



Marine Stewardship Council 1st Surveillance Report

For The

Gulf of St Lawrence snow crab trap

Facilitated By the

**Affiliation of Seafood Producers Association of Nova Scotia
(ASPANS)**

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Certificate Code: F-SAI-009
Report Code: MSC009/SUR01/01
Report Date: 28th February 2018

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Foreword

The Gulf of St Lawrence snow crab trap fishery was re-certified on 10th October 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 effects of the fishery 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, the fishery certificate was suspended. The MSC fishery client, the Affiliation of Seafood Producer Associations of Nova Scotia (ASPANS) provided SAI Global with a corrective action plan, which was accepted by SAI Global. Both the corrective action plan and SAI Global's letter of acceptance of ASPANS corrective action plan were published in June 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 effectiveness of the client corrective action plan implemented to address the cause of the certificate suspension as a result of an expedited audit;
3. To review any developments or changes within the fishery which impact traceability and the ability to segregate MSC certified from non-MSC certified 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.

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Glossary

ASPANS	Affiliation of Seafood Producers Association of Nova Scotia
CHP	Conservation Harvesting Plan
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 Gulf of St Lawrence 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 the client corrective action plan implemented following the suspension of the certificate as a result of an expedited audit.

The audit team 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 mitigate the risk of mortality, reduce entanglements and minimize the UoA-related mortality of ETP species.

However, the audit team currently do not have enough evidence and it is too early to say that:

- 1) Known direct effects of the UoA are likely to not hinder recovery of ETP species; and
- 2) These measures are expected to be highly likely to achieve national requirements for the protection of ETP species given that medium-long term benefits from these measures cannot be guaranteed based on a single season of protection measures to reverse the declining trend of the North Atlantic right whale (NARW) population.

Although SAI Global's audit team determines that good progress has been made regarding the implementation of ASPANS corrective action plan, the team also concludes that the reasons of the suspension have not yet been fully addressed. Therefore, SAI Global determines that:

- **The Gulf of St Lawrence snow crab trap fishery certificate shall remain suspended.**

Table 1 summarizes Performance Indicator (PI) and Principle (P) score. Updated PI evaluation tables are presented in [Appendix 1](#).

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

PI	Public Certification Report		Expedited audit		1 st surveillance audit	
	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 95.7 PASS	< 60	Principle 2 – Ecosystem FAIL	< 60	Principle 2 – Ecosystem FAIL
2.3.2 ETP species management strategy	80		< 60		< 60	
2.3.3 ETP species information	80		80		80	
3.2.3 Compliance & Enforcement	90		90		90	

On behalf of the MSC client, the ASPANS, SAI Global would like to extend thanks to the management organisations and stakeholders of the Gulf of St Lawrence snow crab trap fishery 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 was a member 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)

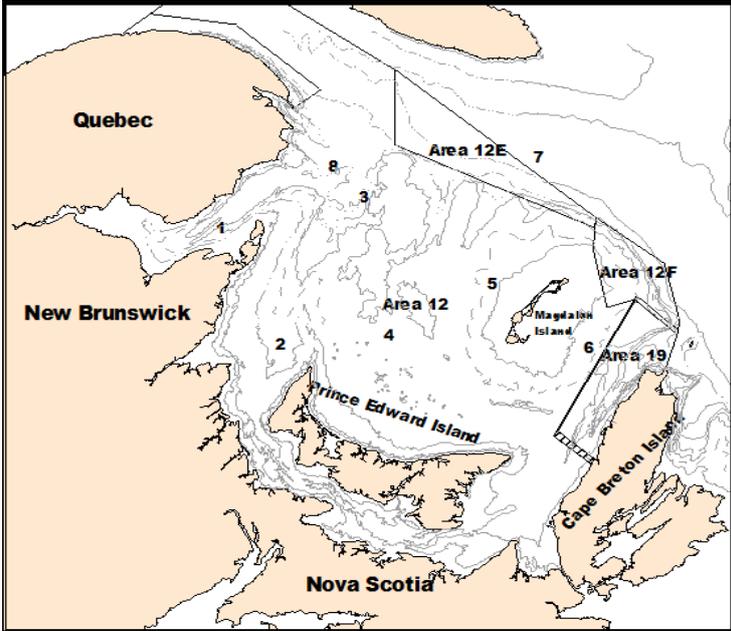
Following undergraduate and graduate degrees at Memorial University of Newfoundland in the 1960s, Dr. Ennis completed a Ph.D. in marine biology at University of Liverpool in the early 1970s. He retired in 2005 following a 37-year research career with the Science Branch of the Department of Fisheries 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	Gulf of St Lawrence snow crab trap		
Unit(s) of assessment	Species: <i>Chionoecetes opilio</i> , snow crab		
	Geographical Area: FAO Fishing Area 21, Canada Atlantic coast, Gulf of St Lawrence (GSL), Crab Fishing Area (CFA) 12, 19, 12E and 12F.		
			
	<p>Map of the Southern Gulf of St. Lawrence showing the Crab Fishing Areas (CFAs), fishing grounds. Fishing grounds are labelled as follows: 1 Chaleur Bay, 2 Shediac Valley, 3 Orphan Bank, 4 Bradelle Bank, 5 Magdalen Channel, 6 Cape Breton Corridor, 7 Laurentian Channel, and 8 American Bank.</p>		
	<p>Stock: Southern GSL snow crab stock</p> <p>Method of Capture: Conical or rectangular baited trap</p> <p>Client group: ASPANS</p> <p>Other eligible fishers: All commercial snow crab harvesters entitled to fish snow crab in CFAs 12, 19, 12E and 12F are members of the client group. There are no other eligible fishers.</p>		
Date certified	10 th October 2017	Date of expiry	9 th October 2022
Surveillance level and type	Surveillance level 6 (Default Surveillance), on-site surveillance audit.		
Date of surveillance audit	14 th and 15 th November 2018		
Surveillance stage (tick one)	1st Surveillance	<input checked="" type="checkbox"/>	
	2nd Surveillance	<input type="checkbox"/>	
	3rd Surveillance	<input type="checkbox"/>	
	4th Surveillance	<input type="checkbox"/>	
	Other (expedited etc.)	<input type="checkbox"/>	
Surveillance team	Lead assessor: Géraldine Criquet Assessors: Vito Romito, Jerry Ennis and Paul Knapman		

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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 Gulf of St Lawrence 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. An Action Plan for meeting each Condition was submitted by the fishery client and these were approved by SAI Global as the Conformity Assessment Body (CAB) 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 effects of the fishery on the North Atlantic right whale (NARW) (an 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, the fishery certificate was suspended.

ASPANS provided SAI Global with a corrective action plan which was accepted. Both the corrective action plan and SAI Global's letter of acceptance of ASPANS corrective action plan were published in June 2018.

ASPANS also agreed in a written contract to be financially and technically responsible for surveillance audits by an MSC accredited CAB, which would occur at a minimum of once a year, or more often at the discretion of the CAB (based on ASPANS action plan or by previous findings by the CAB 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 emails were also made to ensure that stakeholders had been provided with sufficient opportunity to participate in consultation.

Table 3 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 corrective action plan.

Meetings were held with the following management and scientific organizations responsible for the Gulf of St Lawrence snow crab trap fishery:

- **Fisheries and Oceans Canada (DFO), Gulf Region, Moncton.**

A number of scientific and management 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 43,656 mt of southern Gulf of St. Lawrence (sGSL) snow crab were landed in 2017¹. All of the 43,656 mt of snow crab fished in 2017 were fished by vessels that are members of the client group (i.e. by vessels that are part of the UoC). Table 2 details the total TAC, and the UoA and UoC shares of TAC as well as total landings by the UoC i.e. the total certified catch in 2017.

Table 2. TAC and Catch Data.

TAC	Year	2017	Amount	43,475 mt*
UoA share of TAC	Year	2017	Amount	100%
UoC share of TAC	Year	2017	Amount	43,475 mt
Total catch by UoC	Year (most recent)	2017	Amount	43,656 mt
	Year (second most recent)	2016 ²	Amount	21,725 mt**

* Revised quota for the entire southern Gulf of St. Lawrence in 2017

** Caught from a revised quota of 21,611 mt

Snow crab (*Chionoecetes opilio*) updates (sGSL Areas 12, 19, 12E and 12F) for 2017¹

Snow crab landings per area are shown in Figure 1. Catch per unit of effort (CPUE) expressed as kg per trap-haul (kg/th) is calculated directly from logbook data, as the ratio of total landings (kg) to total effort (trap-hauls). CPUE values are not standardized and do not account for changes in management measures and fishing practices and as a result may not be directly proportional to biomass. CPUEs are shown in Figure 2.

Area 12. The 2017 landings in Area 12 were 39,825 mt from a revised quota of 39,651 mt. The CPUE in 2017 (72.0 kg/th) increased compared to 2016 (64.0 kg/th).

Area 19. The 2017 landings in Area 19 were 2,944 mt from a revised quota of 2,945 mt. The CPUE in 2017 (142.8 kg/th) was comparable to 2016 (142.5 kg/th).

Area 12E. The 2017 landings were 203 mt from a revised quota of 199 mt. The CPUE in 2017 (60.9 kg/th) increased compared to 2016 (51.5 kg/th).

Area 12F. The 2017 landings in Area 12F were 684 mt from a revised quota of 680 mt. The CPUE in 2017 (72.6 kg/th) increased compared to 2016 (43.9 kg/th).

¹ http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2018/2018_007-eng.html

² http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2017/2017_004-eng.html

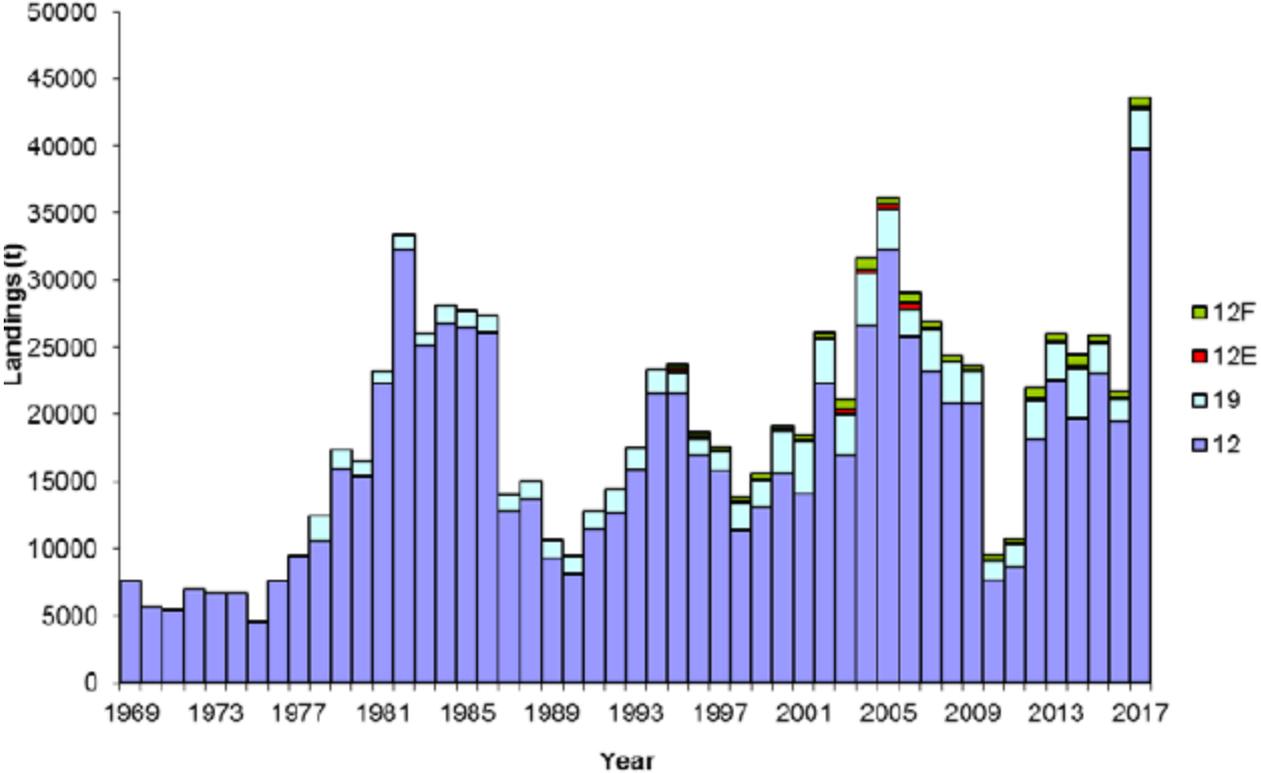


Figure 1. Landings (tonnes) in the southern Gulf of St. Lawrence snow crab fishery, 1969 to 2017. Source: DFO 2018a.

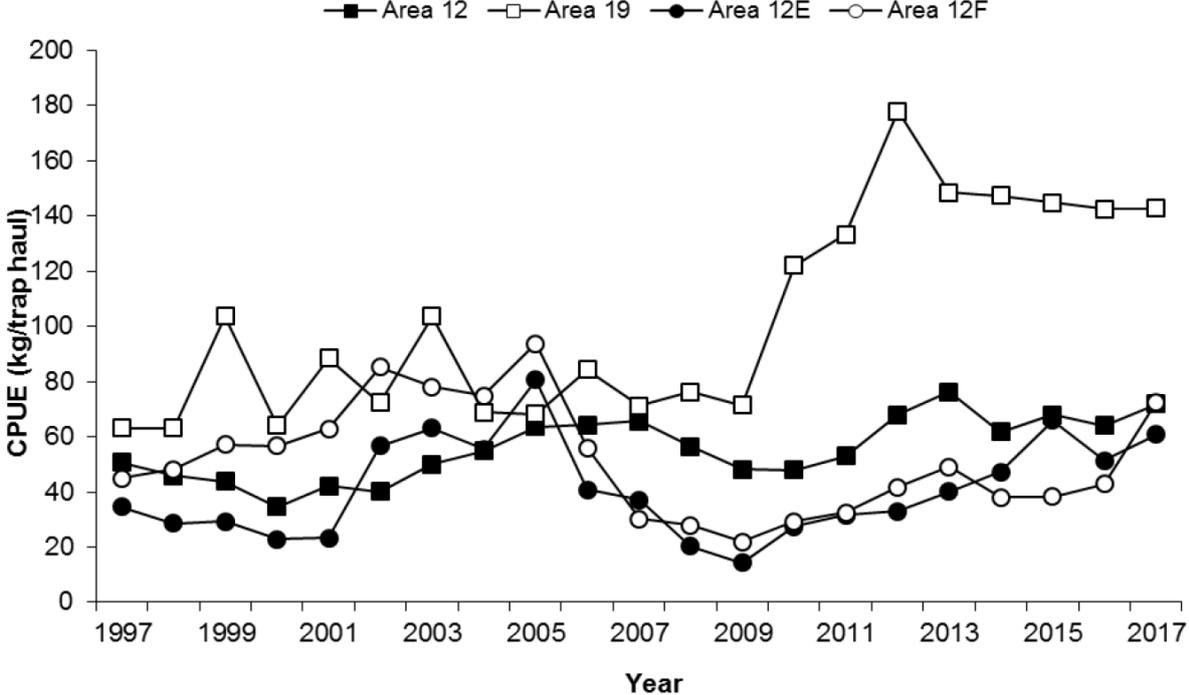


Figure 2. Catch per unit effort (kg per trap haul) in the southern Gulf of St. Lawrence snow crab fishery, Areas 12, 19, 12E and 12F, based on logbooks, 1997 to 2017. Source: DFO 2018a.

Snow crab (*Chionoecetes opilio*) updates (sGSL Areas 12, 19, 12E and 12F) for 2018 2018 TAC Distribution

The distribution of the TAC in each of the crab fishing areas (CFAs) in the sGSL and the scientific survey allocation is as follows:

Table 3. 2018 Snow Crab TAC and Catches by Fishing Areas.

Snow crab fishing area	Revised TAC* (metric tons)	Catches (metric tons)
12 (12-18-25/26)	20,908.950	20,577
12E/12F	1,484.109	1,450
19	2,045.8	2,047.51

*The revised TAC includes quota reconciliation (and carry-over for area 19 only) and the portion of the scientific survey quota allocated to each individual areas. Source: DFO, data provided for Nov. 2018 site visits.

4.1.2 2018 Conservation Harvesting Plans

The Conservation Harvesting Plan for Snow Crab in Area 12 (12, 18, 25, 26) is dated April 05th, 2018³. Key updates include:

- At-sea observer coverage representing 20% of fishing trips will be required for 2018.
- The soft-shell crab protocol
- Only one valid annual tag per trap. Tags from previous years must be removed. The colour for original tags must be light brown, while the colour for replacement tags must be pale blue
- 100% dockside monitoring
- Landings weighed in kilograms on an electronic scale with a memory
- Maximum mesh size of 75 mm
- Authorized release of commercial-sized male crab with small claws back in the water
- A delayed season opening to June 1 applies to an area in CFA 12 for one nautical mile bordering on CFA 19. The buffer zone between CFAs 18 and 19 remains in effect
- The Irving Whale Exclusion Zone is maintained
- The opening date to be confirmed in a separate Notice to Fish Harvesters and by the issuance of a variation order
- The use of a vessel monitoring system (VMS) with five (5) minutes reporting intervals
- Minimal rope floating on the surface of the water
- Requirement to mark rope with orange coloured markings
- Additional identification of buoys
- Requirement to report lost gear
- Requirement to report interactions with marine mammals
- Requirement to report sightings of live whales
- Licence holders holding less than 0.22% of the CFA 12 TAC will be permitted 75 traps
- Licence holders holding 0.44% or more of the CFA 12 TAC will be permitted 150 traps. For 2018, this represents licence holders that are part of the traditional mid-shore fleet
- New access groups who further distribute their quotas or designate operators will be authorized one trap per 0.54 tonne (or 1 trap per 1,200 pounds)
- First Nations have the ability to designate operators under the Aboriginal Communal Fishing Licences Regulations which are authorized one trap per 0.54 tonne (or 1 trap per 1,200 pounds)
- Protocol for dynamic management of the fisheries in 2018 which will close areas to fishing activities when the presence of NARW is observed.
- Observations inside a foraging area (a total of nine grids will be closed to provide a buffer area around the sighting location)

³<http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/snow-crab-notice-avis-crabe-des-neiges-en.html>

- Closures in force for a minimum period of 15 days and will be extended by 15 days from the last NARW sighting
- Static closure in an area where 90% of the NARW observations occurred in 2017 to provide a large gear-free area for the NARWs

The Conservation Harvesting Plan for Snow Crab in **Area 12F** was approved on April 04, 2018⁴. Key updates include:

- Licence holders are allowed to use 75 standard traps. Additional traps may be allocated following the approval of temporary or permanent transfers, as provided in the *Administratives Guidelines*.
- Maximum trap mesh size is 75 mm. All traps used for fishing must be equipped with a biodegradable release mechanism. It is the responsibility of licence holders to lift their gear at least every 72 hours.
- New Management Measures to Minimize the Risks of Interactions with the North Atlantic Right Whales (rope floating on the surface, gear marking, buoys identification, reporting of lost gear, reporting of NARW sightings)
- NARW related closures
- Reporting interactions with marine mammals
- The at-sea observers coverage is funded by the industry and is 15 % of fishing trips made by the fleet, spread over the whole area and the fishing period. Dockside monitoring is mandatory for 100% of landings.
- Licence holders must use an active Vessel Monitoring System (VMS) approved by DFO. Data transmission is required every 5 minutes.
- All incidental captures of species identified above must be immediately returned to the water where they were captured and, if the animal is still alive, in the manner that causes it the least harm. All incidental captures of species at risk must be recorded in the « Species at Risk » section of the logbook. Furthermore, all interactions with species at risk, notably the North Atlantic Right Whale, the Blue Whale (Atlantic population), the Beluga Whale (St. Lawrence Estuary population) and the White Shark (Atlantic population), must be recorded in this section of the logbook.
- Preliminary catches for this area in 2018 are 1,177.013 mt ⁵

The Conservation Harvesting Plan for Snow Crab in **Area 12E** was approved on April 5th, 2018⁶. Key Management measures in 2018 rolled over from 2017 include, amongst others:

- The soft-shell crab protocol
- Only one valid annual tag per trap. Tags from previous years must be removed. The color for original tags must be light brown, while the color for replacement tags must be pale blue
- 100% dockside monitoring, at-sea observer coverage representing 20% of fishing trips
- Landings weighed in kilograms on an electronic scale with a memory
- Maximum mesh size of 75 mm
- Authorized release of commercial-sized male crab with small claws back in the water
- For proper management and control purposes, traps will be issued as described in the individual transferable quota (ITQ) program:
 - ITQ up to 45 tons: 100 traps
 - ITQ > 45 to 68 tons: 125 traps
 - ITQ > 68 to 90 tons: 150 traps
 - ITQ > 90 tons: 175 traps

⁴https://inter-l01.dfo-mpo.gc.ca/applications/opti-opei/notice-avis-detail-eng.php?pub_id=1519&todo=view&type=1®ion_id=4&sub_type_id=5&species=705&area=1844

⁵ <https://inter-j01.dfo-mpo.gc.ca/gr/report/show?report=42721&fisheries=18&fisheries=21>

⁶ <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/snow-crab-notice-avis-crabe-des-neiges-en.html>

- The opening date confirmed in a separate Notice to Fish Harvesters and by the issuance of a variation order
- The use of a vessel monitoring system (VMS) with five (5) minutes reporting intervals
- Minimal rope floating on the surface of the water
- Requirement to mark rope with orange colored markings
- Additional identification of buoys
- Requirement to report lost gear
- Requirement to report interactions with marine mammals
- Requirement to report sightings of live whales
-

No notices were available for the CFA 19 fishery⁷.

4.1.3 Number of licences per CFA

Fisheries characteristics for 2017 including licensed vessels, allocation shares and traps allowed per CFA are reported in table 4.

Table 4. Shares, active vessels, traps allowed opening and closing dates, quota and landings for sGSL snow crab in 2017⁸.

Characteristics	Area 12	Area 12E	Area 12F	Area 19	Southern Gulf
Allocation shares ^a	251	4	46	158	459
Number of active vessels	354	4	18	107	483
Total number of traps allowed	46,622 ^b	475	1,640 ^c	1,732	50,469
Opening date	April 25	April 20	April 19	July 13	-
Date of the last landing	July 24	June 22	June 15	August 5	-
Revised quota (t) ^d	39,651	199	680	2,945	43,475 ^e
Landings (t)	39,825	203	684	2,944	43,656

^a The number of quota allocations among which the Total Allowable Catch is divided.

^b The total number of authorized traps in Area 12 was higher in 2017 than 2016, due to an increase in traps for the midshore traditional fleet. Additionally, the increase in the 2017 TAC resulted in an increase in the number of authorized traps for groups who designate operators (i.e. more vessels on the water).

^c The increased number of traps in 2017 was the result of an arrangement to increase the total allocation shares in Area 12F when the TAC is higher than 544 t.

^d For reasons of interannual quota adjustments, reconciliations, and re-distribution of the scientific quota among areas, the revised quota does not necessarily correspond to the TAC in the notice to harvesters.

^e Quota includes 495 t set aside to finance the trawl survey in 2017 (under Section 10 of the Fisheries Act).

Snow crab trap allocation per CFA for 2018 are provide below in table 5.

Table 5. 2018 Snow Crab Trap Allocations by Crab Fishing Areas

Snow crab fishing area	Number of authorized traps*
12 (12-18-25/26)	36,639
12E	475
12F	2,152
19	1,699

*Number of traps actually fished can be lower. Source: DFO, data provided for Nov. 2018 site visits.

Furthermore, the figure below provides information for the 2018 fishing effort in the sGSL. Note, the pale yellow box is the static closure in place in 2018.

⁷https://inter-l01.dfo-mpo.gc.ca/applications/opti-opei/notice-avis-eng.php?region_id=4&sub_type_id=5&type=1&display_option=1

⁸ <http://waves-vagues.dfo-mpo.gc.ca/Library/40688082.pdf>

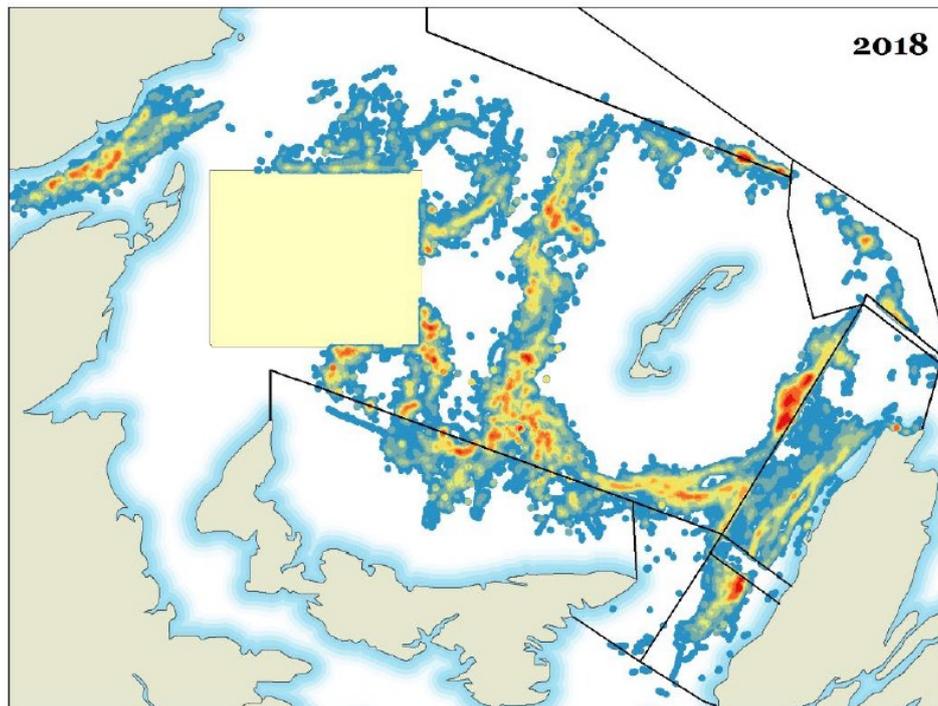


Figure 3. SGSL Snow crab 2018 fishing effort from VMS= Vessel Monitoring System data/ SSN= système de surveillance des navires. Red areas indicate higher effort. Source: DFO, data provided for Nov. 2018 site visits.

4.1.4 Fishing season

Reported openings and closing of fishing seasons as provided by DFO were:

Table 6. 2018 Snow Crab Fishing Seasons by Fishing Areas⁹

Snow crab fishing area	Fishery opening date	Fishery closing date
12 (12-18-25/26)	00:01 ADT Sunday, April 29, 2018	July 1, 2018 at 00:00 hrs ADT
12E	16:00 ADT Friday, April 27, 2018	July 1, 2018 at 00:00 hrs ADT
12F	5:00 (ADT) Thursday, April 19, 2018	June 30, 2018 at 23:59 (ADT).
19	05:00 (ADT) July 11, 2018	23:59 (ADT) September 10, 2018 (note: last landing was on August 1st)

* Source: DFO, data provided for Nov. 2018 site visits.

4.2 Relevant changes to Regulations

Regulations are included in Notices to Fish Harvesters that are presented in section 4.1.2.

Risk of interactions with the North Atlantic right whale

New management measures to minimise the risk of interactions with NARWs have been implemented in the GSL in 2018, and are presented in section 4.4.2.

⁹ <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/snow-crab-crabe-des-neiges-en.html>

4.3 Updates on snow crab stock status

4.3.1 Introduction

Snow crab in the sGSL is considered as a single stock unit for assessment purposes. This stock unit comprises crab fishing areas (CFAs) 12, 19, 12E, and 12F.

The snow crab survey design and biomass estimation polygon covers the entire area of the sGSL defined by the 20 to 200 fathoms depth contours (which approximately corresponds to the areal extent of bottom temperatures < 5 °C which are considered favourable for all life stages of snow crab and encompassing the area of the sGSL stock unit). Of a total 355 stations, 353 were successfully trawled in 2017; two sampling squares had to be abandoned due to failures to successfully trawl the area. The survey was conducted between July 10 and September 22, 2017. All at-sea survey and sampling protocols were identical to previous years.

4.3.2 Stock trends and current status

The biomass of commercial-sized adult males from the 2017 survey was estimated at 66,021 mt (95% confidence interval (C.I.) range of 57,456 mt to 75,495 mt) (Figure 4). The 2017 commercial biomass in the southern Gulf decreased by 33.4% relative to the 2016 estimate.

Recruitment to the fishery at the time of the 2017 survey was 51,262 mt (95% C.I. 44,154 mt to 59,352 mt), comprising 78% of the commercial biomass (Figure 4). Recruitment to the fishery in 2017 decreased by 31% compared to the 2016 estimate. The residual biomass (carapace conditions 3 to 5) of commercial-sized adult male crabs after the 2017 fishery was estimated at 14,759 t (95% C.I. 12,209 mt to 17,683 mt), a decrease of 40.7% compared to the 2016 estimate (Figure 4). The available biomass for the 2018 fishery, derived from the 2017 survey, is within the healthy zone of the Precautionary Approach (PA) framework.

A second fishery-independent, multispecies research vessel bottom trawl survey of the southern Gulf of St. Lawrence is used to provide an index of the biomass of commercial-sized adult male crabs since 2001. This RV survey index also showed a decrease in the biomass of commercial-sized adult male snow crab in 2017, similar to what was estimated from the dedicated snow crab survey.

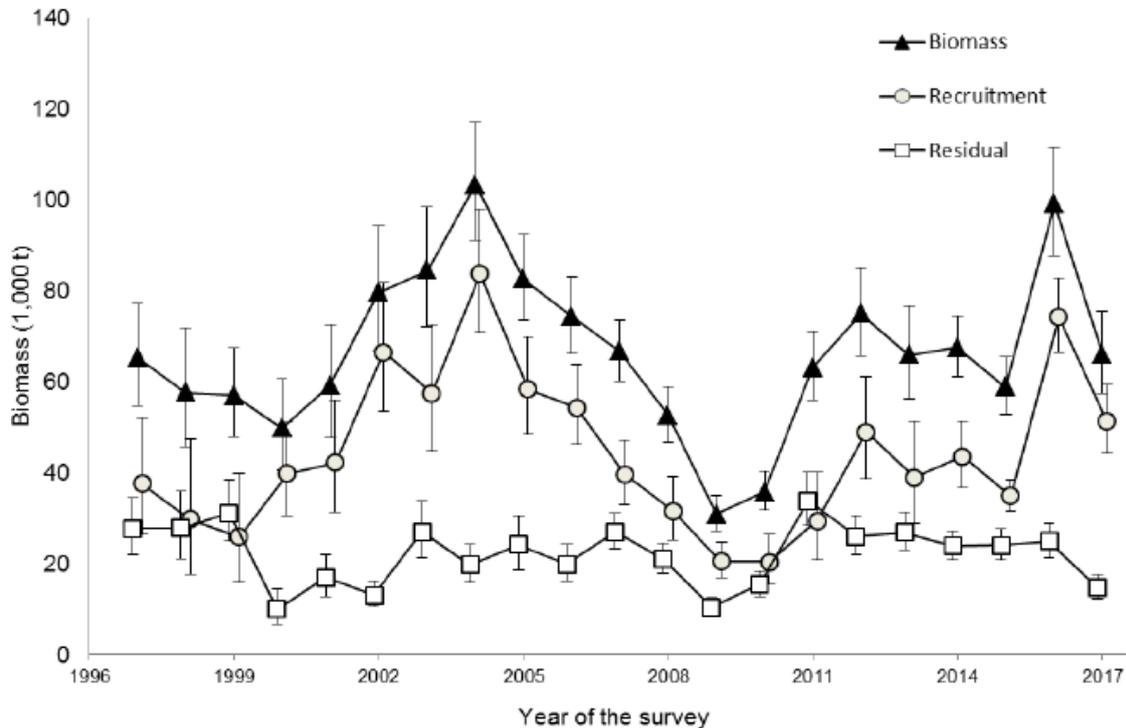


Figure 4. Total commercial biomass, recruitment commercial biomass, and residual commercial biomass (in 1,000 tonnes; means with 95% confidence intervals) in the southern Gulf of St. Lawrence, 1997 to 2017. Source: DFO 2018a.

4.3.3 Exploitation rate

The exploitation rate in the southern Gulf of St. Lawrence fishery is calculated as the ratio between the catch in the year of the assessment and the commercial biomass estimated from the trawl survey in the previous year. The exploitation rates varied between 21% and 45% from 1998 to 2017 (Figure 5). In 2017, the exploitation rate was 44%, as expected with the use of the agreed harvest decision rule.

Total mortality is calculated as one minus the proportion of the residual biomass estimated from the survey in the year of the assessment divided by the biomass available to the fishery as estimated in the previous year's survey. In 2017, total mortality was estimated at 85.1% (Figure 5). The total mortality has varied between 45.8% and 82.5% from 1997 to 2016, except for 2011 when it was estimated at 5.6% (Figure 5).

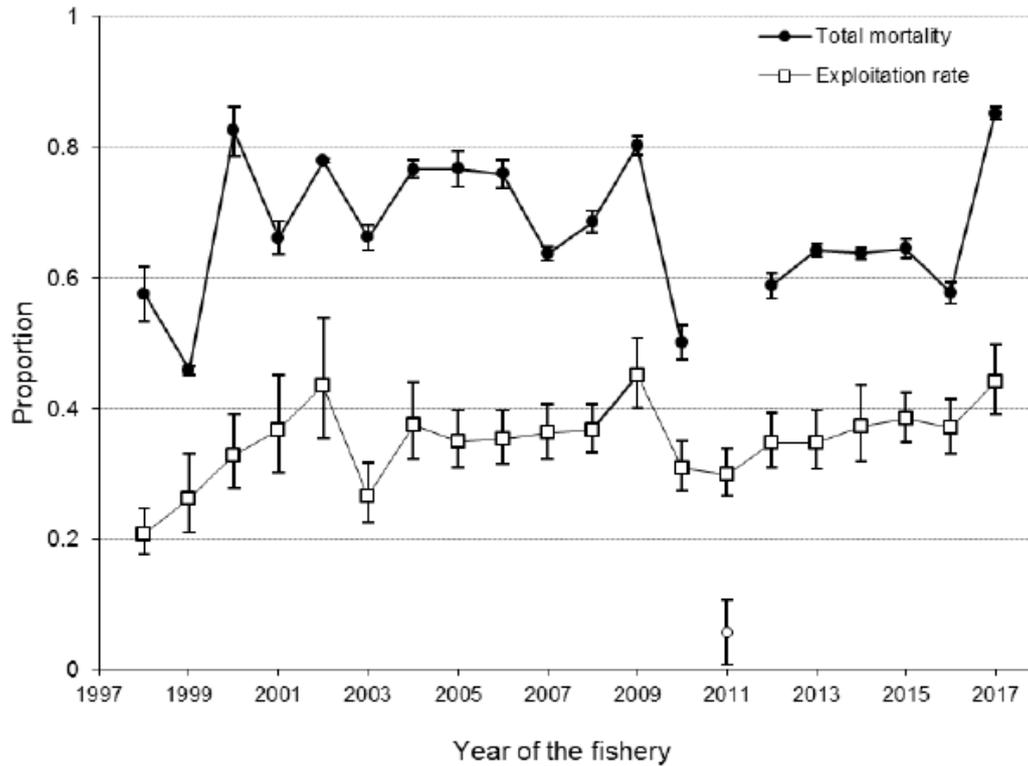


Figure 5. Exploitation rates (means and 95% confidence intervals) by the fishery and total mortality of commercial-sized adult male snow crab in the southern Gulf of St. Lawrence, 1997 to 2017. The 2011 total mortality point is isolated from the series due to uncertainties. Source: DFO 2018a.

4.3.4 Recruitment

Based on abundances of adolescent males of R-2, R-3 and R-4 from recent surveys, the predicted recruitment of commercial-sized adult male crabs for the 2018 survey, available for the 2019 fishery, was estimated at 47,700 mt (95% C.I. 33,800 to 64,880 mt) (Figures 6 and 7).

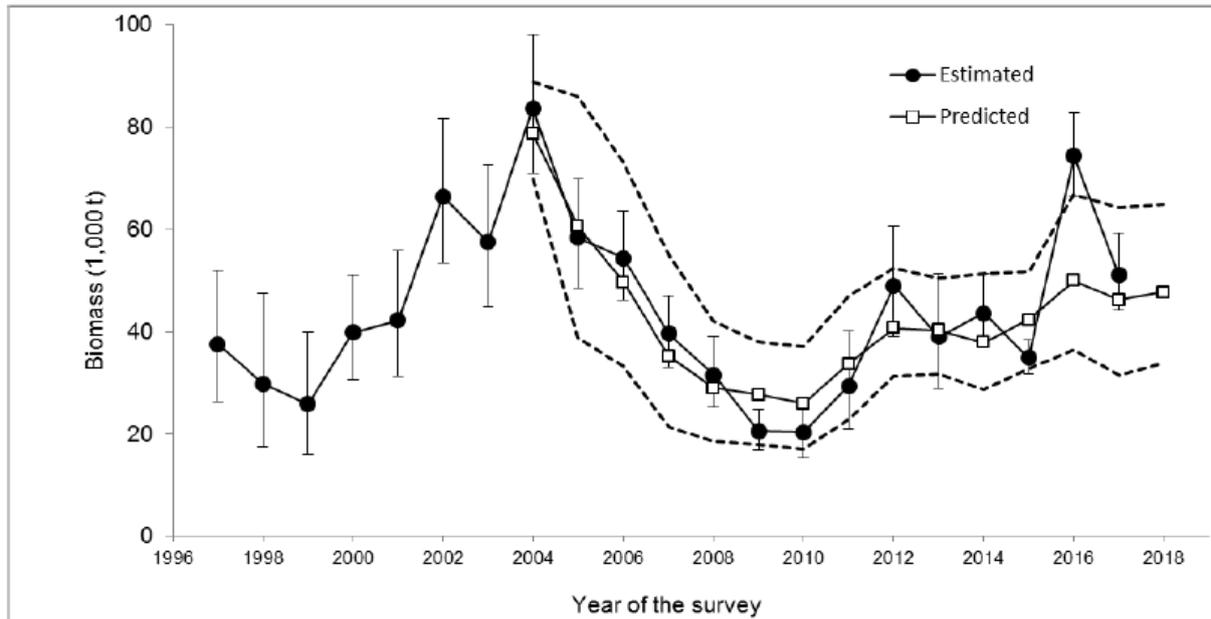


Figure 6. Estimated (black circle symbols are the means with 95% confidence interval vertical bars) and predicted (open square symbols are the means with the 95% confidence interval bands as dashed lines) biomasses of R-1 (adult male crabs ≥ 95 mm carapace width of carapace condition 1 and 2) snow crab in the year of the survey, 1997 to 2017. The predicted abundances are based on a relationship to the estimated abundances of R-2 (adolescent male crabs larger than 83 mm CW) in the previous year. Prediction of R-1 biomass for 2018 is based on abundances of R-2 estimated in 2017 as shown in Figure 7. Source: DFO 2018a.

The spike of recruitment to the fishable biomass for the in 2017 fishery was detected in the 2015 surveys as R-2 (adolescent males expected to molt and recruit to the fishery in 2016) among which skip molter abundance was 3 times higher than in 2014. These molted in spring 2016 to recruit to the fishery in 2017, together with the 2016 R-2 cohort of normal molters.

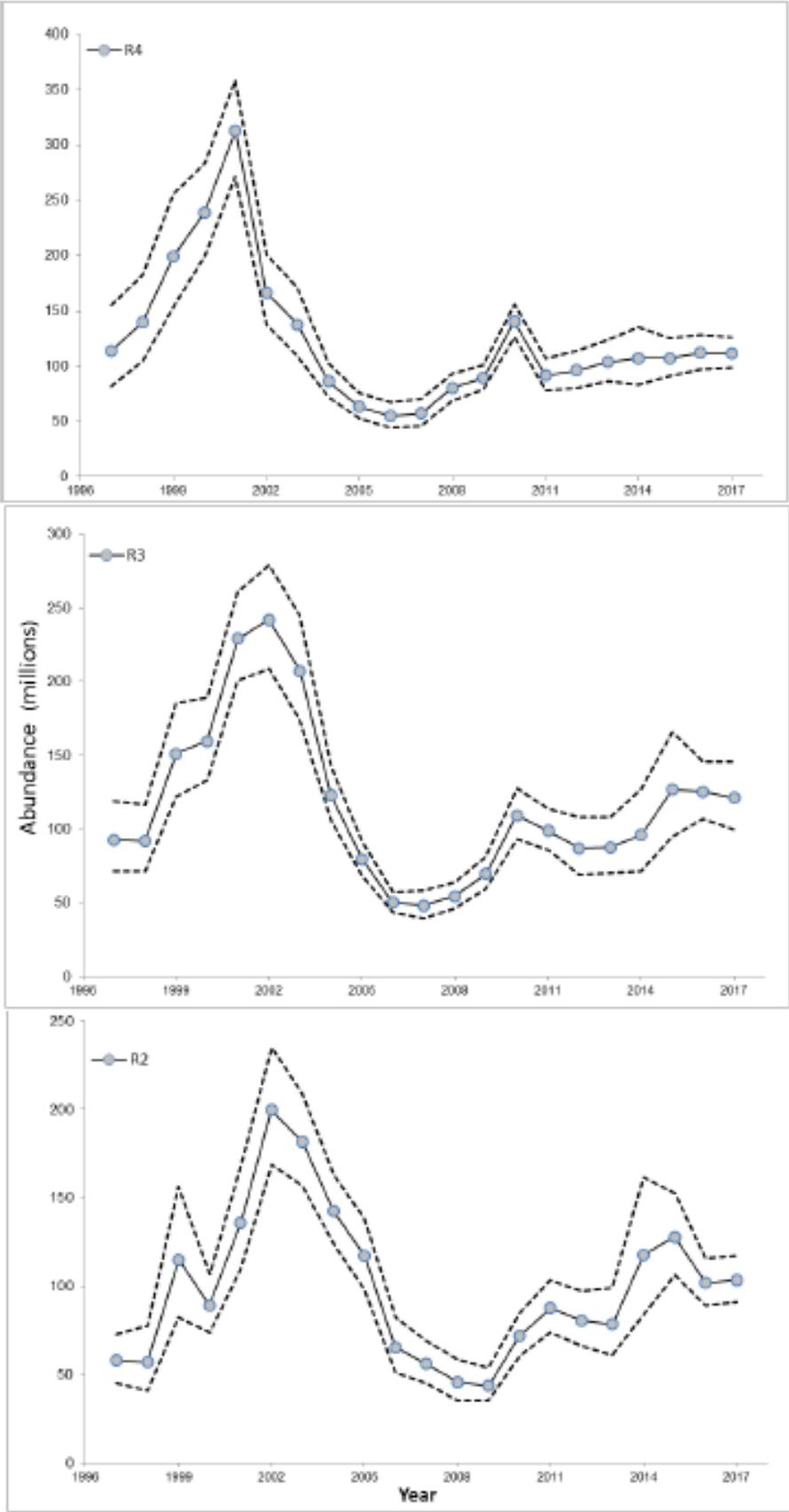


Figure 7. Estimated abundances (in millions; means and 95% confidence intervals) of R-4 (upper panel), R-3 (middle panel) and R-2 (lower panel) adolescent male crabs in the southern Gulf of St. Lawrence for the survey years 1997 to 2017. Source: DFO 2018a.

4.3.5 Reproduction

The abundance of mature females is showing an increasing trend since the low value observed in 2006 (Figure 8). The increase of pubescent females observed in the 2017 survey suggests that the abundance of mature females may increase in the coming years.

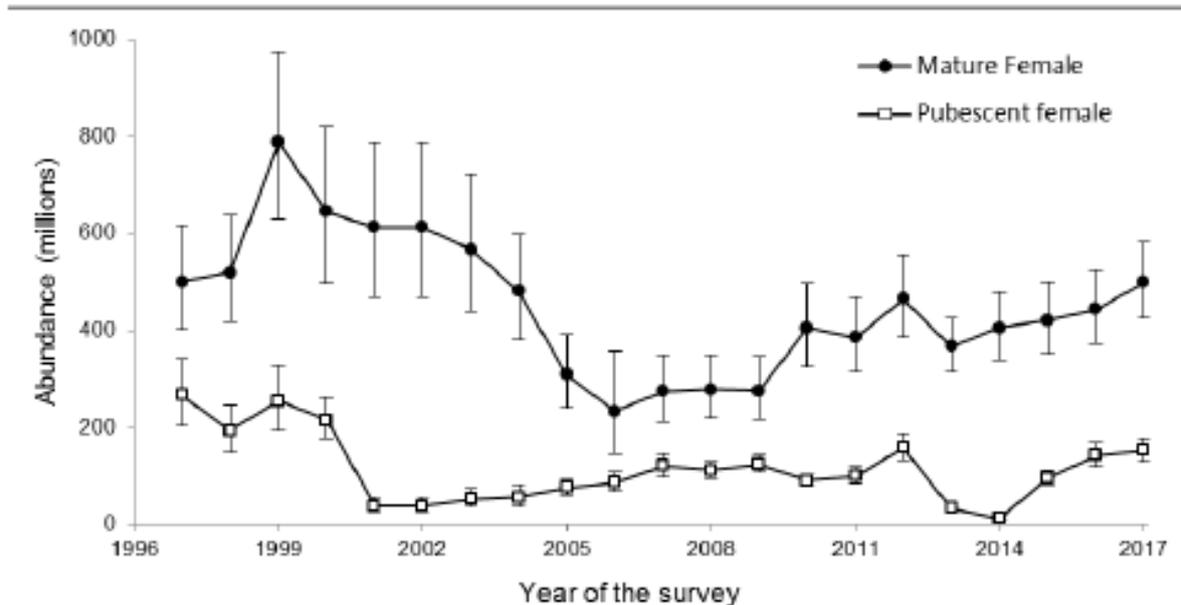


Figure 8. Estimated abundances (in millions; means and 95% confidence intervals) of mature female (black circle symbols) and pubescent females (open square symbols) in the southern Gulf of St. Lawrence based on the trawl surveys from 1997 to 2017. Source: DFO 2018a.

4.3.6 Environmental considerations

Snow crab is a stenothermic species with a preference for colder water. The habitat index (bottom area with temperatures from -1 to 3°C) was above the 1981-2010 average in 2017 and increased by 5% from 2016 and 10% from 2015 (Figure 9). In 2017, the mean temperature within the defined snow crab habitat area index (-1 to 3°C) decreased by about 0.1°C compared to 2016. The mean temperature was at the highest of the 45-year time series in 2012, decreased in 2013 and 2014, and remained slightly above normal since then.

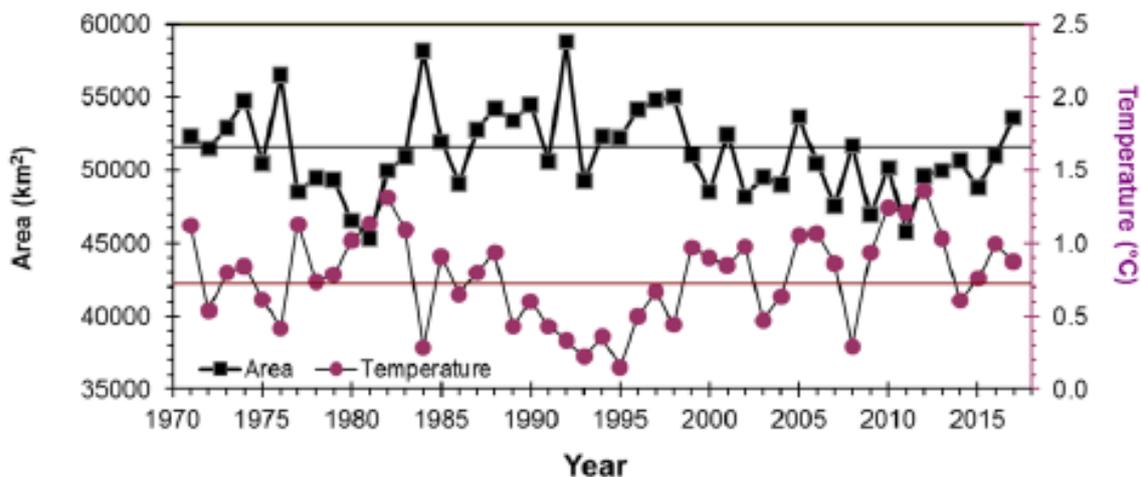


Figure 9. Snow crab temperature habitat area index (km²) that encompasses water temperatures of -1 to 3 °C (upper panel) and the mean temperature (°C) within the temperature area index (lower panel) in the southern Gulf of St. Lawrence, 1971 to 2017. Source: DFO 2018a.

Broad-scale environmental changes that have been taking place affecting the biological oceanography of the Gulf of St. Lawrence (Brosset et al 2018) are most likely to impact snow crab larval and early benthic phases rather than the R2 phase much closer to recruitment to the fishery.

4.3.7 Precautionary approach

The trajectory of stock biomass versus exploitation rate in the fishery is shown in Figure 10. The estimated biomass from the 2017 survey, which would be available to the fishery in 2018, is 66,021 t (95% CI 57,456 – 75,495 t). The 2017 survey biomass estimate is in the healthy zone of the PA framework.

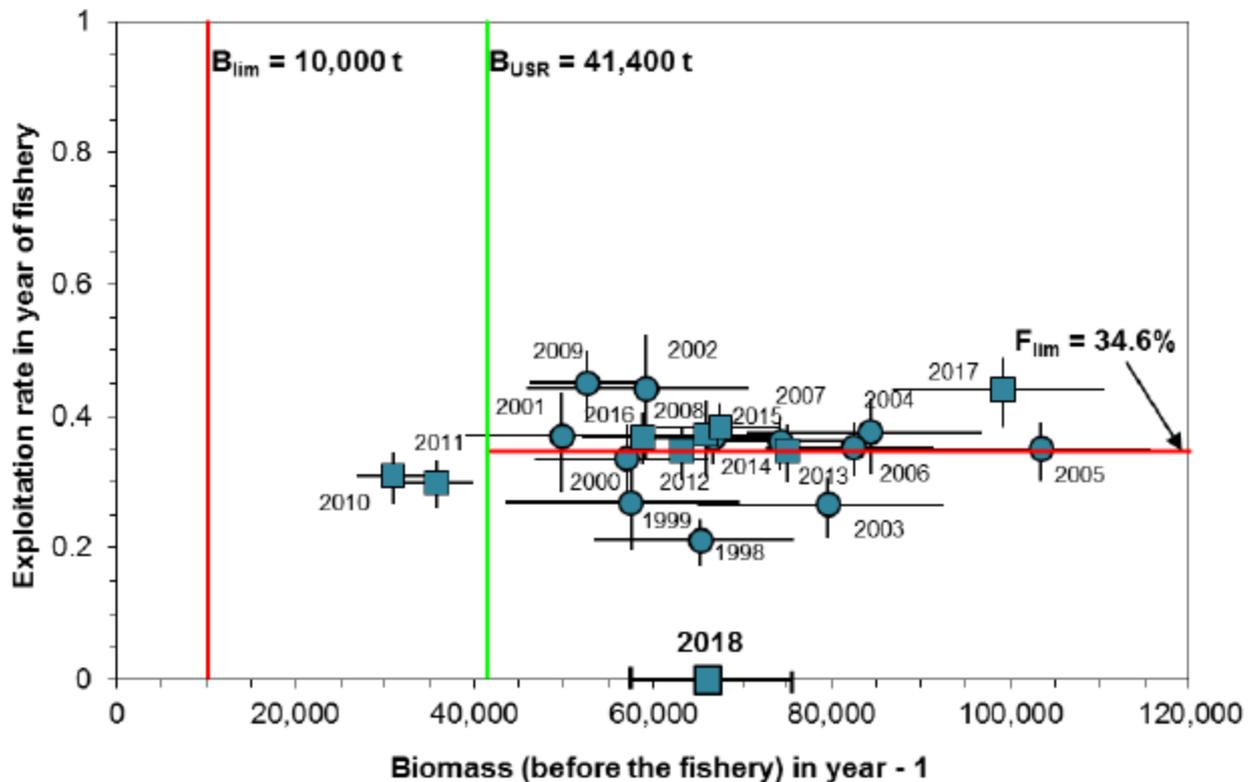


Figure 10. Trajectory of stock abundance (biomass of commercial-sized adult male crabs as estimated from the trawl survey in the year before the fishery) versus exploitation rate in the fishery year for snow crab from the southern Gulf of St. Lawrence. Year of the fishery is labelled on the figure. Error bars are 95% confidence intervals. Circle symbols are biomass and exploitation rate levels used to define the reference points. The squares are the years when the reference points were used within the PA to decide on the fishery quota. The biomass estimate available for the 2018 fishery (with 95% confidence interval) is also shown. Source: DFO 2018a.

PA compliant harvest decision rules, which allow the exploitation rate to exceed F_{lim} when the stock is in the healthy zone, are used to derive the exploitation rate and the TAC. This results in a selected exploitation rate of 38.3% which corresponds to a TAC of 25,286 mt for the 2018 fishery (Figure 11).

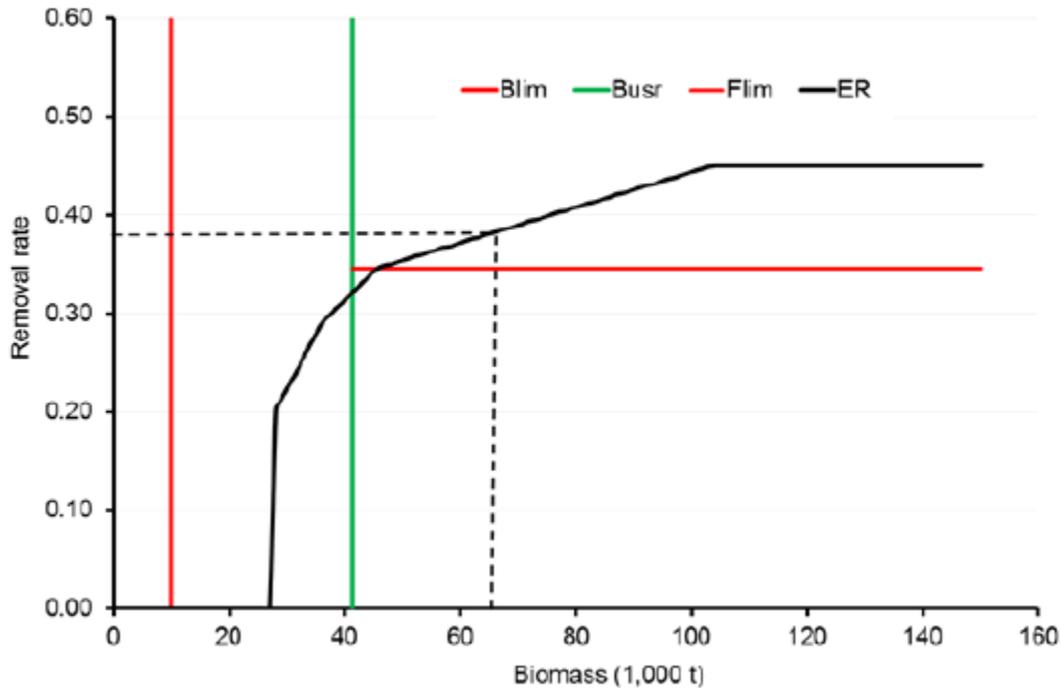


Figure 11. Harvest decision rule (solid black line; proportional variant 4; DFO 2014b) for the southern Gulf of St. Lawrence snow crab fishery and corresponding exploitation rate (0.383) for the 2018 fishery resulting from the commercial biomass estimate of 66,021 mt (dashed-dotted line). Source: DFO 2018a.

4.3.8 Risk analysis of catch option

A risk analysis was developed for the decision rule TAC and relative to other catch levels in 2018 (Table 2). It indicates that the TAC derived from the harvest decision rule will result in a near zero chance of the residual biomass after the fishery being less than B_{lim} and a near 100% chance of the biomass for the next year's fishery being above B_{USR} and in the healthy zone of the PA. The risk analysis also provides predictions of the commercial biomass in the 2018 survey, assuming the corresponding catch level is taken in 2018. At the decision rule TAC value of 25,286 mt for the 2018 fishery, the commercial biomass predicted for the 2018 post-fishery survey and for the 2019 fishery, is 69,780 mt, with a 95% confidence interval range of 55,110 to 84,030 mt, an increase compared to the 2017 survey estimates, and in the healthy zone of the PA framework.

Table 7. Risk analysis of catch options in 2018 for the southern Gulf of St. Lawrence snow crab fishery showing probabilities of the hard-shell commercial-sized adult male remaining biomass falling below B_{lim} , and of the total commercial-sized adult male biomass being equal to or above B_{USR} post-fishery in 2018. The catch level of 25,286 mt based on the agreed harvest decision rule is highlighted in the table. Also shown is the predicted (mean; 95% confidence interval range) commercial biomass from the 2018 survey assuming each corresponding catch level is fished. Source: DFO 2018a.

Catch level (t)	Probability		Expected biomass for the 2018 post-fishery survey
	< B_{lim} (10,000 t)	$\geq B_{USR}$ (41,400 t)	
20,000	0	1	74,770 (60,400-89,320)
21,000	0	1	73,770 (59,400-88,320)
22,000	0	1	72,770 (58,400-87,320)
23,000	0	1	71,770 (57,400-86,320)
24,000	0	1	70,770 (56,400-85,320)
25,286	0	1	69,780 (55,110-84,030)
26,000	0	1	68,770 (54,400-83,320)
27,000	0	1	67,770 (53,400-82,320)
28,000	0	1	66,770 (52,400-81,320)
29,000	0	1	65,770 (51,400-80,320)
30,000	0	1	64,770 (50,400-79,320)
31,000	0	1	63,770 (49,400-78,320)
32,000	0	1	62,770 (48,400-77,320)
37,190	0.5	1	57,580 (43,210-72,130)
53,420	1	0.5	41,350 (26,980-55,900)

4.4 Updates on ecosystem considerations

4.4.1 Primary and secondary species

There are no substantial changes. There are no main primary and secondary species caught in the sGSL snow crab trap fishery.

There is extremely scarce recording of non-targeted species catch in the mandatory logbooks used in the snow crab fishery. As such it is impossible to conduct data analysis on by-catch species given the limited data available. However, based on anecdotal information from harvesters bycatch is very limited and the large mesh size (maximum knot-to knot size at 75 mm) currently used on the traps limits the retention of by-catch species. For example, Choi and Zisseron (2008) described that by-catch levels in the Eastern Nova Scotia (ENS) snow crab fishery are low, being mostly dominated by other crabs, which is attributable to trap design (top entry conical traps), the large mesh size (5.25 inches/133.5 mm, knot to knot) and the passive nature of the gear.

In the sGSL snow crab fishery, electronic logbook system are expected to be introduced in the 2019 season and will request detailed information on by-catch species (species and quantity). Analysis on by-catch could be planned if this new system provides improved data.

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 t to a 2016 SSB at 40,000 t (Figure 12). SSB in 2016 was about 40% of the 103,000 t LRP. Although no significant recruitment episode has been observed since 1999, catch-at-age data indicate a slight improvement in the age structure and there were signs that recruitment was higher in 2015 than observed in recent years.

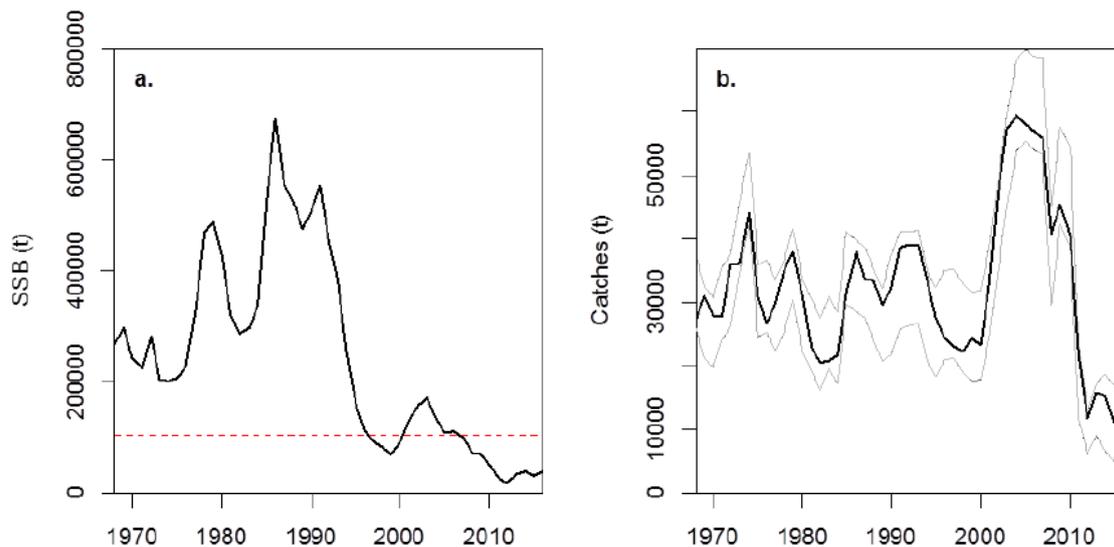


Figure 12. a) Mackerel spawning stock biomass in NAFO subareas 3 and 4 for 1968–2016 estimated by a censored catch-at-age statistical model; dotted red line: limit reference point (b). Estimated catches for NAFO subareas 3 and 4. Lower grey line: lower limit of censored model (= reported catches); upper 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 2017fa

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 13). F is below the removal rate reference since 2011.

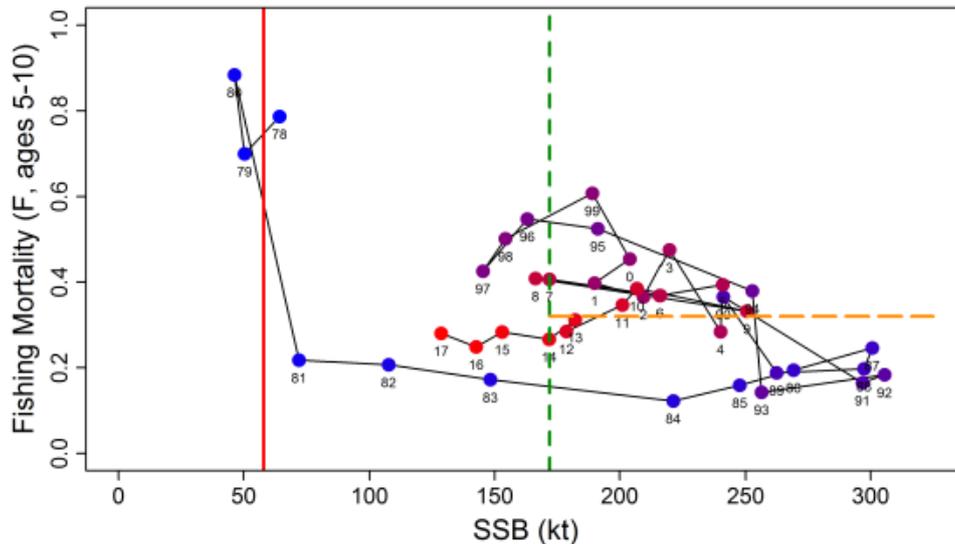


Figure 13. The southern Gulf of St. Lawrence Atlantic Herring fall spawner component trajectory in relation to spawning stock biomass (SSB, kt = thousand t) and fishing mortality reference levels. The solid red vertical line is the LRP (58,000 t), the green dashed vertical line is the Upper Stock Reference (USR = 172,000 t), and the dashed horizontal line is the removal rate reference value ($F_{0.1} = 0.32$). 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 2016¹⁰.

Longfin squid (*Loligo pealei*)

Almost the entire catch is taken by vessels from Fishing Area 21 (northwestern Atlantic)¹¹. 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)¹². Longfin squid are a short-lived species (~9 months)¹³ 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 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 t to only about 38 000 t 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

¹⁰ <http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2016aq-eng.htm>

¹¹ <http://www.fao.org/fishery/species/2714/en>

¹²

https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/59073cc9be65945087783a84/1493646537724/Doryteuthis_update_April_2017.pdf

¹³ http://www.seafoodwatch.org/-/m/sfw/pdf/reports/s/mba_seafoodwatch_squidlongfinshortfinreport.pdf

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 t. The countries with the largest catches were USA (7 334 t) and Canada (313 t). 2014 global catches were just over 11 000 t¹⁴.

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 (Rivard et al., 1998; Hendrickson, 1999). 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 t) 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 2015¹⁵.

4.4.2 Endangered, Threatened and Protected (ETP) species

Updates for Northern / spotted wolffish and Leatherback turtles

During the site visits, DFO confirmed that in the Gulf Region, 20 SARA logbooks were returned from the 2018 Snow Crab fishery in areas 12, 12E, 12F, 18, 19, 25, and 26. All 20 logbooks were NIL reports. No interactions /bycatch with Northern / spotted wolffish and Leatherback turtles were reported.

North Atlantic right whale (NARW)

Expedited Audit Findings Re-Cap

The sGSL snow crab trap fishery was re-certified on October 10th, 2017. SAI Global became aware of significant new information describing a major impact of the fishery i.e. Entanglement and mortality of NARWs in snow crab fishing gear. This major impact constituted 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.

As a result, the expedited audit focused on this event. The expedited audit was announced on the MSC website on November 14th, 2017 and a report was completed and published in February 2018.

The assessment team reviewed all significant new information available at the time of the audit to determine whether or not the NARW mortality event affected the scoring of Principle 2 and Principle 3 and possibly the certification status of the fishery. The scoring rationales of several Principle 2 and 3 PIs were updated and some Principle 2 PIs re-scored (see executive summary).

¹⁴ <http://www.fao.org/fishery/species/2720/en>

¹⁵ <https://archive.nafo.int/open/sc/2016/scr16-034.pdf>

Based on the findings of the Expedited Audit the SAI Global determined that:

- **The Gulf of St Lawrence snow crab trap fishery no longer conformed with the MSC Standard and the fishery certificate was suspended.**

4.4.2.1 NARW interactions during the 2018 fishing season

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 in the Gulf of St Lawrence (GSL)^{16 17} or in Canada (see figure below).

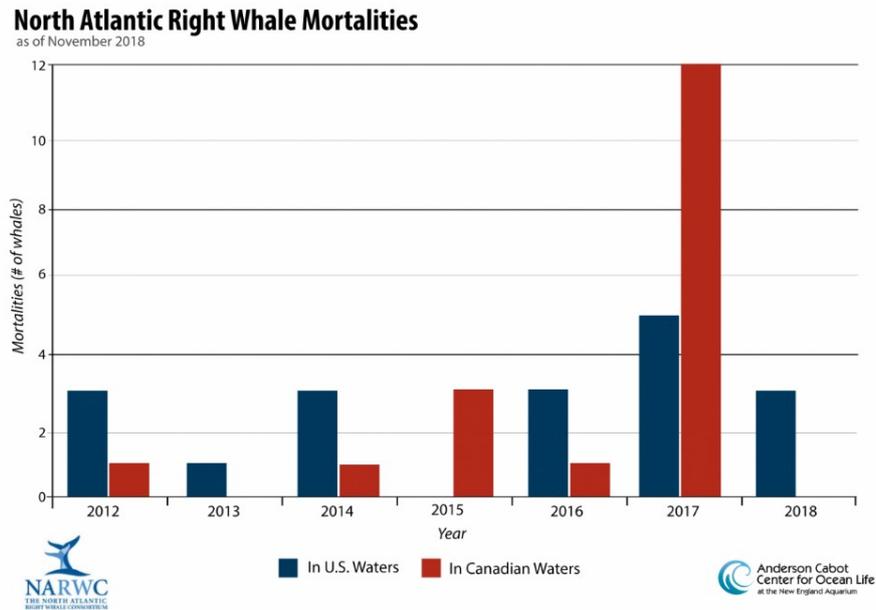


Figure 14. 2012-2018 confirmed NARW mortalities in U.S. waters (dark blue) and Canadian waters (red). Data from NOAA Fisheries.

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 again¹⁸. A detailed description of 2018 Canadian entanglements is provided below using:

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

¹⁶ <https://www.fisheries.noaa.gov/media-release/third-north-atlantic-right-whale-mortality-2018-confirmed>

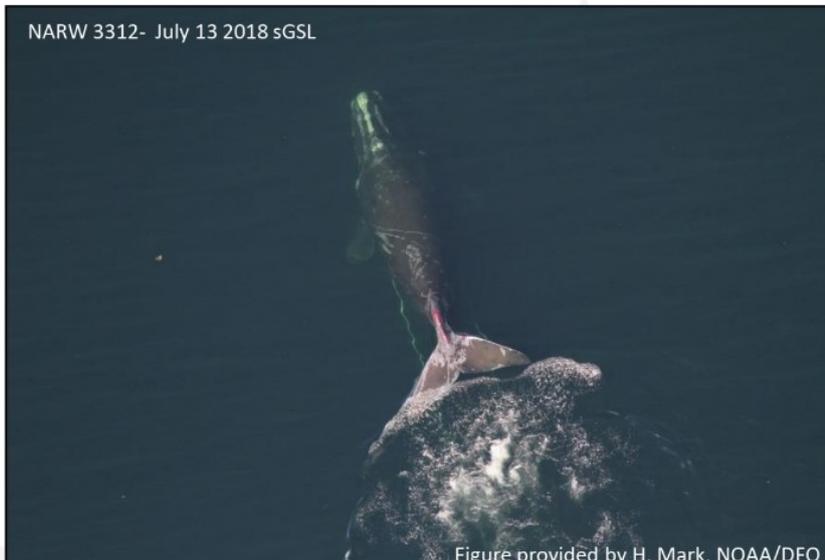
¹⁷ <https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/>

¹⁸ Observations made during the November 2018 site visits.

GSL Entanglements in 2018 – Detailed Information

Entanglement Cases in 2018 as reported by Dr. Moe Brown to the NARW Consortium¹⁹ on November 8, 2018 and in the 2018 NARWC report card:

Right Whale 3312 - GSL

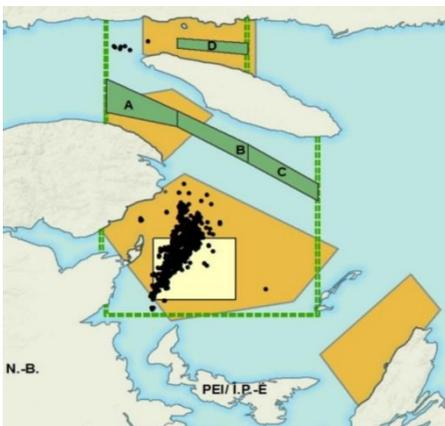


July 13 2018 sGSL: RW# 3312 - seen in the GSL in the morning without gear and seen 3 hours later entangled - not relocated and no further sightings.

About this whale, the 2018 NARWC Report Card²⁰ 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 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 15. 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 resighted/disentangled.

¹⁹ Stakeholders submitted data (see in [Appendix](#))

²⁰ https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

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 Right Whale 3960 became entangled outside the snow crab fishing season by lost snow crab pot 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 Canadian²¹ reported entanglements of 2018. Although it is referred to as been seen in the GSL the specific date of this 2018 sighting is unclear. Because

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

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.

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 condition²². All these factors may collectively affect the survival of this whale.

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https://www.researchgate.net/publication/237973508_Visual_health_assessment_of_North_Atlantic_right_whales_Eu_balaena_glacialis_using_photographs

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 all three of the 2018 mortalities in the U.S. were 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 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.

In the 2007 NARW (Recovery Potential Assessment) RPA²⁵ 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. 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 entanglements

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

²³<https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event>

²⁴https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

²⁵<http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf>

²⁶<https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306>

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.

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 death³⁰. Serious Injury determinations for the US and Canada incidents have been carried out by the NMFS since 2012.

NMFS definition of Serious Injury (SI) 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).

²⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/>

²⁸ <https://www.int-res.com/articles/esr2018/37/n037p233.pdf>

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>

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 update³¹.

Table 8. 2017 US and Canada NARW Serious Injury determinations.

Date 1 st 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

Based on the table above, in 2017 there were:

- 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.

We note that information from the November 2017 - March 2018 Expedited Audit, stated the following about 2017 entanglements:

“In addition to NARW mortalities in 2017, 5 entanglements of NARW were observed between July 5th and August 28th, 2017. Snow crab fishing gear was identified in 4 of the five entanglements. DFO confirmed that all four entanglements were with snow crab gear from CFA 12. Two of the 5 whales were disentangled while a third shed the gear on its own. A disentanglement response for the remaining 2 animals was not permitted. They were not re-sighted and so their fate was unknown.”

Based on the 2017 Serious Injury information provided in the table above we can see that 4 out of 7 Canadian entanglements from snow crab trap/pot gear resulted in Serious Injuries (i.e. more likely than not to cause mortality of the individual or presenting a greater than 50% chance of death).

Information recorded in the Expedited Audit stated that: *“DFO confirmed that all four entanglements were with snow crab gear from CFA 12”*. Because more than 50% of the entanglements from Canadian snow crab gear reported above (i.e. four out of seven) have Serious Injury determination, we can assume that it is likely that at least 50% (i.e. two of the four) of the 2017 snow crab gear entanglements from CFA 12 also caused Serious Injury.

³¹

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

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).

2018 Entanglement and Mortality assessment relative to MSC PI 2.3.1 Scoring issue (SI) a and SI b

Accordingly, this Surveillance Assessment uses the most recent information on a) 2018 mortalities and b) 2018 entanglements to score the following MSC Performance Indicators:

- MSC PI 2.3.1 SI a: *“the effects of the UoA on the population/stock are known and likely to be within the national and international limits (i.e. in this case the National Canadian zero mortality limit).*
- MSC PI 2.3.1 SI b: *“known direct effects of the UoA are likely to not hinder recovery of ETP species (i.e. in this case direct effects are considered as 2018 entanglement incidents that may have significant effects / potentially cause mortality of NARWs).*

4.4.2.2 Management Measures implemented for the 2018 fishing season

New management measures to minimise the risks of interactions with the NARW in the GSL have been implemented for fixed gear fisheries.

Reducing the Amount of Rope Floating on the Surface of the Water

The following requirements will be in place to minimize the length of rope floating on the surface of the water in order to reduce the risk of NARW entanglements:

- No rope attaching a lobster trap to a primary buoy shall remain floating on the surface of the water after the lobster trap has been set.
- If using multiple traps per line, no rope attaching a lobster trap to another lobster trap shall remain floating on the surface of the water after the lobster trap has been set.
- If fishing with a primary and secondary buoy, a maximum of 3.7 meters of rope shall be used when attaching a primary buoys to a secondary buoy.

Note: A primary buoy is defined as a buoy or other floating device attached to a fishing gear. A secondary buoy is defined as a buoy or other floating device attached to a primary buoy.

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 at GLF.DFO.Gear-Engins.GLF.MPO@dfo-mpo.gc.ca within a 72-hour of noticing that the gear has been lost:

- 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](#) section 9.3.4) must be completed and submitted by email to DFO.NAT.InteractionsMM-InteractionsMM.NAT.MPO@dfo-mpo.gc.ca 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 telephone: 1-844-800-8568 or by mail: XMARWhalesightings@dfo-mpo.gc.ca.

Static and dynamic closures

DFO announced on April 2018 (DFO 2018c and d) the implementation of a closure protocol for Gulf Region fixed gear fisheries in case of NARW presence is confirmed. This protocol will allow the DFO to temporarily close specific areas to fishing activities (Figures 16 and 17) carried out with fixed gear in order to prevent incidents with NARW, such as entanglements. When at least one NARW is observed inside a foraging area, the

DFO will close a total of nine grids to create a buffer area around the sighting location to account for whale movements.

Closures will be in force for a minimum period of 15 days and will be extended by 15 days from the last NARW sighting in the closed area. If no NARW are seen in the closed area during at least two aerial surveillance flights during the 15 days period, the nine closed grids will be automatically opened at the end of the period. Closures and openings will be regulated through *Variation Orders* and *Notices of Closure*, among other tools. When licence holders are notified of a closure by a notice issued on a commercial or maritime radio station, by a notice transmitted electronically or by a notice given orally by a fishery officer or a fishery guardian, he will have 48 hours to retrieve fishing gear from the area prior to closure.

Moreover, a static fishing closure is effective since 28th April 2018 (Figures 16 and 17). This static closure occurs in the area where 90% of the NARW observations occurred in 2017 in order to create a large area free of gear thus reducing the risk of NARW interacting with fixed gear and traps.”

In addition, DFO can issue a Caution Notice as the one issued on July 20, 2018³² to confirm the presence of NARW outside potential feeding areas. Areas situated outside potential feeding areas are not subject to the temporary closure protocol. However, DFO is asking licence holders to be vigilant during their fishing activities in the potential presence of NARW in their areas; and when it is possible and safe to do so, DFO encourages licence holders to remove their fishing gear in areas where NARW are present and move to areas where whales have not been observed.

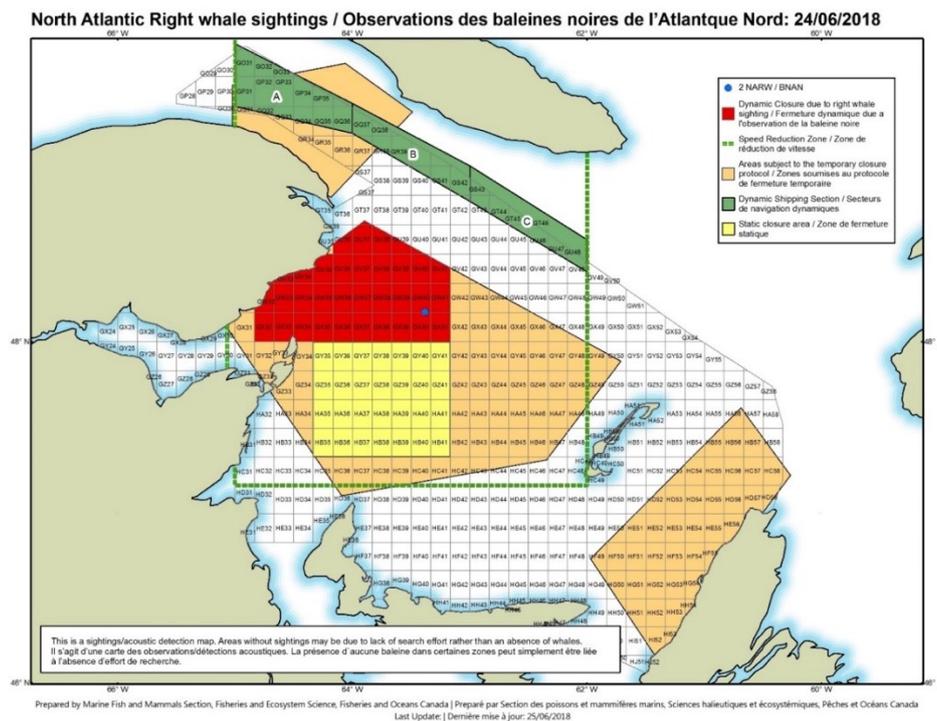


Figure 16. Map showing the static closed area (yellow) that came into effect on April 28, 2018; and the temporary fisheries closure of a fishing area (red) as per June 25, 2018. Orange: areas subject to the temporary closure protocol. Source: DFO 2018c.

³² <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/right-whale-baleine-noires-0723-en.html>

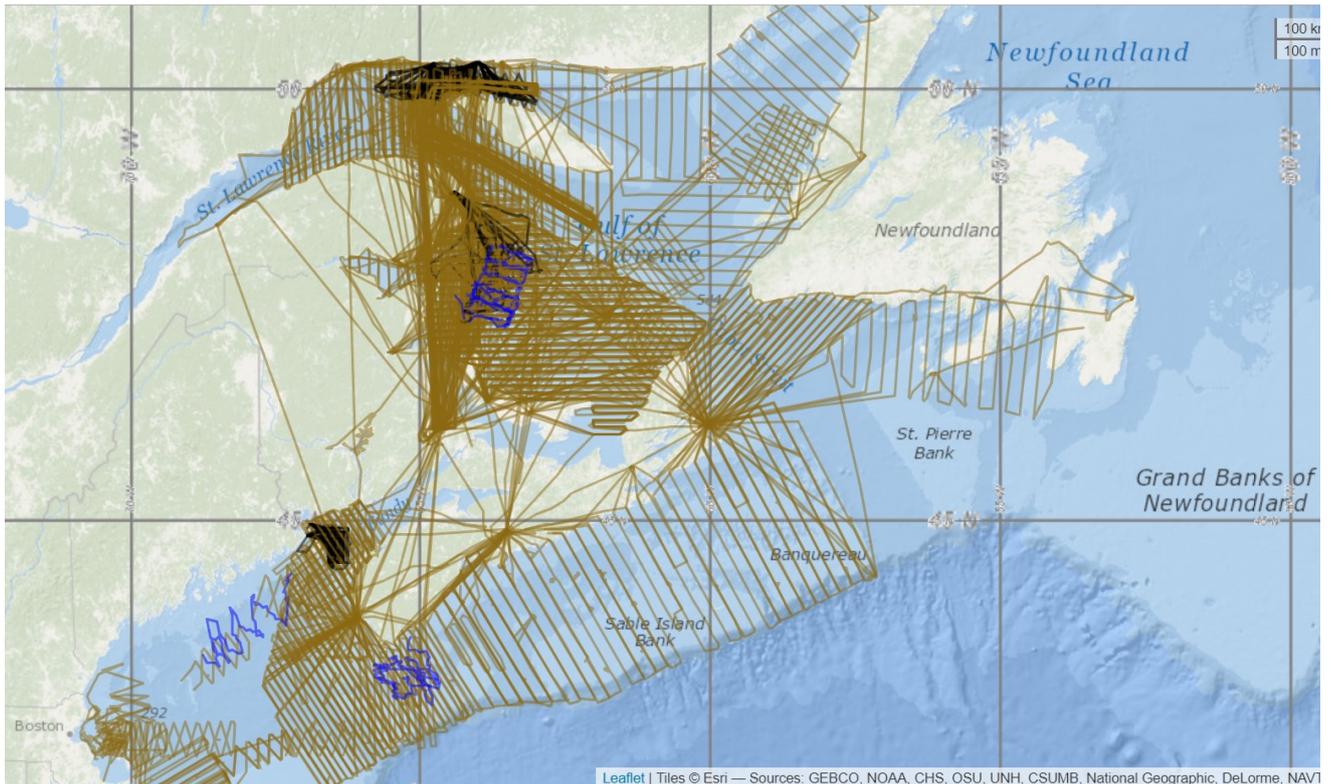


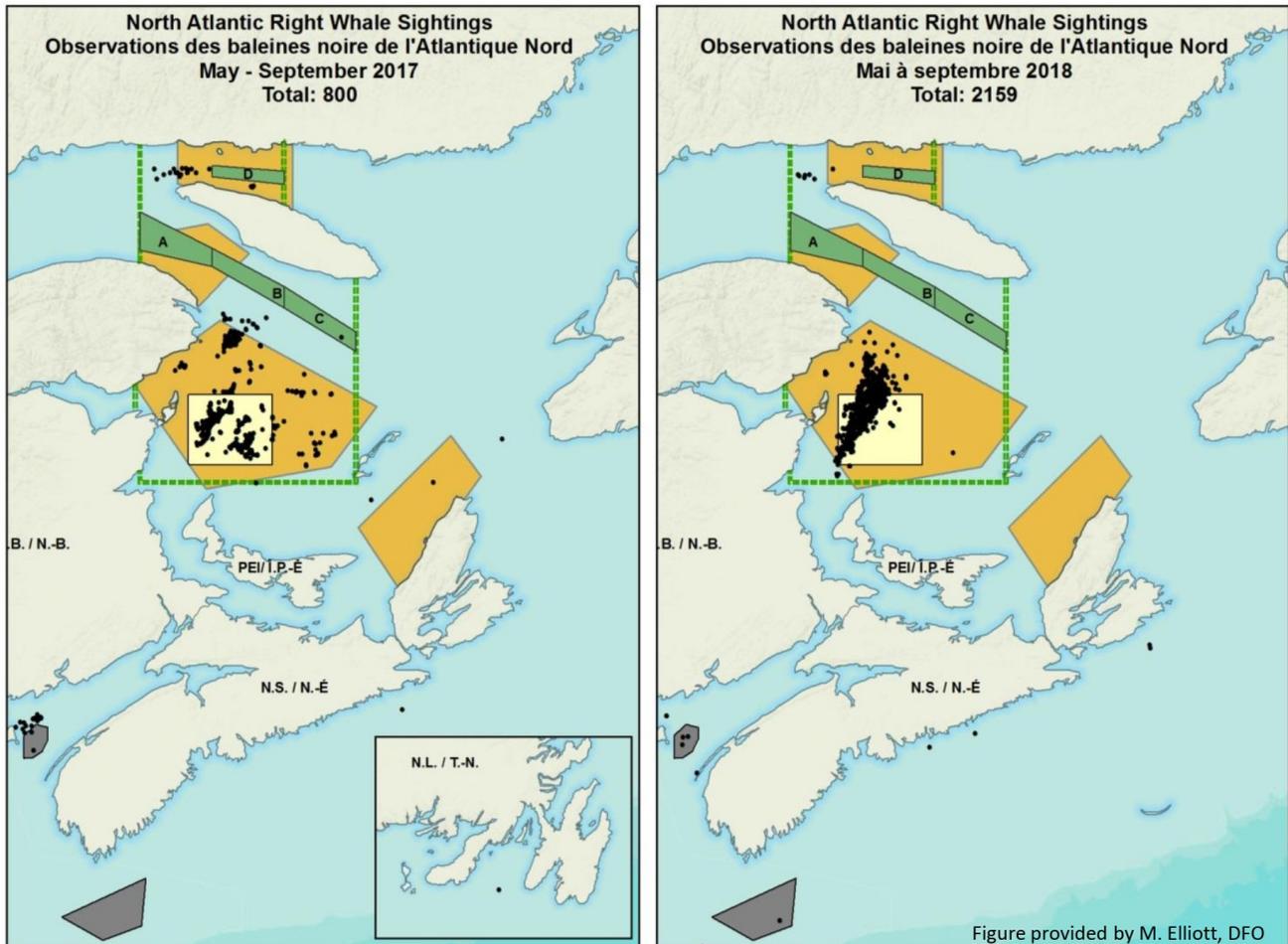
Figure 18. 2018 survey lines from DFO monitoring activities (Source: DFO 2018 DFO Science Efforts in support of mitigation measures to protect the NARW in Canadian Waters).

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



* Preliminary sightings data only

Figure 19. 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 areas³³.

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;

³³ <https://whalemap.ocean.dal.ca/WhaleMap/>

- 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 (OPP) Marine Environmental Quality (MEQ) Impact of shipping noise on NARW research program.

During the site visits, the science OPP 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.

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 season³⁴. 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.
- 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 (Figure 20). 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.

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>

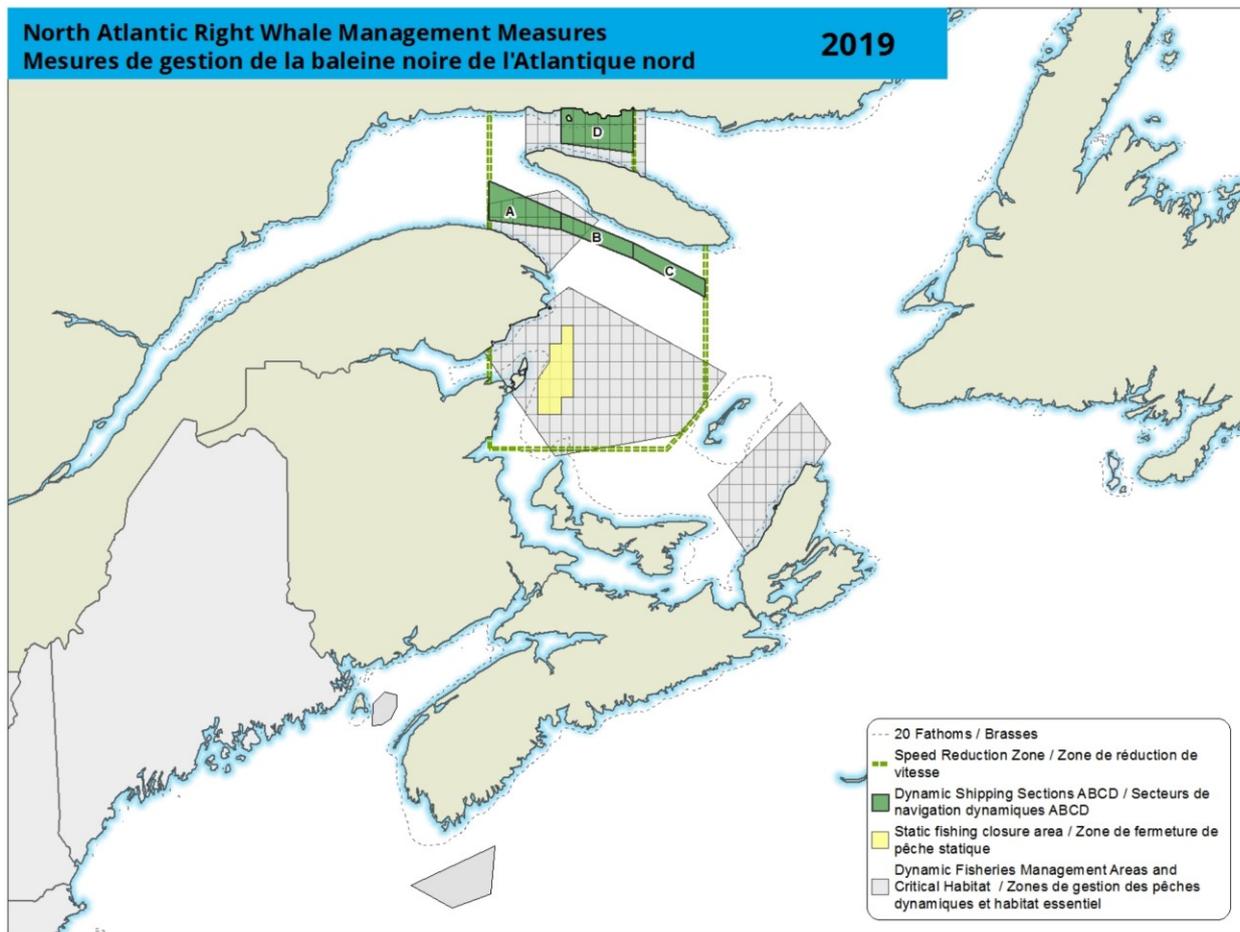


Figure 20. North Atlantic Right Whale Management Measures for 2019³⁵.

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.

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.

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

The Minister also mentioned that, five calves have been recently spotted in U.S. waters³⁶.

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

During the November 2018 site visits DFO reported that the impact of snow crab traps on the benthic community/seafloor has not been studied (published), but foot print estimation of the most popular 7ft conical traps, which has a bottom contact area of 3.58m², can be calculated.

According to DFO 2018, the total number of trap haul was estimated at 553,125 hauls in the sGSL in 2017 which is the highest trap hauls in the last 10 years. The total foot print by snow crab traps could therefore be estimated at 1.98km², which represents 0.0034% of the total habitat surface of snow crab in the sGSL (57,840 km²; DFO, 2018). Total annual trap hauls are annually estimated in this fishery. Therefore, it is reasonable to conclude that the snow crab trap fishery continues to be highly unlikely to reduce structure and function of the commonly encountered habitats.

Coral and sponge conservation areas in the GSL

Permanent closures, new coral and sponge conservation areas.

On December 15, 2017, Fisheries and Oceans Canada created eleven coral and sponge conservation areas in the Estuary and GSL in order to protect areas with high concentrations of sponges and sea pens. These are considered Vulnerable Marine Ecosystems (VMEs).

All fishing activities that use bottom-contact gear or gear designed to come into contact with the sea bed, including but not limited to bottom trawls, dredges, gillnets, bottom longlines, bottom seines and traps (for crab and lobster), are forbidden in the conservation areas. These closures are shown below.

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>

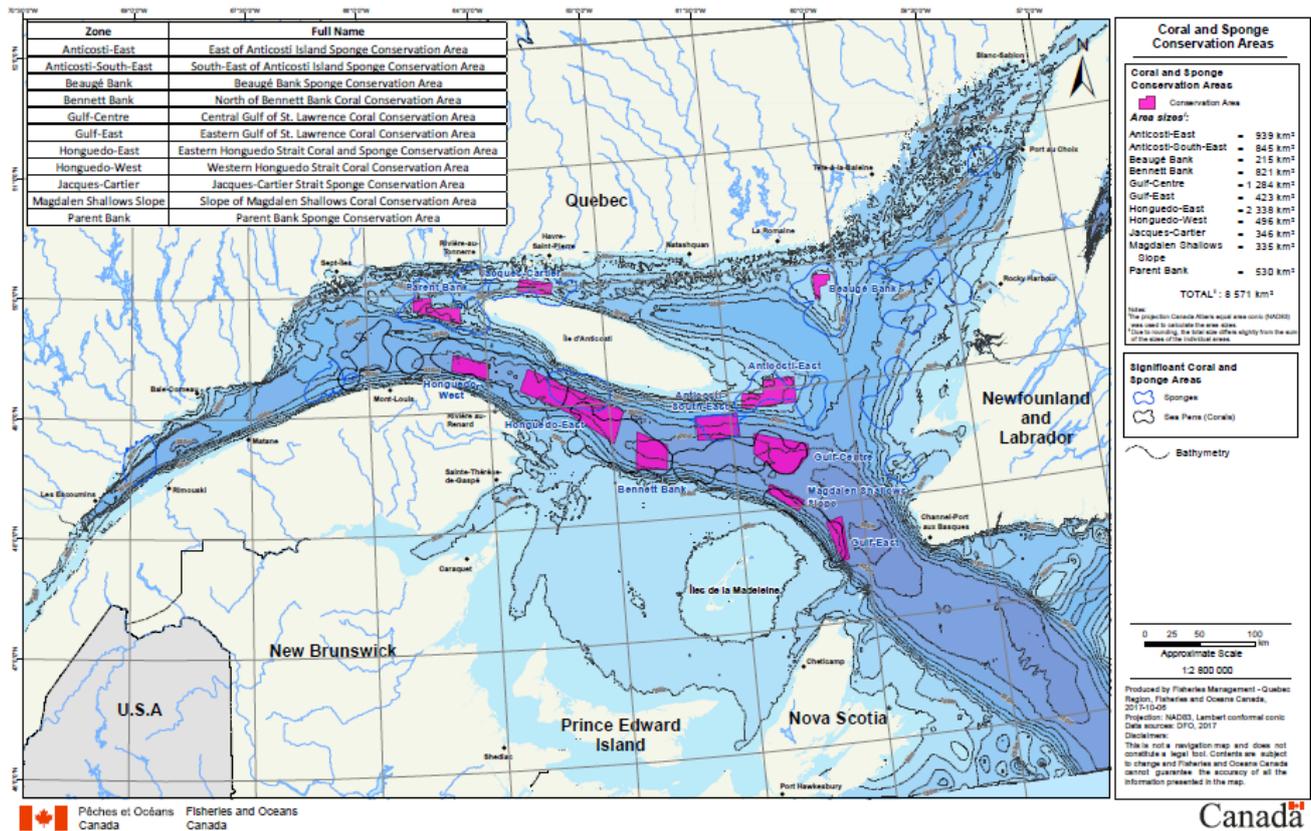


Figure 21. Map of areas identified for coral and sponge conservation in the GSL (pink). Source: <http://www.qc.dfo-mpo.gc.ca/golfe-gulf/corau-eng.html>.

Ecosystem

Northern marine systems are simpler than ecosystems further south. During the site visits DFO reported that snow crab is a bottom dwelling species and plays an important role in breaking down sedimentary organic matter into chemical elements that are then available as nutrients for growth of other species such as algae and other bottom dwelling species. The snow crab stock in the sGSL has been maintained in healthy status and only a maximum of 9.4% of the total population of snow crab in the sGSL was exploited commercially (unpublished data) during the 2017 season.

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 Conservation and Protection (C & P) have a newly appointed Director – Denise Velour.

4.5.4 Compliance and Enforcement

C & P provided the audit team with a summary of enforcement activities for the 2017 – 2018 snow crab fishery in CFAs 12, 12E, 12F, 18, 25 and 26 and the number of violations:

Enforcement Activity	2017	2018
Total Fishery Officer patrol hours	12,214 hours	11,674 hours
Gear checks	17,410	6,701
Vessel checks	1,499	916
Aerial surveillance	499.5 hours	351.5 hours
At-sea observer percentage:		
CFA 12	17.8 %	14.6 %
CFA 12F	15.2 %	13.3 %
CFA 12E	22.7 %	13.9 %
Number of hail outs	8,567	6,898
Dockside Monitoring Program (DMP)	100%	100%

Violation	2017	2018
Charges laid	57	58
Charges not approved	17	13
Charged pending / under review	48	102
Warning issued	262	183
Seizure	9	5

C & P did not consider the numbers of violations significant although they did comment that rapid changes in regulations to mitigate whale interactions did result in a higher number of warnings and charges than in previous years. C & P confirmed they did not consider there is any indication of systematic non-compliance in the fishery.

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

Snow crab working groups: Given the significant changes in the management approach for the snow crab fishery in 2018, and snow crab working group (SCWG) that included with membership from the snow crab advisory committee was established. The objective of the SCWG was to ensure transparency and efficient information sharing between DFO and industry.

The SCWG held weekly conference calls through the snow crab harvesting season commencing on May 18 and ending June 29. The information shared during these calls included:

- Landings updates.
- Updated NARW observations.
- Latest science update regarding observations (migratory pattern, etc.).
- Snow crab fleet practices including changes in fishing patterns, areas and gear locations.
- Current enforcement updates and advisory by C & P.
- Information by processors regarding impact on employment, logistics challenges due to changes in landing patterns, reductions in supply continuity.

There was a post-season meeting held in Shippagan on September 5, 2018, which included DFO, industry stakeholders and provincial representatives.

Two separate working groups were also created specifically for Indigenous fisheries (First Nations with

Commercial access to the snow crab fishery), and the inshore fleet (impacts on inshore fisheries *other than* snow crab).

Proposed management measure changes: As a result of the management measures that were implemented in 2018, and the working group meeting, the New Brunswick industry proposed a number of modifications, new measures and new research initiatives for consideration by the DFO prior to the 2019 season.

National Marine Mammal Peer Review Committee (NMMPRC) Meeting

In November 2018, the 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 DFO and other organizations. Following NMMPRC peer-review and approval, scientific results are used to provide scientific advice for the management and conservation of marine mammals in Canada³⁷.

The objectives of this meeting were to:

- Determine, to the extent possible with available data, the spatial and temporal distribution of NARW in Canadian waters, based on aerial surveys (DFO Science, C&P, TC, NOAA, ENGOs, etc.), acoustic data collected from moorings, buoys and gliders, and other biological data. More specifically:
 - Describe the seasonal distribution of NARW in Canadian waters, including residency in Canadian waters, current and historical distribution, individual residency and distribution.
 - Identify the advantages and disadvantages of the different methods and technologies used to survey and monitor the presence of NARW.
 - Identify the physical and/or biological factors that influence the distribution of NARWs in Canadian waters.
 - Identify potential areas where NARW may occur lying outside of the current survey areas that may warrant more effort to assess species presence.
 - Describe how the factors that influence the distribution and aggregations of NARWs provide a basis for defining spatial or temporal management measures, such as the dynamic or static closures currently implemented in Canadian waters.
 - Determine the probability of NARW presence over various water depths including depths less than 10 and 20 fathoms (18 and 37 m).
- Determine the risks to NARW of entanglement in invertebrate fishing gear in the Gulf of St. Lawrence
- Determine the risks to NARW of vessel collision in the Gulf of St. Lawrence

Expected Publications

- Science Advisory Report
- Proceedings
- 10 Research Documents

NARW National Action Plan external consultation

There is a National Action Plan for NARW that was developed (2016) under requirements of SARA. 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. The objective of the Action Plan on NARW is to: “*achieve an increasing trend in population abundance over 3 generations*”. Objective two of the Recovery Strategy is to reduce mortality and injury as a result of fishing gear interactions.

³⁷ http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2018/11_26-30-eng.html

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;
- 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

- A corrective action plan was submitted and accepted following an expedited audit carrying out in 2018 and actions undertaken are reported in the next section.
- 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
N/A

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 1 st , 2014	Standard and Process
General Certification Requirements v.2.2	March 1 st , 2018	Process
Surveillance Reporting Template v1.0	October 8 th , 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 purpose of the audit was:

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 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 NARW 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.

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 Gulf of St Lawrence 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 Gulf of St Lawrence 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.

- On-site surveillance audit date was 14th and 15th November 2018.
- On-site audit was performed by Géraldine Criquet (Lead Auditor), Vito Romito (Auditor), Jerry Ennis (Auditor) and Paul Knapman (Auditor)

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 3 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 Audit Team.

Table 9. Consultation Meetings during the On Site Surveillance Assessment of Gulf of St Lawrence snow crab trap fishery.

Name of Organisation	Present at Meetings	Location	Venue	Date/Time	Purpose
DFO Gulf	SAIG audit team DFO: Ray MacIsaac, Stephanie Ratelle, Suzanne Léger, Manon Mallet, Sylvie Léger, Bernard Morin, Jérôme Beaulieu, Jean-Claude Legrely; Mikio Moriyasu, Ivy Austin, Amélie Rondeau ASPANS/Industry: Peter Norsworthy, Pierre Dupuis	Moncton	DFO Offices	14 th November 2018 1.00 pm	Fishery updates: fishing season, spatial distribution of fishing season, number of licences and traps allocation per area. Principle 1 updates estimates vs predicted biomass, 2016 recruitment spike, fluctuations in recruitment, survey design. Principle 2: 2018 entanglements, management measures to minimise interactions with NARW, NARW monitoring, DFO long-term plan to address NARW interactions, return rate of SARA logbooks. 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, Gilles Thériault	Moncton	Hotel Chateau Moncton	15 th 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
ASPANS	SAIG audit team ASPANS: Peter Norsworthy	Halifax	Over lunch	16 th November 2018 12.00 pm	Closing meeting Recap of site visit meetings Additional information requested Next step and timeline
Ecological Action Centre	SAIG audit team EAC: Shannon Arnold	Conference call	Conference call	5 th December 2018 4.00 pm CET	management measures implemented in 2018, industry initiatives, collaboration with industry, long-term solutions for NARW, EAC's view that the fishery still do not meet SG60 level for 2.3.1 and 2.3.2.

6 Results

The Client Group listed the following progress against the June 13t 2018 Corrective Action Plan. All of their activities for 2018 are progressing as per plan. Please see the table below for further details.

Gear Changes						
Category	Change Description	Implementation Timeline	Monitoring Tool	Reporting Responsibility	Status	Source Documentation
Line length	A maximum of 3.7 meters (2 fathoms) of rope shall be used when attaching a secondary buoy to a primary buoy. (A primary buoy is defined as a buoy or other floating device attached to a crab trap).	2018 Season	Enforcement Report	DFO C&P	Complete	License condition Jan 23, 2018
Floating lines	No rope attaching a crab trap to a primary buoy shall remain floating on the surface of the water after the crab trap has been set. (meaning some type of weight on the line is necessary)	2018 Season	Enforcement Report	DFO C&P	Complete	License condition Jan 23, 2018
Area identification	<p>The rope used to attach a crab trap to a primary buoy shall have colored markings specific to the fishing area (e.g. 12, 12E, 12F, 19) each of 15 cm in length.</p> <p>The colored marking shall be permanently affixed at a maximum, at every 27.4 meters (i.e. 15 fathoms) of rope attaching a crab trap to a primary buoy.</p> <p>The markings shall be made by using colored twine or colored tape,</p> <p>When using colored twine, it shall be interlaced within the rope in such a manner that it remains permanently affixed to the rope.</p> <p>When using colored tape, it shall be affixed to the rope in such a manner that it remains permanently affixed to the rope.</p> <p>The shade of (orange, yellow, blue or green) used for the markings shall contrast with the color of the rope used to attach a crab trap to a primary buoy.</p>	2018 Season	Enforcement Report	DFO C&P	Complete	License condition Jan 23, 2018
			Enforcement Report			
			Enforcement Report			
			Enforcement Report			
			Enforcement Report			
Gear identification	In addition to the current regulatory requirement to mark buoys with the vessel registration number (VRN), licence holders will be required to identify each primary buoy with a sequential number as to be capable of individually identifying each crab trap or fleet of traps.	2018 Season	Enforcement Report	DFO C&P	Complete	License condition Jan 23, 2018
Number of Traps	Reduce the total number of traps compared to 2017.	2018 Season	Annual comparison of traps licensed	DFO	Complete	Trap notice email 3.29.18 Sylvie
	The number of vertical lines and traps seasonally required to optimize harvesting performance while reducing risk to NARW will be reviewed.	2019	Review outcome	DFO/Harvesting stakeholders	Ongoing	Per Haches V3 comments 5.4.18, confirmed Serge Doucet 5.10.18

Communications Improvements						
Category	Change Description	Implementation Timeline	Monitoring Tool	Reporting Responsibility	Status	Source Documentation
Notification of Inter	Mandatory reporting of any interaction (gear entanglement, marine strike, bycatch) with marine mammals.	2018 Season	Annual Report	DFO Management	Complete	License condition Jan 23, 2018
Notification of sight	Mandatory reporting of live right whale locations.	2018 Season	Annual Report	DFO	Partial Success	License condition April 5, 2018
Lost Gear	License holders are required to report lost gear within 72 hours of noticing that the gear has been lost.	2018 Season	Annual Report	DFO Management	Complete	License condition Jan 23, 2018
Notification of dynamic area closures	Advance notice by email to fishing associations. Gear to be moved within 48 hours from time of advance notice.	As required.	Dated Notice to Fish Harvester	DFO Management	Complete	License condition April 5, 2018
Notification of opening of dynamic closure area	Advance notice by email to fishing associations. Variation order published. Gear can be moved into the area immediately.	Once verified	Dated Notice to Fish Harvester	DFO Management	Complete	License condition April 5, 2018
Identification tool	Development and distribution of identification tool to more accurately report presence of NARW.	2018 Season	Tool available and distributed	DFO and MARS	Complete	
On line database for right whale sighting information	Establish a shared database to report all right whale encounter information in Atlantic Canada	2018 beta operational and review prior to 2019	Online Database Access	DFO Science	Complete	Online June 2018

Management Measures						
Category	Change Description	Implementation Timeline	Monitoring Tool	Reporting Responsibility	Status	Source Documentation
Closures	Static fishery closure commencing April 28, 2018. This closure is in an area demonstrated to be where right whales congregated to feed in 2017.	2018 Season	License conditions	DFO Management	Complete	DFO Press Release 3.28.18
	Dynamic fishery closure based on verified sighting of at least one right whale in identified foraging area. 15 day closure upon confirmed sighting.	2018 Season	Dated Notice to Fish Harvester	DFO Management	Complete	DFO Press Release 3.28.18. Notice to harvesters 4.5.18
Season	Ice breaking resources (as available) to permit an earlier start to the fishery.	2018 Season	Annual Update	Coast Guard	Complete	DFO Press Release 3.28.18
	Earlier season close of June 30.	2018 Season	Dated Notice to Fish Harvester	DFO Management	Complete	DFO Press Release 3.28.18
Monitoring	Increase to aerial and at sea surveillance activity.	2018 Season	Annual Report	DFO Science	Complete	DFO Press Release 3.28.18
	Increase the number of hydrophone buoys to assist in determining location.	2018 Season	Annual Report	DFO/Coast Guard	Complete	DFO Press Release 3.28.18
	Maintain use of passive acoustic glider(s).	2018 Season	Annual Report	DFO/DAL	Complete	DFO Press Release 3.28.18
Vessel monitoring	VMS reporting frequency increased to 5 minutes from 15 minutes.	2018 Season	License conditions	DFO Management	Complete	DFO Press Release 3.28.18
Observers	Provide marine mammal identification training to offshore observers.	2018 Season	Report on training provided	DFO	Complete	Per Training Materials.
Marine mammal res	Funding commitment of \$1m for 2018 for marine mammal response organisations.	2018/19 Fiscal Year	Report of investment and change.	DFO	Complete	DFO Press Release 3.28
Necropsies	Conduct necropsy on whale if it is possible to safely recover the carcass.	Each year	Necropsy Report(s)	DFO with partners	Not Required in 2018	Per SARA requirement

7 Conclusion and Outcome of SAI Global Decision

The audit team 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 mitigate the risk of mortality, reduce entanglements and minimize the UoA-related mortality of ETP species.

However, the audit team currently does not have enough evidence and it is too early to say that:

- 1) Known direct effects of the UoA are likely to not hinder recovery of ETP species; and
- 2) These measures are expected to be highly likely to achieve national requirements for the protection of ETP species given that medium-long term benefits from these measures cannot be guaranteed based on a single season of protection measures to reverse the declining trend of the North Atlantic right whale (NARW) population.

Although SAI Global's audit team determines that good progress has been done regarding the implementation of ASPANS corrective action plan, the team also concludes that the reasons of the suspension have not been fully addressed yet, therefore SAI Global determines that:

- **The Gulf of St Lawrence snow crab trap fishery certificate shall remain suspended.**

8 References

Brosset, P., Doniol-Valcroze, T., Swain, D. P., Lehoux, C., Van Beveren, E., Mbaye, B. C., Emond, K. and Plourde, S. 2018. Environmental variability controls recruitment but with different drivers among spawning components in Gulf of St. Lawrence herring stocks. *Fisheries Oceanography* 2018;00:1–17. Available: <https://doi.org/10.1111/fog.12272>

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-rscf.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 2017a. 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 snow crab (*Chionoecetes opilio*) in the southern Gulf of St. Lawrence (Areas 12, 19, 12E and 12F) to 2017 and advice for the 2018 fishery. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/007. waves-vagues.dfo-mpo.gc.ca/Library/40688082.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

DFO 2018c. Presence of North Atlantic right whale: Notice of Fisheries Closures. Gulf Region, June 25th 2018. <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/right-whale-baleine-noires-2506-gulf-golfe-en.html?rea=1862>

DFO 2018d. Presence of North Atlantic right whale: Notice of Fisheries Closures., Gulf Region, July 12th, 2018. <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/right-whale-baleine-noires-1207-gulf-golfe-en.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. Hamilton 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.

9 Appendices

9.1 Appendix 1. Re-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/gulf-of-st-lawrence-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 Y wolffishes Y leatherback turtle Y NARW	Y Not scored	N Not scored
	Justification	<p>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.</p> <p>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 wolffish, 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 SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>Wolffishes Reported wolffish catches were relatively high in the 1970s and declined in the 1990s. Since 2006, the lowest values since the start of the data series have been recorded, probably partly due to the requirement to release Northern and Spotted Wolffish under SARA. Although reported wolffish catches once exceeded 8,000 mt, current values are approximately 200 mt annually. Commercial log data under-report wolffish catch rates (Kulka <i>et al.</i>, 2007), and close to half of Atlantic Wolffish bycatch in Canada is believed to be discarded without being reported (Simpson and Kulka 2002). Landed values therefore underestimate actual catches. Wolffish caught by trawls are generally more vigorous than most other fish species and their survival rate following release may therefore be higher (Grant <i>et al.</i>, 2005).</p>		

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
	<p>Effects on wolffish from disturbance or alteration of ocean bottoms by repeated use of mobile gear (primarily bottom trawls and dredges) are unknown. Bottom trawls rarely sample rocky bottoms due to the high risk of gear damage. This habitat is important to Atlantic Wolffish. It has been presumed that fishing mortality from bottom gears has been the primary cause of death due to a loss of buoyancy from depleted blubber reserves. (there is no directed fishery for wolffish) but there is a small bycatch issue associated with the 4X5Y OT fishery (c. 0.07 mt per annum average over 2007-2011) and the LLC fishery (1.5 mt) as well as the 5Zjm OTM fishery and LLC fishery (<1 mt). It meets SG60 the SG80a score</p> <p>Leatherback turtle</p> <p>Leatherback turtles are 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.</p> <p>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), lobster and snow crab pots represented a higher risk, somewhat mitigated by the spatial and seasonal distribution of the gear.</p> <p>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. 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 SG60 the SG80a</p> <p>North Atlantic Right Whale (NARW)</p> <p>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.</p> <p>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</p>

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
	<p>in offshore areas may never be sighted due to low search effort. It is suspected that chronically entangled animals may sink upon death. It meets SG80a</p> <p>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.</p> <p>In addition to the NARW mortalities, 5 entanglements of NARW were observed between July 5th and August 28th, 2017. Four of the 5 were confirmed entangled in snow crab gear. DFO confirmed that all four entanglements were with snow crab gear from CFA 12. Two of the 5 whales were disentangled while a third shed the gear on its own. A disentanglement response for the remaining 2 animals was not permitted and they were not re-sighted. It was confirmed that neither of the dead entangled whales were one of these two animals.</p> <p>The NARW is listed as endangered and protected under Schedule 1 of SARA, as such no person can: kill, harm, harass, capture or take, possess, collect, buy, sell or trade NARW. The Recovery Potential Assessment (RPA) for the NARW developed in 2007 states: "There is no scope for allowable human-induced mortality, since population abundance is estimated as critically low and the population appears to be declining toward extinction". Considering the above, the national limit for the NARW is a zero-take, and the fishery does not have a SARA Permit or a Fisheries Act Authorization or an exemption in their Commercial fishing licences conditions allowing to harm the species.</p> <p>The audit team therefore determine that the effects of the fishery are unlikely to be within these requirements and so the fishery does not meet the SG 60.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u> <u>2017 NARW Population Status</u></p> <p>The North Atlantic Right Whale Identification Database (Catalog), curated by the Anderson Cabot Center for Ocean Life at the New England Aquarium, collates and presents data on NARW sightings and identification. 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 1935³⁸. 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.</p> <ul style="list-style-type: none"> • The presumed alive method (PA) counts whales that have been seen at least once in the last six years (Knowlton <i>et al.</i> 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

³⁸ https://www.narwc.org/uploads/1/1/6/6/116623219/2018report_cardfinal.pdf

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		
		<p>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 the Catalog. The Catalog estimates for 2017 range from a low of 343 to a high of 728 with a middle estimate of 511.</p> <ul style="list-style-type: none"> • 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 <i>and</i> after (see Hayes <i>et al.</i> 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 <i>et al.</i> 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 <i>et al.</i> 2017 methodology represent the estimated abundance at the <i>start</i> 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). <p>The best estimate for the population at the end of 2017 was 411³⁹, and there have been an additional three documented mortalities in US waters in 2018.</p> <p>Audit Team Determination Since there is no scope for allowable human-induced mortality defined in the Canadian NARW (Recovery Potential Assessment) RPA⁴⁰ 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. This is because there have been <u>zero</u> NARW mortalities attributed to Canadian fisheries in 2018 from sGSL snow crab gear).</p> <p>PI 2.3.1, SG60, Scoring Issue a is therefore met.</p>		
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 wolffishes Y leatherback turtle N NARW	Y Not scored	N Not scored

³⁹ <https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/>

⁴⁰ <http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf>

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
Justification	<p>Known direct effects of the UoA are highly likely to not hinder recovery of ETP species. SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>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 SG60 the SG80b</p> <p>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 Gulf of St Lawrence, 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).</p> <p>Given the small number of observed interactions between sea turtles and pot gear in the Gulf of St Lawrence, it is highly unlikely that the snow crab trap fishery is causing unacceptable direct or indirect impacts on sea turtles. From 2012 to 2016, there was no ETP species interaction reported in DFO species-at-risk logbooks for the snowcrab fishery. (Manon Mallet DFO personal communication 10/17/2016). It meets SG60 the SG80b.</p> <p>North Atlantic Right Whale (NARW) 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 <i>et al.</i>, 2016). However, due to a 40% decrease in the estimated calving rate since 2010 (Kraus <i>et al.</i>, 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 <i>et al.</i>, 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.</p> <p>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.</p> <p>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. It meets SG80b.</p> <p>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 and</p>

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
	<p>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.</p> <p>In addition of NARW mortality, 5 entanglements of NARW were observed between July 5th and August 28th, 2017. Snow crab fishing gear was identified in 4 of the five entanglements. DFO confirmed that all four entanglements were with snow crab gear from CFA 12. Two of the 5 whales were disentangled while a third shed the gear on its own. A disentanglement response for the remaining 2 animals was not permitted. They were not re-sighted and so their fate was unknown.</p> <p>Recent research studies concluded that the NARW population abundance is declining, the current calving rate is poor and the overall population health declined likely resulting in the previously observed slow recovery being halted and possibly reversed.</p> <p>Based on the evidence provided, the assessment team determines that it cannot be said that the effects of the GSL snow crab trap fishery on the NARW population are likely to not hinder the recovery of the NARW, the fishery does not meet SG60.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u></p> <p>In November 2018, DFO reported <u>3 entanglements incidents for 2018</u> (2 in the GSL and one from either the GSL or Bay of Fundy) as well as noting <u>two additional NARWs with fresh entanglement scars</u>. The two additional NARWs with fresh entanglement scars may have become entangled and disentangled. The gear responsible for the wounds/scars is unknown.</p> <p>Please refer to the in-depth description of 2018 entanglements made in the background section of this report, specifically under <u>section 4.4.2.1 NARW interactions during the 2018 fishing season</u>.</p> <p><u>Recent peer-reviewed scientific information (i.e. post RPA publication in 2007) on NARW survival after entanglements</u></p> <p>Robbins <i>et. al.</i> (2015)⁴¹ 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. 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.</p> <p>Van der Hoop <i>et. al.</i> (2017)⁴² 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. 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.</p>

⁴¹ <https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306>

⁴² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/>

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		
	<p>Kenney (2018)⁴³ 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.</p> <p>Results of 2017 entanglements and relevance to 2018 entanglements In 2017 there were 4 Serious Injuries resulting from Canadian entanglements⁴⁴. Hence, having highlighted that entanglements incidents do have effects on NARW mortality and survival, the effects of entanglements for 2018 are taken into account as they provide clear evidence on the known direct effects of the UoA in relation to hindering (or not hindering) the recovery of the NARW population.</p> <p>Audit Team Determination The assessment team has taken into account the above information and 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)). As a result, the team has determined that despite the management measures implemented in 2018, the known direct effects of the UoA in 2018, defined as entanglements with the potential to result in mortality of individual whales, are likely to hinder recovery of the NARW population. Based on the above evidence, there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the endangered NARW population. As such, PI 2.3.1, SG60, Scoring Issue b, is not met.</p>		
c	Indirect effects		
	Guidepost		<p>Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.</p> <p>There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.</p>
	Met?	Y Not scored	Y Not scored
	Justification	<p>SG 80 and SG 100 are not scored as all SG 60 have not been met (MSC FCR v 7.10.5.2 and 7.10.5.3).</p> <p>Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.</p> <p>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.</p>	

⁴³ <https://www.int-res.com/articles/esr2018/37/n037p233.pdf>

⁴⁴

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

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
	<p>For Wolffishes, fixed gear (longline, gillnet, and handline) are not known to disturb seabed habitat. Despite the mobile otter trawl demersal nature of the fishery's operation, 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 or mobile gear sediment zones of influence, therefore it cannot be said with a high degree of confidence that SG 100 is met.</p> <p>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) were 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). 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 prey on 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 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.</p> <p>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 <i>et al.</i>, 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 <i>et al.</i>, 2013) and on average it can take six months for an entangled whale to die (Moore <i>et al.</i>, 2006). Even if the disentanglement team locates the entangled whale and attempts disentanglement, there is a low probability of success.</p> <p>In a study of 53 North Atlantic right whale entanglements between 1995 and 2008 only 40% of the cases resulted in successful disentanglement (Robbins <i>et al.</i>, 2015). Furthermore, sub-lethal entanglements can contribute to declining health and reproductive failure long after the whale is disentangled (Rolland <i>et al.</i>, 2016; van der Hoop <i>et al.</i>, 2016, 2017).</p> <p>From 2012 to 2016, there was no ETP species interaction reported in DFO species-at-risk logbooks for the snowcrab fishery. (Manon Mallet DFO personal communication 10/17/2016). However, given that there is no observer monitoring system in place, and no verification of the SARA logbooks data, we cannot say with a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species preventing the fishery to score 100c. It meets 80c.</p> <p>SG 80 and SG 100 are not scored as all SG 60 have not been met (MSC FCR v 7.10.5.2 and 7.10.5.3).</p>
References	<p>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.</p> <p>DFO. 2007. Recovery potential assessment for right whale (Western North Atlantic population). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/027.</p>

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
	<p>Hayes S.A, E. Josephson, K. Maze-Foley and P. e. Rosel, Editors, 2017. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2016. NOAA Technical Memorandum NMFS – NE-241.</p> <p>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.</p> <p>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.</p> <p>Rolland, R. M., Schick, R. S., Pettis, H. M., Knowlton, A. R., Hamilton, P. K., Clark, J. S., & Kraus, S. D. 2016. Health of North Atlantic right whales <i>Eubalaena glacialis</i> over three decades: From individual health to demographic and population health trends. Marine Ecology Progress Series, 542, 265–282.</p> <p>Schick, R.S., Kraus, S.D., Rolland, R.M., Knowlton, A.R., Hamilton, P.K., Pettis, H.M., et al. (2013). Using hierarchical Bayes to understand movement, health, and survival in the endangered North Atlantic right whale. PLoS ONE 8:e64166.</p> <p>Van der Hoop, J.M., Corkeron, P., Kenney, J., Landry, S., Morin, D., Smith, J., et al. 2016. Drag from fishing gear entangling North Atlantic right whales. Mar.Mamm.Sci. 32,619–642.</p>
OVERALL PERFORMANCE INDICATOR SCORE:	80 < 60
CONDITION NUMBER (if relevant):	NA

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: <ul style="list-style-type: none"> • 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 wolffishes Y leatherback turtle N NARW	Y Not scored	N Not scored
	Justification	<p>SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>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.</p> <p>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 includes - Northern Wolffish (<i>Anarhichas denticulatus</i>), Spotted Wolffish (<i>Anarhichas minor</i>), North Atlantic Right whales (<i>Eubalaena glacialis</i>), and Leatherback Turtle (<i>Dermochelys coriacea</i>), - 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).</p> <p>The fishery meets SG60 for wolffish species and leatherback turtle.</p> <p>NARW</p> <p>The "Recovery Strategy for the North Atlantic Right Whale (<i>Eubalaena glacialis</i>) 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".</p> <p>In 2016, DFO published a proposed "Action plan for the North Atlantic Right Whale (<i>Eubalaena glacialis</i>) 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:</p> <ol style="list-style-type: none"> 1. Prevention (reduce the probability of NARW interacting with fishing gear), and 2. Response (reduce the severity of entanglements by responding to reported incidents). 		

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>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.</p> <p>However, until the 2017 NARW mortality event, there were no management measures implemented for fisheries, including GSL snow crab fishery, to reach the Objectives 2 of the recovery strategy published in 2009.</p> <p>On January 23rd 2018, DFO announced, through a News Release and a Notice to Harvesters new management measures for the snow crab fishery in the GSL. The following is taken from the Notice to Harvesters:</p> <p><u><i>Amount of Rope Floating on the Surface of the Water</i></u> <i>Requirements will be in place to minimize the length of rope floating on the surface of the water and to reduce the risks of whale entanglements</i></p> <p><u><i>Gear Marking</i></u> <i>Licence holders will be required to mark rope used to attach a crab trap to a primary buoy with a color specific to the fishing area in which they are authorized to fish. This new gear marking requirement will help officials to better identify the sectors where incidents have occurred in the event of future entanglements. The following colored markings will be required for each crab fishing area: 12, 18, 25 and 26 (orange), 12E (yellow), 12F (blue) and 19 (green).</i></p> <p><u><i>Additional Identification of Buoys</i></u> <i>In addition to the current regulatory requirement to mark buoys with the vessel registration number (VRN), licence holders will be required to identify each primary buoy with a sequential number as to be capable of individually identifying each crab trap.</i></p> <p><u><i>Requirement to Report Lost Gear</i></u> <i>Starting in 2018, 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.</i></p> <p>Given these measures have only recently become a requirement and the fishery has yet to commence the 2018 season there is no evidence to support a conclusion that they are highly likely to achieve national and international requirements for the protection of the NARW population. This is the first time that mandatory measures to reduce the impacts on the NARW have been implemented in Canada Atlantic so there is no possible comparison with similar Canadian UoAs. Therefore the assessment team determines that the fishery does not meet SG60.</p> <p>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 specific fisheries or meeting the goals. Information gaps remains a concern in areas where observer coverage is variable such as Gulf of St Lawrence (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 snow trap crabs. From 2012 to 2016, there was no ETP species interaction reported in DFO species-at-risk logbooks for the snowcrab fishery. (Manon Mallet DFO personal communication 10/17/2016). However there is no verification of the SARA Logbooks.</p>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>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.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u></p> <p>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.</p> <p>Canada’s strategy in 2018 included a series of targeted measures⁴⁵, which complemented existing preventative measures including:</p> <p>Less rope in the water:</p> <ul style="list-style-type: none"> • Requiring a maximum rope length in the southern Gulf of St. Lawrence snow crab fishery when attaching buoys. • In the southern Gulf of St. Lawrence snow crab fishery, no rope attaching a crab trap to buoys can remain floating on the surface of the water after the trap has been set. <p>Keeping better track of rope and buoys:</p> <ul style="list-style-type: none"> • Harvesters in the southern Gulf snow crab fishery were required to mark rope with colours and a sequential number. <p>Mandatory reporting of lost gear:</p> <ul style="list-style-type: none"> • DFO has made it a priority in 2018 to search for abandoned or lost fishing gear in the Gulf of St. Lawrence. Any reports of abandoned or lost gear, either from fishermen, DFO officers or our partners, including NOAA, are acted upon immediately and gear is removed from the water. Harvesters in the Gulf of St. Lawrence are also required to report lost gear as a licence condition. <p>Mandatory reporting of interactions:</p> <ul style="list-style-type: none"> • Any accidental contact between a vessel or fishing gear and a marine mammal must be reported. <p><u>Decrease in number of traps deployed in 2018</u></p> <p>During 2017 there was a higher than usual number of crab traps in the sGSL due to the unusually high quota. The trap increases in 2017 were to permit harvesters to capture the high quantity of quota within the confines of the days of fishing available. One component of</p>

⁴⁵ <http://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/narightwhale-baleinenoirean/fm-gp/index-eng.html>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>measures taken in 2018 were to ensure that the number of traps were reduced even though the season had been shortened by one month and area closures were in place. The number of licensed traps were reduced 19% overall, equating to 9,664 fewer traps in the water. The number of traps deployed in 2018 was quite similar to 2015 and 2016.</p> <p>Speed Restriction, fixed and temporary management areas and closures in 2018</p> <p>For the 2018 season, a speed restriction for vessels 20 metres or longer to a maximum of 10 knots when travelling in the western Gulf of St. Lawrence in the area was imposed from April 28 until November 15, 2018⁴⁶. The speed restriction zone may be changed as the whales migrate through the area.</p> <p>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 (<i>Calanus finmarchicus</i>) biomass, while Maritime management areas were based on current Critical Habitat boundaries for NARW in the Roseway Basin and Grand Manan.</p> <ul style="list-style-type: none"> • DFO closed 10,445 square kilometres⁴⁷ within the southern Gulf of St. Lawrence to fishing activity for the 2018 season. • Temporary closures were in place on a grid-by-grid basis for non-tended, fixed-gear fisheries in the Gulf of St. Lawrence and in the Roseway Basin and Grand Manan critical habitat areas, when one or more right whales were observed inside areas where DFO expected to see whales congregating. The effect of these NARW management measures on fishing activity could vary on a daily basis as dynamic closure management measures were imposed. <p>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.</p> <p>NARW Monitoring in 2018</p> <p>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.</p> <p>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.</p>

⁴⁶ http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2018/11_26-30-eng.html

⁴⁷ <http://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/narightwhale-baleinenoirean/fm-gp/index-eng.html>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>Based on the monitoring activities the following NARW sightings were recorded in 2018.</p> <p>2018 Fishing Spatial Distribution</p> <p>Due to the static and dynamic closure areas for NARW that were implemented in 2018, the spatial distribution of fishing effort changed significantly. During the October 4-5 2018 advisory meeting, DFO provided a presentation to industry where change in effort was discussed. See Figure 3 in the background section of this report.</p> <p>The static area closure covered a significant portion of the area fished in years prior to 2018. Information indicates that this areas was heavily fished when the season first opens, then harvesters moved on to other areas as the crab migrated and catch rates declined.</p> <p>Lost Gear</p> <p>Information is available for lost crab gear in the Gulf and Quebec in 2018. This accounted for 1.2% of the gear.</p> <p>Industry measures to mitigate NARW entanglement risk – October 2018 updates</p> <p>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.</p> <p>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 initiatives by industry, progress against timelines, etc. is provided in Appendix 2 as part of the client submission.</p> <p>DFO lead research activities during 2018</p> <p>DFO conducted extensive NARW related research and monitoring activities during 2018. A summary of the key projects is provided in the background section.</p> <p>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.</p> <p>NMMPRC Meeting</p> <p>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.</p>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>Following NMMPRC peer-review and approval, scientific results are used to provide scientific advice for the management and conservation of marine mammals in Canada⁴⁸.</p> <p>The objectives of this meeting were to:</p> <ul style="list-style-type: none"> • Determine, to the extent possible with available data, the spatial and temporal distribution of NARW in Canadian waters, based on aerial surveys (DFO Science, C&P, TC, NOAA, ENGOs, etc.), acoustic data collected from moorings, buoys and gliders, and other biological data. More specifically: <ul style="list-style-type: none"> ○ Describe the seasonal distribution of NARW in Canadian waters, including residency in Canadian waters, current and historical distribution, individual residency and distribution. ○ Identify the advantages and disadvantages of the different methods and technologies used to survey and monitor the presence of NARW. ○ Identify the physical and/or biological factors that influence the distribution of NARWs in Canadian waters. ○ Identify potential areas where NARW may occur lying outside of the current survey areas that may warrant more effort to assess species presence. ○ Describe how the factors that influence the distribution and aggregations of NARWs provide a basis for defining spatial or temporal management measures, such as the dynamic or static closures currently implemented in Canadian waters. ○ Determine the probability of NARW presence over various water depths including depths less than 10 and 20 fathoms (18 and 37 m). • Determine the risks to NARW of entanglement in invertebrate fishing gear in the Gulf of St. Lawrence • Determine the risks to NARW of vessel collision in the Gulf of St. Lawrence <p>Expected Publications</p> <ul style="list-style-type: none"> • Science Advisory Report • Proceedings • 10 Research Documents <p><u>NARW National Action Plan external consultation</u></p> <p>There is a National Action Plan for NARW that was developed (2016) under requirements of SARA. 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. The objective of the <u>Action Plan on NARW</u> is to: <i>“achieve an increasing trend in population abundance over 3 generations”</i>. Objective two of the Recovery Strategy is to reduce mortality and injury as a result of fishing gear interactions.</p>

⁴⁸ http://www.dfo-mpo.gc.ca/csas-sccs/Schedule-Horraire/2018/11_26-30-eng.html

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>Management Plans for 2019</p> <p>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 season⁴⁹. To reduce the probability of vessel strikes the Government is:</p> <ul style="list-style-type: none"> • 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. • 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. <p>To address the possibility of entanglements in fishing gear the Government is:</p> <ul style="list-style-type: none"> • 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. <p>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.</p> <p>Audit Team Determination</p> <p>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. However, given there has only been a single season of their operation and there were 3 reported entanglements of NARW (2 in</p>

⁴⁹ <https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html>

PI 2.3.2	The UoA has in place precautionary management strategies designed to: <ul style="list-style-type: none"> • 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 GSL) plus a further 2 observations of fresh entanglement scarring, there is currently not enough evidence to say that <i>these measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</i> Based on the above rationale PI 2.3.2 SG60, SI a is not met.		
b	Management strategy in place (alternative)		
Guidepost	There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a comprehensive strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species
Met?			
Justification	NA		
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 wolffishes Y leatherback turtle Y NARW	Y Not scored	N Not scored
Justification	<p>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.</p> <p>SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>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, the blue whale and the Northern right whale. However there are some gaps in information: No management measures 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. Gulf of St Lawrence observer coverage is low. Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment. Despite that from 2012 to 2016, there were no ETP species interaction reported in DFO species-at-risk logbooks, Information is equivocal to say that supports high confidence that the strategy will work. For example 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.</p> <p>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 <i>et al.</i>, 2016). Of 24 records of mortality and serious injury from 2009 through 2013 (both from USA and Canada) 18 were attributable to fishing-</p>		

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>gear entanglements (Waring <i>et al.</i>, 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 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 <i>et al.</i>, 2012).</p> <p>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 <i>et al.</i>, 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 <i>et al.</i>, 2012; van der Hoop <i>et al.</i>, 2013; Pace <i>et al.</i>, 2014).</p> <p>On January 23rd 2018, DFO announced, through a News Release and a Notice to Harvesters new management measures for the snow crab fishery in the GSL. The following is a taken from the Notice to Harvesters:</p> <p><u>Amount of Rope Floating on the Surface of the Water</u> Requirements will be in place to minimize the length of rope floating on the surface of the water and to reduce the risks of whale entanglements</p> <p><u>Gear Marking</u> Licence holders will be required to mark rope used to attach a crab trap to a primary buoy with a color specific to the fishing area in which they are authorized to fish. This new gear-marking requirement will help officials to better identify the sectors where incidents have occurred in the event of future entanglements. The following colored markings will be required for each crab fishing area: 12, 18, 25 and 26 (orange), 12E (yellow), 12F (blue) and 19 (green).</p> <p><u>Additional Identification of Buoys</u> In addition to the current regulatory requirement to mark buoys with the vessel registration number (VRN), licence holders will be required to identify each primary buoy with a sequential number as to be capable of individually identifying each crab trap.</p> <p><u>Requirement to Report Lost Gear</u> Starting in 2018, 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.</p> <p>However, these measures have been recently put in place and there is no plausible argument to support a conclusion that these measures are considered likely to work. This is the first time that mandatory measures to reduce the impacts on the NARW have been implemented in Canada Atlantic so there is no possible comparison with similar Canadian UoAs. Therefore the assessment team determines that the fishery does not meet SG60.</p> <p>However there is existing information that interactions are low for crab trap fisheries. Thus, there is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved. It meets the SG80c score.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u> 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</p>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>			
	<p>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.</p> <p>Further details of the measures implemented in 2018 are listed under PI 2.3.2, SI <i>a</i>.</p> <p>The large number of measures that have been implemented in 2018 to improve knowledge, mitigate the risk of NARW mortality and reduce entanglements are considered likely to work if results similar to those achieved in 2018 (i.e. zero recorded mortality) coupled with no entanglements/non-significant harm/injury caused by entanglements) can be consistently sustained in the future.</p> <p>As such, PI 2.3.2 SG60, SI C is met.</p>			
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 Not scored	N Not scored
	Justification	<p>SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>There is some evidence that the measures/strategy is being implemented successfully.</p> <p>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, and the Northern right whale.</p> <p>From 2012 to 2016, there were no ETP species interaction reported in DFO species-at-risk logbooks for the snowcrab fishery. (Colleen Smith DFO personal communication 10/19/2016) However there are some gaps in information: Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment.</p> <p>No management measures have been taken in Canada to reduce the risk of Whale entanglement in fishing gear and there are low levels of observer coverages. Given the most recent survey data, recent articles on gear impact on populations, and the recent evaluation of the North Atlantic Action Plan and Recovery Strategy, there is no clear evidence that is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b) at this time. Evidence for this is the downward trends in the population growth, declines in calf abundances, and higher increases</p>		

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>		
	<p>entanglement events rates in recent years. Nevertheless there is existing information that interactions are low for snow crab trap fishery. It meets the SG80d score</p> <p>Information from logbooks as well as observers shows that there have been no interactions with any ETP species from 2012 till 2016. It meets 100d.</p>		
e	Review of alternative measures to minimize mortality of ETP species		
Guidepost	<p>There is a review of the potential effectiveness and practicality of alternative measures to minimize UoA-related mortality of ETP species.</p>	<p>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.</p>	<p>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.</p>
Met?	Y	Y Not scored	N Not scored
Justification	<p>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</p> <p>There is a review of the potential effectiveness and practicality of alternative measures to minimize UoA- related mortality of ETP species.</p> <p>SG 80 and SG 100 are not scored as all SG 60 have not been met (FCR 7.10.5.2 and 7.10.5.3).</p> <p>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.</p> <p>There are also amendments of recovery plans for certain species that presumably interact with this fishery such as leatherback turtles, North Atlantic Right whale and wolfish species.</p> <p>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.</p> <p>Evidence that all these implemented and revised measures have been considerably instrumental in minimize UoA related mortality is the fact that from 2012 to 2016, there were no ETP species interaction reported in DFO species-at-risk logbooks for the snow crab fishery. (Colleen Smith DFO personal communication 10/19/2016). It meets 80e.</p> <p><u>2018 First Surveillance Audit – Updates and Determination Management Plans for 2019</u></p> <p>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 season⁵⁰. To reduce the probability of vessel strikes the Government is:</p>		

⁵⁰ <https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<ul style="list-style-type: none"> • 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. <p>To address the possibility of entanglements in fishing gear the Government is:</p> <ul style="list-style-type: none"> • 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. <p>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.</p> <p>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.</p> <p>Audit Team Determination</p> <p>The large number of measures that have been implemented in 2018 to improve knowledge, mitigate risk of NARW mortality and reduce entanglements are considered likely to work if results like those achieved in 2018 (i.e. zero recorded mortality) and no entanglements/non-significant harm/injury caused by entanglements) can be consistently sustained in the future.</p> <p>In 2018 and through early 2019, there has been an extensive review of the potential effectiveness and practicality of alternative measures to minimize UoA- related mortality of</p>

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimize the mortality of ETP species.</p>
	<p>NARWs for the 2019 snow crab fishing season.</p> <p>As such, PI 2.3.2 SG60, SI e is met.</p>
References	<p>DFO 2016. Action Plan for the North Atlantic Right Whale (<i>Eubalaena glacialis</i>) in Canada: Fishery Interactions [Proposed]. <i>Species at Risk Act</i> Action Plan Series. Fisheries and Oceans Canada, Ottawa. v + 35pp. http://www.sararegistry.gc.ca/default.asp?lang=En&n=F6E69C11-1</p> <p>DFO 2018. Notice to Harvesters (DFO Gulf Region 23rd January 2018) http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/comm/atl-arc/snow-crab-mgmt-measure-crabe-des-neiges-mesure-gestion-en.html</p> <p>Pace III RM, Corkeron PJ, Kraus SD, 2017. State–space mark–recapture estimates reveal a recent decline in abundance of North Atlantic right whales. <i>Ecology and Evolution</i> 7:8730–8741</p>
OVERALL PERFORMANCE INDICATOR SCORE:	80 < 60
CONDITION NUMBER (if relevant):	NA

9.1.3 PI 2.3.3 ETP species information

PI 2.3.3	Relevant information is collected to support the management of UoA impacts on ETP species, including: <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
Scoring Issue	SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts		
Guidepost	Qualitative information is adequate to estimate the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.	Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the magnitude of UoA- related impacts, mortalities and injuries and the consequences for the status of ETP species.
Met?	Y	Y	N
Justification	<p>Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species.</p> <p>Quantitative information on the snow crab catch and landings are available from the at-sea observer and dockside monitoring programs, respectively. Observer data includes information on numbers, weights and lengths of incidentally caught species and can be used to confirm their non- commercial nature, both in quantity and size.</p> <p>Dockside monitoring records on 100% of landings provide the amounts of all landed species in this fishery. Information on directed and other incidental species is also available from SARA logbooks. All sources of information and expert advice available to the Assessment Team indicate the SGSL snow crab fishery, because of its nature and the various management measures imposed on it, has an extremely low incidence of harm to the few ETP species encountered in that area. Based on information from DFO from observer data and SARA logbooks, there were no interactions from 2012 to 2016 (Manon Mallet DFO Gulf).</p> <p>Wolffish</p> <p>Information on Wolffishes that is used to monitor the UoC fisheries comes from demersal longline surveys and multi-species DFO RV trawl surveys. These data provide quantitative estimates such as abundance indices as well as spatial extent of these species. Biological samples and life history traits are recorded in the surveys to detect any changes in growth rates or age/sex structure. Also useful are fishery observer-sourced data of sightings and observed interactions. Interactions with fishing gear are recorded on SARA logbooks (by mandatory arrangements) and are entered into a database that is interrogated to evaluate and monitor levels of interaction (Kulka et al, 2007; SCSSCS 2013).</p> <p>Despite the available information, the level observer coverage is known to vary across different fisheries, higher for longline and otter trawl while lower for gillnet and handline fleet, as well as in offshore areas; therefore a high degree of certainty cannot be claimed for the outcome status of</p>		

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.
	<p>wolffishes. There is, however, sufficient information from SARA data, observer data and survey data to quantify fishery-related mortality and impact on the species. SG 80 is met.</p> <p>Sea Turtles Sea Turtles (including Leatherback and Loggerhead species) are known to make seasonal migrations to Nova Scotia and Newfoundland-Labrador waters for feeding activities. Information on their engagement with fishers is gathered through SARA logbook, observer logbook, and other monitoring programs such as the Nova Scotia Leatherback Turtle Working Group and the Canadian Sea Turtle Network. These programs involve fishers and volunteers working together to record sea turtle sightings and conduct satellite tracking studies. Population abundances for the different species of sea turtles are estimated from nesting site monitoring in the Caribbean and other breeding areas. There are no established scientific surveys and quantitative analysis with reference to the outcome status of sea turtles in the UoC. They are considered highly migratory in nature with some unknown interactions which possibly influence population abundance. Post-interaction with fishing gear survival rate are estimated to be high from studies conducted in USA waters. Human-based impacts were evaluated as not to be jeopardizing survival or hindering recovery; rather a greater threat to these species is identified to come from marine pollution and litter (CSTN) (COSEWIC 2012, James and Martin 2005, Dwyer et al, 2002).</p> <p>A high degree of certainty cannot be claimed in regards to Sea Turtles (including Leatherback and Loggerhead species) outcome status, based on such factors as limited surveys, lack of scientific quantitative population abundance assessments in the Nova Scotia and Newfoundland-Labrador areas, less balanced observer coverage and likely un-noticed or un-reported data. Therefore, SG 100 is not met. However, tools such as the SARA logbook, observer and fisheries logbooks, as well as voluntary monitoring program provide sufficient information to quantify fishery-related mortality and impact on the species, thus SG 80 is met.</p> <p>North Atlantic Right Whale (NARW) North Atlantic Right whales are vulnerable to fishing gear when there is an overlap between migration paths and the use of high-risk fishing gear. Whale migrations are well documented in the critical habitat zones (Brown et al 2009). Boat and aerial surveys are conducted annually to track and report whale abundance and location, calf survival, genetic and other life history information. Unique marking allow researchers to identify individuals and record the number of births and human-induced fishing gear scars. Over 83% of photo-identified individuals bear evidence of entanglement (Johnson et al (2007). Fishery observer data of sightings and observed interactions are recorded. Interactions with fishing gear are required to be recorded in SARA logbooks (licence condition).</p> <p>In the groundfish fishery, hook and line are the greatest risk to entanglement (83%) of NA Right whale during the summer migration where there is overlap of fishing and migration path as well as time of year (July - Sept). It is believed that relative threat of entanglement to NA Right Whales during summer (July - October) is 4- 83% for the groundfish hook-and-line fishery and only 9.6% for the offshore lobster trap fishery.</p> <p>Based on entanglement scar data from 1993 to 2004, 87 ± 29 incidents of entanglements causing scarring occur annually and there is a ~1% chance each year of a lethal entanglement of a Right Whale occurring in identified Critical Habitat in Canada (Vanderlaan et al, 2011). (Brown et al 2009, Vanderlaan 2011, Brilliant et al (2017). A high degree of certainty cannot be claimed for NA Right whale outcome status for various reasons, including less balanced observer coverage and likely un-noticed</p>

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.
	<p>or reported data; therefore, SG 100 is not met. However tools such as the SARA logbook, fisheries logbook, and the New England monitoring program provide sufficient information to quantify fishery-related mortality and impact. Necropsies were performed on 7 of the 12 dead whales, it was confirmed that 2 of the NARW mortalities was caused by and 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.</p> <p>In addition to the NARW mortalities, 5 entanglements of NARW were observed between July 5th and August 28th, 2017. Four of the 5 were confirmed entangled in snow crab gear. DFO confirmed that all four entanglements were with snow crab gear from CFA 12. Two of the 5 whales were disentangled while a third shed the gear on its own. A disentanglement response for the remaining 2 animals was not permitted and they were not re-sighted. It was confirmed that neither of the dead entangled whales were one of these two animals.</p> <p>With respect to survey, monitoring and science, DFO Gulf region confirmed the following collaborative efforts between DFO, Transport Canada and NOAA:</p> <ul style="list-style-type: none"> • Aerial surveillance: Gulf Region Science provided coordination and/or Marine Mammal Observers throughout the enhanced surveillance efforts in the Gulf but especially in the southern Gulf. Platforms included: DFO Twin Otter (140 hours from Sept to Nov), Transport Canada Dash 8 flight (marine mammal surveillance flights twice a week starting in Aug and ongoing), NOAA aerial survey (June-Aug), C&P Cessna King Air surveillance flights (Summer – ongoing), and other opportunistic sightings. Weekly surveillance map with NARW sightings map produced and posted on DFO website). Coordination with NOAA is ongoing to identify the individual NARW present in the Gulf of St. Lawrence. • Flights are ongoing in January 2018, and as of December 5th, over 45,000 linear kilometers were surveyed by the Dash 8 and Twin Otter alone. • Near-Real Time Passive Acoustics - Maritimes Region lead: Passive acoustic glider deployment was undertaken through collaboration among Woods Hole Oceanographic Institute (WHOI), Dalhousie University (DAL), and CWI researchers. A Teledyne Webb Research Slocum glider equipped with passive acoustic listening system (DMON/LFDCS) was deployed in the southern Gulf of St. Lawrence (5 June to 19 September; 3 to 27 October). • Passive acoustics monitoring (PAM) (archival) in the Gulf of St. Lawrence - Quebec Region lead: There are multiple PAM stations within the Gulf of St. Lawrence and Cabot Straight that have been listening for cetaceans for multiple years. Data is analysed and presented by the lead marine mammal scientists in the Quebec region. Data was used to provide the CSAS advice to the shipping industry. • Ship-based observations: Marine mammal observers aboard DFO research vessel surveys (29 May – 28 September 2017) throughout the Gulf of Saint-Lawrence. In addition, boat surveys were carried out by the Mingan Island Cetacean Study (MICS) from June to October in the Jacques Cartier passage. <p>In addition, the Government of Canada invested in the enhancement of capacity to respond to marine mammal incidents; a VHF channel has been established to report on observations of dead and injured whales, and further work with partners to patrol the coast to monitor and assess any reports of dead or distressed whale sightings has been implemented.</p> <p>Therefore, it is considered that some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery</p>

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.
	<p>of the ETP species, thereby meeting the SG80.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u> <u>2017 NARW Population Status</u></p> <p>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 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. In 2018, DFO reported no NARW mortalities in the sGSL^{51 52}. However, 3 entanglements were reported in Canada as well as two additional NARWs with fresh entanglement scars. Two of these NARW entanglements were in snow crab fishing gear in the Gulf of St. Lawrence.</p> <p><u>NARW Monitoring in 2018</u></p> <p>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.</p> <p>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.</p> <p>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.</p> <p><u>Industry measures to mitigate NARW entanglement risk – October 2018 updates</u></p> <p>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 (see <u>Appendix 2. Industry Research</u> for full details).</p> <ul style="list-style-type: none"> • Initiative 9: Tracking & monitoring of NARW – Electronic monitoring packages (VMS, RFID, Smart buoys) • Initiative 10: Tracking & monitoring of NARW – Hydrophones on traps on the fishing ground • Initiative 11: Tracking & monitoring of NARW – Rope identification and marking on 3 sections

⁵¹ <https://www.fisheries.noaa.gov/media-release/third-north-atlantic-right-whale-mortality-2018-confirmed>

⁵² <https://www.andersoncabotcenterforoceanlife.org/blog/2018-right-whale-report-card/>

PI 2.3.3	Relevant information is collected to support the management of UoA impacts on ETP species, including: <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
	<p>DFO lead research activities during 2018</p> <p>DFO conducted extensive NARW related research and monitoring activities during 2018. A summary of the key projects is provided in the background section (although not a complete list of research projects currently underway) to collect the necessary information of the UoA impacts on NARWs:</p> <p>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.</p> <p>Conclusion</p> <p>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.</p> <p>As such, PI 2.3.3 SG60 and SG80, SI α are met.</p> <p>Quantitative information is not available to assess with a high degree of certainty the magnitude of UoA- related impacts, mortalities and injuries and the consequences for the status of ETP species. This is especially true in regards to injury and effects of entanglements. SG 100 is not met.</p>		
b	Information adequacy for management strategy		
Guidepost	Information is adequate to support measures to manage the impacts on ETP species.	Information is adequate to measure trends and support a strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
Met?	Y	Y	N
Justification	<p>Information is adequate to measure trends and support a strategy to manage impacts on ETP species.</p> <p>Recovery strategies implemented for the SARA listed species - Northern Wolffish (<i>Anarhichas denticulatus</i>), Spotted Wolffish (<i>Anarhichas minor</i>), North Atlantic Right whales (<i>Eubalaena glacialis</i>), and Leatherback Turtle (<i>Dermochelys coriacea</i>), - mandate licence holder and operator 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. However, exceptions according to Section 7.2 place emphasis that: licence holders shall provide information regarding any interactions with SARA listed species. Some objectives of these strategies are full implemented and some partially implemented. Data from the SARA database indicated by-catch proportions of wolffishes, and zero sea turtles; however no data for whales. Some population trend assessment is conducted for wolffishes but for all SARA listed species (COSEWIC 2012; SAIG 2016). However there is information missing that is imperative to collect to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objective. For example the North Atlantic Right Whale:</p>		

PI 2.3.3	Relevant information is collected to support the management of UoA impacts on ETP species, including: <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.
	<p>According to the recent review of the DFOs North Atlantic Right Whale Action a and recovery strategy: Determining mitigation measures to decrease North Atlantic right whale entanglements is challenging (Knowlton <i>et al.</i>, 2012) as North Atlantic right whale entanglement events are rarely directly observed (Weinrick 1999). The locations, in time and space, and the mechanics of fishing-gear entanglements remain largely unknown (Johnson <i>et al.</i>, 2007). Unless gear can be attributable to a Canadian fisher, or the entanglement event is observed in Canadian waters, entanglement events cannot be assigned spatially, nor can the resulting statistics. Even if a whale is initially observed in Canadian waters with gear attached, it does not necessarily mean the whale was entangled in Canada, and vice versa for the USA. However, as USA fisheries continue to implement gear marking, it becomes easier to rule out entangling gear from the USA.</p> <p>There are significant limitations on the SARA logbooks where only document interactions during active fishing operations (i.e. catches) and, therefore, it cannot gather important data necessary to evaluate risk inferences of these fisheries to right whales. Another limitation is the documentation gear impacts from the fishery that has been lost and the risk of entanglement on right whales.</p> <p>The DFO (2017) review states The North Atlantic right whale proposed Action Plan (DFO 2016a) focusses on fishery interactions; however, it does not “prescribe specific type of mitigation measures (voluntary or regulatory) needed to reduce the risk of entanglements”. It does identify that specific future mitigation measures will rely on several other activities listed in the Action Plan, including conducting spatial analyses of entanglement risk associated with fishing gear. Few proposed recovery activities focus on entanglement prevention (e.g., spatiotemporal closures) and mitigation (e.g., decreased breaking strength in rope). Many knowledge gaps remain about fishing-gear entanglements, such as the mechanisms of entanglement, the level of threat associated with each type.</p> <p>With respect to survey, monitoring and science, DFO Gulf region confirmed the following collaborative efforts between DFO, Transport Canada and NOAA:</p> <ul style="list-style-type: none"> • Aerial surveillance: Gulf Region Science provided coordination and/or Marine Mammal Observers throughout the enhanced surveillance efforts in the Gulf but especially in the southern Gulf. Platforms included: DFO Twin Otter (140 hours from Sept to Nov), Transport Canada Dash 8 flight (marine mammal surveillance flights twice a week starting in Aug and ongoing), NOAA aerial survey (June-Aug), C&P Cessna King Air surveillance flights (Summer – ongoing), and other opportunistic sightings. Weekly surveillance map with NARW sightings map produced and posted on DFO website). Coordination with NOAA is ongoing to identify the individual NARW present in the Gulf of St. Lawrence. • Flights are ongoing in January 2018, and as of December 5th, over 45,000 linear kilometers were surveyed by the Dash 8 and Twin Otter alone. • Near-Real Time Passive Acoustics - Maritimes Region lead: Passive acoustic glider deployment was undertaken through collaboration among Woods Hole Oceanographic Institute (WHOI), Dalhousie University (DAL), and CWI researchers. A Teledyne Webb Research Slocum glider equipped with passive acoustic listening system (DMON/LFDCS) was deployed in the southern Gulf of St. Lawrence (5 June to 19 September; 3 to 27 October). • Passive acoustics monitoring (PAM) (archival) in the Gulf of St. Lawrence - Quebec Region lead: There are multiple PAM stations within the Gulf of St. Lawrence and Cabot Straight that have been listening for cetaceans for multiple years. Data is analysed and

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species.
	<p>presented by the lead marine mammal scientists in the Quebec region. Data was used to provide the CSAS advice to the shipping industry.</p> <ul style="list-style-type: none"> • Ship-based observations: Marine mammal observers aboard DFO research vessel surveys (29 May – 28 September 2017) throughout the Gulf of Saint-Lawrence. In addition, boat surveys were carried out by the Mingan Island Cetacean Study (MICS) from June to October in the Jacques Cartier passage. <p>In addition, the Government of Canada invested in the enhancement of capacity to respond to marine mammal incidents; a VHF channel has been established to report on observations of dead and injured whales, and further work with partners to patrol the coast to monitor and assess any reports of dead or distressed whale sightings has been implemented.</p> <p>Therefore SG80 is met but not SG100.</p> <p>Finally the DFO (2017) review also states ...Data on marine mammal incidents are currently scattered throughout different organizations making comprehensive analysis difficult – data collection of incidents should be standardized nationally and made available for analyses (DFO 2016c)... Thus It cannot be said that a comprehensive strategy implemented to address all impacts of the fishery resulting in mortality or injury to SARA listed species, based on reasons that included; lack of population abundance trends for all SARA listed species or other ETPs in Canadian waters, and partial implementation of some objectives of the respective recovery strategies, SG 100 is not met. However tools recovery strategies and action plans are developed for all SARA listed species, and the SARA Logbook is actively implemented, generating information that is use to estimate some levels of changes in by-catch levels, and sightings represents a form of population monitoring; therefore is sufficient information to measure trends and support a full strategy to manage impacts on ETPs, SG 80 is met.</p> <p><u>2018 First Surveillance Audit – Updates and Determination</u> <u>NARW Monitoring in 2018</u></p> <p>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.</p> <p>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.</p> <p>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.</p> <p><u>Industry measures to mitigate NARW entanglement risk – October 2018 updates</u></p> <p>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.</p>

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 	
	<ul style="list-style-type: none"> • Initiative 9: Tracking & monitoring of NARW – Electronic monitoring packages (VMS, RFID, Smart buoys) • Initiative 10: Tracking & monitoring of NARW – Hydrophones on traps on the fishing grounds • Initiative 11: Tracking & monitoring of NARW– Rope identification and marking on 3 sections <p>DFO lead research activities during 2018</p> <p>DFO conducted extensive NARW related research and monitoring activities during 2018. A summary of the key projects is provided in the background section (although not a complete list of research projects currently underway) to collect the necessary information of the UoA impacts on NARWs.</p> <p>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.</p> <p>Conclusion</p> <p>There is adequate information to measure trends and support a strategy to manage impacts on ETP species.</p> <p>As such, PI 2.3.3 SG60 and SG80, SI b are met.</p> <p>Information is not adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives. This is especially true in regards to injury assessment. SG 100 is not met.</p>	
References	<p>The DFO website “Right whale deaths in Gulf of St. Lawrence”: http://www.dfo-mpo.gc.ca/science/environmental-environnement/narightwhale-baleinenoirean/index-eng.html</p> <p>DFO News Release (23rd January 2018) https://www.canada.ca/en/fisheries-oceans/news/2018/01/minister_leblancannouncesnewprotectionsforwhales.html</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		NA

9.2 Appendix 2. Industry Research

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:** Completed.

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 document 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 they 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 1 vessel and 16 traps without netting.

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

One of the main components 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

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input type="checkbox"/> 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.
<input checked="" type="checkbox"/> 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.	<i>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>
<input checked="" type="checkbox"/> 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-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
<input checked="" type="checkbox"/> I wish to suggest other individuals or organisations who should be considered stakeholders in the MSC assessment of this fishery (please provide contact information).	
<input type="checkbox"/> 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. <i>Ecol Evol.</i> 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.

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input checked="" type="checkbox"/> 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.
<input type="checkbox"/> I DO NOT believe the <u>proposed modifications</u> 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.

<input type="checkbox"/>	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 process³ (please provide details and rationale). <input type="checkbox"/> 1.1.1 <input type="checkbox"/> 2.1.1 <input type="checkbox"/> 2.2.1 <input type="checkbox"/> 2.3.1 <input type="checkbox"/> 2.4.1 <input type="checkbox"/> 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.
<input type="checkbox"/>	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). <input type="checkbox"/> 1.1.1 <input type="checkbox"/> 2.1.1 <input type="checkbox"/> 2.2.1 <input type="checkbox"/> 2.3.1 <input type="checkbox"/> 2.4.1 <input type="checkbox"/> 2.5.1	
<input checked="" type="checkbox"/>	Other (please specify)	

Nature of Comment (select all that apply)	Additional Information/Detail Please attach additional pages if necessary.
<input type="checkbox"/> 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).	<p><i>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:</i></p> <p>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</p> <p>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</p> <p>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/fall_alwtrt_entanglement_update.pdf</p> <p>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/lq_whale_ume_oct2018.pdf</p> <p>5. van der Hoop J, Corkeron P, Moore M. Entanglement is a costly life-history stage in large whales. <i>Ecol Evol.</i> 2016;7(1):92-106. Published 2016 Dec 11. doi:10.1002/ece3.2615 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/</p>

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input checked="" type="checkbox"/> Public review of the draft assessment report. 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

<input checked="" type="checkbox"/>	<p>I wish to comment on the evaluation of the fishery against specific Performance Indicators. <i>A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.</i></p> <p>Nature of comment (Please insert one or more of these codes in the second column of the table below for each PI.)</p> <ol style="list-style-type: none"> 1. I do not believe all the relevant information⁵ 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 score² (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 level⁶ (please provide details and rationale). 4. Other (please specify)
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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.
<p><i>Example: PI 1.1.2, Stock Rebuilding</i></p> <p>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</p>	<p>2</p> <p>1,2</p>	<p><i>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.</i></p> <p>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_alwrt_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.</p> <p>*https://www.smithsonianmag.com/science-nature/plight-right-whale-180970648/</p>

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.
<p>PI 2.3.2 the UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species 	1,2	<p>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</p>
<p>PI 2.3.2 the UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species 	1,2	<p>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).</p>
<p>PI 2.3.3 Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 	1,2	<p>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:</p> <ul style="list-style-type: none"> • 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 <p>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.</p>

<p>1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.</p>	<p>MSC stated objective of surveillance audit</p>	<p>In 2018, DFO implemented a number of temporary measures to reduce risk including:</p> <ul style="list-style-type: none"> ▪ 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 <p>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.</p>
<p>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.</p>	<p>MSC stated objective of surveillance audit</p>	<p>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.</p> <p>In addition to the DFO actions, the client has agreed to:</p> <ul style="list-style-type: none"> ▪ 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. <p>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.</p>
<p>To review any other significant changes in the fishery.</p>	<p>MSC stated objective of surveillance audit</p>	<p>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.</p>

Comment	Nature of Comment	Justification <small>Please attach additional pages if necessary.</small>
<input checked="" type="checkbox"/> I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.		<p>This fishery has been documented to entangle and kill critically endangered North Atlantic right whales (<i>Eubalaena glacialis</i>), 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).</p> <p>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.</p>

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input checked="" type="checkbox"/> Surveillance ^a 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 <small>(select all that apply)</small>		Justification <small>Please attach additional pages if necessary.</small>	
e.g. <input type="checkbox"/>	I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	<i>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>	
<input type="checkbox"/>	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.	

<input checked="" type="checkbox"/>	Other (please specify)	<p>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.</p> <p>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*</p> <p>*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.</p> <div data-bbox="619 674 1123 904" data-label="Image">  </div>
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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 Gulf of St Lawrence snow crab trap fishery

February 27th, 2019

Dear Regina,

The audit team appointed to conduct the 1st surveillance audit after re-assessment of the Gulf of St Lawrence 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 Gulf of St Lawrence 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 Scotian Shelf snow crab trap fishery is being carried out concurrently by the same audit team, this letter contains our responses only related to the Gulf of St Lawrence snow crab trap fishery, and our responses to your comments related to the Scotian Shelf snow crab trap fishery will be provided in a separate letter that will be included in the surveillance audit report for that fishery.

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input type="checkbox"/> 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.)
<input checked="" type="checkbox"/> 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. <input type="checkbox"/>	<p><i>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></p> <p>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.</p> <p>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-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_alwrt_entanglement_update.pdf 4. Jaclyn Taylor. 2018. Large Whale Unusual Mortality Events. Presentation to the Atlantic Large Whale Take Reduction Team, October</p>
<input checked="" type="checkbox"/> I wish to suggest information or documents important for the assessment of this fishery (you may either attach documents or provide references).	
<input checked="" type="checkbox"/> I wish to suggest other individuals or organisations who should be considered stakeholders in the MSC assessment of this fishery (please provide contact information).	

<input type="checkbox"/> 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. <i>Ecol Evol.</i> 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.
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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.

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input checked="" type="checkbox"/> 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.)
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<input type="checkbox"/> I DO NOT believe the <u>proposed modifications</u> 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.
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<input type="checkbox"/> 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 ³ (please provide details and rationale).	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.
<input type="checkbox"/> 1.1.1 <input type="checkbox"/> 2.1 <input type="checkbox"/> 2.2.1 <input type="checkbox"/> 2.3.1 <input type="checkbox"/> 2.4 <input type="checkbox"/> 2.5.1	
<input type="checkbox"/> 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).	
<input type="checkbox"/> 1.1.1 <input type="checkbox"/> 2.1 <input type="checkbox"/> 2.2.1 <input type="checkbox"/> 2.3.1 <input type="checkbox"/> 2.4 <input type="checkbox"/> 2.5.1	
<input checked="" type="checkbox"/> Other (please specify)	

Nature of Comment (select all that apply)	Additional Information/Detail Please attach additional pages if necessary.
<input type="checkbox"/> 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).	<p>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:</p> <ol style="list-style-type: none"> 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 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 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 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/lq_whale_ume_oct2018.pdf 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/

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Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input checked="" type="checkbox"/> Public review of the draft assessment report ¹ . 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

<input checked="" type="checkbox"/> I wish to comment on the evaluation of the fishery against specific Performance Indicators. <i>A table with these indicators and the scores and rationales provided by CABs can be found in Appendix 1 of the draft assessment report.</i> <p>Nature of comment (Please insert one or more of these codes in the second column of the table below for each PI.)</p> <ol style="list-style-type: none"> I do not believe all the relevant information¹ available has been used to score this performance indicator (please provide details and rationale). I do not believe the information and/or rationale used to score this performance indicator is adequate to support the given score² (please provide details and rationale). I do not believe the condition set for this performance indicator is adequate to improve the fishery's performance to the SG80 level³ (please provide details and rationale). Other (please specify)
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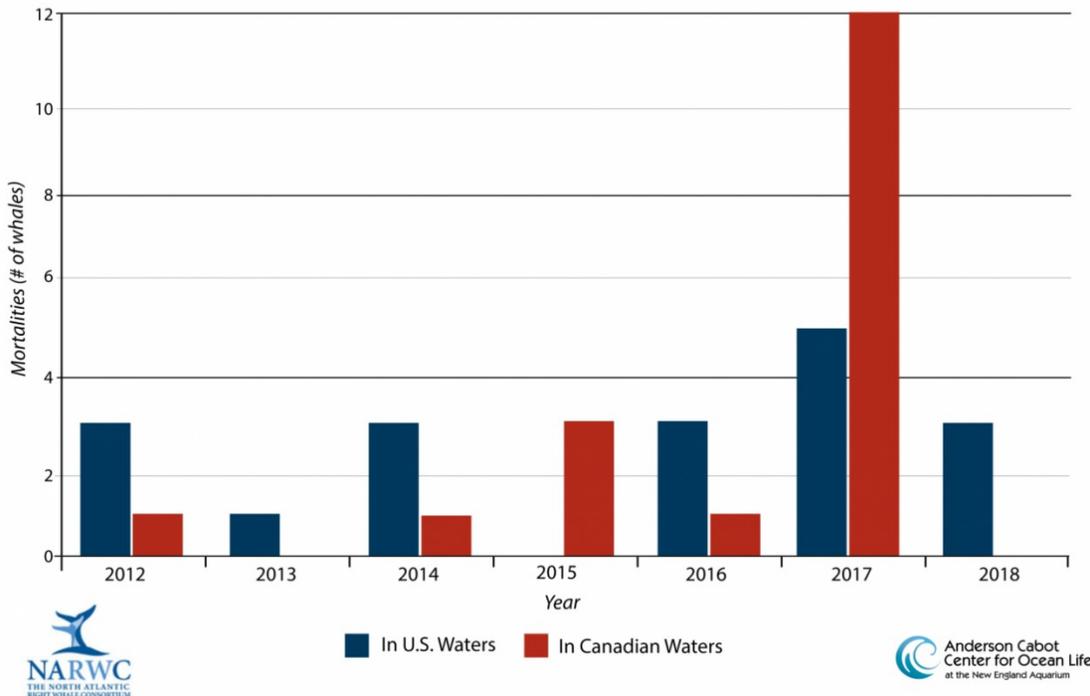
Performance Indicator	Nature of Comment Indicate relevant code(s) from list above.	Justification Please support your comment by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.
<i>Example: PI 1.1.2, Stock Rebuilding</i>	2	<i>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.</i>
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	<p>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</p> <p>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.</p> <p>*https://www.smithsonianmag.com/science-nature/plight-right-whale-180970648/</p>

The audit team acknowledges and thanks WDC for the 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.

North Atlantic Right Whale Mortalities

as of November 2018



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 (RPA⁵³) and the Canadian national limit 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.

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:

⁵³ <http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf>

- Both juveniles and adult NARW have a lower probability (about 25%) of survival after a reported entanglement (Robbins et al 2015⁵⁴);
- 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.* 2017⁵⁵).
- Kenney (2018)⁵⁶ 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)).”

As a result, the team has determined that despite the management measures implemented in 2018, the known direct effects of the UoA in 2018, defined as entanglements with the potential to result in mortality of individual whales, are likely to hinder recovery of the NARW population. Furthermore, there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the NARW population.

As such, PI 2.3.1, SG60, Scoring Issue *b*, is not met.

PI 2.3.1, SG 80 and SG 100 Scoring issue *c* are not scored as all SG 60 have not been met in this PI (MSC FCR v 7.10.5.2 and 7.10.5.3).

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).

⁵⁴ <https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306>

⁵⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/>

⁵⁶ <https://www.int-res.com/articles/esr2018/37/n037p233.pdf>

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 endangered NARW during the 2019 season⁵⁷. 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.
- 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 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. However, given there has only been a single season of their operation and there were 3 reported entanglements of NARW (2 in the GSL) plus a further 2 observations of fresh entanglement scarring, there is currently not enough evidence to say that *these measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species*. The audit team concludes that PI 2.3.2 SG60, SI a is not met.

⁵⁷ <https://www.canada.ca/en/fisheries-oceans/news/2019/02/government-of-canada-unveils-its-2019-plan-for-protecting-north-atlantic-right-whales.html>

<p>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.</p>	<p>1,2</p>	<p>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:</p> <ul style="list-style-type: none"> ▪ 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 <p>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.</p>
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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 right whale 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.

<p>1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation.</p>	<p>MSC stated objective of surveillance audit</p>	<p>In 2018, DFO implemented a number of temporary measures to reduce risk including:</p> <ul style="list-style-type: none"> ▪ 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 <p>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.</p>
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<p>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.</p>	<p>MSC stated objective of surveillance audit</p>	<p>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.</p> <p>In addition to the DFO actions, the client has agreed to:</p> <ul style="list-style-type: none"> ▪ 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. <p>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.</p>
<p>To review any other significant changes in the fishery.</p>	<p>MSC stated objective of surveillance audit</p>	<p>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.</p>

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 <small>Please attach additional pages if necessary.</small>
<input checked="" type="checkbox"/> I wish to provide general comments about the assessment of this fishery against the MSC Fisheries Standard.		<p>This fishery has been documented to entangle and kill critically endangered North Atlantic right whales (<i>Eubalaena glacialis</i>), 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).</p> <p>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.</p>

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
<input checked="" type="checkbox"/> Surveillance ³ 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.
<input type="checkbox"/> e.g. I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	<i>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>
<input type="checkbox"/> 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 report.

<input checked="" type="checkbox"/> Other (please specify)	<p>New Entanglement Cases in GSL in 2018 as reported by Dr. Moe Brown to the North Atlantic right whale Consortium on November 8, 2018</p> <p>RW# 3312- seen in the GSL morning without gear and seen three hours later entangled- not relocated and no further sightings.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p> <p>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*</p> <p>*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.</p> 
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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 done regarding the implementation of ASPANS corrective action plan, the team also concludes that the reasons of the suspension have not been fully addressed yet, therefore SAI Global determines that the Gulf of St Lawrence snow crab fishery shall remain suspended.

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

New England Aquarium

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input type="checkbox"/> Surveillance 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	November 26, 2018	Michelle Cho/Anderson Cabot Center for Ocean Life at the New England Aquarium

Nature of Comment (select all that apply)	Justification (Please attach additional pages if necessary.)
e.g. <input checked="" type="checkbox"/> I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	<p>The Anderson Cabot Center for Ocean Life at the New England Aquarium is home to scientific experts on North Atlantic right whales. Our research team has been monitoring the status of this species for nearly four decades including the documentation of entanglement rates and impacts. Therefore, the contents of these public comments focus on this species, and only briefly touch on other marine wildlife that is also affected by snow crab gear.</p> <p>Since we provided our last comments on the expedited audit report in December 2017, there have been four or five (one was just a skull) dead right whales observed. According to a report given at the North Atlantic Right Whale Consortium annual meeting in New Bedford, MA on November 7-8, 2018, three mortalities were entanglement-related, one of which may have initially occurred in the Gulf of St Lawrence (see #1).</p> <ol style="list-style-type: none"> 22 Jan 2018- carcass found 80 nm offshore in mid-Atlantic, 10 year old female #3893 with multiple wraps of gear around head and flippers causing deep injuries while attached for weeks to months and leading to her death; gear was consistent with Canadian snow crab gear according to NOAA gear analysis. #3893 was previously seen without gear in the Gulf of St Lawrence on July 7, 2018

	<ol style="list-style-type: none"> 25 Aug 2018- carcass found near Martha's Vineyard- multiple linear abrasions- probable acute entanglement 14 Oct 2018 – Georges Bank, probable severe acute entanglement <p>There were also four newly entangled whales (3 with gear, 1 with severe injuries) observed in Canadian waters:</p> <ol style="list-style-type: none"> 13 Jul 2018 – Gulf of St Lawrence - #3312, 15 year old male observed gear free at 11:40 and entangled at 14:45 in illegally set snow crab gear; whale has not been sighted since and has gear trailing at least 4 body lengths with apparently heavy gear attached 30 Jul 2018 – Bay of Fundy - #3843, 10 year old male observed with trailing and weighted gear and attached buoy; partially disentangled on 3 Aug 2018; last seen without gear in Gulf of St Lawrence on June 7, 2018 11 Aug 2018 – Gulf of St Lawrence – 2016 calf of 3101 observed with multiple deep injuries across head and tail; one blowhole no longer functioning; last seen without gear in the Gulf of St Lawrence on 6 June 2018 20 Aug 2018 – Gulf of St Lawrence - #3960, 9 year old male observed with multiple wraps of gear around the head and blowholes and damaged baleen sticking out the front of its mouth, bloody tail suggesting fairly recent; whale shed gear over a two hour period of observation; last seen without gear in the Gulf of St Lawrence on 6 Aug 2018 <p>The fate of all four whales is uncertain. One case (#1) occurred in the closed snow crab fishing area. #2 and #3 were seen together in the Gulf of St Lawrence on June 6/7 in an area that was part of a recently designated dynamic closure that was delayed 48 hours due to weather. #4 was found in the closed snow crab fishing area.</p> <p>These entanglements are relevant for all MSC units of assessment that overlap with the range of endangered North Atlantic right whales, as the cumulative impacts of fishing gear entanglements consistently exceed limits, both in Canada and the U.S. The Gulf of St. Lawrence, Scotian Shelf, and Newfoundland and Labrador snow crab trap fisheries are all evaluated under fisheries standard v.2.0, which makes these entanglements relevant for all of their evaluations.</p> <p>We suggest that the information we are providing indicates the following scores for principle indicator 2.3:</p>
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		<p>In Canada under the Species at Risk Act, it is illegal to “kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species”; including North Atlantic right whales (http://lawslois.justice.gc.ca/eng/acts/s-15.3/page-4.html#h-14). That means it is illegal to have fishing gear entanglements if they contribute to mortality or harm the whale. In addition to the government documents issued under the Species at Risk Act (http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780), North Atlantic right whales have been identified as one of three key species in the Government of Canada’s Ocean Protection Plan announced in November 2016.</p> <p>North Atlantic right whales are a coastal species distributed along the eastern seaboard of the U.S. and Canada. During the late spring and summer, they are found in northern feeding grounds primarily known to be in the Maritimes region, including in the Gulf of St Lawrence, although dedicated survey effort in the Gulf was lacking until 2014. In recent years, as a result of increased survey effort and a likely distribution shift of more whales to that area, there have been many more sightings throughout the Gulf of St. Lawrence than had previously been documented (Brown et al. 2013). A retrospective analysis of acoustic data collected along the U.S. and Canada indicates a shift in right whale distribution starting in 2010 with one aspect of the study indicating fewer whales in the Bay of Fundy and broader Gulf of Maine (Davis et al. 2017) which coincides with the increase in sightings in the Gulf of St Lawrence. Concurrent with this increase in sightings in the Gulf of St. Lawrence, several snow crab gear entanglements have been documented:</p> <ol style="list-style-type: none"> 1. On July 18, 2015, an adult right whale was found entangled in snow crab pot gear east of Ingonish, Cape Breton Island and subsequently disentangled, although based on a description of the injuries, it may not have survived. The whale was free swimming slowly and the location of the initial gear deployment is unknown. 2. In 2016, two right whales were found entangled in snow crab gear and, based on the markings on the gear, these were traced back to gear deployed in June in Area 12 (see slide 3; https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/docs/2017%20April%20Meeting%20Docs/morin_presentation.pdf). One of these whales was found dead on Sable Island and the other was disentangled in the Bay of Fundy however, because of the severity of his injuries, he may not have survived. 3. On Sep 23, 2016, an adult female right whale was found dead and entangled off the coast of Maine. Gear analysis by NOAA Fisheries indicated gear consistent with Canadian snow crab gear 4. In January, 2017, an adult male right whale was disentangled off the Georgia coast and was found to be trailing a pot consistent with snow crab gear. This whale was then seen in the Gulf of St. Lawrence during
		<p>the summer 2017 indicating that he uses that habitat. 4. Since June 6, 2017, 12 dead and five live entangled right whales were found in the Gulf of St. Lawrence (Daoust et al. 2017). Images of the five live entangled whales showed snow crab gear was involved in at least four of them. Two of the dead whales necropsied showed evidence that they had died from entanglement in snow crab gear, one case was in gear that was active in Area 12 at the time.</p> <ol style="list-style-type: none"> 5. In January 2018, a dead whale was found entangled in Canadian snow crab trap gear. <p>[PI 2.3.1 a), below SG 60: There is no harm allowed to right whales in Canada under the Species at Risk Act, and the known effects on the population in the last three and a half years have exceeded this limit, including in the last year and since the last audit (see information on entanglements provided above).] There is no harm allowed and there has been no permit to harm granted to snow crab fisheries for fishing activities. These have only been granted in cases of finding a whale entangled for purposes of release. Canadian snow crab gear has been implicated in a 2018 entanglement mortality, since the last audit.</p> <p>[PI 2.3.1 b), below SG 60: Known direct effects of the UoA contribute to mortalities of right whales and so are contributing to population decline.]</p> <p>Additionally, the entanglement effects on the health and reproduction of whales and the increase in gear rope strengths can also pose fatal risk to right whales (Knowlton et al. 2016; Knowlton et al. In progress). [PI 2.3.1 c), below SG 80 (no SG for 60 available): Indirect effects have been considered for the UoA and are also contributing to population decline.]</p> <p>To reduce and/or mitigate right whale entanglement in fishing gear in the near term, our scientists recommend a variety of measures, relevant to Canadian and U.S. fisheries, as laid out in our proposal to the U.S. Atlantic Large Whale Take Reduction Team.</p> <p>If you have any questions about any of this, please let us know. We would be happy to help you better understand the issue, what can and cannot be interpreted from the survey data and figure out how to work together to find solutions and get the most accurate information included in these assessments.</p>

		<p>Below are references to consider and include with regards to endangered species bycatch, specifically North Atlantic right whale entanglement and ensuing serious injury and/or mortality.</p> <p>Here are additional relevant references that have been published since last December.</p> <p>Burgess, E.A., Hunt, K.E., Kraus, S.D. and Rolland, R.M., 2018. Quantifying hormones in exhaled breath for physiological assessment of large whales at sea. <i>Scientific reports</i>, 8(1), p.10031.</p> <p>Corkeron, P., Hamilton, P., Bannister, J., Best, P., Charlton, C., Groch, K.R., Findlay, K., Rowntree, V., Vermeulen, E., Pace, R.M. 2018. The recovery of North Atlantic right whales, <i>Eubalaena glacialis</i>, has been constrained by human-caused mortality. <i>Royal Society Open Science</i>, 5(11), 180892.</p> <p>Haves, S.A., Gardner, S., Garrison, L., Henry, A., Leandro, L. North Atlantic Right Whales - Evaluating Their Recovery Challenges in 2018. 2018. NOAA Technical Memorandum NMFS-NE-247. 30pp.</p> <p>Howle, L.E., Kraus, S.D., Werner, T.B., Nowacek, D.P. 2018. Simulation of the entanglement of a North Atlantic right whale (<i>Eubalaena glacialis</i>) with fixed fishing gear. <i>Marine Mammal Science</i>.</p> <p>Krzyzstan, A.M., Gowan, T.A., Kendall, W.L., Martin, J., Ortega-Ortiz, J.G., Jackson, K., Knowlton, A.R., Naessig, P., Zani, M., Schulte, D.W., Taylor, C.R. 2018. Characterizing residence patterns of North Atlantic right whales in the southeastern USA with a multistate open robust design model. <i>Endang Species Res</i> 36:279-295. https://doi.org/10.3354/esr00902.</p> <p>Lysiak, N.S., Trumble, S.J., Knowlton, A.R., & Moore, M.J. 2018. Characterizing the Duration and Severity of Fishing Gear Entanglement on a North Atlantic Right Whale (<i>Eubalaena glacialis</i>) Using Stable Isotopes, Steroid and Thyroid Hormones in Baleen. <i>Frontiers in Marine Science</i>, 5, 168.</p> <p>Meyer-Gutbrod, E.L., Greene, C.H. 2018. Uncertain recovery of the North Atlantic right whale in a changing ocean. <i>Global change biology</i>, 24(1), 455-464.</p>
		<p>Meyer-Gutbrod, E.L., C.H. Greene, and K.T.A. Davies. 2018. Marine species range shifts necessitate advanced policy planning: The case of the North Atlantic right whale. <i>Oceanography</i> 31(2)</p> <p>Reports</p> <p>Surrey-Marsden, Claire, K. Howe, M. White, C. George, T. Gowan, P. Hamilton, K. Jackson, J. Jakush, T. Pitchford, C. Taylor, L. Ward, and Zoodsma, B. 2017. North Atlantic Right Whale Calving Area Surveys: 2015/2016 Results. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-SER-6. 13 p</p> <p>Baumgartner, M., Moore, M., Kraus, S., Knowlton, A., Werner, T. 2018. Overcoming Development, Regulatory and Funding Challenges for Ropeless Fishing to Reduce Whale Entanglement in the U.S. and Canada.</p> <p>Khan, C. B., Henry, A., Crowe, L., Duley, P., Gatzke, J., & Cole, T. V. 2018. North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2016 Results Summary.</p>
<input type="checkbox"/>	I wish to provide information relevant to fulfilment of the conditions of certification.	
<input type="checkbox"/>	Other (please specify)	

Audit team's response

Michelle Cho
 Anderson Cabot Center for Ocean Life at the New England Aquarium
 Central Wharf Boston, MA 02110
 USA

Re: Your submission regarding the 1st surveillance audit after re-assessment of the Gulf of St Lawrence snow crab trap fishery

February 27th, 2019

Dear Michelle,

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

The audit team would like to thank you for providing comments in regards to the impact of the Gulf of St Lawrence 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 27th November 2018 letter in the general order in which they are presented.

Assessment Stage	Fishery	Date	Name of Individual/Organisation Providing Comments
<input type="checkbox"/> Surveillance ³ 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	November 26, 2018	Michelle Cho/Anderson Cabot Center for Ocean Life at the New England Aquarium

Nature of Comment (select all that apply)	Justification (Please attach additional pages if necessary.)
e.g. <input checked="" type="checkbox"/> I wish to alert the assessment team to important changes in the circumstances of this fishery relevant to the MSC certification.	<p>The Anderson Cabot Center for Ocean Life at the New England Aquarium is home to scientific experts on North Atlantic right whales. Our research team has been monitoring the status of this species for nearly four decades including the documentation of entanglement rates and impacts. Therefore, the contents of these public comments focus on this species, and only briefly touch on other marine wildlife that is also affected by snow crab gear.</p> <p>Since we provided our last comments on the expedited audit report in December 2017, there have been four or five (one was just a skull) dead right whales observed. According to a report given at the North Atlantic Right Whale Consortium annual meeting in New Bedford, MA on November 7-8, 2018, three mortalities were entanglement-related, one of which may have initially occurred in the Gulf of St Lawrence (see #1).</p> <p>1) 22 Jan 2018- carcass found 80 nm offshore in mid-Atlantic, 10 year old female #3893 with multiple wraps of gear around head and flippers causing deep injuries while attached for weeks to months and leading to her death; gear was consistent with Canadian snow crab gear according to NOAA gear analysis. #3893 was previously seen without gear in the Gulf of St Lawrence on July 7, 2018</p>

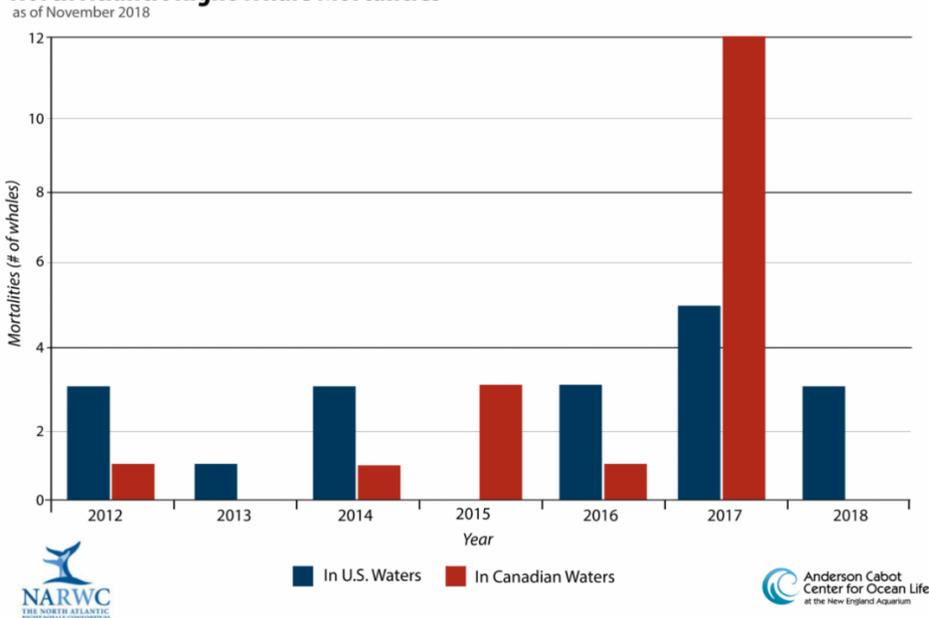
		<p>2) 25 Aug 2018- carcass found near Martha’s Vineyard- multiple linear abrasions- probable acute entanglement</p> <p>3) 14 Oct 2018 – Georges Bank, probable severe acute entanglement</p> <p>There were also four newly entangled whales (3 with gear, 1 with severe injuries) observed in Canadian waters:</p> <ol style="list-style-type: none"> 1) 13 Jul 2018 – Gulf of St Lawrence _ #3312, 15 year old male observed gear free at 11:40 and entangled at 14:45 in illegally set snow crab gear; whale has not been sighted since and has gear trailing at least 4 body lengths with apparently heavy gear attached 2) 30 Jul 2018 – Bay of Fundy - #3843, 10 year old male observed with trailing and weighted gear and attached buoy; partially disentangled on 3 Aug 2018; last seen without gear in Gulf of St Lawrence on June 7, 2018 3) 11 Aug 2018 – Gulf of St Lawrence – 2016 calf of 3101 observed with multiple deep injuries across head and tail; one blowhole no longer functioning; last seen without gear in the Gulf of St Lawrence on 6 June 2018 4) 20 Aug 2018 – Gulf of St Lawrence - #3960, 9 year old male observed with multiple wraps of gear around the head and blowholes and damaged baleen sticking out the front of its mouth, bloody tail suggesting fairly recent; whale shed gear over a two hour period of observation; last seen without gear in the Gulf of St Lawrence on 6 Aug 2018 <p>The fate of all four whales is uncertain. One case (#1) occurred in the closed snow crab fishing area. #2 and #3 were seen together in the Gulf of St Lawrence on June 6/7 in an area that was part of a recently designated dynamic closure that was delayed 48 hours due to weather. #4 was found in the closed snow crab fishing area.</p> <p>These entanglements are relevant for all MSC units of assessment that overlap with the range of endangered North Atlantic right whales, as the cumulative impacts of fishing gear entanglements consistently exceed limits, both in Canada and the U.S. The Gulf of St. Lawrence, Scotian Shelf, and Newfoundland and Labrador snow crab trap fisheries are all evaluated under fisheries standard v.2.0, which makes these entanglements relevant for all of their evaluations.</p> <p>We suggest that the information we are providing indicates the following scores for principle indicator 2.3:</p>
		<p>In Canada under the Species at Risk Act, it is illegal to “kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species”; including North Atlantic right whales (http://lawslois.justice.gc.ca/eng/acts/s-15.3/page-4.html#h-14). That means it is illegal to have fishing gear entanglements if they contribute to mortality or harm the whale. In addition to the government documents issued under the Species at Risk Act (http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=780), North Atlantic right whales have been identified as one of three key species in the Government of Canada’s Ocean Protection Plan announced in November 2016.</p> <p>North Atlantic right whales are a coastal species distributed along the eastern seaboard of the U.S. and Canada. During the late spring and summer, they are found in northern feeding grounds primarily known to be in the Maritimes region, including in the Gulf of St Lawrence, although dedicated survey effort in the Gulf was lacking until 2014. In recent years, as a result of increased survey effort and a likely distribution shift of more whales to that area, there have been many more sightings throughout the Gulf of St. Lawrence than had previously been documented (Brown et al. 2013). A retrospective analysis of acoustic data collected along the U.S. and Canada indicates a shift in right whale distribution starting in 2010 with one aspect of the study indicating fewer whales in the Bay of Fundy and broader Gulf of Maine (Davis et al. 2017) which coincides with the increase in sightings in the Gulf of St Lawrence. Concurrent with this increase in sightings in the Gulf of St. Lawrence, several snow crab gear entanglements have been documented:</p> <ol style="list-style-type: none"> 1. On July 18, 2015, an adult right whale was found entangled in snow crab pot gear east of Ingonish, Cape Breton Island and subsequently disentangled, although based on a description of the injuries, it may not have survived. The whale was free swimming slowly and the location of the initial gear deployment is unknown. 2. In 2016, two right whales were found entangled in snow crab gear and, based on the markings on the gear, these were traced back to gear deployed in June in Area 12 (see slide 3; https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/docs/2017%20April%20Meeting%20Docs/morin_presentation.pdf). One of these whales was found dead on Sable Island and the other was disentangled in the Bay of Fundy however, because of the severity of his injuries, he may not have survived. 3. On Sep 23, 2016, an adult female right whale was found dead and entangled off the coast of Maine. Gear analysis by NOAA Fisheries indicated gear consistent with Canadian snow crab gear 4. In January, 2017, an adult male right whale was disentangled off the Georgia coast and was found to be trailing a pot consistent with snow crab gear. This whale was then seen in the Gulf of St. Lawrence during

		<p>the summer 2017 indicating that he uses that habitat. 4. Since June 6, 2017, 12 dead and five live entangled right whales were found in the Gulf of St. Lawrence (Daoust et al. 2017). Images of the five live entangled whales showed snow crab gear was involved in at least four of them. Two of the dead whales necropsied showed evidence that they had died from entanglement in snow crab gear, one case was in gear that was active in Area 12 at the time.</p> <p>5. In January 2018, a dead whale was found entangled in Canadian snow crab trap gear.</p> <p>[PI 2.3.1 a), below SG 60: There is no harm allowed to right whales in Canada under the Species at Risk Act, and the known effects on the population in the last three and a half years have exceeded this limit, including in the last year and since the last audit (see information on entanglements provided above).] There is no harm allowed and there has been no permit to harm granted to snow crab fisheries for fishing activities. These have only been granted in cases of finding a whale entangled for purposes of release. Canadian snow crab gear has been implicated in a 2018 entanglement mortality, since the last audit.</p> <p>[PI 2.3.1 b), below SG 60: Known direct effects of the UoA contribute to mortalities of right whales and so are contributing to population decline.]</p> <p>Additionally, the entanglement effects on the health and reproduction of whales and the increase in gear rope strengths can also pose fatal risk to right whales (Knowlton et al. 2016; Knowlton et al. In progress). [PI 2.3.1 c), below SG 80 (no SG for 60 available): Indirect effects have been considered for the UoA and are also contributing to population decline.]</p> <p>To reduce and/or mitigate right whale entanglement in fishing gear in the near term, our scientists recommend a variety of measures, relevant to Canadian and U.S. fisheries, as laid out in our proposal to the U.S. Atlantic Large Whale Take Reduction Team.</p> <p>If you have any questions about any of this, please let us know. We would be happy to help you better understand the issue, what can and cannot be interpreted from the survey data and figure out how to work together to find solutions and get the most accurate information included in these assessments.</p>
		<p>Below are references to consider and include with regards to endangered species bycatch, specifically North Atlantic right whale entanglement and ensuing serious injury and/or mortality.</p> <p>Here are additional relevant references that have been published since last December.</p> <p>Burgess, E.A., Hunt, K.E., Kraus, S.D. and Rolland, R.M., 2018. Quantifying hormones in exhaled breath for physiological assessment of large whales at sea. <i>Scientific reports</i>, 8(1), p.10031.</p> <p>Corkeron, P., Hamilton, P., Bannister, J., Best, P., Charlton, C., Groch, K.R., Findlay, K., Rowntree, V., Vermeulen, E., Pace, R.M. 2018. The recovery of North Atlantic right whales, <i>Eubalaena glacialis</i>, has been constrained by human-caused mortality. <i>Royal Society Open Science</i>, 5(11), 180892.</p> <p>Hayes, S.A., Gardner, S., Garrison, L., Henry, A., Leandro, L. North Atlantic Right Whales - Evaluating Their Recovery Challenges in 2018. 2018. NOAA Technical Memorandum NMFS-NE-247. 30pp.</p> <p>Howle, L.E., Kraus, S.D., Werner, T.B., Nowacek, D.P. 2018. Simulation of the entanglement of a North Atlantic right whale (<i>Eubalaena glacialis</i>) with fixed fishing gear. <i>Marine Mammal Science</i>.</p> <p>Krzyzstan, A.M., Gowan, T.A., Kendall, W.L., Martin, J., Ortega-Ortiz, J.G., Jackson, K., Knowlton, A.R., Naessig, P., Zani, M., Schulte, D.W., Taylor, C.R., 2018. Characterizing residence patterns of North Atlantic right whales in the southeastern USA with a multistate open robust design model. <i>Endang Species Res</i> 36:279-295. https://doi.org/10.3354/esr00902.</p> <p>Lysiak, N.S., Trumble, S.J., Knowlton, A.R., & Moore, M.J. 2018. Characterizing the Duration and Severity of Fishing Gear Entanglement on a North Atlantic Right Whale (<i>Eubalaena glacialis</i>) Using Stable Isotopes, Steroid and Thyroid Hormones in Baleen. <i>Frontiers in Marine Science</i>, 5, 168.</p> <p>Meyer-Gutbrod, E.L., Greene, C.H. 2018. Uncertain recovery of the North Atlantic right whale in a changing ocean. <i>Global change biology</i>. 24(1), 455-464.</p>

The audit team acknowledges and thanks NEA 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 attributed NARW deaths to Canadian fisheries in 2018. Furthermore, the 2018 NARW Consortium Report Card did not assign any NARW mortalities in 2018 to Canadian fisheries.

North Atlantic Right Whale Mortalities



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 (RPA⁵⁸) 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) the audit team conclude that PI 2.3.1, SG60, Scoring Issue *a* is 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 entanglement 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 2015⁵⁹);
- 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.* 2017⁶⁰).
- Kenney (2018)⁶¹ 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

⁵⁸ <http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf>

⁵⁹ <https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306>

⁶⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/>

⁶¹ <https://www.int-res.com/articles/esr2018/37/n037p233.pdf>

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))”.

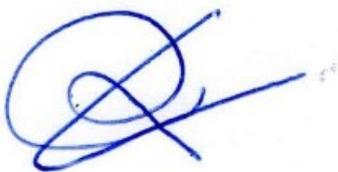
As a result, the team has determined that despite the management measures implemented in 2018, the known direct effects of the UoA in 2018, defined as entanglements with the potential to result in mortality of individual whales, are likely to hinder recovery of the NARW population. Furthermore, there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the NARW population. As such, PI 2.3.1, SG60, Scoring Issue *b*, is not met.

PI 2.3.1, SG 80 and SG 100 Scoring issue *c* are not scored as all SG 60 have not been met in this PI (MSC FCR v 7.10.5.2 and 7.10.5.3).

In conclusion, the audit team considers that good progress has been made regarding the implementation of the ASPANS corrective action plan, however, the reasons of the suspension have not been fully addressed yet. Therefore, SAI Global determines that the Gulf of St Lawrence snow crab fishery shall remain suspended.

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

ASPANS (client group)

ASPANS
745 Sackville Drive, PO Box 612
Lower Sackville, N.S. B4C 3J1
Tel: (902) 482-0984

February 26, 2019

Geraldine Criquet
SAI Global

Re: Draft Southern Gulf of St. Lawrence Snow Crab Trap Fishery Surveillance Audit
F-SAI-009

Dear Ms. Criquet,

The Issue: The certification of the fishery was suspended as an outcome of the findings from the expedited audit published March 15, 2018. This suspension was based on North Atlantic Right Whale (NARW) mortalities that occurred as a result of snow crab gear entanglement during the 2017 fishing season. Specifically Performance Indicators 2.3.1, guidepost a and b, and 2.3.2, guidepost a and c, scored less than 60.

Corrective Action Plan (CAP): In accordance with the requirements of the suspension a CAP was developed in association with stakeholders and regulators, and subsequently accepted by SAI Global. This CAP included numerous regulatory, policies, licensing changes and a suite of research initiatives. For each of the performance indicators the following milestones of the CAP were specified:

PI 2.3.1 ETP Species Outcome

By the first annual surveillance audit the CAB will be presented with ***evidence that measures have been implemented to reduce the immediate risk of interaction of snow crab gear with right whales, in order to meet national requirements on right whale mortalities.*** Furthermore, efficiency of the strategy will be monitored closely and changes will be implemented based on information collected and consultation among all stakeholders through special advisory group(s) and regular advisory meeting. Of particular interest is the monitoring of right whale migration patterns, which if understood much better can inform a more effective strategy.

By the second annual surveillance audit the CAB will be presented with evidence regarding ongoing monitoring of outcomes.

PI 2.3.2 ETP Species Management Strategy

By the first annual surveillance audit the CAB will be presented with ***evidence that immediate measures are in place that are highly likely to reduce and mitigate any interaction of right whales with snow crab gear.*** Furthermore, efficiency of the strategy will be monitored closely and changes will be implemented based on findings and consultation with stakeholders, with a view to achieve national and international requirements for the protection of NARW.

By the second annual surveillance audit the CAB will be presented with evidence regarding research outcomes and reporting of management measure outcomes.

Conclusion: The client group believes that the first annual surveillance audit requirements were achieved, and the scoring should reflect this fact.

Species at Risk Act (SARA): The SARA requires that a recovery strategy for listed species be developed. The [recovery strategy for NARW](#) was published in 2014 and includes a number of cross-sectoral objectives and performance indicators. The objective and performance indicators affecting the MSC certification is identified in this recovery strategy, specifically:

Objective 2 - Reduce mortality and injury as a result of fishing gear interactions (entanglement and entrapment). All the following performance indicators were achieved in 2018:

- Rate of interactions in Canadian waters decline
- Regular analysis of gear/right whale risk and mitigation measures is conducted
- Increased involvement in mitigation efforts by fisheries associated with higher risk gear
- Possible disentanglement efforts are conducted

Conclusion: The client group believes that the all performance indicators of objective 2 have been achieved. In fact, fisheries that had not had any interaction with NARW had to comply with additional licensing requirements.

Surveillance Audit Result and Response: The surveillance audit result indicates that Performance Indicators 2.3.1, guidepost b, and 2.3.2, guidepost a, scored less than 60. Further the guidepost for 2.3.1(a), and 2.3.2(c), which had both previously not been met have achieved a >60 score for this surveillance audit. Therefore, the audit team acknowledges that the effects of the UoA on population/stock are within national limits (re: PI 2.3.1(a)), and that the measures in place are considered likely to work (re: PI 2.3.2(c)).

2.3.1(b): Guidepost 2.3.1 (b) states ‘Known direct effects of the UoA are likely to not hinder recovery of ETP species.’ Also, the guidance document, SA3.10.3, states (with emphasis) ‘When assessing 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)).’

Further, the determination by SAI Global was ‘The assessment team has taken into account the above information and 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)). As a result, the team has determined that despite the management measures implemented in 2018, the known direct effects of the UoA in 2018, defined as entanglements with the potential to result in mortality of individual whales, are likely to hinder recovery of the NARW population.

Based on the above evidence, there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the endangered NARW population.'

Response: The 'known' effects are that though there have been entanglements, no mortalities occurred. These entanglements, per Dr. Moe Brown reporting to the NARW Consortium on November 8, 2018, include:

- RW#3312 was seen not entangled, then entangled in gear 3 hours later, and was not seen again. The type of gear was not specified. |
- RW#3960 was seen not entangled, then entangled, and then observed believed it may have been free of entanglement. The whale was not observed again.
- RW#3843 observed in the GSL then 53 days later in Bay of Fundy entangled with 5/8" leaded line. Whale was primarily disentangled on August 5, 2018, though further observations off Nantucket on December 30, 2018 indicated line remained.

The assessment team has concluded that these incidences all represent serious injury, though there is not independent assessment of these specific encounters to indicate this categorization. Further, DFO has no such categorization for harm that distinguishes serious from non-serious injury. Further, the assessment team has concluded that these significant injuries... 'more likely than not to cause mortality of the individual', which appears to have been inferred from studies indicating that mortality 'can' occur from serious injury.

Conclusion: The client group believes that concluding serious harm and resultant mortality with no independent assessment or verification of mortality does not align with the intention of the standard or guidepost, which clearly states 'known direct effects'.

Further, PI 2.3.3 was scored at 80, indicating the assessment team believes that there is sufficient evidence to assess impact of the UoA on ETP. Specifically, the conclusions from assessment team for each of the guidepost are:

2.3.3(a) conclusion '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'

2.3.3(b) conclusion 'There is adequate information to measure trends and

support a strategy to manage impacts on ETP species.’

Conclusion: *The client group believes that whereas the assessment team acknowledges the effectiveness of the management system to determine impacts, then it is counterintuitive to infer non-verified information that deems serious injury and mortality has occurred.*

The client group believes that these conclusions warrant reconsideration of the score.

2.3.2(a): Guidepost 2.3.2 (a) states ‘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’. Further, the conclusion by SAI Global was ‘.....given there has only been a single season of their operation and there were 3 reported entanglements of NARW (2 in the GSL) plus a further 2 observations of fresh entanglement scarring, there is currently not enough evidence to say that *these measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species.*’

Response: The previously mentioned recovery strategy states that the recovery objective is 3 generations, which in timeframe means 2070. Given, the long-term objective is not measurable within the certification cycle, and that the short-term objectives of zero mortalities and reduced interaction have been demonstrated to be achieved, and acknowledged by the assessment team, then the client group believes that the only measure that can be used are short-term objectives, as it not only highly unlikely but an impossibility to measure the effect of the fishery on the NARW declining population trend within the certification cycle. Further, given that 2.3.2(c) result indicates that the measurements in place are considered likely to work, infers that measures employed have been effective.

The guidance document under GSA3.5 background clearly indicates that the ‘intent’.....is to ‘assess the arrangements in place....(and)...to encourage the development and implementation of technologies and operational methods that minimize mortality of unwanted catch where it occurs.’ Also, referring to Box GSA8 which states ‘To achieve this for species, a new scoring issue has been added to the P1 Harvest Strategy (PI 1.2.1) and P2 Species Management PIs (PI 2.1.2, 2.2.2, 2.3.2) requiring fisheries to continually review alternative measures to encourage the development and implementation of technologies and operational methods that minimize mortality of unwanted catch or ETP species, *taking into account the practicality of the measures, their potential impact on other species and habitats and on the overall cost of implementing the measures.*’

Response: The assessment team has accurately identified and detailed all the measures that have been undertaken, and laud the efforts that have been made. However, the assessment team has misunderstood the ‘intent’ of the performance indicator, in the client group’s belief. All stakeholders and regulators responded to the identified risk, put in place all practical measures, is further research commercially unproven technologies that would further minimize risk, and have assessed the cost of many of the measures. Further, the client believes that the effort undertaken have

cost tens of millions of dollars, and will continue to cost millions of dollars annually in surveillance, monitoring, and research activities. The client believes these efforts, and the corresponding elimination of mortalities and significant reduction in encounters clearly meets the 'intent'.

Conclusion: The client group believes that the intent of the standard and guidelines has been achieved, and reconsidering of the scoring is warranted.

Concluding Statements: The client group representatives do not claim to understand all the intricacies of the guidance documents, performance indicators or goalposts. However, the client group representatives do understand the Canadian seafood sector and the need to demonstrate continuous improvement of sustainability measures. In our view, all possible efforts have been made to reduce interaction, respond to entanglements, monitor in situ, and report transparently. The recovery of the NARW is recognized as an important issue in the context of the Atlantic Canadian fishery, and stakeholders are committed to continue engagement with regulators and NGO's to make further improvements.

The client group developed a CAP, which was approved by SAI Global, and our belief at that time was that if the year one targets were achieved, that the certificate would be reinstated. If that was not the case, the CAP should have reflected the plan that would result in re-instatement so that all parties (industry, government and NGO's) that contributed to the CAP and put forward efforts would clearly understand where the 'goal line' was.

If the assessment team believes that the goal line is to have zero entanglements from any MSC certified Canadian fixed gear fishery, then this should be clearly stated. However, if this is the belief, then our response is that this does not consider the cost of implementing measures to achieve this, as that cost is that the fixed gear fishery in practical terms would have to cease to exist, which would have catastrophic socio-economic implications. Our belief is that there will be additional measures in the fishery that align technologies and management measures that will significantly reduce risk of entanglement, though elimination of all risk is impractical due to several factors (cost, uncertainty regarding migration, feed availability spatially, etc.).

It must be recognized by the assessment team that the commitment to further reduce risk to NARW is unwavering, and that efforts to date have achieved the objectives defined in the corrective action plan and national regulatory requirements. We encourage the assessment team to acknowledge that the actions taken and results reflect the 'intent', which is to ensure measures are enacted, achieve a significant reductions in encounters, and that management measures and results of these measures are reported in a comprehensive and transparent manner.

In closing, we encourage the assessment team to re-evaluate the scoring, acknowledging the aforementioned, and re-instate the certificate for the Southern Gulf of St. Lawrence snow crab trap fishery. In so doing, this would recognize the efforts that have been undertaken and acknowledge the intent, if not the assessment teams interpretation, of the guiding principles.

Thank you for consideration of our request and I look forward to continuing the important work that the MSC certification requirements have already brought to the Canadian seafood industry.

Yours Sincerely,
ASPANS – Affiliation of Seafood Producers Association of Nova Scotia

Peter Norsworthy
Executive Director

Audit team's response

ASPANS
745 Sackville Drive, PO Box 612
Lower Sackville, N.S. B4C 3J1
Tel: (902) 482-0984

Re: Your submission regarding the 1st surveillance report of the Gulf of St Lawrence snow crab trap fishery

February 27th, 2019

Dear Peter,

The audit team appointed to conduct the 1st surveillance audit after re-assessment of the Gulf of St Lawrence snow crab trap fishery has reviewed your submission and considered ASPANS's concerns and issues regarding the audit team's conclusion and determination.

This letter contains the audit team's responses to ASPANS's letter in the general order in which they are presented.

The Issue: The certification of the fishery was suspended as an outcome of the findings from the expedited audit published March 15, 2018. This suspension was based on North Atlantic Right Whale (NARW) mortalities that occurred as a result of snow crab gear entanglement during the 2017 fishing season. Specifically Performance Indicators 2.3.1, guidepost a and b, and 2.3.2, guidepost a and c, scored less than 60.

Corrective Action Plan (CAP): In accordance with the requirements of the suspension a CAP was developed in association with stakeholders and regulators, and subsequently accepted by SAI Global. This CAP included numerous regulatory, policies, licensing changes and a suite of research initiatives. For each of the performance indicators the following milestones of the CAP were specified:

PI 2.3.1 ETP Species Outcome

By the first annual surveillance audit the CAB will be presented with ***evidence that measures have been implemented to reduce the immediate risk of interaction of snow crab gear with right whales, in order to meet national requirements on right whale mortalities.*** Furthermore, efficiency of the strategy will be monitored closely and changes will be implemented based on information collected and consultation among all stakeholders through special advisory group(s) and regular advisory meeting. Of particular interest is the monitoring of right whale migration patterns, which if understood much better can inform a more effective strategy.

By the second annual surveillance audit the CAB will be presented with evidence regarding ongoing monitoring of outcomes.

PI 2.3.2 ETP Species Management Strategy

By the first annual surveillance audit the CAB will be presented with ***evidence that immediate measures are in place that are highly likely to reduce and mitigate any interaction of right whales with snow crab gear.*** Furthermore, efficiency of the strategy will be monitored closely and changes will be implemented based on findings and consultation with stakeholders, with a view to achieve national and international requirements for the protection of NARW.

By the second annual surveillance audit the CAB will be presented with evidence regarding research outcomes and reporting of management measure outcomes.

Conclusion: The client group believes that the first annual surveillance audit requirements were achieved, and the scoring should reflect this fact.

Audit Team Response

The audit team acknowledged the management measures implemented in 2018 and planned for 2019 to minimize interactions with NARW. However, there is insufficient evidence to determine that these measures are highly likely to reduce and mitigate negative effects resulting from interactions with NARW as entanglements in the GSL occurred in 2018. Therefore, the audit team concludes that ASPANS has partially met the requirements for this first annual audit.

Species at Risk Act (SARA): The SARA requires that a recovery strategy for listed species be developed. The [recovery strategy for NARW](#) was published in 2014 and includes a number of cross-sectoral objectives and performance indicators. The objective and performance indicators affecting the MSC certification is identified in this recovery strategy, specifically:

Objective 2 - Reduce mortality and injury as a result of fishing gear interactions (entanglement and entrapment). All the following performance indicators were achieved in 2018:

- Rate of interactions in Canadian waters decline
- Regular analysis of gear/right whale risk and mitigation measures is conducted
- Increased involvement in mitigation efforts by fisheries associated with higher risk gear
- Possible disentanglement efforts are conducted

Conclusion: The client group believes that the all performance indicators of objective 2 have been achieved. In fact, fisheries that had not had any interaction with NARW had to comply with additional licensing requirements.

Audit Team Response

The Team partially agrees with this conclusion. In 2016, DFO published a [Progress Report on the Recovery Strategy for the North Atlantic Right Whale in Canadian Waters for the Period 2009-2014](#)⁶². Table 3 in Section

⁶² <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/north-atlantic-right-whale-report-2009-2014.html>

3.2 of the DFO report presented a summary of progress made toward meeting each performance indicator as part of the overall objectives set for recovery. These are:

- Indicator 3 - Rate of interactions (entanglements and entrapments) in Canadian waters. This was not met as of 2016 and was considered to be partially met as of 2018 (situation has improved since 2017).
- Indicator 4 - Regular analysis of gear/NARW risk and mitigation measures is conducted. This was partially met as of 2016 and progress to date can be considered satisfactory and further work is ongoing.
- Indicator 5 - Increased involvement in mitigation efforts by fisheries associated with higher risk gear and Indicator 6 - Possible disentanglement efforts are conducted. These were partially met as of 2016 and was considered the same as of 2018 since moderate to significant progress has been made and further work is ongoing or planned.

Based on the above, there is a lack of evidence to determine that the indicators of Objectives 2 have been fully met. Met is defined as either “*met but effort will continue until such time the population is considered to be recovered*” or as “*met and no further action is required*”.

Surveillance Audit Result and Response: The surveillance audit result indicates that Performance Indicators 2.3.1, guidepost b, and 2.3.2, guidepost a, scored less than 60. Further the guidepost for 2.3.1(a), and 2.3.2(c), which had both previously not been met have achieved a >60 score for this surveillance audit. Therefore, the audit team acknowledges that the effects of the UoA on population/stock are within national limits (re: PI 2.3.1(a)), and that the measures in place are considered likely to work (re: PI 2.3.2(c)).

Audit Team Response

That is correct, the audit team concluded that:

- for 2.3.1, 60a is met but not 60b; and
- for 2.3.2, 60c and 60e are met but not 60a.

2.3.1(b): Guidepost 2.3.1 (b) states ‘Known direct effects of the UoA are likely to not hinder recovery of ETP species.’ Also, the guidance document, SA3.10.3, states (with emphasis) ‘When assessing 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)).’

Further, the determination by SAI Global was ‘The assessment team has taken into account the above information and 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)). As a result, the team has determined that despite the management measures implemented in 2018, the known direct effects of the UoA in 2018, defined as entanglements with the potential to result in mortality of individual whales, are likely to hinder recovery of the NARW population.’

Based on the above evidence, there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the endangered NARW population.’

Response: The ‘known’ effects are that though there have been entanglements, no mortalities occurred. These entanglements, per Dr. Moe Brown reporting to the NARW Consortium on November 8, 2018, include:

Audit Team Response

The 2016 DFO Report stated that *“The observed number of Right Whale mortalities caused by fishing gear entanglements and entrapments is considered a minimum estimate, because not all whale carcasses are observed. Some Right Whales have carried fishing gear for weeks or months, sustaining serious long-term injury leading to poor health, decreased reproduction, and shorter life span for the individual. This in turn is likely a limitation to the population’s recovery.”* The audit team has defined known direct effect as entanglement which may have significant effects on individuals and as such on the population, in accordance with the 2016 DFO Report and recent scientific articles showing the negative impacts of entanglements on the NARW population’s overall health and thus recovery.

In addition to the 0 mortality record we also know that these entanglements have cause some degree of harm or injury.

- RW#3312 was seen not entangled, then entangled in gear 3 hours later, and was not seen again. The type of gear was not specified. |

Audit Team Response

As mentioned in the report, the Audit Team noted that RW# 3312 was clearly entangled in the GSL based on the 3 hours between being observed as having no entanglement and then being observed as being entangled. Since the fishery in CFA 12, 12E and 12F ended by July 1st the whale became entangled 13 days after the closure, likely by lost gear from these CFAs.

- RW#3960 was seen not entangled, then entangled, and then observed believed it may have been free of entanglement. The whale was not observed again.

Audit Team Response

We also note that this whale was recorded as badly injured and in poor health. Also, the 2018 NARW Commission report card stated that: *“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.”*

- RW#3843 observed in the GSL then 53 days later in Bay of Fundy entangled with 5/8” leaded line. Whale was primarily disentangled on August 5, 2018, though further observations off Nantucket on December 30, 2018 indicated line remained.

Audit Team Response

We agree, and as stated in the report the origin of entanglement remains unclear but the whale was last sighted in very poor health.

The assessment team has concluded that these incidences all represent serious injury, though there is not independent assessment of these specific encounters to indicate this categorization. Further, DFO has no such categorization for harm that distinguishes

serious from non-serious injury. Further, the assessment team has concluded that these significant injuries...’ more likely than not to cause mortality of the individual’, which appears to have been inferred from studies indicating that mortality ‘can’ occur from serious injury.

Conclusion: The client group believes that concluding serious harm and resultant mortality with no independent assessment or verification of mortality does not align with the intention of the standard or guidepost, which clearly states ‘known direct effects’.

Audit Team Response

The team did not conclude that: ...“these incidences all represent serious injury”, the team concluded that based on the available evidence: “there is insufficient evidence to determine that the known direct effects of the UoA (i.e. entanglements with probable significant effects) are likely to not hinder recovery of the endangered NARW population. **As such, PI 2.3.1, SG60, Scoring Issue b, is not met.**”

This was based on:

- 1) Scientific information (Robbins *et. al.* (2015), Van der Hoop *et. al.* (2017) and Kenney (2018)) highlighting entanglement effects on NARW mortality and survival.
- 2) The 2016 DFO Progress Report stating that “*The observed number of Right Whale mortalities caused by fishing gear entanglements and entrapments is considered a minimum estimate, because not all whale carcasses are observed. Some Right Whales have carried fishing gear for weeks or months, sustaining serious long-term injury leading to poor health, decreased reproduction, and shorter life span for the individual. This in turn is likely a limitation to the population’s recovery.*”
- 3) Entanglements and related injuries as described in 2018 by DFO, in stakeholder submissions and in the 2018 NARW Consortium Annual Report Card.
- 4) A precautionary approach to uncertainty.

Further, PI 2.3.3 was scored at 80, indicating the assessment team believes that there is sufficient evidence to assess impact of the UoA on ETP. Specifically, the conclusions from assessment team for each of the guidepost are:

2.3.3(a) conclusion ‘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’

2.3.3(b) conclusion ‘There is adequate information to measure trends and support a strategy to manage impacts on ETP species.’

Conclusion: The client group believes that whereas the assessment team acknowledges the effectiveness of the management system to determine impacts, then it is counterintuitive to infer non-verified information that deems serious injury and mortality has occurred.

The client group believes that these conclusions warrant reconsideration of the score.

Audit Team Response

The previous response applies here.

2.3.2(a): Guidepost 2.3.2 (a) states ‘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’. Further, the conclusion by SAI Global was ‘.....given there has only been a single season of their operation and there were 3 reported entanglements of NARW (2 in the GSL) plus a further 2 observations of fresh entanglement scarring, there is currently not enough evidence to say that *these measures are expected to be highly likely to achieve national and international requirements for the protection of ETP species.*’

Response: The previously mentioned recovery strategy states that the recovery objective is 3 generations, which in timeframe means 2070. Given, the long-term objective is not measurable within the certification cycle, and that the short-term objectives of zero mortalities and reduced interaction have been demonstrated to be achieved, and acknowledged by the assessment team, then the client group believes that the only measure that can be used are short-term objectives, as it not only highly unlikely but an impossibility to measure the effect of the fishery on the NARW declining population trend within the certification cycle. Further, given that 2.3.2(c) result indicates that the measurements in place are considered likely to work, infers that measures employed have been effective.

Audit Team Response

The Team notes that NARW recovery strategy objectives were taken into account. We also note that harm of these species is prohibited under SARA. We have addressed the point of “reduced interaction” earlier on. We also note the difference between “measure that are likely to work” and “measure that are highly likely to achieve national and international requirements for the protection of ETP species.”

The guidance document under GSA3.5 background clearly indicates that the ‘intent’.....is to ‘assess the arrangements in place....(and)...to encourage the development and implementation of technologies and operational methods that minimize mortality of unwanted catch where it occurs.’ Also, referring to Box GSA8 which states ‘To achieve this for species, a new scoring issue has been added to the P1 Harvest Strategy (PI 1.2.1) and P2 Species Management PIs (PI 2.1.2, 2.2.2, 2.3.2) requiring fisheries to continually review alternative measures to encourage the development and implementation of technologies and operational methods that minimize mortality of unwanted catch or ETP species, *taking into account the practicality of the measures, their potential impact on other species and habitats and on the overall cost of implementing the measures.*’

Response: The assessment team has accurately identified and detailed all the measures that have been undertaken, and laud the efforts that have been made. However, the assessment team has misunderstood the ‘intent’ of the performance indicator, in the client group’s belief. All stakeholders and regulators responded to the identified risk, put in place all practical measures, is further research commercially unproven technologies that would further minimize risk, and have assessed the cost of many of the measures. Further, the client believes that the effort undertaken have

cost tens of millions of dollars, and will continue to cost millions of dollars annually in surveillance, monitoring, and research activities. The client believes these efforts, and the corresponding elimination of mortalities and significant reduction in encounters clearly meets the 'intent'.

Conclusion: The client group believes that the intent of the standard and guidelines has been achieved, and reconsidering of the scoring is warranted.

Audit Team Response

PI 2.3.2 scoring issue e was added to P1 Harvest Strategy and P2 Species Management PIs to:

- 1) Encourage the development and implementation of technologies and operational methods that minimise mortality of unwanted catches taking into account the practicality of the measures and the overall costs of implementing the measures; and
- 2) Require fisheries to continually review alternative measures.

The audit team does not misunderstand the intent of PI 2.3.2 and had considered all requirements and guidance. Note that GSA 3.5 BoxGSA 8 also states that *alternative measures should avoid capture of species in the first place or increase its survivability if released*.

Note also that SA3.11.1 states that "When scoring the ETP management Strategy PI SGs, teams shall consider the need to minimise mortality", "All sources of direct mortality shall be considered, including, but no limited to, direct deaths and injuries leading to death" (SA3.11.1.1).

The audit team acknowledges:

- the measures implemented in 2018, and
- the fact that the effectiveness of these measures have been reviewed and refined for the 2019 fishing season.

That said, the scoring reflects:

- the implementation of measures that are considered to **likely** work, 60c being met;
- the fact that there is no evidence yet that the measures are **highly likely** to achieve national requirements for the NARW protection given that there were 3 reported entanglements of NARW plus further 2 observations of fresh entanglement scarring, 60a not being met;
- there is a review of the effectiveness of measures implemented. 60e being met.

Concluding Statements: The client group representatives do not claim to understand all the intricacies of the guidance documents, performance indicators or goalposts. However, the client group representatives do understand the Canadian seafood sector and the need to demonstrate continuous improvement of sustainability measures. In our view, all possible efforts have been made to reduce interaction, respond to entanglements, monitor in situ, and report transparently. The recovery of the NARW is recognized as an important issue in the context of the Atlantic Canadian fishery, and stakeholders are committed to continue engagement with regulators and NGO's to make further improvements.

Audit Team Response

The audit team recognized that the industry has been and is still very proactive in implementing actions to address the issue of NARW interactions, in collaboration with DFO, eNGOs and other research organizations. This is reflected in the background section and rationales of scoring tables.

The client group developed a CAP, which was approved by SAI Global, and our belief at that time was that if the year one targets were achieved, that the certificate would be reinstated. If that was not

the case, the CAP should have reflected the plan that would result in re-instatement so that all parties (industry, government and NGO's) that contributed to the CAP and put forward efforts would clearly understand where the 'goal line' was.

Audit Team Response

The CAP was accepted by SAI Global. As stated by ASPANS at the beginning of its letter, the CAP includes milestones as follow:

- 1) *"By the first annual surveillance audit the CAB will be presented with **evidence that measures have been implemented to reduce the immediate risk of interaction of snow crab gear with right whales, in order to meet national requirements on right whale mortalities.**"*
- 2) *"By the first annual surveillance audit the CAB will be presented with **evidence that immediate measures are in place that are highly likely to reduce and mitigate any interaction of right whales with snow crab gear.**"*

The audit team concludes that ASPANS has partially met the requirements for this first annual audit as:

- Management measures to reduce immediate risk of interaction of snow crab gear with NARW have been implemented, thereby meeting point 1 above;
- But there is insufficient evidence to determine that these measures are highly likely to reduce and mitigate negative effects resulting from interactions with NARW, and so, point 2 above is not met.

If the assessment team believes that the goal line is to have zero entanglements from any MSC certified Canadian fixed gear fishery, then this should be clearly stated. However, if this is the belief, then our response is that this does not consider the cost of implementing measures to achieve this, as that cost is that the fixed gear fishery in practical terms would have to cease to exist, which would have catastrophic socio-economic implications. Our belief is that there will be additional measures in the fishery that align technologies and management measures that will significantly reduce risk of entanglement, though elimination of all risk is impractical due to several factors (cost, uncertainty regarding migration, feed availability spatially, etc.).

Audit Team Response

The audit team has defined known direct effect as entanglement with potential significant effects on individuals and as such on the population, in accordance with the 2016 DFO Report and recent scientific articles showing the negative impacts of serious injuries from entanglements on the NARW population's overall health and recovery.

It must be recognized by the assessment team that the commitment to further reduce risk to NARW is unwavering, and that efforts to date have achieved the objectives defined in the corrective action plan and national regulatory requirements. We encourage the assessment team to acknowledge that the actions taken and results reflect the 'intent', which is to ensure measures are enacted, achieve a significant reductions in encounters, and that management measures and results of these measures are reported in a comprehensive and transparent manner.

Audit Team Response

The audit team have acknowledged the actions that have been taken and consider recognized they have partially achieved the objective of the corrective action plan, as explained above. The audit team also recognize that further actions and measures will be implemented to further reduce and mitigate interactions of the fishery with NARW.

In closing, we encourage the assessment team to re-evaluate the scoring, acknowledging the aforementioned, and re-instate the certificate for the Southern Gulf of St. Lawrence snow crab trap fishery. In so doing, this would recognize the efforts that have been undertaken and acknowledge the intent, if not the assessment teams interpretation, of the guiding principles.

Audit Team Response

The audit team has considered the MSC requirements, guidance and information that has been made available and concludes that the suspension of the MSC certification should remain.

Thank you for consideration of our request and I look forward to continuing the important work that the MSC certification requirements have already brought to the Canadian seafood industry.

Audit Team Response

The audit team thanks ASPANS for its submission and encourages the industry in continuing the impressive work started with the 2018 NARW mitigation measures.

Yours sincerely,



Géraldine Criquet
SAIG Fisheries Team Leader

9.4 Appendix 4. Surveillance audit information

MARINE MAMMAL INTERACTION FORM		
<i>Please fill out every section below. Once completed, this form must be submitted to DFO as per instructions on page 2.</i>		
<u>Interaction Information</u> Interaction Date: _____ Interaction Time: _____ Location: _____ _____ _____ Latitude: _____ <i>Deg.</i> <i>Min</i> Longitude: _____ <i>Deg.</i> <i>Min</i>	<u>Individual Observing the Information</u> Name: _____ Address: _____ _____ _____ Province: _____ Phone: _____ Email: _____ Vessel: _____ Target Species: _____ Gear Type: _____	<u>Identifier</u> Logbook / Combined form #: _____ _____ Other: _____ _____ <u>Gear Damage</u> Gear damage: <input type="checkbox"/> Yes <input type="checkbox"/> No Gear lost: <input type="checkbox"/> Yes <input type="checkbox"/> No Cause: <input type="checkbox"/> Known <input type="checkbox"/> Unknown Comments: _____ _____ _____
<u>Species (check one)</u> Dolphin / Porpoise <input type="checkbox"/> Species code: _____ <input type="checkbox"/> Unidentified Whale <input type="checkbox"/> Species code: _____ <input type="checkbox"/> Unidentified Seal / Sea Lion <input type="checkbox"/> Species code: _____ <input type="checkbox"/> Unidentified	<u>Incident type</u> <input type="checkbox"/> Dead animal <input type="checkbox"/> Live Stranding <input type="checkbox"/> Entanglement <input type="checkbox"/> Shooting <input type="checkbox"/> Collision <input type="checkbox"/> Sick or Injured <input type="checkbox"/> Harassment <input type="checkbox"/> Depredation <input type="checkbox"/> Other: _____ <u>ID Confidence</u> <input type="checkbox"/> Certain <input type="checkbox"/> Probable <input type="checkbox"/> Possible <input type="checkbox"/> Uncertain	<u>Animal Condition</u> <input type="checkbox"/> Appears Healthy <input type="checkbox"/> Sick or Injured <input type="checkbox"/> Dead <input type="checkbox"/> Unknown <u>Support Material</u> <input type="checkbox"/> Photos <input type="checkbox"/> Video <input type="checkbox"/> Sample <input type="checkbox"/> Other <u>Number of Animals</u> Min #: _____ Max #: _____ Best #: _____
<u>Body Length</u> <input type="checkbox"/> <1m (<3 ft) <input type="checkbox"/> 8-16m (25-50 ft) <input type="checkbox"/> 1-1.5m (3-5 ft) <input type="checkbox"/> 16-26m (50-80 ft) <input type="checkbox"/> 1.5-2m (5-7 ft) <input type="checkbox"/> >26m (>80 ft) <input type="checkbox"/> 2-3m (7-10 ft) <input type="checkbox"/> Other: _____ (m/ft) <input type="checkbox"/> 3-8m (10-25 ft)		
<u>Description:</u> <i>(shape, colour, markings, behaviour)</i> _____ _____		<u>Comments:</u> <i>(timeline, actions, people involved, etc.)</i> _____ _____

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

- 100- Steller (northern) sea lion
- 101- California sea lion
- 105- Northern (Pribilof) fur seal
- 115- Harbor seal
- 116- Spotted seal
- 117- Ringed seal
- 121- Ribbon seal
- 124- Gray seal
- 129- Northern elephant seal
- 130- Bearded seal
- 131- Harp seal
- 132- Hooded seal
- 135 – Sea Otter
- 204- Unidentified seal
- 203- Unidentified sea lion

Dolphins and Porpoises

- 047- Atlantic white-sided dolphin
- 049- Pacific white-sided dolphin
- 053- Common dolphin
- 055- Grampus (Risso's) dolphin
- 058- Spotted dolphin
- 060- Spinner dolphin
- 061- Striped dolphin
- 063- Northern right whale dolphin
- 068- Harbor porpoise
- 072- Dall's porpoise
- 235- Unidentified small cetacean

Toothed and baleen whales

- 002- North Atlantic right whale
- 005- Gray whale
- 007- Fin whale
- 010- Minke whale
- 011- Humpback whale
- 012- Sperm whale
- 016- Beluga whale
- 038- False killer whale
- 039- Killer whale
- 221- Pilot whale
- 230- Beaked whale
- 231- Bryde's whale
- 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) RPA⁶³

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)⁶⁴ 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 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 effecting in mitigating potential

⁶³ <http://waves-vagues.dfo-mpo.gc.ca/Library/330657.pdf>

⁶⁴ <https://www.sciencedirect.com/science/article/abs/pii/S0006320715300306>

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)⁶⁵, 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)⁶⁶ 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 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”⁶⁷ (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

⁶⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5213775/>

⁶⁶ <https://www.int-res.com/articles/esr2018/37/n037p233.pdf>

⁶⁷ 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>

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 used⁶⁸.

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”

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.

⁶⁸ 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>

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)⁶⁹. 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 MMPA⁷⁰. 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.⁷¹

The 5-yr Exemption Period begins January 1, 2017 during which nations and LOFF fisheries listed must⁷²:

- 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)

⁶⁹ <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>

⁷⁰ <https://www.fisheries.noaa.gov/foreign/international-affairs/list-foreign-fisheries>

⁷¹ <https://beta.fisheries.noaa.gov/webdam/download/68046947>

⁷² <https://www.seafoodexpo.com/north-america/wp-content/uploads/sites/3/2017/03/What-is-newly-required-1.pdf>

