes
Y leatherback turtle
Y fin whale
Y blue whale
N NARW</td><td>N Not scored</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">There is a biennial review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality ETP species, and they are implemented, as appropriate.
There is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species and they are implemented as appropriate, except for the NARW.

SG 100 is not scored as all SG80 have not been met (FCR 7.10.53).

Implementation of a multi-year approach to the snow crab fishery have been adopted where regional advisory processes (RAP) and peer reviews as well as Advisory Committee meetings are conducted on a 2-year cycle. On these meetings DFO annually carries out a review of a fisheries performances against the objectives established by management groups and examine distinct topics including effectiveness of options to minimize UoA-related mortality of ETP species.
Sections 46 and 72 of the Species at Risk Act (SARA) requires the competent Minister to report on the implementation of the Recovery Strategy or Management Plan for a species at risk, and on the progress towards meeting its objectives within five years of the date when the Recovery Strategy or Management Plan was placed on the Species at Risk Public Registry.
Reporting on the progress of Recovery Strategy or Management Plan implementation requires reporting on the collective efforts of the competent Minister, provincial organizations and all other parties involved in conducting activities that contribute towards the species' recovery.
There are also amendments of recovery plans for certain species that potentially interact with this fishery such as leatherback turtles, North Right whales, baleen whales, and wolffish species.
A summary of these efforts by species is provided here

Evidence that these revised measures are implemented is the fact that there have been no confirmed specific lethal entanglement interactions of the with ETP species</td></tr>
</table>

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		from 2012 till 2016. It meets 100e.
		Wollfish A recovery strategy was posted on the Species at Risk Public Registry in 2008. The Recovery Strategy identified five Recovery Objectives: 1) enhance knowledge of the biology and life history of wolffish species; 2) identify, conserve and /or protect wolfish habitat required for viable population sizes and densities; 3) reduce the potential of wolfish population declines by mitigating human impacts; 4) promote wolffish population growth and recovery; and 5) develop communication and education programs to promote the conservation and recovery of wolffish populations. A progress report to evaluate the progress of Recovery Strategy implementation .the progress report covers the period 2007-2012 (DFO 2013) . Progress on the recovery strategy: Critical habitat has been identified for Northern and Spotted Wolffish. . Large scale collecting of habitat data continue to be collected through DFO RV surveys and other surveys (ie acoustic tagging and telemetry, as well as direct observation using SCUBA and towed cameras). There should also be an increased emphasis on collecting age and maturity data. Population and distribution objectives, BRP's and biomass targets must also be identified to fully achieve the Recovery Objectives. Therefore, ongoing research on distribution, abundance, population structure, and life history is planned for 2013 onwards. <u>Progress on Human induced Mortality Mitigation:</u> There are no directed fisheries for wolffish in Canadian waters. Bycatch has been identified as a cause of human induced mortality and has been quantified in many fisheries (Ouellet et al. 2011; Simon et al. 2012; Simpson et al.2012; DFO 2013; Simpson et al. 2013a). These studies represent progress toward Recovery Objectives 3: Reduce the potential of wolffish population declines by mitigating human impacts; and 4: Promote wolffish population growth and recovery. In 1971 the reported landings of wolffish in the entire Canadian zone of interest (NAFO Divisions 0AB, 2GH, 2J3K, 3LNO, 3P, 4RST, 4VWX) peaked at 12,000 tons and then declined (DFO 2013). In 2004, an Allowable Harm Assessment was carried out for wolfish (DFO 2004a,b; Kulka and Simpson 2004). Live release of Northern and Spotted Wolffish bycatch was made mandatory when the species were listed on Schedule 1 of the Species at Risk Act (SARA) when the Act came into power in 2003. Northern and Spotted Wolffish must be released back into the water and only Atlantic Wolffish may be landed. This measure was implemented to address Recovery Objective 3: Reduce the potential of wolffish population declines by mitigating human impacts. Atlantic Wolffish are considered a resilient species and a good survival rate of live released fish is considered likely. Fishery Observer records have shown that wolffish captured incidentally in various fisheries are very active upon release (Kulka and Simpson 2004). In a study by Grant et al. (2005) Atlantic Wolffish caught as bycatch in the commercial Yellowtail Flounder fishery showed high survival rates when returned

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		to the ocean following up to 2.5 hours out of the water. SARA logbook data (>35 foot commercial vessels fishing in Canada's EEZ) indicate that in 2005-2010, a high percentage of Northern and Spotted Wolffish were released alive. Wolffish are captured incidentally by a wide variety of gear types in many different fisheries. With the exception of the Nordmore Grate in shrimp trawling, which excludes most wolfish greater than 15-20cm (Kulka and Simpson 2004), few other modifications to gear have been identified or developed to prevent wolffish capture. Live release of wolffish remains the most effective method of potentially reducing fishing mortality. Commercial fishermen fishing in Canada's EEZ report mandatory release of wolffish by species in SARA logbooks. Fisheries Observers, which observe a small portion of the total fishery, also gather information on the capture and release of wolffish by species. These activities represent progress in Recovery Objectives 3: Reduce the potential of wolffish population declines by mitigating human impacts; and 4: Promote wolfish population growth and recovery. DFO noted after reviewing the SARA log reports from the MSC Scotian Shelf snow crab fleet that 3 spotted wolffish were reported as bycatch (and released, as per licence requirements) in 2017, and that there was no further reported SARA bycatch from the logbooks in 2018. From SARA logbooks, there have been no reported interactions with the Newfoundland and Labrador snow crab fishery (2018 re- assessment) from the Newfoundland and Labrador, Gulf, and Maritimes regions. The 2017 DFO 2017 Atlantic Coast (All Regions) commercial landings database reported no landings of wolffish[94]. This species continue to meet SG80.
		Leatherback Turtle The Leatherback Sea Turtle was listed as Endangered under the *Species at Risk Act* (SARA) in June 2003. Entanglement in fishing gear is considered the primary threat in these northern foraging areas (Atlantic Leatherback Turtle Recovery Team 2006). Other threats in Atlantic Canadian waters include collisions with vessels, marine pollution, and acoustic disturbances. The Recovery Strategy for the Leatherback Turtle (Dermochelys coriacea) in Atlantic Canada referred to as the "Recovery Strategy") was posted on the Species at Risk Public Registry in 2007. A progress report was done to evaluate the progress of Recovery Strategy implementation (DFO 2013) the progress report covers the period 2007-2012. DFO developed mandatory mitigation measures for the Canadian pelagic longline fishing fleet which include the use of corrodible circle hooks, as well as training and 3-year certification in sea turtle de-hooking and disentanglement techniques. DFO (NL Region) has begun promoting gear modification (using sinking lines to reduce floating lines in the water) on a trial basis in selected commercial and Aboriginal

[94] http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2017aq-eng.htm

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		fisheries to reduce the risk of entanglement for large marine animals including the Leatherback Turtle. DFO (NL Region is working with the Fish, Food and Allied Workers (FFAW) and others to better understand the encounter rate and types of interactions Leatherback Turtles have with fishing gear. DFO (NL Region) has created an educational website and distributed printed materials to fishers to promote better gear management for Leatherback Turtle conservation. Leatherback Turtle disentanglement and live-release best practices training are underway for DFO Fisheries Officers (Gulf Region). Emergency reporting hotlines and response networks are in place in Atlantic Canada and Quebec for Leatherback Turtles and other marine animals. Through ongoing collaborative efforts, NGOs and fishermen in Atlantic Canada and Quebec have accomplished some threat mitigation and risk reduction to Leatherback Turtles. DFO is currently preparing a SARA Action Plan and an amended Recovery Strategy for Leatherback Turtles as part of the Government of Canada's ongoing commitment to the conservation of Species at Risk through the implementation of the Species at Risk Act. DFO is currently preparing an Action Plan for the Leatherback Sea Turtle in Atlantic Canada. It outlines the measures that are required to implement the Recovery Strategy, including those that address threats. A 2017 study by Hamelin et al. [95] highlighted that most reports came from coastal Nova Scotia (*n* = 136) and Newfoundland (*n* = 40), with reporting rates peaking in the mid-to-late 2000s. 85% of the entanglements were released alive, although this was considered a gross underestimate of actual entanglement-associated mortality, as a true mortality rate cannot be estimated. The majority of entanglements were reported during the summer months of July and August when leatherbacks are seasonally resident and several fisheries are active in continental shelf waters. The snow crab fishery was implicated in the most pot fishery entanglement incidents during the study period. However, changes in fishing effort may reduce entanglement rates. For example, there has been a recent shift from a summer to a spring snow crab fishery by a portion of the fleet on the eastern Scotian Shelf, reducing the overlap between this fishery and leatherback turtle distributions. Snow crab fishing in CFA 24W ended on April 7, 2018[96]. Snow crab spring fishing in CFA 20-22 ended on May 13th. Also, DFO stated that fishing ended well before the August 31st date[97] in CFAs 23 and 24 (SE-NS), where most of the Scotian shelf catch is taken. DFO also noted after reviewing the SARA log reports from the fleet, that there was no reported SARA bycatch from the logbooks in 2018.

[95] https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2733
[96] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-11-eng.htm
[97] http://dfo-mpo.gc.ca/decisions/fm-2018-gp/atl-12-eng.htm

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
		From SARA logbooks, there have been no reported interactions with this fishery from the Newfoundland and Labrador, Gulf, and Maritimes regions. This species continues to meet SG80.
		North Atlantic Right Whale TheRecovery Strategy for North Atlantic Right Whale was first published in June 2009, and subsequently was amended in 2014 to incorporate changes made to Section 1.9 pertaining to the critical habitat of the population. The revised objectives for mitigation activities to reduced impact from gear interactions were ***Objective 2****: Reduce mortality and injury as a result of fishing gear interactions (entanglement and entrapment).* *Rationale: A serious threat to right whales is injury and mortality from fishing gear interactions in Canadian waters: this may affect the survival of the species. To increase the chances for survival, the number and severity of entanglements or entrapments must be reduced.* *Strategies:* *a. Evaluate, promote, and/or implement where necessary, strategies (e.g. gearmodifications, effort restrictions) that will reduce the potential for harmfulinteractions between fishing gear and right whales. Collaboration betweenresearchers, fishers and resource managers on the development and fieldtestingof modified fishing practices will assist in the identification and application of mitigation measures.* *b. Evaluate and minimize the effects of all new and expanding fisheries on right whales.* *c. Collaborate with fishers about ways in which they can, through measurable voluntary action, reduce the number/frequency of interactions between right whales and fishing operations. d. Support emergency response and disentanglement programs in eastern Canada that are able to rapidly respond to reports of entangled or entrapped right whales* As a result of the recovery strategy an action plan was developed recently (DFO 2016) *This action plan places priority on addressing Objective 2 of the recovery strategy:* Reduce mortality and injury as a result of fishing gear interactions*, and presents two approaches to address this objective: prevention (reduce the probability of Right Whales interacting with fishing gear), and response (reduce the severity of entanglements by responding to reported incidents).* *Possible mitigation measures that have been used for prevent Right Whale entanglement include temporal and/or spatial closures for fisheries, changes in gear configurations, reducing the amount of gear or line in the water, and others. The selection of specific future mitigation measures will rely upon the output of several other activities (e.g. the outcomes of Recovery Measures 2 and 3).*

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		There is a review of the potential effectiveness and practicality of alternative measures to minimize UoA- related mortality of NARW. DFO annually conducts a review of a fisheries performance against the objectives and examined distinct topics including effectiveness of options to minimize UoA-related mortality of ETP species. The 2016 Action plan for NARW provides a description of measures that could be implemented to reduce, or support the reduction of, the frequency and severity of NARW entanglement in fishing gears. However, no mandatory measures have not been implemented for the Scotian Shelf snow crab fishery, preventing the fishery from meeting SG80. **2018 First Surveillance Audit – Updates and Determination** **Rope-less gear research** Funding through Atlantic Fisheries Fund (AFF) has been announced to the Coldwater Lobster Association (CLA) to conduct a pilot study on the effectiveness and practicality of rope-less fishing gear technology for the commercial lobster industry within lobster Fishing Area 34 (LFA 34, Southwest Nova Scotia). CLA is partnering with an oceans technology company, to research, test, explore, demonstrate and/or sea trial rope-less fishing gear, acoustic receivers and related technology to reduce some risks to the endangered NARW population, as well as for other marine mammals. Furthermore, through DFO's joint federal-provincial AFF, the Association des Crabiers Acadiens Inc. (ACA) in coordination with the Association des Pêcheurs Professionnels Crabiers Acadiens and the Crabiers du Nord-est have received funding over three years to implement a series of initiatives to research, test, explore, demonstrate and/or sea trial, technologies and processes to mitigate the risks of right whale entanglements in snow crab fishing gear. There were 13 initiatives outlined by these groups, all of which were described and included in the Corrective Action Plan. **Plans for 2019** Similar measures to those adopted in 2018 have been announced on February 7th by the Canadian Minister for Fishery for the 2019 fishing season. The large number of measures that have been implemented in 2018 to improve knowledge, curb NARW mortality and reduce entanglements are considered likely to work if results like those achieved in the last fishing season (i.e. zero mortality and no entanglements or entanglements without significant effects) can be sustained in the future. In 2018 and through early 2019, there has been and continues to be a review of the potential effectiveness and practicality of alternative measures to minimize UoA-

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		related mortality of NARWs for the 2019 snow crab fishing season. **As such, PI 2.3.2 SG60, SI *e* is met.** However, since these key management measures are only being in place for a single fishing season, there is insufficient evidence to show that there is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of the NARW population and they are implemented as appropriate. **As such, PI 2.3.2 SG80, SI *e* is not met.** **Blue Whale** The Northwest Atlantic Blue Whale population was listed under the *Species at Risk Act* in 2005 as an endangered species. The Recovery Strategy for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, was posted on the Species at Risk Public Registry in 2009. This strategy includes recovery objectives aiming towards a better understanding of the population and its habitat, its threats and measures to mitigate them. The Recovery Strategy's goal consisted to reach a population of at least 1,000 mature individuals to ensure the survival and recovery of the Blue Whale population in the Northwest Atlantic. This recovery target corresponds to the COSEWIC criteria for downgrading the status of the Blue Whale population from "endangered" to "not at risk status. The Recovery Strategy proposed three recovery objectives: 1. Define and undertake a long term assessment of the number of Northwest Atlantic Blue Whales, the structure and trends of the population, and determine their range as well as their critical habitat within Canadian waters. 2. Implement control and follow-up measures for activities which could disrupt the recovery of the Blue Whale in its Canadian range by prioritizing the following actions: 2.1 first, reducing anthropogenic noise (e.g., seismic exploration) and protecting food resources; 2.2 second, reducing disturbance from anthropogenic activities (e.g., whale-watching), reducing the risk of accidents associated to collisions as well as other human activities (e.g., fisheries and by-catch) and by reducing toxic contamination in the marine environment, which may have an impact on Blue Whales. 3. Increase knowledge concerning the principal threats to the recovery of the Blue Whale in Canadian waters, such as anthropogenic noise, the reduced availability of food resources, anthropogenic activities that can lead to disturbance, injuries or mortality (e.g., whale-watching activities, shipping traffic, coastal and offshore developments) and contamination, in order to determine their true impact and identify effective measures to mitigate the negative consequences for this

PI 2.3.2		The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.
		A progress report DFO 2016 reviewed the implementation of the Recovery Strategy over the period 2009-2014. Research conducted by DFO and its partners resulted in the characterisation of several Blue Whale feeding grounds in the Estuary and Gulf of St. Lawrence. It also began to document Blue Whales' use of waters south of Newfoundland and on the Scotian Shelf. Research has led to a better understanding of the behaviour and population dynamics of krill, the Blue Whale's main food source, and how these affect Blue Whale behaviour. Research into the Blue Whale's exposure to noise in the Estuary and Gulf of St. Lawrence and the Laurentian Channel provided insight into the threat that noise from shipping represents. Several conservation and awareness measures, primarily focused on shipping and pleasure boating, taken by DFO and other stakeholders, have reduced disturbance and the risk of collision Objective 2 was to reduce the impact of human activities on the Blue Whale. The review report stated that Several conservation and awareness measures, primarily focused on shipping and pleasure boating, have reduced disturbance and the risk of collision. Other actions can be proposed once knowledge of the population and the threats to its recovery is improved. In 2018, DFO published the Action plan for the Blue Whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada[98]. The action plan for the Northwest Atlantic Blue Whale presents measures that will be implemented in the short and medium term to assist in meeting the recovery objectives. These are primarily research measures to estimate the population's size and its use of Canadian waters. They also aim to implement or enforce legislation or policies to protect Blue Whale habitat and mitigate threats. The third set presents measures that concerned stakeholders could undertake voluntarily. Such measures include gathering observations of the Blue Whale, photo-identification and raising awareness among marine users. No blue whale (*Balaenoptera musculus*) mortalities in US and Canadian waters were reported for 2017 or 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[99]. Three entanglements were reported in US waters in 2017[100]. Furthermore,

98 https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/action-plans/blue-whale-northwest-atlantic-population.html#toc2

99 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

100 https://www.fisheries.noaa.gov/resource/document/national-report-large-whale-entanglements-2017

PI 2.3.2	**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
	no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. This species continues to meet SG80. The Management Plan for the Fin Whale (*Balaenoptera physalus*), Atlantic Population in Canada was published in 2017[101]. The objective of the management plan is to ensure that anthropogenic threats within Canadian waters do not cause a decline of the population or a reduction of the currently. No fin whale (*Balaenoptera physalus*) mortalities or entanglements in US and Canadian waters were reported for 2018 by the NOAA fisheries Atlantic Large Whale Take Reduction Plan (ALWTRP) entanglement summary[102]. Furthermore, no mortality or entanglement reports can be found online and none have been reported by DFO and stakeholders for 2018. This species continues to meet SG80.
References	DFO 2017. North Atlantic Right Whale (NARW) notice to Harvesters. DFO 2016. Action Plan for the North Atlantic Right Whale (*Eubalaena glacialis*) in Canada: Fishery Interactions [Proposed]. *Species at Risk Act* Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 35pp. http://www.sararegistry.gc.ca/default.asp?lang=En&n=F6E69C11-1 DFO 2013 Report on the Progress of Implementation of the Recovery Strategy for Northern Wolffish (Anarhichas denticulatus) and Spotted Wolffish (Anarhichas minor), and Management Plan for Atlantic Wolffish (Anarhichas lupus) in Canada for the Period 2008-2013. Species at Risk Act Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa. vi + 16 pp. DFO 2013 Report on the Progress of Recovery Strategy Implementation for the Leatherback Sea Turtle (Dermochelys coriacea) in Canada for the Period 2007-2012. Species at Risk Act Recovery Strategy Report Series. Fisheries and Oceans Canada, Ottawa NMFS 2017 Hayes SA, Josephson E, Maze-Foley K, Rosel, PE, editors. 2016. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2016. NOAA Tech Memo NMFS NE 241; 274

101 https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/Mp-FinWhaleAtlantic-v00-2017Jan24-Eng.pdf

102 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf

PI 2.3.2	**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.**
	Cook, A.M., Zisserson, B.M., Cameron, B.J., and Choi, J.S. 2015. Assessment of Scotian Shelf Snow Crab in 2014. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/068. vi + 119 p.
OVERALL PERFORMANCE INDICATOR SCORE:	85 **70**
CONDITION NUMBER (if relevant):	**2**

ACADIAN CRABBERS'ASSOCIATION

PILOT AND SEA TRIAL OF NEW AND EMERGING TECHNOLOGIES FOR THE REDUCTION OF ENTANGLEMENT OF RIGHT WHALES IN SNOW CRAB FISHING GEAR IN CFA 12 AND SURROUNDING AREAS

DESCRIPTION OF ACTIVITIES - UPDATE

SHIPPAGAN, OCTOBER, 2018

Initiative 1: Survey on existing fishermen knowledge and practices

This initiative will produce a detailed survey for the gathering and assessing of existing fishers' knowledge and practices in relation with the various existing and projected gear configurations and equipment to be assessed by the other sub projects. A template questionnaire has been developed by CORBO in collaboration with ACA and APPCA and fishermen leaders from the three (3) mid shore snow crab associations from NB. The questionnaire was administered by ACA and APPCA staff as well as by fishermen leaders to a sample of 26 mid shore snow crab fishers from CFA 12. The data collected is being collated and analyzed by CORBO at this time. The results of this survey will be used to refine our approach to the delivery of the other subproject. **Status:** Competed.

Initiative 2: Whale identification, sighting & reporting bilingual hand-out

One thousand (1000) laminated hand-outs (8'' x 11'') were produced and distributed to snow crab fishing vessels in the Southern Gulf of St Lawrence to provide fishers with useful info about right whales including how to identify right whales in the water correctly and how to correctly report sighting of entangled animals to the proper authorities. The content of the hand-out was developed by the Marine Animal Response Society (MARS) in collaboration with ACA and APPCA. **Status:** Completed. Possible new version for 2019.

Initiative 3: Breakaway gear – Rope tensile strength

This activity will consist of testing the strength of existing ropes used on snow crab gear in CFA12 and surrounding areas as confirmed through the fishermen survey as well as other sizes of rope identified by a review of existing literature and other criteria to be identified. We plan to documentation the minimum rope strength required (whale 1,700lbs) as a function of inertia; the minimum to keep buoy afloat, the minimum to lift pot and the minimum to break from whale.We will pilot test a minimum of 4 different sizes of rope and perform sea trials using these ropes in Chaleurs Bay on various rock bottom and muddy bottoms.
We will also use the scientific and technical expertise in computer modelling available at the Anderson Cabot Center for Ocean Life to perform various virtual test loads on snow crab traps as well as simulate encounters between right whales and snow crab traps. Using a customized computer model developed in collaboration with independent engineers, ACCOL will analyse rope loads under different scenarios to evaluate the feasibility of using break-away ropes in this fishery. **Status:** Scheduled for September/October 2018 using 1 vessel and 16 traps without netting.

Initiative 4: Breakaway gear – Mechanical weak links

This activity will consist of testing the efficiency of various mechanical weak links on existing ropes used on snow crab gear in CFA12 and surrounding areas as well as other sizes of rope identified by a review of existing literature and other criteria to be identified. We plan to pilot test a minimum of 4 different weak link technologies and perform 12 pilot testing runs and 12 sea trials runs using these technologies in Chaleurs Bay under various conditions to be identified. We also plan to use the scientific and technical expertise in computer modeling available at the Anderson

Cabot for Ocean Life to perform various virtual test loads on snow crab traps as well as simulate encounters between right whales and snow crab traps. **Status:** Scheduled for April\May 2019 using 1 vessel and 16 existing snow crab traps**.**

Initiative 5: Breakaway gear – Time tension line cutter

This activity will consist of testing the efficiency of a time tension line cutter on existing ropes used on snow crab gear in CFA12 and surrounding areas as well as other sizes of rope identified by a review of existing literature and other criteria to be identified. We plan to pilot test and sea trial the only existing technology of this kind under various at sea conditions to be identified. We also plan to use the scientific and technical expertise in computer modeling available at the Anderson Cabot Center for Ocean Life to perform various virtual test loads on snow crab traps as well as simulate encounters between right whales and snow crab traps. **Status:** Scheduled pilot test in January 2019 and sea trial in July 2019.

Initiative 6: Rope in water column – Rope behaviour in water

This activity will consist of testing the behaviour in the water column of existing ropes used on snow crab gear in CFA12 and surrounding areas as confirmed through the fishermen survey as well as other sizes of rope identified by a review of existing literature and other criteria to be identified. We plan to pilot test a minimum of 4 different sizes of rope and perform sea trials using these ropes in Chaleurs Bay either attached to a buoy or separated from it under various conditions such as in high current shallow water, in high current deep water, in regular current shallow water and in regular current deep water. This activity should provide indications on the best sink versus regular rope ratio to be applied to snow crab fishing gear.

While this analysis focuses on how practical different ropes and gear configurations are in the fishery, an equal important objective is to study the degree to which the may reduce entanglement risks to NARW. Essentially, this involves an assessment of the likelihood that gear can facilitate the release of a whale should it encounter these ropes. The Virtual Whale Entanglement Simulator (VWES), a computer program developed in collaboration between ACCOL scientists and an engineer with expertise in hydrodynamics of aquatic animals will be used to study breakaway rope models to understand the forces on the rope generated by an entangled whale. **Status:** Scheduled for September/October 2018 using I vessel and 16 traps without netting.

Initiative 7: Rope in the water column – Rope less buoys

One of the main component of our project will be the testing of three (3) different rope less buoy trap prototypes by snow crab fishers after the 2017 fishing season and also during the 2018 fishing season. One prototype developed by Desert Star, and one prototype developed by Edgetech consist of having an acoustically triggered release of a buoy attached to a bag of rope on the trap at sea bottom. Once triggered, the buoy and the rope float to the surface. The other one, developed by SMELT, consist of having a triggered CO2 inflatable device attached directly to the trap. Once triggered, the trap itself floats to the surface. Experts from both companies will coordinate locally the sea trials of their contraptions. Each prototype will be tested by up to five

(5) different fishermen in various pre-selected conditions on the fishing grounds. **Status:** Scheduled for August/September 2018 and May\June 2019 using 5 vessels and a maximum of 25 traps without netting.

Initiative 8: Safe line trap – R & D Prototyping and testing of a Smart Snow Crab Trap

This activity aims at creating the prototype of a snow crab trap attached to a floating buoy that would be right whale safe and would cost much less to produce than existing rope less buoy models. CORBO Engineering envisions a new trap configuration that would use a rope contraption with a tensile strength equal or less than 1700lbs lined with a small electrical cable to link the floating buoy to an electrical triggering device fastened to a coil of regular rope attached to the trap on the sea floor. The activity will consist of first identifying the design requirements as well as the criteria to produce an efficient snow crab fishing gear by reviewing existing scientific literature and consulting with fishermen using the survey questionnaire. Trap design, fabrication drawings, purchase of material and prototyping will follow. This will be followed by pilot testing and sea trials for up to 3 prototypes. **Status:** Scheduled design to start in September 2018. Pilot and sea trials in 2019.

Initiative 9: Tracking & monitoring of right whales – Electronic monitoring packages (VMS, RFID, Smart buoys)

This activity will consist of testing the efficiency of two (2) integrated electronic monitoring systems ability to monitor, track and report the presence and conditions of right whales as they interact with the snow crab fishing activities in CFA 12. Two (2) different companies will each provide us with an integrated a system of sensors linked to an electronic log software program that will monitor the movement of the vessel (VMS), the position of the trap (RFID) and the position of the buoys. The two companies are Ecotrust from NS and Ocean Marine from Quebec. Experts from both companies will coordinate locally the sea trials of their contraptions. Each prototype will be tested by up to five (5) different fishermen in various pre-selected conditions on the fishing grounds. **Status:** Scheduled for July/September 2018 and May/June 2019 using 5 vessels and a maximum of 25 traps without netting.

Initiative 10: Tracking & monitoring of right whales – Hydrophones on traps on the fishing ground

This research activity will consist of deploying three (3) hydrophones on snow crab fishing traps to test the efficiency of this method to track the movement of right whales in the fishing grounds. The tests will be developed and supervised by Dalhousie University. There will be 16 outings at sea by 3 fishermen to retrieve the hydrophones during the season. The data collected will be analyzed and diffused through habitual scientific channels. **Status:** Scheduled sea trials October 2018 with one vessel and May/June 2019 with three (3) vessels.

Initiative 11: Tracking & monitoring of right whales – Rope identification and marking on 3 sections

This activity will consist of a review of recommendations from government, ENGO and the fishing industry as to the best way to identify the provenance of the ropes found entangled on right whales with a view to define the design requirements applicable by rope manufacturers. If available, pre-marked rope will be purchased from manufacturers for pilot tests and sea trials. Documentation and recommendations on long term marking of ropes as well as 3 section markings will be made available to industry and DFO. **Status:** Starting date January 2019.

Initiative 12: Marine debris reduction and removal – Recovery grapples

This activity will consist of testing the behaviour and efficiency of a pre-selected grapple used to recover reported snow crab gear lost in the CFA12 during the 2018 season as confirmed through the fishermen survey as well as through DFO'S lost gear report. We plan to do 9 sea trials using 3 Norwegian grapples in a selection of various bottom conditions found in CFA12 and according to various level of precision as to the location of the lost gears. **Status:** Scheduled for October 2018 using 1 vessel with a Norwegian grapple.

Initiative 13: Marine debris reduction and removal – R & D Smart winch system

The aim of this initiative is to address the challenge of recovering an extensive amount of gear in an area as widespread as CFA 12 efficiently and with the least foot print to the sea floor. CORBO Engineering envisions creating a prototype of an efficient and eco-friendly recovery system design for lost fishing gear in widespread areas. The activity will consist of first identifying the preliminary design parameters through existing literature and through fishermen knowledge gathered from the survey. Design parameters and criteria for gear recovery will follow and guide in the design and fabrication drawings of up to three (3) prototypes. This will be followed by pilot testing of prototypes and four (4) sea trials. **Status:** Completed design September 2019. Pilot and sea trials in 2020.

Initiative 14: Marine debris reduction and removal – Vessel Stabilizer Design Optimization

The aim of this initiative is to improve the design of vessel stabilizers used on snow crab fishing boats to allow for a better response from encounters with snow crab buoys on the water surface. CORBO Engineering plans to review the response of buoys to the various existing designs through information gathered from the fishermen's survey and direct involvement with its' own clientele. This will be followed by the selection of criteria and the ensuing finite element flow analysis. Pilot testing and sea trial will result in the selection and documentation of the optimum stabilizer design for positive response of snow crab fishing ropes in the water column. **Status:** Completed design September 2019; pilot and sea trials 2020.

Initiative 15: Final report & best practices education package

Request for feedback from DFO and ENGOs will be pursued all through the duration of projects. This feedback will be analyzed and integrated whenever appropriate and possible. A final

comprehensive report covering all findings and recommendations resulting from all the activities achieved during the project will be produced and published along with some educational hand-outs explaining the best practices identified through the overall work to help reduce/mitigate right whales' entanglements. Training sessions on same will also be made available to fishermen.

9.3 Appendix 3. Stakeholder submissions and audit team's responses

Whale and Dolphin Conservation, The Humane Society of the United States, Center of Biological Diversity, Defenders of Wildlife and Conservation Law Foundation

• SECTION 1 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☐ Fishery announcement and stakeholder identification[1] Opportunity to indicate that you are a stakeholder and identify other stakeholders.	Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fishery	11/09/2018	Whale and Dolphin Conservation; The Humane Society of the United States; Center for Biological Diversity; Defenders of Wildlife; Conservation Law Foundation

Nature of Comment (select all that apply)		Additional Information/Detail Please attach additional pages if necessary.
e.g. ☒ ☐	I wish to indicate that I am a stakeholder in this fishery. Please keep me informed about each stage of the assessment process.	*Example: My company has been operating five charter boats for recreational fishing on this fish stock for 20 years, and I would like to be informed and involved as this MSC assessment progresses. In addition, we have kept detailed logs over the years of our client's' catches, including sizes, weights and fish caught per trip and would be happy to share these with the assessment team.*
☒	I wish to suggest information or documents important for the assessment of this fishery *(you may either attach documents or provide references).*	WDC, Whale and Dolphin Conservation is a global charity dedicated to the protection of whales and dolphins. WDC's North American office has implemented a program dedicated to the conservation of the endangered North Atlantic right whale since its incorporation in 2005. Suggested documents and presentations: 1. Sean A. Hayes, Susan Gardner, Lance Garrison, Allison Henry, Luis Leandro. 2018. North Atlantic right whales- Evaluating Their Recovery Challenges in 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/September%202018/tm247__2_.pdf 2. Erin L. Meyer-Gutrbrod and Charles H. Greene. 2017. Uncertain recovery of the North Atlantic right whale in a changing ocean. https://doi.org/10.1111/gcb.13929 3. David Morin, Allison Henry, John Higgins, Mark Minton. 2018. ALWTRT entanglement summary, SI/M and gear analysis. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf 4. Jaclyn Taylor. 2018. Large Whale Unusual Mortality Events. Presentation to the Atlantic Large Whale Take Reduction Team, **October**
☒	I wish to suggest other individuals or organisations who should be considered stakeholders in the MSC assessment of this fishery *(please provide contact information).*	
☐	Other (please specify)	9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/lg_whale_ume_oct2018.pdf 5. van der Hoop J, Corkeron P, Moore M. Entanglement is a costly life-history stage in large whales. Ecol Evol. 2016;7(1):92-106. Published 2016 Dec 11. doi:10.1002/ece3.2615 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/ **Suggested Individuals That Should Be Considered as Stakeholders**: I am suggesting that Erica Fuller (CLF) and Emily Green (CLF) be added as stakeholders for these fisheries. Please see earlier in this section for their contact details.

• SECTION 2 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☒ Defining the assessment tree[2] Opportunity to review and comment on the assessment tree in relation to the fishery if a modified tree is used.	Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fisheries	11/09/2018	WDC, HSUS, CBD, DoW. CLF

Nature of Comment (select all that apply)		Additional Information/Detail Please attach additional pages if necessary.
☐	I DO NOT believe the proposed modifications to the default assessment tree (FCR Annex SA) are appropriate to assess this fishery *(please provide details and rationale).*	**Other** We are responding to MSC's objectives of the surveillance audit with regard to the Corrective Action Plan for the Canadian Snow Crab Fishery: 1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.

☐	**I DO NOT think the RBF should be used to assess the Performance Indicator(s) ticked below because there is sufficient information available to follow the conventional process[1] *(please provide details and rationale).*** ☐ 1.1.1 ☐ 2.1.1 ☐ 2.2.1 ☐ 2.3.1 ☐ 2.4.1 ☐ 2.5.1	2. To evaluate the effectiveness of the client corrective action plan implemented to address the cause of the certificate suspension as a result of an expedited audit which concluded that the effects of the UoA on the North Atlantic right whale (NARW, ETP species) population are unlikely to be within national limits. 3. To review any developments or changes within the fishery which impact traceability and the ability to segregate MSC from non-MSC products. 4. To review any other significant changes in the fishery.
☐	**I DO think the RBF should be used to assess the Performance Indicator(s) ticked below because there is NOT sufficient information available to follow the conventional process *(please provide details and rationale).*** ☐ 1.1.1 ☐ 2.1.1 ☐ 2.2.1 ☐ 2.3.1 ☐ 2.4.1 ☐ 2.5.1	
☒	**Other (please specify)**	

Nature of Comment (select all that apply)		**Additional Information/Detail** Please attach additional pages if necessary.
☐	**I wish to request an in-person meeting with the site team during their assessment visit (meetings without the fishery client present may be requested at this phase of the process if desired).**	*We are unable to attend the scheduled on-site meetings with the assessment team about this fishery but would like to ensure the following documents are considered when the team reviews the available information:* 1. Sean A. Hayes, Susan Gardner, Lance Garrison, Allison Henry, Luis Leandro. 2018. North Atlantic right whales- Evaluating Their Recovery Challenges in 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/September%202018/tm247__2_.pdf 2. Erin L. Meyer-Gutbrod and Charles H. Greene. 2017. Uncertain recovery of the North Atlantic right whale in a changing ocean. https://doi.org/10.1111/gcb.13929 3. David Morin, Allison Henry, John Higgins, Mark Minton. 2018. ALWTRT entanglement summary, SI/M and gear analysis. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf 4. Jaclyn Taylor. 2018. Large Whale Unusual Mortality Events. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/lg_whale_ume_oct2018.pdf **5.** van der Hoop J, Corkeron P, Moore M. Entanglement is a costly life-history stage in large whales. Ecol Evol. 2016;7(1):92-106. Published 2016 Dec 11. doi:10.1002/ece3.2615 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/

• **SECTION 4** • Return to Page 4

Assessment Stage		**Fishery**	**Date**	**Name of Individual/Organisation Providing Comments**
☒	**Public review of the draft assessment report[9] Opportunity to review and comment on the draft report, including the draft scoring of the fishery.**	**Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fisheries**	**11/109/2018**	**WDC, HSUS, CBD, DoW, CLF**

☒ I wish to comment on the evaluation of the fishery against specific Performance Indicators.
A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.

Nature of comment *(Please insert one or more of these codes in the second column of the table below for each PI.)*

1. I do not believe all the relevant information[6] available has been used to score this performance indicator *(please provide details and rationale)*.
2. I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score[7] *(please provide details and rationale)*.
3. I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level[8] *(please provide details and rationale)*.
4. Other *(please specify)*

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
Example: PI 1.1.2, Stock Rebuilding	*2*	*The CAB gave a score of 80 for this PI. The 80 scoring guidepost asks that there is evidence that rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within the timeline specified. However, no timeline has been specified based on previous performance or simulation models.*
PI 2.3.1, The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species, Known direct effects of the UoA are likely to not hinder recovery of ETP species, Direct Effects	**1,2**	Entanglements in fishing gear are the single biggest threat to endangered and declining North Atlantic right whales. Canadian snow crab fishing gear has been identified as the gear type for over half (8 of 14) of all North Atlantic right whale entanglement cases in 2017 and 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf Efforts in 2018 to reduce entanglements in Canadian waters reduced risk but these efforts largely revolved around fishery closures, not actual risk reduction of the fishery itself. There were three documented right whale mortalities in 2018, each with injuries consistent with entanglement. Additionally, at least three right whales were observed entangled in fishing gear in 2018, each in Canadian waters, and in at least one case, the gear was identified as crab gear in the Gulf of St. Lawrence*. This continued entanglement in snow crab gear indicates that the fishery remains a risk to the species if prosecuted using vertical lines in right whale habitat. *https://www.smithsonianmag.com/science-nature/plight-right-whale-180970648/

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 2.3.2 the UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species	**1,2**	Measures put forward by DFO in 2018, including static and dynamic closures as well as broad scale visual and acoustical surveys likely reduced risk from entanglement. However, Fisheries and Oceans Canada ("DFO") is now reviewing the entanglement risk reduction measures adopted in 2018, to determine 2019 licensing requirements for its fisheries, and has not committed to implementing the same measures beyond 2018. Therefore, long term benefits from these measures cannot be guaranteed and a single season of protection will not reverse the decline in right whales. In fact, an October 30, 2018 article entitled "Canada looking to add flexibility to right whale protection measures" indicates that DFO is considering lessening the restrictions placed on fisheries during 2018. https://www.seafoodsource.com/news/environment-sustainability/canada-looking-to-add-flexibility-to-right-whale-protection-measures
PI 2.3.2 the UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species	**1,2**	A review of gear from entanglements of North Atlantic right whales indicates that at least 8 right whales were entangled in Canadian snow crab gear between 2017 (n=7) and 2018 (n=1). As the species is in decline, the serious injury or mortality of any individual right whale poses a risk of extinction for the species. A reduction in entanglement in a single year is not sufficient for species recovery. As we mentioned in previous comments, sub-lethal effects of entanglement have population level impacts, therefore any entanglement inhibits the recovery of right whales and therefore diminishes the productivity and diversity of the ecosystem (van der Hoop et al. 2017).
PI 2.3.3 Relevant information is collected to support the management of UoA impacts on ETP species, including: • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.	**1,2**	As mentioned previously, DFO significantly increased visual and acoustical surveillance for the species during 2018. DFO also implemented a static closure to fishing as well as several dynamic areas subject to temporary closures based on the presence of right whales. Additional modifications to gear were also implemented, including: ▪ Reduction in the amount of floating line at the surface to 3.7m (12 feet) ▪ Requiring specific gear marking (coloring) on vertical lines to identify the fishing region of origin ▪ Requiring a sequential number marking on buoys identifying the individual crab trap ▪ Requiring fishers to report lost gear including the gear's last known GPS location It is unclear how effective these additional measures were in comparison to broad scale closures. In spite of these measures, at least one right whale was identified as entangled in Canadian snow crab gear in 2018 while another individual whale was entangled in gear identified as Canadian "unknown." As mentioned previously, DFO has not implemented closure or surveillance measures beyond 2018 leaving right whales at risk until such measures are made permanent.

1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.	**MSC stated objective of surveillance audit**	In 2018, DFO implemented a number of temporary measures to reduce risk including: ▪ Static closures ▪ Dynamic closures ▪ Prohibition of floating line at primary buoys ▪ Limitation of float line to secondary buoy to 3.7-6.4m in length ▪ Enhanced gear marking ▪ Lost Gear reporting ▪ At sea observers on 20% of snow crab trips ▪ Reinstatement of disentanglement teams ▪ Ending snow crab fishery season two weeks early (end date of June 30) ▪ Enhanced visual and acoustical survey effort for right whales ▪ Trap reductions While these measures appear to have reduced risk to right whales in the current season, DFO has not indicated it will implement and enforce these measures beyond 2018. Without regulatory measures and enhanced surveillance ongoing, we do not believe continued risk reduction will be achieved.
To evaluate the effectiveness of the client corrective action plan implemented to address the cause of the certificate suspension as a result of an expedited audit which concluded that the effects of the UoA on the North Atlantic right whale (NARW, ETP species) population are unlikely to be within national limits.	**MSC stated objective of surveillance audit**	While the previously mentioned DFO regulatory measures were included in the client's Corrective Action Plan, we believe it is important to note that these regulatory measures were implemented and funded by DFO on a temporary basis. DFO has not yet committed to these actions beyond 2018 and therefore they cannot be considered as corrective actions beyond this season or until DFO indicates these actions will continue permanently. In addition to the DFO actions, the client has agreed to: ▪ Review the breaking strength of ropes ▪ Test rope behaviour in the water column ▪ Test mechanical weak links on snow crab ropes ▪ Test a time tension line cutter on snow crab ropes ▪ Test a smart snow crab trap (using line <1700lbs) ▪ Test Ropeless gear ▪ Test gear identification marking ▪ Pilot project to remove ghost gear ▪ Test electronic monitoring and tracking of right whale ▪ Test hydrophones on the fishing ground ▪ Establish a whale rescue team ▪ Survey fishermen for current practices ▪ Develop a team similar to the US Atlantic Large Whale Take Reduction Team ▪ Produce a bilingual handout ▪ Offer outreach to fleet ▪ Develop a best practice guide. While we commend the client for being proactive in these much-needed and laudable efforts toward developing mitigation, none of these actions are, in and of themselves, a means to reduce risk to the species in the immediate and therefore cannot be considered as sufficient corrective actions to address the cause of suspension, i.e. entanglement of endangered North Atlantic right whales. As mentioned previously, in spite of temporary regulatory measures in place by DFO, and these actions by the client, at least one North Atlantic right whale became entangled in Canadian snow crab gear in 2018.
To review any other significant changes in the fishery.	**MSC stated objective of surveillance audit**	As stated previously, we believe the efforts put forward in 2018 significantly reduced risk to right whales, but reiterate that DFO has not committed to implementing these measures going forward. Until then, risk to right whales should be evaluated at 2017 levels, prior to the implementation of this year's measures. As such, risk to the survival of the species remains high from snow crab gear.

Comment	Nature of Comment	Justification Please attach additional pages if necessary.
☒ **I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.**		This fishery has been documented to entangle and kill critically endangered North Atlantic right whales (*Eubalaena glacialis*), a species listed under both the United States Endangered Species Act and Canada's Species At Risk Act and known to be in decline. We reiterate that even for whales who are not immediately killed, the sub-lethal effects of entanglement have population level impacts, therefore any entanglement inhibits the recovery of right whales and therefore diminishes the productivity and diversity of the ecosystem (van der Hoop et al. 2017). Mortalities of ETP species are in violation of the MSC Fisheries Standards. No ongoing measures are in place which will ensure that right whales will not be injured or killed in Canadian snow crab fisheries.

• SECTION 5 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☒ **Surveillance[9]** **Opportunity to provide information to the CAB about any changes in the fishery since certification and/or the achievements made towards conditions.**	**Gulf of St. Lawrence Snow Crab Trap Fishery**	**11/14/2017**	**WDC, HSUS, CBD, DoW, CLF**

Nature of Comment (select all that apply)		Justification Please attach additional pages if necessary.
e.g. ☐	**I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.**	*Example: Since this fishery was certified 2 years ago, government scientists have been working closely with the fishery client to develop a system for monitoring stock status capable of ensuring a precautionary harvest strategy. Although not published, the progress on this work to date can be found in the following report (attached)…*
☐	**I wish to provide information relevant to fulfilment of the conditions of certification.**	At least three mortalities associated with entanglements and three new entanglements of live North Atlantic right whales have been documented in 2018. Of these, at least one mortality (January 2018) and one live right whale entanglement (August 2018) have been attributed to the Gulf of St. Lawrence snow crab fishery. Further, a number of new entanglement cases in 2018 were documented in the GSL indicating even the current measures are not sufficient to reduce risk to a level acceptable by Canada's Species at Risk Act or the US Endangered Species Act.

☒	**Other (please specify)**	New Entanglement Cases in GSL in 2018 as reported by Dr. Moe Brown to the North Atlantic right whale Consortium on November 8, 2018 RW# 3312- - seen in the GSL morning without gear and seen three hours later entangled- not relocated and no further sightings. RW# 3960- seen in GSL without gear and again in the GSL entangled in a 14 period. Freed itself but severe damage to its baleen. RW# 3843- seen GSL then 53 days later in Bay of Fundy entangled in gear with 5/8" line with lead core. Described as attached to something "heavy" and was last seen with line attached. 2016 calf of 1301- seen in GSL without gear and then 15 days later seen with deep entanglement scars on rostrum, damaged blowholes and evidence of body and flipper wraps. The following entanglement data were provided by David Morin of NOAA's Atlantic Entanglement Response Program (David.Morin@noaa.gov) and indicate that the Canadian snow crab fishery has, and continues to threaten the recovery of the endangered North Atlantic right whale 2014 - 1 Canadian snow crab 2015 - 1 Canadian snow crab 2016 - 3 Canadian snow crab 2017 - 7 Canadian snow crab 2018 - 1 Canadian snow crab, 1 Canadian unknown* *According to The Smithsonian Magazine, researchers witnessed right whale #3960 struggle for hours entangled in crab gear. While the animal did eventually free itself from the gear, the damage to the baleen was substantial and will impair its ability to forage. 

Audit team's response

Regina Asmutis-Silvia
Executive Director, Whale and Dolphin Conservation, North America
7, Nelson Street, Plymouth
MA, USA 02360

Re: Your submission regarding the 1st surveillance audit after re-assessment of the Scotian Shelf snow crab trap fishery

February 27th, 2019

Dear Regina,

The audit team appointed to conduct the 1st surveillance audit after re-assessment of the Scotian shelf snow crab trap fishery has reviewed your submission provided before the November 2018 site visit.

The audit team would like to thank you for providing comments in regards to the impact of the Scotian shelf snow crab trap fishery on the North Atlantic right whale (NARW).

I'm pleased to provide you with the audit team's responses to the specific issues raised in your 9th November 2018 letter in the general order in which they are presented.

Before providing you with our responses, I would like to remind you that although the surveillance audit for the Gulf of St Lawrence (GSL) snow crab trap fishery has been carried out concurrently by the same audit team, this letter contains our responses only related to the Scotian shelf snow crab trap fishery, and our responses to your comments related to the other fishery will be provided in a separate letter that will be included in the surveillance audit report for that fishery.

• SECTION 1 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☐ Fishery announcement and stakeholder identification[1] Opportunity to indicate that you are a stakeholder and identify other stakeholders.	Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fishery	11/09/2018	Whale and Dolphin Conservation; The Humane Society of the United States; Center for Biological Diversity; Defenders of Wildlife; Conservation Law Foundation

Nature of Comment (select all that apply)		Additional Information/Detail Please attach additional pages if necessary.
e.g. ☒ ☐	I wish to indicate that I am a stakeholder in this fishery. Please keep me informed about each stage of the assessment process.	*Example: My company has been operating five charter boats for recreational fishing on this fish stock for 20 years, and I would like to be informed and involved as this MSC assessment progresses. In addition, we have kept detailed logs over the years of our client's' catches, including sizes, weights and fish caught per trip and would be happy to share these with the assessment team.*
☒	I wish to suggest information or documents important for the assessment of this fishery *(you may either attach documents or provide references).*	WDC, Whale and Dolphin Conservation is a global charity dedicated to the protection of whales and dolphins. WDC's North American office has implemented a program dedicated to the conservation of the endangered North Atlantic right whale since its incorporation in 2005. Suggested documents and presentations: 1. Sean A. Hayes, Susan Gardner, Lance Garrison, Allison Henry, Luis Leandro. 2018. North Atlantic right whales- Evaluating Their Recovery Challenges in 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/September%202018/tm247__2_.pdf 2. Erin L. Meyer-Gutrbrod and Charles H. Greene. 2017. Uncertain recovery of the North Atlantic right whale in a changing ocean. https://doi.org/10.1111/gcb.13929 3. David Morin, Allison Henry, John Higgins, Mark Minton. 2018. ALWTRT entanglement summary, SI/M and gear analysis. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf 4. Jaclyn Taylor. 2018. Large Whale Unusual Mortality Events. Presentation to the Atlantic Large Whale Take Reduction Team, **October**
☒	I wish to suggest other individuals or organisations who should be considered stakeholders in the MSC assessment of this fishery *(please provide contact information).*	
☐	Other (please specify)	9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/lg_whale_ume_oct2018.pdf 5. van der Hoop J, Corkeron P, Moore M. Entanglement is a costly life-history stage in large whales. Ecol Evol. 2016;7(1):92-106. Published 2016 Dec 11. doi:10.1002/ece3.2615 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/ **Suggested Individuals That Should Be Considered as Stakeholders**: I am suggesting that Erica Fuller (CLF) and Emily Green (CLF) be added as stakeholders for these fisheries. Please see earlier in this section for their contact details.

The audit team acknowledges and thanks WDC for the references provided. The team has reviewed all the papers and presentations mentioned here. Erica Fuller and Emily Green have been added as stakeholders for these fisheries.

• SECTION 2 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☒ Defining the assessment tree[2] Opportunity to review and comment on the assessment tree in relation to the fishery if a modified tree is used.	Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fisheries	11/09/2018	WDC, HSUS, CBD, DoW. CLF

Nature of Comment (select all that apply)		Additional Information/Detail Please attach additional pages if necessary.
☐	I DO NOT believe the proposed modifications to the default assessment tree (FCR Annex SA) are appropriate to assess this fishery *(please provide details and rationale).*	**Other** We are responding to MSC's objectives of the surveillance audit with regard to the Corrective Action Plan for the Canadian Snow Crab Fishery: 1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.

☐	**I DO NOT think the RBF should be used to assess the Performance Indicator(s) ticked below because there is sufficient information available to follow the conventional process[1] *(please provide details and rationale).*** ☐ 1.1.1 ☐ 2.1.1 ☐ 2.2.1 ☐ 2.3.1 ☐ 2.4.1 ☐ 2.5.1	2. To evaluate the effectiveness of the client corrective action plan implemented to address the cause of the certificate suspension as a result of an expedited audit which concluded that the effects of the UoA on the North Atlantic right whale (NARW, ETP species) population are unlikely to be within national limits. 3. To review any developments or changes within the fishery which impact traceability and the ability to segregate MSC from non-MSC products. 4. To review any other significant changes in the fishery.
☐	**I DO think the RBF should be used to assess the Performance Indicator(s) ticked below because there is NOT sufficient information available to follow the conventional process *(please provide details and rationale).*** ☐ 1.1.1 ☐ 2.1.1 ☐ 2.2.1 ☐ 2.3.1 ☐ 2.4.1 ☐ 2.5.1	
☒	**Other (please specify)**	

Nature of Comment (select all that apply)		**Additional Information/Detail** Please attach additional pages if necessary.
☐	**I wish to request an in-person meeting with the site team during their assessment visit (meetings without the fishery client present may be requested at this phase of the process if desired).**	*We are unable to attend the scheduled on-site meetings with the assessment team about this fishery but would like to ensure the following documents are considered when the team reviews the available information:* 1. Sean A. Hayes, Susan Gardner, Lance Garrison, Allison Henry, Luis Leandro. 2018. North Atlantic right whales- Evaluating Their Recovery Challenges in 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/September%202018/tm247__2_.pdf 2. Erin L. Meyer-Gutrbrod and Charles H. Greene. 2017. Uncertain recovery of the North Atlantic right whale in a changing ocean. https://doi.org/10.1111/gcb.13929 3. David Morin, Allison Henry, John Higgins, Mark Minton. 2018. ALWTRT entanglement summary, SI/M and gear analysis. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf 4. Jaclyn Taylor. 2018. Large Whale Unusual Mortality Events. Presentation to the Atlantic Large Whale Take Reduction Team, October 9, 2018 https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/lg_whale_ume_oct2018.pdf **5.** van der Hoop J, Corkeron P, Moore M. Entanglement is a costly life-history stage in large whales. Ecol Evol. 2016;7(1):92-106. Published 2016 Dec 11. doi:10.1002/ece3.2615 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/

• **SECTION 4** • Return to Page 4

Assessment Stage		**Fishery**	**Date**	**Name of Individual/Organisation Providing Comments**
☒	**Public review of the draft assessment report[9]** **Opportunity to review and comment on the draft report, including the draft scoring of the fishery.**	**Gulf of St. Lawrence and Scotian Shelf Snow Crab Trap Fisheries**	**11/109/2018**	**WDC, HSUS, CBD, DoW, CLF**

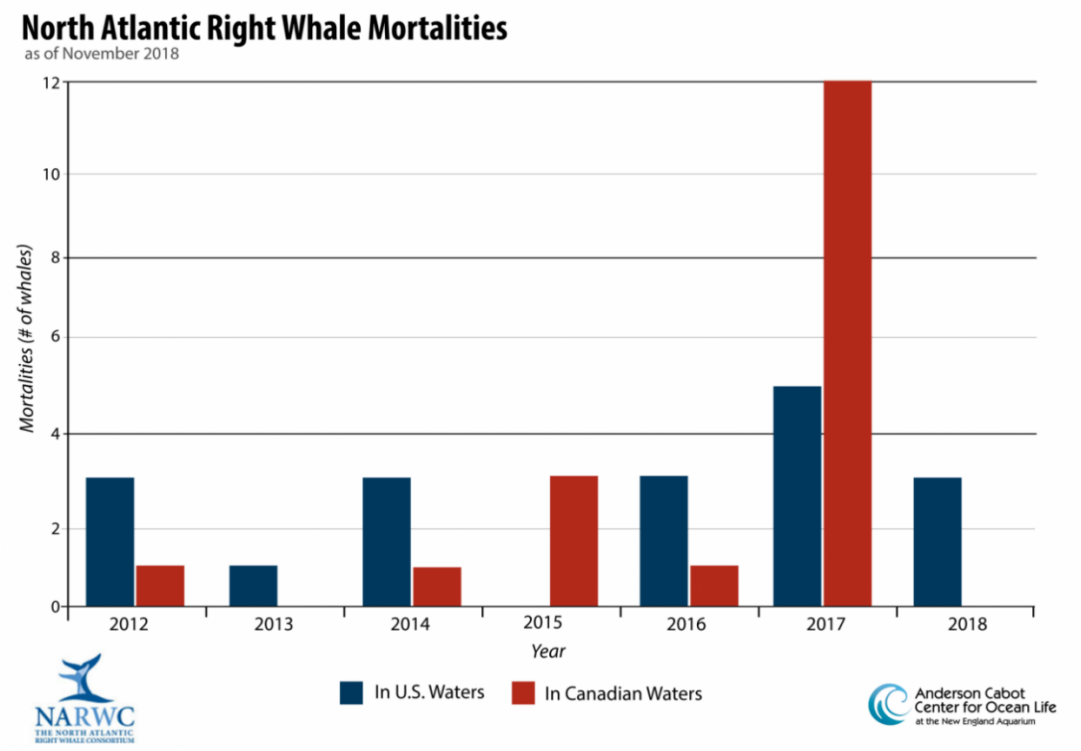
☒ I wish to comment on the evaluation of the fishery against specific Performance Indicators.
A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.

Nature of comment *(Please insert one or more of these codes in the second column of the table below for each PI.)*

1. I do not believe all the relevant information[6] available has been used to score this performance indicator *(please provide details and rationale)*.
2. I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score[7] *(please provide details and rationale)*.
3. I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level[8] *(please provide details and rationale)*.
4. Other *(please specify)*

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
Example: PI 1.1.2, Stock Rebuilding	*2*	*The CAB gave a score of 80 for this PI. The 80 scoring guidepost asks that there is evidence that rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within the timeline specified. However, no timeline has been specified based on previous performance or simulation models.*
PI 2.3.1, The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species, Known direct effects of the UoA are likely to not hinder recovery of ETP species, Direct Effects	**1,2**	Entanglements in fishing gear are the single biggest threat to endangered and declining North Atlantic right whales. Canadian snow crab fishing gear has been identified as the gear type for over half (8 of 14) of all North Atlantic right whale entanglement cases in 2017 and 2018. https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/trt/meetings/October%202018/2018_fall_alwtrt_entanglement_update.pdf Efforts in 2018 to reduce entanglements in Canadian waters reduced risk but these efforts largely revolved around fishery closures, not actual risk reduction of the fishery itself. There were three documented right whale mortalities in 2018, each with injuries consistent with entanglement. Additionally, at least three right whales were observed entangled in fishing gear in 2018, each in Canadian waters, and in at least one case, the gear was identified as crab gear in the Gulf of St. Lawrence*. This continued entanglement in snow crab gear indicates that the fishery remains a risk to the species if prosecuted using vertical lines in right whale habitat. *https://www.smithsonianmag.com/science-nature/plight-right-whale-180970648/

The audit team acknowledges and thanks WDC for their input. Our analysis of the issue is presented below. Available information collected by the audit team on the interactions of the fishery with NARW during the 2018 fishing season has been used to amend the rationale for both PIs 2.3.1 ETP species outcome and 2.3.2 ETP species management.
DFO reported no NARW deaths for 2018 in Canada.



Source: https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/

Since there is no scope for allowable human-induced mortality defined in the Canadian NARW Recovery Potential Assessment (RPA[103]) the Canadian national limit for NARW consists therefore of zero-take. Given the effects of the UoA on the population/stock in 2018 are known and likely to be within these limits (i.e. zero mortality recorded in 2018 in Canadian waters). Therefore, the audit team conclude that PI 2.3.1, SG60, Scoring Issue *a* is met.

This WDC submission states that the January 22nd 2018 whale mortality in the US should be attributed to a Canadian snow crab fishery. However, this has not been confirmed by DFO or any US agency sources, or in the 2018 NARWC Report Card.
The audit team concluded that the combined effects of the MSC UoAs on the NARW population/stock are likely known but it is unclear if they are highly likely (>80th percentile - MSC FCR v2.0, Table SA9) to be within these limits. Therefore, PI 2.3.1, SG80, Scoring Issue *a* is not met.
The audit team have considered the available data and research with respect to the impacts of entanglements and considered this in relation to PI 2.3.1 scoring issue *b*.
In November 2018, DFO reported 3 entanglements incidents for 2018 (2 in the GSL and 1 from either the GSL or Bay of Fundy - assigning it to a specific area with certainty was not possible). Two additional NARWs with fresh entanglement wounds/scars and without signs of gear attached, were also sighted. The gear responsible for the wounds/scars is unknown.
Recent peer-reviewed scientific information (i.e. post RPA publication in 2007) on NARW survival after entanglements show that:

- Both juveniles and adult NARW have a lower probability (about 25%) of survival after a reported entanglement (Robbins et al 2015[104]);
- Drag from entanglement can impact blubber stores and require energy investment on the order of magnitude as a reproductive event or migration. Recovery from such physiological stress and disturbance may limit an individual's future reproductive success, making entanglement a potential contributor to fluctuations in population growth (Van der Hoop *et. al.* 2017[105]).
- Kenney (2018)[106] analysed the NARW population trajectories without entanglement mortality. By using National Marine Fisheries Service (NMFS) Mortality and Serious Injury data and a relatively simple approach to estimate what the population trajectory since 1990 might have been under 4 different scenarios of reduced entanglement mortality he found that, under the best-case scenarios, the population at the end of the time-series would have been 25-30% higher than observed at present, and much more resilient to heavy mortality years like 2017.

The audit team has taken into account the above information together with MSC SA3.10.3, which states that, "*…when assessing (PI 2.3.1) scoring issue (a) and (b), the team shall take into account whether there are any changes in the catch or mortality of ETP species resulting from the implementation of measures to minimize their mortality (PI 2.3.2 scoring issue (e))*".

[103] http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf
[104] https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306
[105] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/
[106] https://www.int-res.com/articles/esr2018/37/n037p233.pdf

The audit team concluded that because it was not possible to assign the Grand Manan Basin entanglement to snow crab gear from the GSL or the Bay of Fundy, and there were no other reported entanglements attributed from the Scotian Shelf snow crab fishery there is sufficient evidence to determine that the known direct effects of the UoA are highly likely to not hinder recovery of the endangered NARW population. As such, PI 2.3.1, SG80, Scoring Issue *b,* is met and the uncertainties relating to the Grand Manan Basin entanglement have been accounted for in PI 2.3.1, Scoring Issue a.

Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
PI 2.3.2 the UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species	**1,2**	Measures put forward by DFO in 2018, including static and dynamic closures as well as broad scale visual and acoustical surveys likely reduced risk from entanglement. However, Fisheries and Oceans Canada ("DFO") is now reviewing the entanglement risk reduction measures adopted in 2018, to determine 2019 licensing requirements for its fisheries, and has not committed to implementing the same measures beyond 2018. Therefore, long term benefits from these measures cannot be guaranteed and a single season of protection will not reverse the decline in right whales. In fact, an October 30, 2018 article entitled "Canada looking to add flexibility to right whale protection measures" indicates that DFO is considering lessening the restrictions placed on fisheries during 2018. https://www.seafoodsource.com/news/environment-sustainability/canada-looking-to-add-flexibility-to-right-whale-protection-measures
PI 2.3.2 the UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species	**1,2**	A review of gear from entanglements of North Atlantic right whales indicates that at least 8 right whales were entangled in Canadian snow crab gear between 2017 (n=7) and 2018 (n=1). As the species is in decline, the serious injury or mortality of any individual right whale poses a risk of extinction for the species. A reduction in entanglement in a single year is not sufficient for species recovery. As we mentioned in previous comments, sub-lethal effects of entanglement have population level impacts, therefore any entanglement inhibits the recovery of right whales and therefore diminishes the productivity and diversity of the ecosystem (van der Hoop et al. 2017).

The audit team acknowledges and thanks WDC for the input. Our analysis of the issue is summarised below.

Management Plans for 2019

On February 7, 2019 the Minister of Fisheries, Oceans and the Canadian Coast Guard, along with the Minister of Transport, and the Member of Parliament for Acadie—Bathurst, announced how the Government of Canada will protect the NARW during the 2019 season[107]. The following is extracted from the announcement:

To reduce the probability of vessel strikes the Government is:

- Re-introducing a mandatory speed restriction for vessels 20 metres or longer to a maximum of 10 knots when travelling in the western Gulf of St. Lawrence starting on April 28th 2019.
- Continuing to allow vessels to travel at safe operational speeds in parts of two shipping lanes north and south of Anticosti Island when no North Atlantic right whales are spotted in the area.

107 https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html

- Adjusting the areas where the mandatory speed restriction applies to reflect North Atlantic right whale sightings to minimize impacts on the cruise ship industry and on community resupply.

To address the possibility of entanglements in fishing gear the Government is:

- Adjusting the area closed to snow crab, lobster fisheries and all other non-tended fixed-gear fisheries in Atlantic Canada and Quebec to include the area where 90% of the North Atlantic Right Whale were sighted last year during the prime fishing season. This area is a little less than half the size it was in 2018 and is more elongated North-to-South than in 2018.
- Keeping the overall protection area the same in terms of the combined season-long closure area and the area where temporary 15-day closures may occur for snow crab, lobster fisheries and all other non-tended fixed-gear fisheries following a sighting of one or more right whales.
- Adjusting the protocol for temporary closures to include provisions for sightings of right whales in shallow waters less than 20 fathoms (approximately 36.5 metres deep). A 15-day closure will be triggered in waters less than 20 fathoms only if one or more right whales are spotted in shallow waters.

Once properly agreed and formalised as fishery regulations, these measures or potentially, some variation of them, will be published in formal Notice/s to Fish Harvesters to be implemented in the 2019 snow crab season.

The audit team concluded that following implementation of the new management measures in the 2018 Scotian Shelf snow crab fishery there were zero mortalities and no confirmed entanglements of NARW. As indicated above, changes to the management measures will be applied in the 2019 season. However, the audit team considered that there is insufficient evidence to substantiate the existence of a ***strategy***, (i.e. a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically) for managing the UoA's impact on the NARW population. As a result, PI 2.3.2 SG80, SI a is not met.

PI 2.3.3 Relevant information is collected to support the management of UoA impacts on ETP species, including: **• Information for the development of the management strategy;** **• Information to assess the effectiveness of the management strategy; and** **• Information to determine the outcome status of ETP species.**	**1,2**	As mentioned previously, DFO significantly increased visual and acoustical surveillance for the species during 2018. DFO also implemented a static closure to fishing as well as several dynamic areas subject to temporary closures based on the presence of right whales. Additional modifications to gear were also implemented, including: ▪ Reduction in the amount of floating line at the surface to 3.7m (12 feet) ▪ Requiring specific gear marking (coloring) on vertical lines to identify the fishing region of origin ▪ Requiring a sequential number marking on buoys identifying the individual crab trap ▪ Requiring fishers to report lost gear including the gear's last known GPS location It is unclear how effective these additional measures were in comparison to broad scale closures. In spite of these measures, at least one right whale was identified as entangled in Canadian snow crab gear in 2018 while another individual whale was entangled in gear identified as Canadian "unknown." As mentioned previously, DFO has not implemented closure or surveillance measures beyond 2018 leaving right whales at risk until such measures are made permanent.

The audit team acknowledges and thanks WDC for the input. Our analysis of the issue is presented below.

The issue of risk to NARW mortality and entanglements and longer term management strategy have been covered in previous comments relating to PI 2.3.1 and PI 2.3.2. Please refer to those responses.

Information relevant to NARW management

2017 NARW Population Status

In late 2018, the Anderson Cabot Center for Ocean Life at New England Aquarium provided updated number for the NARW population in 2017, following the 2018 NARW Consortium meeting. The best estimate for the population at the end of 2017 was 411 (range 392 and 433), and there have been an additional three documented mortalities in US waters in 2018.

NARW Monitoring in 2018

In 2018, a very extensive area was monitored by DFO (including Control and Protection) from April 1st to September 15th 2018 using a suit of different planes. In this period about 2'000 survey hours of flights were logged, about 5 times more hours than 2017.

In addition to the aerial surveys, DFO Science deployed Marine Mammal Observers that totalled about 1'000 hours of observation on a number of different research vessels. Near real time and autonomous Passive Acoustic Monitoring (e.g. Slocum Gliders) systems were also set up to track for presence of NARW.

Industry measures to mitigate NARW entanglement risk – October 2018 updates

Through DFO's joint federal-provincial Atlantic Fisheries Fund (AFF), the Association des Crabiers Acadiens Inc. (ACA) in coordination with the Association des Pêcheurs Professionnels Crabiers Acadiens and the Crabiers du Nord-est have received funding over three years to implement a series of initiatives to research, test, explore, demonstrate and/or sea trial, technologies and processes to mitigate the risks of NARW entanglements in snow crab fishing gear. Of these we report the ones that have a whale monitoring information aspect to it.

Initiative 9: Tracking & monitoring of right whales – Electronic monitoring packages (VMS, RFID, Smart buoys)

This activity will consist of testing the efficiency of two (2) integrated electronic monitoring systems ability to monitor, track and report the presence and conditions of right whales as they

interact with the snow crab fishing activities in CFA 12. Two (2) different companies will each provide us with an integrated system of sensors linked to an electronic log software program that will monitor the movement of the vessel (VMS), the position of the trap (RFID) and the position of the buoys. **Status:** Scheduled for July/September 2018 and May/June 2019 using 5 vessels and a maximum of 25 traps without netting.

Initiative 10: Tracking & monitoring of right whales – Hydrophones on traps on the fishing ground

This research activity will consist of deploying three (3) hydrophones on snow crab fishing traps to test the efficiency of this method to track the movement of right whales in the fishing grounds. The tests will be developed and supervised by Dalhousie University. There will be 16 outings at sea by 3 fishermen to retrieve the hydrophones during the season. The data collected will be analyzed and diffused through habitual scientific channels. **Status:** Scheduled sea trials October 2018 with one vessel and May/June 2019 with three (3) vessels.

Initiative 11: Tracking & monitoring of right whales – Rope identification and marking on 3 sections

This activity will consist of a review of recommendations from government, ENGO and the fishing industry as to the best way to identify the provenance of the ropes found entangled on right whales with a view to define the design requirements applicable by rope manufacturers. If available, pre-marked rope will be purchased from manufacturers for pilot tests and sea trials. Documentation and recommendations on long term marking of ropes as well as 3 section markings will be made available to industry and DFO. **Status:** Starting date January 2019.

DFO lead research activities during 2018

DFO conducted extensive NARW related research and monitoring activities during 2018. A summary of the key projects is provided below (although not a complete list of research projects currently underway) to collect the necessary information of the UoA impacts on NARWs:

- Satellite tagging project (2018-2021);
- Effort-weighted distribution of NARW in the GSL using DFO aerial and vessel based surveys (up to July 2018);
- Habitat suitability for NARW predictions based upon a bioenergetics model and zooplankton biomass in the GSL;
- NARW encounter rates with the GSL snow crab gear (2015-2017);
- Species distribution model based only on opportunistic sightings of NARW, and bathymetry / oceanographic variables that include NS and NFLD, and Labrador waters;
- Species distribution model that also incorporates water mass structures, tidal current magnitude, and two prey data layers for NS waters only;
- *Calanus* distribution and changes in abundance;
- Testing whale-detection technologies, including profiling buoys and instrumenting existing oceanographic buoys with acoustics packages, to inform the development of real-time detection system that would inform mariners of right-whale presence;
- OPP MEQ Impact of shipping noise on NARW research program.

During the site visits, the science Ocean Protection Program reported to have funding for 5 years

for monitoring the effects of noise pollution on NARW and for real time detection systems to prevent vessel strikes.

The audit team concluded that there is adequate quantitative information to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of NARWs and, as such, PI 2.3.3 SG60 and SG80, SI *a* are met. Furthermore, there is adequate information to measure trends and support a strategy to manage impacts on ETP species and, as such, PI 2.3.3 SG60 and SG80, SI *b* are met.

1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.	**MSC stated objective of surveillance audit**	In 2018, DFO implemented a number of temporary measures to reduce risk including: ▪ Static closures ▪ Dynamic closures ▪ Prohibition of floating line at primary buoys ▪ Limitation of float line to secondary buoy to 3.7-6.4m in length ▪ Enhanced gear marking ▪ Lost Gear reporting ▪ At sea observers on 20% of snow crab trips ▪ Reinstatement of disentanglement teams ▪ Ending snow crab fishery season two weeks early (end date of June 30) ▪ Enhanced visual and acoustical survey effort for right whales ▪ Trap reductions While these measures appear to have reduced risk to right whales in the current season, DFO has not indicated it will implement and enforce these measures beyond 2018. Without regulatory measures and enhanced surveillance ongoing, we do not believe continued risk reduction will be achieved.
To evaluate the effectiveness of the client corrective action plan implemented to address the cause of the certificate suspension as a result of an expedited audit which concluded that the effects of the UoA on the North Atlantic right whale (NARW, ETP species) population are unlikely to be within national limits.	**MSC stated objective of surveillance audit**	While the previously mentioned DFO regulatory measures were included in the client's Corrective Action Plan, we believe it is important to note that these regulatory measures were implemented and funded by DFO on a temporary basis. DFO has not yet committed to these actions beyond 2018 and therefore they cannot be considered as corrective actions beyond this season or until DFO indicates these actions will continue permanently. In addition to the DFO actions, the client has agreed to: ▪ Review the breaking strength of ropes ▪ Test rope behaviour in the water column ▪ Test mechanical weak links on snow crab ropes ▪ Test a time tension line cutter on snow crab ropes ▪ Test a smart snow crab trap (using line <1700lbs) ▪ Test Ropeless gear ▪ Test gear identification marking ▪ Pilot project to remove ghost gear ▪ Test electronic monitoring and tracking of right whale ▪ Test hydrophones on the fishing ground ▪ Establish a whale rescue team ▪ Survey fishermen for current practices ▪ Develop a team similar to the US Atlantic Large Whale Take Reduction Team ▪ Produce a bilingual handout ▪ Offer outreach to fleet ▪ Develop a best practice guide. While we commend the client for being proactive in these much-needed and laudable efforts toward developing mitigation, none of these actions are, in and of themselves, a means to reduce risk to the species in the immediate and therefore cannot be considered as sufficient corrective actions to address the cause of suspension, i.e. entanglement of endangered North Atlantic right whales. As mentioned previously, in spite of temporary regulatory measures in place by DFO, and these actions by the client, at least one North Atlantic right whale became entangled in Canadian snow crab gear in 2018.
To review any other significant changes in the fishery.	**MSC stated objective of surveillance audit**	As stated previously, we believe the efforts put forward in 2018 significantly reduced risk to right whales, but reiterate that DFO has not committed to implementing these measures going forward. Until then, risk to right whales should be evaluated at 2017 levels, prior to the implementation of this year's measures. As such, risk to the survival of the species remains high from snow crab gear.

The audit team acknowledges and thanks WDC for the input. The issue of risk to NARW mortality and entanglements and longer term management strategy has been covered in previous comments relating to PI 2.3.1 and PI 2.3.2. Please refer to those responses.

Comment	Nature of Comment	Justification Please attach additional pages if necessary.
☒ **I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.**		This fishery has been documented to entangle and kill critically endangered North Atlantic right whales (*Eubalaena glacialis*), a species listed under both the United States Endangered Species Act and Canada's Species At Risk Act and known to be in decline. We reiterate that even for whales who are not immediately killed, the sub-lethal effects of entanglement have population level impacts, therefore any entanglement inhibits the recovery of right whales and therefore diminishes the productivity and diversity of the ecosystem (van der Hoop et al. 2017). Mortalities of ETP species are in violation of the MSC Fisheries Standards. No ongoing measures are in place which will ensure that right whales will not be injured or killed in Canadian snow crab fisheries.

The audit team acknowledges and thanks WDC for the input. The issue of risk to NARW entanglements and resulting harm/injury has been fully covered in previous comments relating to PI 2.3.1, SG60, SI *b*. Please refer to those responses.

• SECTION 5 • Return to Page 4

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
☒ Surveillance[9] Opportunity to provide information to the CAB about any changes in the fishery since certification and/or the achievements made towards conditions.	Gulf of St. Lawrence Snow Crab Trap Fishery	11/14/2017	WDC, HSUS, CBD, DoW, CLF

Nature of Comment (select all that apply)		Justification Please attach additional pages if necessary.
e.g. ☐	I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	*Example: Since this fishery was certified 2 years ago, government scientists have been working closely with the fishery client to develop a system for monitoring stock status capable of ensuring a precautionary harvest strategy. Although not published, the progress on this work to date can be found in the following report (attached)…*
☐	I wish to provide information relevant to fulfilment of the conditions of certification.	At least three mortalities associated with entanglements and three new entanglements of live North Atlantic right whales have been documented in 2018. Of these, at least one mortality (January 2018) and one live right whale entanglement (August 2018) have been attributed to the Gulf of St. Lawrence snow crab fishery. Further, a number of new entanglement cases in 2018 were documented in the GSL indicating even the current measures are not sufficient to reduce risk to a level acceptable by Canada's Species at Risk Act or the US Endangered Species Act.

The audit team acknowledges and thanks WDC for the input. However, we note that neither DFO nor the 2018 NARW Consortium Report card has confirmed any mortality in 2018 attributable to Canadian gear. The 2018 entanglements have been thoroughly recorded in the reports.

☒	Other (please specify)	New Entanglement Cases in GSL in 2018 as reported by Dr. Moe Brown to the North Atlantic right whale Consortium on November 8, 2018 RW# 3312- - seen in the GSL morning without gear and seen three hours later entangled- not relocated and no further sightings. RW# 3960- seen in GSL without gear and again in the GSL entangled in a 14 period. Freed itself but severe damage to its baleen. RW# 3843- seen GSL then 53 days later in Bay of Fundy entangled in gear with 5/8" line with lead core. Described as attached to something "heavy" and was last seen with line attached. 2016 calf of 1301- seen in GSL without gear and then 15 days later seen with deep entanglement scars on rostrum, damaged blowholes and evidence of body and flipper wraps. The following entanglement data were provided by David Morin of NOAA's Atlantic Entanglement Response Program (David.Morin@noaa.gov) and indicate that the Canadian snow crab fishery has, and continues to threaten the recovery of the endangered North Atlantic right whale 2014 - 1 Canadian snow crab 2015 - 1 Canadian snow crab 2016 - 3 Canadian snow crab 2017 - 7 Canadian snow crab 2018 - 1 Canadian snow crab, 1 Canadian unknown* *According to The Smithsonian Magazine, researchers witnessed right whale #3960 struggle for hours entangled in crab gear. While the animal did eventually free itself from the gear, the damage to the baleen was substantial and will impair its ability to forage. 

The Audit Team acknowledges and thanks WDC for the input. The information provided is very useful and has been fully accounted for in the reports (for PI 2.3.1, SG60, SI *b*).
Although SAI Global's audit team determines that good progress has been made regarding the implementation of the ASPANS action plan and the team concludes that this fishery is on track with the action plan, conditions remain open for the time being.

I would like to once again thank you for having taken the time to communicate with the audit team.

Yours sincerely,

Géraldine Criquet
SAIG Fisheries Team Leader

9.4 Appendix 4. Surveillance audit information

Marine Mammal Interaction Form

MARINE MAMMAL INTERACTION FORM

Please fill out every section below. Once completed, this form must be submitted to DFO as per instructions on page 2.

Interaction Information

Interaction Date: _____

Interaction Time: _____

Location: _____

_____

_____

Latitude: _____ _____
Deg. *Min*

Longitude: _____ _____
Deg. *Min*

Individual Observing the Information

Name: _____

Address: _____

_____

_____

Province: _____

Phone: _____

Email: _____

Vessel: _____

Target Species: _____

Gear Type: _____

Identifier

Logbook / Combined form #:

_____

Other: _____

Gear Damage

Gear damage: ☐Yes ☐No

Gear lost: ☐Yes ☐No

Cause: ☐Known ☐ Unknown

Comments:

_____

_____

_____

Species (check one)

Dolphin / Porpoise
☐Species code: _____
☐Unidentified

Whale
☐Species code: _____
☐Unidentified

Seal / Sea Lion
☐Species code: _____
☐Unidentified

Incident type

☐Dead animal
☐Live Stranding
☐Entanglement
☐Shooting
☐Collision
☐Sick or Injured
☐Harassment
☐Depredation
☐Other: _____

Animal Condition

☐Appears Healthy
☐Sick or Injured
☐Dead
☐Unknown

Support Material

☐Photos
☐Video
☐Sample
☐Other

ID Confidence

☐Certain
☐Probable
☐Possible
☐Uncertain

Number of Animals

Min #: _____

Max #: _____

Best #: _____

Body Length

☐<1m (<3 ft)
☐1-1.5m (3-5 ft)
☐8-16m (25-50 ft)
☐16-26m (50-80 ft)

☐1.5-2m (5-7 ft) ☐>26m (>80 ft)
☐2-3m (7-10 ft) ☐Other: _____(m/ft)
☐3-8m (10-25 ft)

Description: *(shape, colour, markings, behaviour)*	**Comments:** *(timeline, actions, people involved, etc.)*
_____	_____
_____	_____
_____	_____

INSTRUCTIONS FOR COMPLETING THE MARINE MAMMAL INTERACTION FORM

As per the Fisheries General Regulations under the Fisheries Act, this reporting form must be completed immediately after any accidental contact between a marine mammal and a vessel or fishing gear. The completed form must be sent to the following email address: DFO.NAT.InteractionsMM-InteractionsMM.NAT.MPO@dfo-mpo.gc.ca
The licence holder is required to report an incidental mortality or injury within 48 hours after the end of the fishing trip (even if an observer is on board). A separate report form is required for each incident, for each date, and for each location.

GOAL OF DATA COLLECTION

The information supplied on this form will be used by the Department of Fisheries and Oceans Canada to estimate levels of incidental mortalities and injuries to marine mammals. This information allows DFO to better assess the types of threats that may be affecting Canada's marine mammals and develop mitigation strategies. Certain information supplied on this form may be considered proprietary and therefore subject to data confidentiality restrictions of the Privacy Act.

SPECIES AND STOCK CODES FOR MARINE MAMMALS

Seals and sea lions and Otters	**Dolphins and Porpoises**	**Toothed and baleen whales**
100- Steller (northern) sea lion	047- Atlantic white-sided dolphin	002- North Atlantic right whale
101- California sea lion	049- Pacific white-sided dolphin	005- Gray whale
105- Northern (Pribilof) fur seal	053- Common dolphin	007- Fin whale
115- Harbor seal	055- Grampus (Risso's) dolphin	010- Minke whale
116- Spotted seal	058- Spotted dolphin	011- Humpback whale
117- Ringed seal	060- Spinner dolphin	012- Sperm whale
121- Ribbon seal	061- Striped dolphin	016- Beluga whale
124- Gray seal	063- Northern right whale dolphin	038- False killer whale
129- Northern elephant seal	068- Harbor porpoise	039- Killer whale
130- Bearded seal	072- Dall's porpoise	221- Pilot whale
131- Harp seal	235- Unidentified small cetacean	230- Beaked whale
132- Hooded seal		231- Bryde's whale

135 – Sea Otter

204- Unidentified seal

203- Unidentified sea lion

232-Dwarf sperm whale

210- Unidentified baleen whale

220- Unidentified toothed whale

Other Marine Mammals

114- Walrus

9.5 Appendix 5. Additional detail on conditions/ actions/ results (if necessary)

Not necessary.

9.6 Appendix 6. Revised Surveillance Program (if necessary)

The Surveillance Program is not revised.

9.7 Appendix 7. NMFS Serious Injury (SI) and SARA Harm definitions - compatibility

Serious injury/harm caused by entanglement events

Under the Species At Risk Act (SARA) regulation it is prohibited to kill, **harm**, harass, capture or take an (NARW) individual and also to destroy any part of its critical habitat. There has been non-lethal harm through entanglements events in 2018. An analysis of this issue is provided below.

Assessing risk from entanglements: the context

2007 NARW (Recovery Potential Assessment) RPA[108]

Allowable Human-induced Mortality
In the NARW RPA it was determined that scope for allowable human-induced mortality does not exist, since population abundance is estimated as critically low, the population appears to exhibit a declining trend toward extinction, and the mortality rate of a key life stage (adult females) appears to have increased between 1980 and 1995.

The RPA further states that the population has to stabilize (cease declining) first and that what level of non-lethal harm may be permissible is not apparent and nearly impossible to evaluate with confidence. As such, any level of nonlethal harm that may impede population productivity would put recovery at risk, given the population's trajectory toward extinction.

From this text it would appear that non-lethal harm (e.g. as caused by some entanglement events) that may impede population recovery is mostly not permissible, although this was not clearly stated back in 2007, probably due to uncertainties.

Recent information (i.e. post RPA publication in 2007) on NARW survival after entanglements.

Robbins *et. al.* (2015)[109] results from a study on mark–recapture estimate of whale entanglement survival indicated that that both juveniles and adult NARW have a lower probability of survival after a reported entanglement. The study analysed three basic aspects of entanglement that can be assessed at the time of the first report for many individuals: the likely risk posed by the entangling gear, the severity of sustained injuries and health impacts from the event.

Their multistate models estimated the apparent survival of entangled adults to be 23% lower than other adult females and 26% lower than other adult males. The post-entanglement survival of entangled juveniles was comparable to entangled adults and 25% lower than con-specifics.

[108] http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf
[109] https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306

The authors of the study also highlighted in their analysis that calculated survival is over-estimated because some individuals die before their entanglement is documented and such individuals could not be accounted for in their study. Furthermore, the study only examined reported entanglements, but NARWs are also frequently involved in unreported events. The study indicated that most entanglement deaths likely occur in the first year after detection (although two NARW entanglements in the study were detected only after the death of the whale) and so early intervention is considered to be particularly effective in mitigating potential post-entanglement mortality. This highlights the importance of early detection of entangled whales, maximizing disentanglement opportunities and the continued improvement of disentanglement techniques.

Van der Hoop *et. al.* (2017)[110], in their bioenergetics based study on NARWs summarised that entanglement in fishing gear is an unpredictable event that can be extremely costly and last for days to years. Even over the wide range of fishing gears, entanglement durations, and fates of individuals in the study, their results suggested that drag from entanglement can impact blubber stores and require energy investment on the order of magnitude as a reproductive event or migration.

Recovery from such physiological stress and disturbance may limit an individual's future reproductive success, making entanglement a potential contributor to fluctuations in population growth.

Kenney (2018)[111] analysed the NARW population trajectories without entanglement mortality. In his study he reported that mortality and serious injury from entanglement in commercial fishing gear have had a significant impact on recovery. By using National Marine Fisheries Service (NMFS) Mortality and Serious Injury data and a relatively simple approach to estimate what the population trajectory since 1990 might have been under 4 different scenarios of reduced entanglement mortality he found that, under the best-case scenarios, the population at the end of the time-series would have been 25-30% higher than observed at present, and much more resilient to a heavy mortality years like 2017.

NMFS Serious Injury definition

Context

The US Marine Mammal Protection Act (MMPA) requires NMFS to estimate annual levels of human-caused mortality and *serious injury* to marine mammal stocks (section 117) and to categorize commercial fisheries based on their level of incidental mortality and serious injury of marine mammals (section 118). Defining what serious injury actually meant proved challenging and as a result, to create a consistent and transparent process to categorise yearly entanglements (and vessel strikes) leading to significant injury, the NMFS convened a workshop in 2007 to review

[110] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/

[111] https://www.int-res.com/articles/esr2018/37/n037p233.pdf

performance under existing guidance, gather current scientific information, and update guidance based on the best available information (Andersen *et al.*, 2008).

Serious Injury Definition

Andersen *et al* (2008) and subsequently, the NMFS "Policy and Process Distinguishing Serious from Non-Serious Injury of Marine Mammals"[112] (2012) enabled NMFS to interpret the regulatory definition of serious injury as any injury that is "**more likely than not" to result in mortality**, **or any injury that presents a greater than 50% chance of death** to a marine mammal. Thus, the definition does not require that all such injured animals actually die, but rather requires only that the animal is more likely than not to die. In situations where NMFS has clear veterinary medical guidance, or data of known outcomes of various injury types within an appropriate taxonomic group (e.g., large cetaceans, small cetaceans, pinnipeds), injuries that are known to result in mortality in more than 50% of documented cases are considered serious injuries. In situations where such data do not exist, expert opinions or an approach of prorating data are used[113].

The intent of the procedures is to correctly and consistently categorize a documented injury or injury event as a serious injury or a non-serious injury. NMFS's interpretation of the serious injury definition coupled with the approach described in the procedural directive (i.e. the Policy and Process Distinguishing Serious from Non-Serious Injury of Marine Mammals) was designed to allow evaluation of the majority of documented injury events, providing a more accurate estimation of total annual human-caused serious injury and mortality to marine mammals, even though it was recognized the results still underestimated serious injury and mortality, given the likelihood of undetected and unreported events. The procedures provide guidance for cases that are data poor, data rich, or require consideration of additional contributing factors (but excluding noise impacts).

Along with the US, Canadian NARW entanglements are accounted for in the yearly NMFS determinations of serious/non-serious injury. A DFO equivalent methodology to account for serious harm effects of fisheries is currently not in place.

NMFS definition of Serious Injury (SI) versus DFO description of "non-lethal harm"

[112] Distinguishing Serious from Non-Serious Injury of Marine Mammals: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations

[113] See 2012 Policy for Distinguishing Serious from Non-Serious Injury of Marine Mammals available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations

As explained above, the DFO 2007 NARW RPA stated that: “The population has to stabilize (cease declining) first and what level of non-lethal harm may be permissible is not apparent and nearly impossible to evaluate with confidence. Any level of nonlethal harm that may impede population productivity would put recovery at risk, given the population’s trajectory toward extinction.

This should be considered within the context of SARA regulation, where: “it is prohibited to kill, harm, harass, capture or take an individual of this [NARW] population and also to destroy any part of its critical habitat.”

From this text it would appear that non-lethal harm (e.g. as caused by some entanglement events) that may impede population recovery is mostly not permissible, although this is not clearly stated due to uncertainty at that time (i.e. what may be permissible).

To substantiate harm, research information from Robbins *et. al.* (2015), Van der Hoop *et. al.* (2016) and Kenney (2018) has been summarised earlier on to shed further light on NARW survival/mortality after entanglements. Both these studies provide a more substantial appreciation of the degree and type of harm caused by entanglement events.

To further improve transparency of (injury) assessment, the NMFS policy interprets the definition of serious injury (i.e., “any injury that will likely result in mortality,”) as any injury that is “more likely than not” to result in mortality, or any injury that presents a greater than 50 percent chance of death to a marine mammal. As such, the NMFS SI definition appears to be quite readily applicable and fitting to the less precise but seemingly equivalent DFO contextual description of non-lethal harm (i.e. any level of nonlethal harm that may impede population productivity would put recovery at risk).

In this respect, Significant Injury could be seen as equivalent to significant harm or a level of non-lethal harm that is quite harmful and more likely than not to cause death, and therefore, put population recovery at risk. Concurrently, Non Significant Injury could be seen as equivalent to non significant harm or as a *permissible* level of harm, more likely than not to not cause death of an individual. This treatment of the DFO contextual definition may also be seen as more conservative than the overarching SARA regulation where killing and harming (whereby significant harm is implied at the very least) of North Atlantic Right whales is prohibited.

It follows that Significant Injury could be seen as equivalent to significant harm or a level of non-lethal harm that is quite harmful and more likely than not to cause death, further leading to the conclusion that any one actual mortality or likely mortality of an individual (i.e. any injury/harm that presents a greater than 50 percent chance of death) will impede NARW population productivity and put recovery at risk, given the current population’s trajectory toward extinction.

Furthermore, we cite the US MMPA requirement where fish/fish products (from outside the United States) cannot be imported into the US from commercial fishing operations that result in the incidental mortality or serious injury of marine mammals in excess of United States standards. These are in effect, international limits on both harm/injury (and mortality) that will affect Canadian snow crab fisheries importing seafood into the USA starting 2021.

Fish Import Requirements of the MMPA

In August 2016, NMFS published a final rule (81 FR 54390; August 15, 2016) implementing the fish and fish product import provisions (section 101(a)(2)) of the Marine Mammal Protection Act (MMPA)[114]. NMFS also published its final 2017 List of Foreign Fisheries (LOFF), as required by the regulations implementing the Fish and Fish Product Import Provisions of the MMPA[115]. Under this rule, fish or fish products cannot be imported into the United States from commercial fishing operations that result in the incidental mortality or serious injury of marine mammals in excess of United States standards.

NMFS included a five-year exemption period (which began 1 January 2017) in this process to allow foreign harvesting nations time to develop, as appropriate, regulatory programs comparable in effectiveness to U.S. programs at reducing marine mammal bycatch. If, during the five-year exemption period, the United States determines that a marine mammal stock is immediately and significantly adversely affected by an export fishery, NMFS may use its emergency rulemaking authority to institute an import ban on products from that fishery. The snow crab fisheries in the Gulf of St. Lawrence and the Scotian shelf are both included in the LOFF list of exporting fisheries which makes them subject this requirement.[116]

The 5-yr Exemption Period begins January 1, 2017 during which nations and LOFF fisheries listed must[117]:

- Provide information to classify fisheries in the List of Foreign Fisheries (LFF) (2017, 2020)
- Develop their regulatory program (2017-2021)
- Provide progress report mid-way through the exemption period (2019)
- Apply for a Comparability Finding to export to the U.S. (2021)

[114] https://www.federalregister.gov/documents/2018/03/16/2018-05348/fish-and-fish-product-import-provisions-of-the-marine-mammal-protection-act-list-of-foreign

[115] https://www.fisheries.noaa.gov/foreign/international-affairs/list-foreign-fisheries

[116] https://beta.fisheries.noaa.gov/webdam/download/68046947

[117] https://www.seafoodexpo.com/north-america/wp-content/uploads/sites/3/2017/03/What-is-newly-required-1.pdf

