

Marine Stewardship Council Reassessment

Client Report

For the

Groundfish Enterprise Allocation Council (GEAC)

Canada Scotia-Fundy Haddock Fishery

Assessors: Ivan Mateo, Jerry Ennis, R. J. (Bob) Allain

Report Author: Ivan Mateo, Jerry Ennis, R.J. (Bob) Allain

Association: SAI Global Assurance Service
3rd Floor Block 3
Quayside Business Park
Mill Street
Dundalk, Co. Louth
Ireland
Tel: +353 42 9320912
Fax: + 353 42 9386864
W: www.saiglobal.com

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Glossary

B	Bycatch
B_{MSY}	Biomass calculated for Maximum Sustainable Yield
CAB	Conformity Assessment Body
CHP	Conservation Harvest Plan
COSEWIC	Committee of the Status of Endangered Wildlife in Canada
CSAS	Canadian Science Advisory Secretariat
DFO	Fisheries and Oceans Canada
EA	Enterprise Allocation
EAM	Ecosystem Approach to Management
F	Fishing Mortality
FG	Fixed Gear
F_{LIM}	Limit Reference Point for Fishing Mortality
F_{REF}	Fishing Mortality reference Point
GEAC	Groundfish Enterprise Allocation Council (the client)
GOMAC	Gulf of Maine Advisory Committee
GN	Gillnet
HL	Handline
IFMP	Integrated Fisheries Management Plan
ITQ	Individual Transferable Quota
LRP	Limit Reference Point
LL	Longline
MG	Mobile Gear
MSC	Marine Stewardship Council
NAFO	North Atlantic Fisheries Organization
NMFS	National Marine Fisheries Service
OT	Otter Trawl, Bottom
P1, P2, P3	MSC's Guiding Principles
PA	Precautionary Approach
PI	Performance Indicator
RDG	Regional Director General of DFO
RAP	Regional Advisory Process
RV	Research Vessel
SARA	Species-at-Risk Act (Canada)
SCS	Scientific Certification Systems
SFF	Sustainable Fisheries Framework
SSB	Spawning Stock Biomass
SSB_{MSY}	SSB for Maximum Sustainable Yield
SSR	Special Science Response
TAC	Total Allowable Catch
TMGC	Transboundary Management Guidance Committee
TRAC	Transboundary Resources Assessment Committee
USR	Upper Stock Reference Point
VPA	Virtual Population Analysis
VMS	Vessel Monitoring System

1.0. MSC Fishery Assessment Report

Fishery Unit	<p><u>Species</u>: Haddock (<i>Melanogrammus aeglefinus</i>)</p> <p><u>Geographical Area</u>: The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y and 5Zjm; denominated respectively as the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y) and the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21.</p> <p><u>Methods of Capture</u>: Longline, Otter Trawl, Gillnet, Handline.</p>	
Report Issue	30 th August 2015	• Client Report
	December 2015	• Peer Review
	14 th January 2016	• Public Comment Draft Report
		• Final Report and Determination
		• Public Certification Report
Correspondence to	<p>SAI Global Assurance Service 3rd Floor, Block 3, Quayside Business Park, Mill Street, Dundalk, Co. Louth, Ireland. Website: www.saiglobal.com Programme Administrator: Jean Ragg jean.ragg@saiglobal.com</p>	
Client Name & Contact Details	<p>Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8</p>	

The aim of this reassessment is to determine the degree of compliance of the fishery with the Marine Stewardship Council's (MSC) Principles and Criteria for Sustainable Fishing.

This Client report contains:

- The MSC Standard and Certification Requirements (CR) used, MSC Fishery Standard - Principles and Criteria for Sustainable Fishing v1.1 and the MSC CR v1.3
- The scores, weighting and certification outcome, (Section 6)
- All intended conditions set in Appendix 1.3
'Conditions provide for agreed further improvement in the fishery and provide one of the bases for subsequent audit. They are intended to improve performance against the MSC Principles'
- The Assessment Team certification recommendation.
- The Assessment followed the current versions of MSC scheme requirements and these were implemented by SAI Global accredited MSC Procedures.
- Information sources used are provided throughout the report and full references for published, unpublished data and main websites accessed are documented at the end of this report in the reference section.
- The stakeholder submission and the Assessment Team's response in Appendix 3.

2.0. Executive Summary

This report contains the findings of the reassessment audit in relation to the certificate of the Fishery: *The Canada-Scotia-Fundy Haddock Fishery* (8 Units of Certification, 4 gear types, 2 management areas and 2 fleet sectors). On 11th September, 2014, the Groundfish Enterprise Allocation Council (GEAC), in accordance with Marine Stewardship Council (MSC) requirements, changed the Conformity Assessment Body (CAB) from SCS Global Services to SAI Global Assurance Services for the 4th annual surveillance audit and reassessment of the Canada Scotia-Fundy Haddock Fishery.

This fishery is treated as two distinct stocks by scientific and management bodies and their associated committee and working group arrangements. Stock assessments for area 4X5Y are conducted by Fisheries and Oceans Canada (DFO) whereas the stock assessment for area 5Z (including sub-area 5Zjm) is conducted by the Transboundary Resources Assessment Committee (TRAC - refer to Figures 2 and 3 for illustration of the management areas of the fishery).

The MSC Guidelines to a Conformity Assessment Body (CAB) specify that the Unit of Certification (UoC) is “The fisheries or fish stock (biologically distinct unit) combined with the fishing method/gear and practice (vessel(s) pursuing the fish of that stock) and management framework”. Accordingly, *Canada-Scotia-Fundy Haddock Fishery* proposed for reassessment is defined by the following UoCs:

UoC 1: 4X5Y Otter Trawl

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y) as FAO Statistical Area 21
Method of capture	Otter Trawl
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 2: 4X5Y Long Line

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y) as FAO Statistical Area 21
Method of capture	Long line
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 3: 4X5Y Gillnet

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y) as FAO Statistical Area 21
Method of capture	Gillnet
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 4: 4X5Y Handline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y) as FAO Statistical Area 21
Method of capture	Handline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 5: 5Zjm Otter Trawl

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm) of FAO Statistical Area 21
Method of capture	Otter Trawl
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 6: 5Zjm Longline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm) of FAO Statistical Area 21
Method of capture	Longline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 7: 5Zjm Gillnet

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm) of FAO Statistical Area 21
Method of capture	Gillnet
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

UoC 8: 5Zjm Handline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm) of FAO Statistical Area 21
Method of capture	Handline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive, Manotick, Ontario K4M 1K8

This fishery has been previously assessed against the MSC Principles and Criteria for Sustainable Fishing under their same certificate.

The Scotia-Fundy haddock fishery under reassessment covers two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y and 5Zjm; denominated respectively as the Southern Scotian Shelf / Bay of Fundy / the Gulf of Maine (4X5Y) and the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21. A full and up-to-date active list of fleet licences will be made available by the client group and provided to SAI Global on an annual basis as a requirement of surveillance conditions. It is to be interpreted in strict accordance with operational practices, including adherence to the certificate sharing mechanism defined in CR 27.23.1. The Client Sharing Letter can be seen at:

http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/canadian_scotia_fundy_haddock/assessment-downloads-1/22.05.2009%20Scotia%20haddock%20certificate%20sharing%20notification.pdf

2.1 Scotia-Fundy Haddock fishery key strengths and weaknesses by UoC

UoC 1: 4X5Y OT

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia-Fundy Haddock has shown a strong recruitment to the fishery in the last years. The summer survey catch at size for haddock in the 9-11cm size range (i.e. young-of-the-year) in 2013 and 2014 was well above the long term average (1970-2012) indicating potentially very strong and above average recruitment from the incoming 2013 and 2014 year classes, respectively.</p> <p>Scotia-Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Scotia-Fundy Haddock has a robust governance and policy.</p>	<p>A strategic plan for skates bycatch has been implemented recently; however, its effectiveness cannot be objectively evaluated at this time.</p> <p>Strategies to reduce bycatch have not been completely effective in increasing some retained abundance limits to healthy biological limits (4X5Y Cod).</p> <p>Very low observer coverage level.</p>

UoC 2: 4X5Y LL

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia-Fundy Haddock has shown a strong recruitment to the fishery in the last years. The summer survey catch at size for haddock in the 9-11cm size range (i.e. young-of-the-year) in 2013 and 2014 was well above the long term average (1970-2012) indicating potentially very strong and above average recruitment from the incoming 2013 and 2014 year classes, respective</p> <p>Scotia-Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>A strategic plan for skates bycatch has been implemented recently; however, its effectiveness cannot be objectively determined at this time.</p> <p>Strategies to reduce bycatch have not been completely effective in increasing some retained and bycatch species abundance limits to healthy biological limits (4X5Y Cod, 4X5Y Thorny skate).</p> <p>Very low observer coverage level.</p>

UoC 3: 4X5Y GN

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia-Fundy Haddock has shown a strong recruitment to the fishery in the last years. The summer survey catch at size for haddock in the 9-11cm size range (i.e. young-of-the-year) in 2013 and 2014 was well above the long term average (1970-2012) indicating potentially very strong and above average recruitment from the incoming 2013 and 2014 year classes, respective</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years.</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>Information on retained species catch and bycatch is scarce.</p> <p>Low observer coverage levels.</p>

UoC 4: 4X5Y HL

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years. Scotia-Fundy Haddock has shown a strong recruitment to the fishery in the last years. The summer survey catch at size for haddock in the 9-11cm size range (i.e. young-of-the-year) in 2013 and 2014 was well above the long term average (1970-2012) indicating potentially very strong and above average recruitment from the incoming 2013 and 2014 year classes, respective</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>Information on retained species catch and bycatch is scarce.</p> <p>Low observer coverage levels.</p>

UoC 5: 5Zjm OT

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years.</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>A strategic plan for skates bycatch has been implemented recently; however, its effectiveness cannot be objectively determined at this time.</p> <p>Strategies to reduce bycatch have not been completely effective in increasing some retained and bycatch species abundance limits to healthy biological limits (5Zjm Cod, 5Zjm Thorny Skate).</p>

UoC 6: 5Zjm LL

Strengths	Weaknesses
<p>Scotia-Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years.</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>A strategic plan for skates bycatch has been implemented recently; however, its effectiveness cannot be objectively determined at this time.</p> <p>Strategies to reduce bycatch have not been completely effective in increasing some retained and bycatch species abundance limits to healthy biological limits (5Zjm Cod,5Zjm Thorny skate).</p>

UoC 7: 5Zjm GN

Strengths	Weaknesses
<p>Scotia Fundy Haddock has a relatively high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years.</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>Information on retained species catch and bycatch is scarce.</p>

UoC 8: 5Zjm HL

Strengths	Weaknesses
<p>Scotia Fundy Haddock has a high abundance based on Long Term Fishery independent-based CPUE and Biomass.</p> <p>Scotia Fundy Haddock has a strong recruitment to the fishery in the last years.</p> <p>Scotia Fundy Haddock has a healthy spawner biomass stock and well-defined reference points, and harvest control rules are in place.</p> <p>Robust governance and policy.</p>	<p>Information on retained species catch and bycatch is scarce.</p>

2.2. Reassessment Results

A reassessment against the MSC Principles and Criteria was undertaken by the Assessment Team and a detailed, fully referenced scoring rationale is provided in Appendix 1 of this report.

The UoC achieved the minimum required score of 80 or above on each of the three MSC Principles independently and did not score less than 60 against any Performance Indicator (PI).

Final Principle scores are shown in the following tables.

Table 1a. Final Principle Scores for all gears in Area 4X5Y.

4X5Y Trawl net UoC1		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	91.9	P
Principle 2 – Ecosystem	83.7	P
Principle 3 – Management System	90.9	P
4X5Y Longline UoC2		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	91.9	P
Principle 2 – Ecosystem	80.3	P
Principle 3 – Management System	90.9	P
4X5Y Gillnet UoC3		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	91.9	P
Principle 2 – Ecosystem	81	P
Principle 3 – Management System	90.9	P

4X5Y Handline UoC4		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	91.9	P
Principle 2 – Ecosystem	81	P
Principle 3 – Management System	90.9	P

Table 1b. Final Principle Scores for all gears in Area 5Zjm.

5Zjm Trawl net UoC5		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	97.5	P
Principle 2 – Ecosystem	84.3	P
Principle 3 – Management System	90.9	P
5Zjm Longline UoC6		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	97.5	P
Principle 2 – Ecosystem	84.3	P
Principle 3 – Management System	90.9	P
5Zjm Gillnet UoC7		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	97.5	P
Principle 2 – Ecosystem	81	P
Principle 3 – Management System	90.9	P
5Zjm Handline UoC8		
Principle	Score	PASS/FAIL
Principle 1 – Target Species	97.5	p*
Principle 2 – Ecosystem	81	p*
Principle 3 – Management System	90.9	P

* Although the Assessment Team found the overall Principles and Unit of Certification in overall compliance with the MSC Standard, the team also found the performance of five performance indicators (PI 2.1.1: Retained Catch Outcome; PI 2.1.2: Retained Catch Management; PI 2.2.1: Bycatch Outcome; PI 2.2.2 Bycatch Management; and PI 2.2.3: Bycatch Information/Monitoring) to be below the established compliance mark (Score of 80). Full explanation of these conditions is provided in Appendix 1.3.

2.3. Conditions for continued certification

Five PIs which contribute to the overall reassessment score were assessed as scoring less than the unconditional pass mark (SG80), and therefore five conditions were attached to the fishery, which must be addressed within a specified timeframe. The condition is applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification. A full explanation of how the Client intends to meet these conditions is provided in the client action plan in Appendix 1.3 of the report. As a standard requirement of the MSC CR, the fishery shall be subject to (as a minimum) annual surveillance audits. These audits shall be publicized and reports made publicly available.

The specific conditions and their associated UoCs are listed in the following table:

Condition number	Condition	Performance Indicator	Related to previously raised condition? (Y,N,N/A)
1, 2	(UoC1- 4X5Y OT), (UoC2-4X5Y LL) The client must provide evidence that there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of retained species (4X5Y Cod).	2.1.1, 2.1.2	Y
3, 4	(UoC2-4X5Y LL), (UoC 5-5Zjm OT), (UoC6- 5Zjm LL) The client must provide evidence there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of bycatch species (Thorny Skates).	2.2.1, 2.2.2	Y
5	(UoC1-4X5Y OT), (UoC2-4X5Y LL) The client must provide evidence that qualitative information and some adequate quantitative information are available on the amount of main bycatch species affected by the fishery.	2.2.3	Y

2.4. Certification Recommendation

On completion of the reassessment and scoring process, the Reassessment Team has recommended that the *Scotia-Fundy Haddock Fishery* is eligible to be certified according to the MSC Principles and Criteria for Sustainable Fishing subject to the conditions and client action plan outlined in the report

2.5. Reassessment Process

The reassessment followed set procedures as described in the MSC CR v1.3. Key stages of the reassessment were:

- **Stage 1: Fishery Announcement and Assessment Team Formation**
 - Stakeholder Notification: Fishery enters full reassessment – 2 October 2014
 - Stakeholder Notification: Assessment team nominated – 2 October 2014
 - Stakeholder Notification: Assessment team confirmation – 14 October 2014
- **Stage 2: Building the Reassessment Tree**
 - Stakeholder Notification: Use of the default reassessment tree – 14 October 2014
- **Stage 3: Information gathering, stakeholder meetings and scoring**
 - Stakeholder Notification: Site Visit scheduled – 16 October 2014
 - Site visits: 16 October 2014
 - Stakeholder Notification: Revised timeline - 15 January 2015
 - Revised Timeline - 15 January 2015
 - Stakeholder Notification: Revised Timeline - 26 March 2015
 - Revised Timeline - 26 March 2015
 - Stakeholder Notification: Peer reviewers proposed - 14 April 2015
 - Stakeholder Notification: Peer reviewers confirmed - 7 May 2015
 - Stakeholder Notification: Revised Timeline - 26 March 2015
 - Revised Timeline - 26 March 2015
 - Stakeholder Notification: Peer reviewers proposed - 14 April 2015
 - Stakeholder Notification: Peer reviewers confirmed - 7 May 2015
 -
- **Stage 4: Client and peer review**
 - Stakeholder Notification: Revised timeline - 23 June 2015
 - Revised timeline - 23 June 2015
 - Variation request: Delayed PCDR and use of v1.3 - 4 August 2015
 - Variation response: Delayed PCDR and use of v1.3 - 4 August 2015
 - Stakeholder Notification: Revised timeline - 18 August 2015
 -
- **Stage 5: Public Review of Draft Assessment Report**
 - Revised timeline - 1 December 2015
 - Stakeholder Notification: Revised timeline - 1 December 2015
 - Revised timeline - 23 June 2015
 - Stakeholder Notification: Revised timeline - 23 June 2015- 23 June 2015
 - Variation request: Delayed PCDR and use of v1.3 - 4 August 2015
 - Variation response: Delayed PCDR and use of v1.3 - 4 August 2015
 - Stakeholder Notification: Revised timeline - 18 August 2015
 - Revised timeline - 18 August 2015
 - Stakeholder Notification: Revised timeline - 18 August 2015
 - Stakeholder Notification: Additional stakeholder information gathering - 29 September 2015
 - Revised timeline - 29 September 2015
 - Stakeholder Notification: Revised timeline - 29 September 2015
 - Revised timeline - 1 December 2015
 - Stakeholder Notification: Revised timeline - 1 December 2015
 - Variation response: Certificate extension - 3 December 2015
 - Variation request: Certificate extension - 3 December 2015

3.1. Assessment Team

Dr. Ivan Mateo (Lead Assessor, Responsibilities on Principle 2)

Dr. Mateo has over 15 years of experience working with natural resources population dynamic modelling. His specialization is in fish and crustacean population dynamics, stock assessment, evaluation of management strategies for exploited populations, bioenergetics, ecosystem-based assessment, and ecological statistical analysis. Dr. Mateo received a Ph.D. in Environmental Sciences with Fisheries specialization from the University of Rhode Island. He has studied population dynamics of economically important species as well as candidate species for endangered species listing from many different regions of the world such as the Caribbean, the Northeast US Coast, Gulf of California, and Alaska. He has done research with NMFS Northeast Fisheries Science Centre Ecosystem Based Fishery Management on bioenergetics modelling for Atlantic Cod. He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defense Fund developing population dynamics models for data poor stocks in the Gulf of California. Recently Dr. Mateo worked as National Research Council postdoctoral research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modelling of Alaska sablefish

Dr. Jerry Ennis (Assessor, Responsibilities on 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.

R.J. (Bob) Allain (Assessor, Responsibilities on Principle 3)

Mr. Allain is an independent management consultant and president of OceanIQ Management Services. He is a former senior executive with over 30 years of experience with Canada's Federal Department of Fisheries and Oceans in fisheries and aquaculture management, strategic planning, policy development and analysis, program design and delivery, human and financial resources management, media and inter-governmental relations, facilitation and conflict resolution, and mentoring. He has consulted internationally for the Canadian International Development Agency, the (former) International Centre for Ocean Development, the World Bank, and the Food and Agricultural Organization of the United Nations. He has participated in, and spoken at, international conferences in the United States, Ireland and Australia and has given over 600 media interviews to national and international news agencies while in government service.

3.2. Peer Reviewers

Ms. Nancie Cummings

Ms. Cummings has over 35 years of experience working in marine and estuarine fisheries science in the U.S. and Caribbean. She has been actively involved in conducting marine fish stock assessments, in the optimal design of fisheries data collections, and in providing inputs required for management of U.S. federally managed species. As a lead stock assessment analyst she has been involved for more than 30 years with analyses of highly migratory species (albacore and Bluefin tuna), coastal migratory species (king and Spanish mackerels, cobia, and dolphin fish), and reefish stocks (amberjacks, groupers and shallow and deep-water snappers) in the US Gulf of Mexico and South Atlantic and Caribbean. Ms. Cummings has conducted primary fishery stock evaluations for status determinations required by U.S. fishery management councils and has conducted stock rebuilding projections of U.S. federally managed marine resources including reefish, mackerels, tunas, and shellfish. Ms. Cummings also has experience conducting analyses of salmonid resources off Washington State, including in-season run-size forecasting, escapement estimations, and developing creel census estimations. Ms. Cummings has extensive experience working with commercial and recreational fisheries constituent groups, tribal groups, national and international advisory groups, and academic institutions. Ms. Cummings has experience in application of data poor stock assessment techniques and recent experience developing and leading Data Limited Stock Assessment Workshops in the U.S. and in an International forum. Ms. Cummings received her M.S. degree in Fisheries from the College of Fisheries, University of Washington working on a stock assessment of Pacific Cod in the North Pacific Bering Sea. She holds a Bachelor of Science degree in Biology from Erskine College (South Carolina).

Dr. Robert Leaf

Dr. Robert Leaf has ten years of experience working in the field of natural resource management of fin and shellfish. He specializes in the evaluation of management strategies of harvested species and the identification of environmental drivers that impact their population dynamics. Dr. Leaf received his Master's Degree in Marine Science at Moss Landing Marine Laboratories and his PhD in Fisheries and Wildlife Sciences from Virginia Polytechnic and State Institute. His last professional post was as a post-doc under Dr. Kevin Friedland at the Northeast Fishery Science Centre's Narragansett Laboratory. There, he worked on understanding the impact of environmental conditions on fish stock productivity and recruitment. He has worked in the Gulf of Mexico for the last three years working on fish stock assessments of commercially and recreationally important species in that area. Dr. Leaf is a member of the Gulf of Mexico Fishery Management Council's Red Drum working group and NOAA's Marine Fisheries and Climate Taskforce. He currently supervises four masters level students working on various state and federally-managed fish stocks.

4.0. Description of the Fishery

4.1. Unit of Certification and scope of certification sought

The MSC Guidelines to CAB specify that the UoC is “The fisheries or fish stock (biologically distinct unit) combined with the fishing method/gear and practice (vessel(s) pursuing the fish of that stock) and management framework”. Accordingly, the proposed fishery for certification is defined by the following UoCs:

UoC 1: 4X5Y Otter Trawl

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Method of capture	Otter Trawl
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 2: 4X5Y Long Line

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Method of capture	Long line
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 3: 4X5Y Gillnet

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Method of capture	Gillnet
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 4: 4X5Y Handline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in two areas that are defined by the Northwest Atlantic Fisheries Organization (NAFO) as 4X5Y denominated respectively as FAO Statistical Area 21 - the Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Stock	Southern Scotian Shelf / Bay of Fundy / Gulf of Maine (4X5Y)
Method of capture	Handline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 5: 5Zjm Otter Trawl

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm)
Method of capture	Otter Trawl
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 6: 5Zjm Longline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm)
Method of capture	Longline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 7: 5Zjm Gillnet

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm)
Method of capture	Gillnet
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

UoC 8: 5Zjm Handline

Species	Haddock (<i>Melanogrammus aeglefinus</i>)
Geographical Area	The Canadian fishery for haddock is carried out in 5Zjm; denominated respectively as the Canadian portion of Georges Bank (5Zjm). The fishery takes place in FAO Statistical Area 21
Stock	The Canadian portion of Georges Bank (5Zjm)
Method of capture	Handline
Management system	Canadian fishery for haddock is managed by DFO
Client Group	Groundfish Enterprise Allocation Council Mr. Bruce Chapman, Executive Director 1362 Revell Drive Manotick, Ontario K4M 1K8

4.1.1. Eligibility for Certification against the MSC Standard

The fishery is eligible for certification and able to be assessed within the scope of the MSC Principles and Criteria for Sustainable Fishing as:

- The fishery is not conducted under a controversial unilateral exemption to an international agreement;
- Fishing operations do not use destructive fishing practices such as fishing with poisons or explosives;
- The fishery applying for certification is not the subject of controversy and/or dispute;
- The fishery has not previously failed an assessment or had a certificate withdrawn;
- The Client Group is prepared to consider how other eligible fishers may share the certificate;
- There are no catches of non-target stocks that are inseparable or practicably inseparable (IPI) from the target stock; and
- The reassessment of the Scotia-Fundy Haddock Fishery will not result in an overlapping assessment (See Section 5.1).

4.1.2. Eligible fishers

Currently, the following companies are part of the certification and are eligible to sell certified product. Notification of any changes will be provided to the MSC.

1. Sea Star Seafoods Ltd
2. Ocean Choice International Ltd
3. Inshore Fisheries Ltd
4. Charlesville Fisheries Ltd
5. Nova's Finest Fisheries Ltd
6. Acadian Fish Processors Ltd
7. Fisherman's Market International Inc
8. James L. Mood Fisheries Ltd
9. O'Neil Fisheries Ltd
10. Doucet Fisheries Ltd
11. R. Baker Fisheries Ltd

4.1.3. Scope of Reassessment in Relation to Enhanced Fisheries

The fishery under reassessment is not an enhanced fishery.

4.1.4. Scope of Reassessment in Relation to Introduced Species Based Fisheries (ISBF)

The fishery under reassessment is not an Introduced Species Based Fishery.

4.2. Overview of the fishery

4.2.1. Biology of the target species

Taxonomy and geographic range

Atlantic haddock (*Melanogrammus aeglefinus*) is a member of the family Gadidae that consists of cod, hakes, pollock, and whiting among other species. They are considered one of the most important families of commercial fishes (FishBase, 2010). In the western north Atlantic, haddock occur from Cape Hatteras, North Carolina in the south to the Strait of Belle Isle, Newfoundland in the north (Needler 1931; Bigelow, H.B. and W.C. Schroeder. 1953; NOAA. 1999). Haddock stocks are most abundant in the areas off Cape Cod, the Gulf of Maine and Nova Scotia.

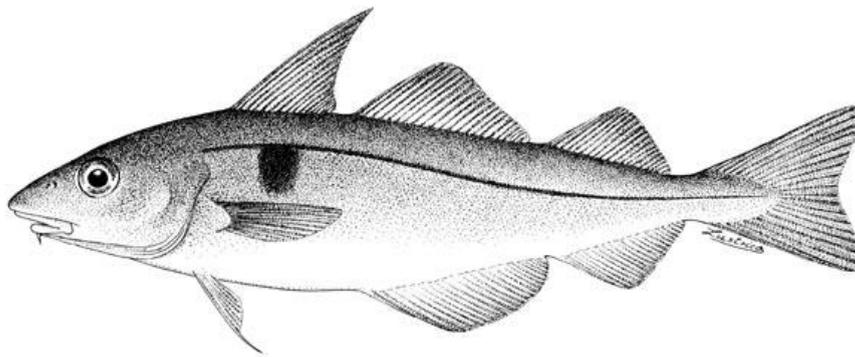


Figure 1. Atlantic haddock. Source: <http://www.fao.org/fishery/species/2228/en>

Stock structure

Combined information from demographic, recruitment, meristic, parasitic, and genetic studies as well as tagging investigations provide documentation of discrete haddock stocks, with major population divisions occurring between New England, Nova Scotia, and Newfoundland waters (Begg 1998; NOAA 1999).

Early Life History

After fertilization occurs, eggs become buoyant, and float on the surface where subsequent development occurs. Haddock eggs have a wide range of salinity tolerance. Early stage eggs concentrate near the surface, whereas later stages are distributed either uniformly over depth or with a sub-surface maximum. Larvae are generally pelagic at 10 m to 50 m depth over a period of three months or more. Juvenile haddock inhabit bottom habitats following the larval phase, but are found in shallower water on bank and shoal areas compared to larger adults that typically occur in deeper waters. Both juvenile and adult haddock rarely occur near ledges, rocks, kelp or soft oozy mud.

Maturity and Reproduction

Although haddock may mature earlier than 3 years, 50 % of females are mature by age 3 in 4X5Y while in 5Zjm nearly 100% are mature at age 3 (Begg 1998). Major spawning grounds for haddock on the Scotian Shelf are Georges Bank, Browns Bank Emerald, Western, and Sable Island Banks on the (Figure 2). Haddock form spawning aggregations at various times of the year, although a seasonal peak of spawning occurs on Georges Bank in late-March through April, and on Browns Bank from late April to early May (Brodziak 2005; DFO 2002b, 2005a) (Bigelow, H.B. and W.C. Schroeder 1953; NOAA 1999). Spawning occurs on rocks, gravel, smooth sand and mud (Klein-MacPhee 2002).

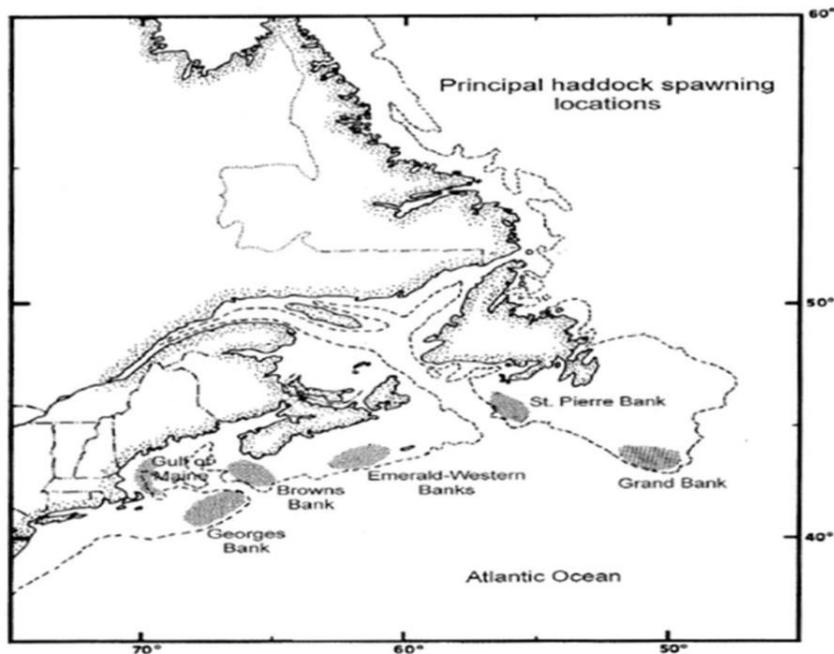


Figure 2. Main Haddock Spawning Banks in the North-west Atlantic Ocean.

Haddock have high reproductive capacity. Annual egg production for a mature female is approximately 850,000 eggs with the potential of producing up to 3 million. A female will spawn batches of eggs near the bottom over rocks, gravel, smooth sand and mud at 1 to 2 day intervals over a period of 2 to 3 weeks.

Age and Growth

Age and growth of haddock vary slightly among stocks (Begg 1998, Mohn & Simon 2002, DFO 2005a). It has been documented that Inshore Gulf of Maine (Div. 5Y) and offshore Georges Bank (Div. 5Z) haddock grow faster than those in coastal Nova Scotian waters and Browns Bank (Div. 4X), respectively (Begg 1998). Haddock from the western Scotian Shelf (Div. 4X) tend to be larger and older at maturation than those from Georges Bank (Div. 5Z) (Begg 1998), but smaller than those from St. Pierre Bank (Div. 3Ps). Several stock assessments also found on differences in growth between the Bay of Fundy and Scotian Shelf (Hurley et al 1996, DFO 2009, DFO 2011). Changes in fishing patterns may affect the development of the catch at age. It has also been suggested that selective fishing pressure may have reduced size and age at maturity of haddock in the Southern Scotian Shelf/ Bay of Fundy stock and size at maturity in Georges Bank haddock (Brodziak 2005; Mohn and Simon 2002). The growth rate or von Bertalanffy growth coefficient (k) for haddock is 0.12 – 0.23 and The L infinity is 51 – 86. The maximum known age for haddock is 14 years (Stevens 2004), but only a small proportion of haddock survive past age 9 (Brodziak 2005).

Mortality

Stock assessments for haddock currently assume a natural mortality rate of $M = 0.20$ constant across age and area (Hurley et al. 2005, Van Eckhaute et al. 2008).

Recruitment

Larval retention in suitable nursery habitats is an important determinant of the strength of haddock recruitment (the number of individuals surviving until the size of entry into the fishery) (Brodziak 2005). Scotian Shelf distributions of haddock larvae are associated with gyres that tend to concentrate and retain offspring over relatively shallow banks of the shelf, thereby playing a functional role in maintenance of stock integrity (O'Boyle et al., 1984; Smith, 1989). Campana et al. (1989) discussed potential mechanisms of larval transport dynamics suggesting that larval drift and retention processes occur jointly on the permanent, tidally induced, clockwise gyre around Browns Bank to retain some larvae on the bank, while

transporting others towards inshore waters and to the Bay of Fundy, creating a single retention zone or unit stock throughout this region (Div. 4X).

Frank (1992) proposed a density-dependent dispersive model suggesting juvenile haddock of strong year classes disperse from the spawning grounds in Division 4VW and move or travel to the spawning grounds of Division 4X, thereby promoting stability on Division 4X populations. Smith and Morse (1985) found that haddock eggs and larvae originating on Georges Bank, Gulf of Maine, and Scotian Shelf spawning grounds do not intermix, and hence, are geographically isolated and constitute separate stocks.

Haddock recruitment in Georges Bank is highly variable, characterized by periods of low recruitment that are interrupted by exceptionally high years. For example, low recruitment on Georges Bank for the past 40 years has been marked or interrupted by a few extremely high years in 1963, 2000 and 2003.

4.2.2. Fishing area

The Canada Scotia-Fundy Haddock Fishery takes place in two principle areas: the Southern Scotian Shelf and Bay of Fundy areas and the eastern portion of Georges Bank (5Zjm) area (Figure 3).

Southern Scotian Shelf and Bay of Fundy (4X5Y) Fishery (Figure 3 left panel)

The Southern Scotian Shelf and Bay of Fundy Haddock fishery is part of a multi-species groundfish fishery where fishermen use otter trawl (OT) gear or fixed gears (e.g. baited hook and line (HL), gillnets (GN) during the fishery season from April 1st to March 31st. The 4X5Y Haddock stock is comprised of the entirety of NAFO Division 4X, as well as the portion of NAFO Division 5Y which lies within Canada's Exclusive Economic Zone (Figure 3). Haddock is the target of a commercial, recreational, and aboriginal food, social and ceremonial fishery in this area.

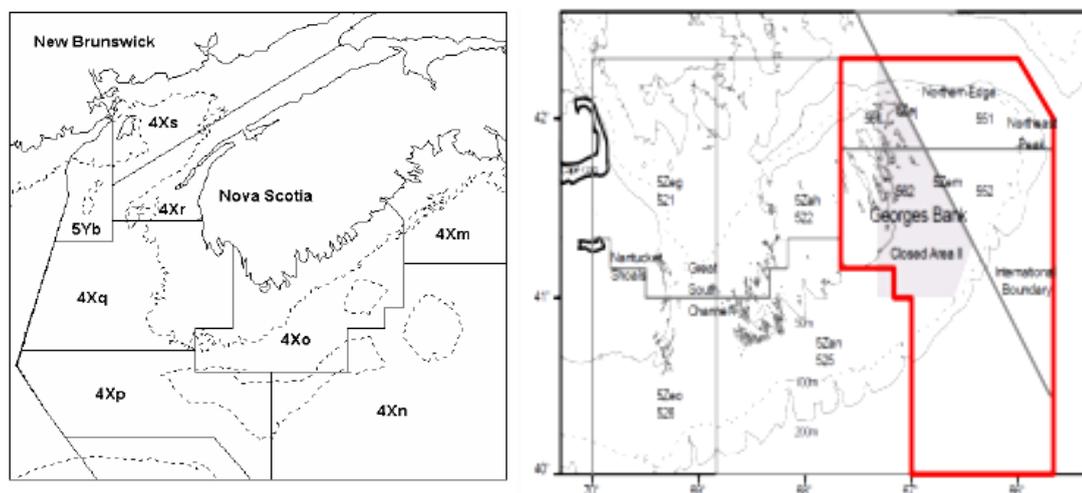


Figure 3. 4X5Y Haddock stock area (left panel) and Eastern George Bank 5Zjm (right panel).

Eastern Georges Bank 5Zjm Fishery (Figure 3 right panel)

Haddock is the preferred species in the multi-species groundfish fishery on Eastern Georges Bank. The Eastern Georges Bank Haddock stock is comprised of NAFO Division 5Zjm (Figure 3 right panel) and is a transboundary resource managed collaboratively with the United States by the Transboundary Management Guidance Committee (TMGC).

4.2.3. History of the Scotia-Fundy Haddock Fishery

The groundfish fisheries in Atlantic Canada have existed since colonial times targeting mainly Atlantic Cod. Since then fishing methods have changed substantially starting from hook and line on small sailing dories, to otter trawls and bigger fisher vessels (Klein-MacPhee 2002; Stevens 2004). After World War I, fishermen targeted a wide variety of groundfish species, including haddock. Groundfish landings declined during World War II and then increased in the 1960s, largely due to effort by foreign European trawlers (Stevens 2004). After the creation of a 200-mile Exclusive Economic Zone (EEZ) along Canada's coastline in 1977, the domestic fishing fleet grew substantially. In the last two decades excessive fishing pressure, led to severe overfishing of many groundfish stocks, including haddock. Over the past decade, haddock populations have begun to recover and based on recent assessment results are currently not considered overfished.

4.2.4. Catches

Landings and the Total Allowable Catch (TAC) for haddock from NAFO division 4X5Y are shown in Figure 4 for 1970 – 2012. Haddock landings between 1975 and 1985 ranged from 17000 mt to 32000 mt , peaking around 32,000 mt in 1985. Landings declined sharply to 5,000 mt in 1993. Since then, landings have fluctuated between 5,000 and 8,000 mt (Figure 4).

Groundfish fisheries off the coast of Atlantic Canada have been regulated since 1977. Haddock fisheries have been managed using quota regulations since the 1970's (<http://www.dfo-mpo.gc.ca/fm-gp/sustainable-durable/fisheries-peches/haddock-aiglefin-eng.htm>).

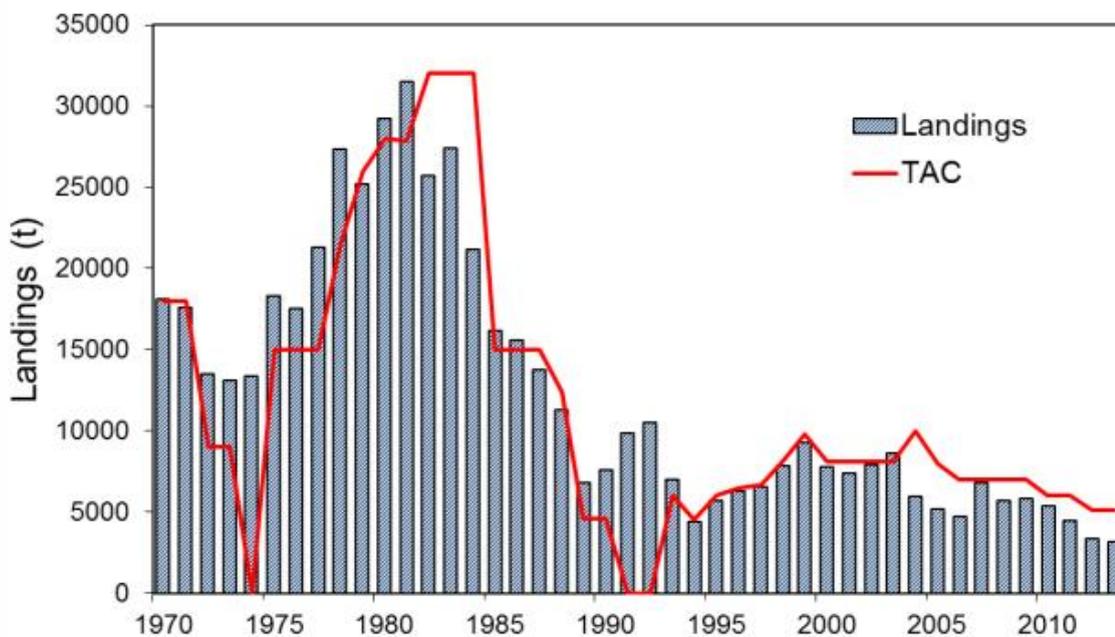


Figure 4. Haddock landings in NAFO Division 4X5Y 1970 – 2013.

Haddock landings since 1968 from NAFO Division 5Zjm are shown in Figure 5. Canadian landings have been much higher than US landings since the mid-1980s. Canadian landings since 2005 have ranged between 13,000 and 18,000 mt.

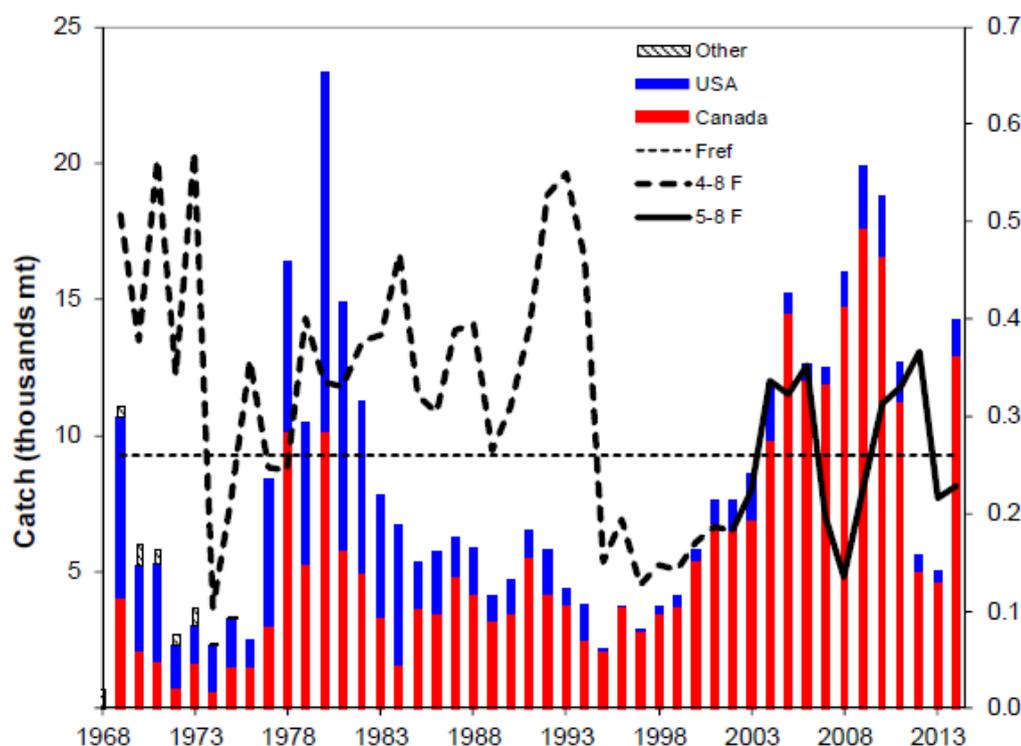


Figure 5. Haddock landings in NAFO Division 5Zjm 1968 – 1970.

4.2.5. Fishing season

The fishing year in 4X5Y is defined as April 1st to March 31st. In 5Zjm, the fishing year is the calendar year, January 1st to December 31st.

4.2.6. Fishing method and fleet description

The Canadian fishery for haddock is primarily undertaken using otter trawls (OT) and bottom longlines (LL), followed by gillnets (GN) and handlines (HL); the Otter Trawl fleet (mobile gear) accounts for the majority of landings (80 %). In 2013 – 2014, the otter trawl sector landed 60 % of the 4X5Y haddock TAC and 67 % of the 5Zjm haddock TAC. Hook size, mesh size and net construction are regulated by license conditions to meet individual fisheries conservation objectives such as minimum fish size and escapement of incidental catch.

Otter Trawl

The otter trawl is a large, usually cone-shaped net, which is towed across the seabed. The forward part of the net – the ‘wings’ – is kept open laterally by otter boards or doors. Fish are herded between the boards and along the spreader wires or sweeps, into the mouth of the trawl where they swim until exhausted. They then drift back through the funnel of the net, along the extension or lengthening piece and into the Cod-end, where they are retained.

Between the doors and trawl is 45.7 m - 54.9 m of rubber-covered bridles depending on the trawl design. The only parts of the gear that touch the benthos are the trawl door keels, bottom bridles between the net and doors and the rock skipper gear that bounces off the bottom as the gear is towed.

Longline

Long-lining is one of the most fuel-efficient catching methods. This method is used to capture both demersal and pelagic fishes including swordfish and tuna. It involves setting out a length of line, possibly as much as 50-100 km long, to which short lengths of line, or snoods, carrying baited hooks are attached at intervals. The lines may be set vertically in the water column, or horizontally along the bottom. The size of fish and the species caught are determined mainly by hook size and the type of bait used although location of set is also important. In 4X5Y there may be between 400 and 500 hooks per tub and between 25 and 80 tubs per boat. For fishing operations in 5Zjm there are 300 hooks per tub and 80 to 90 tubs per vessel.

Gillnet

Gillnets are walls of netting which may be set at or below the surface, on the seabed, or at any depth in-between. Gillnetting is probably the oldest form of net fishing, having been in use for thousands of years. True gillnets catch fish that attempt to swim through the net, which are caught if they are of a size large enough to allow the head to pass through the meshes but not the rest of the body. The fish then becomes entangled by the gills as it attempts to back out of the net. The mesh size used depends upon the species and size range being targeted.

Gillnet fishermen normally use 40 nets with an overall length up to a maximum of 50 fathoms (91.4 m). The net is made of polyethylene and mesh size is restricted to a minimum of 140 mm. It is anchored to the bottom and marked by surface buoys. In 5Zjm there is a requirement that gillnets must be tended.

Hook and Line

Handlining involves a series of baited hooks, weighted on the bottom which are lowered to within reach of the bottom and "jigged" or moved up and down. The size of the fish can be regulated by the size of the hook and type of bait to some degree. Hand lines are usually hauled by hand, although in some fisheries automatic reels have been tested. The usual number of hand lines per vessel is five.

Gear Management Measures

Management measures in 4X5Y include mesh-size restrictions on otter trawls (130-mm square mesh) and gillnet (5½" mesh size), hook-size (12 mm gape) restrictions on bottom-longlines. Both the Client and DFO report that the fishery continues to operate in an orderly manner and that measures with respect to mesh size and hook size are being followed. The most current statistics indicate that reported landings are within prescribed quota and TAC limits. The majority of landings are confirmed by a third-party, independent mandatory dockside monitoring program. This OT fleet operates exclusively under well-established Individual Transferable Quota (ITQ) and Enterprise Allocation (EA) Programs. Over time, the number of vessels with haddock landings from both areas have been reduced.

In 2014, the OT fleet began testing 145 mm diamond mesh and 125 mm square mesh nets for targeting haddock in 5Zjm. The main purpose of the testing is to determine if these mesh size variations improve catch rates while maintaining similar haddock size composition and to identify any changes to by-catch rates from the normally authorized 130 mm square mesh. The testing is conducted with at-sea observers recording catch, bycatch, and size composition.

4.2.7. Market information

Atlantic haddock (*Melanogrammus aeglefinus*) is a mild white fish known for its excellent table quality. Fresh haddock has a fine white flesh and can be cooked in a similar manner to cod. Haddock is an excellent source of low-fat protein and is high in magnesium and selenium. Small fresh haddock and cod fillets are often sold as scrod. The term "scrod" refers to the size of the fish which have a variety of sizes, i.e. scrod, markets, and cows.

In Canada, the responsibility for the fish and seafood industry is divided between the Department of Fisheries and Oceans (DFO) which manages the production component of the business (that is, fish - whether wild or farmed - when they are in the water) and Agriculture and Agri-Food Canada (AAFC) which provides export market-development support for a wide variety of Canada's food and beverage products, including fish and seafood.

According to DFO, seafood is among the country's most valuable food commodity exports. Nearly two-thirds of Canada's exports are to the US; other important consumers of Canadian seafood include various European countries and Japan.

Haddock is available in Atlantic Canada in many forms including fresh or frozen, as bait, boneless, cooked, dressed, fillets, salted, smoked, steaks, or whole. In recent years, haddock has accounted for only a minor proportion of Canada's total fish and seafood exports (0.81 % in 2014, 0.8 % in 2015) (Anon. 2007a), reflecting the overall decline in groundfish. Among groundfish species, however, haddock is relatively important. In 2015, Canada exported 4,278 mt of haddock, while in 2014, 4,476 mt were exported (Anon. 2015a). Canada imports almost as much haddock as it exports. Canada imported 5,798 mt of haddock in 2015, and 9,118 mt in 2014 (Anon 2015a). In 2015, the United States imported approximately 3,774 mt of Canadian haddock valued at \$13,750,963 which represents 20% of the haddock imported to the United States (NMFS 2015). The United States fishery landed 4,530 mt of haddock in 2014 (NMFS 2015).

4.3. Principle One: Target Species Background

4.3.1 4X5Y

4.3.1.1 Stock assessment

Opening notes

A recent framework assessment for the haddock fishery was published in June 2015 (DFO 2015); however, given that this assessment was published several months after the final scoring of the fishery, and is not complete as updated reference points, harvest control rules and projections results are not yet available. It is anticipated that the assessment will be completed at a DFO workshop in Fall 2015. Therefore, the CAB decided to use the 2012 stock assessment to evaluate the fishery and will utilize this new assessment during the next surveillance audit.

Catch at age data

The status of the 4X5Y haddock stock was most recently assessed in January 2012 (DFO 2012) to provide science advice for the 2012/2013 and 2013/2014 fishing years. It had previously been assessed in November 2009 (DFO 2010). The assessment included the summer research vessel (RV) survey data up to July 2011 together with commercial landings data and port sampling for the first half of 2011. As in previous assessments, haddock caught by Canadian fishers in Division 5Y are included in the 4X5Y haddock management unit. Given that haddock grow faster in the Bay of Fundy than in the southern Scotian Shelf, landings from Divisions 4Xmnop and 4Xqrs5Y are treated separately in the development of the catch at age inputs for the population model. Annual weight/length parameters are calculated from the summer RV survey for each stock component each year. Age composition is generated by applying age-length keys to length frequencies. Separate age-length keys are used for landings from the two areas, designated Bay of Fundy and Scotian Shelf, respectively (Figure 3). The catch at age, from landings and port sampling data, is calculated separately for each area and then combined to get the total catch at age for 4X5Y. Similarly, haddock catches from the summer RV survey on the Scotian Shelf (strata 470 – 481) and in the Bay of Fundy (strata 482 – 495) are treated as separate components and subsequently combined to produce numbers at age for the entire survey area.

Abundance Data

Summer Research Vessel Survey

A stratified random design bottom trawl RV survey of the Scotian Shelf and Bay of Fundy has been conducted every summer since 1970. Three vessels and two types of gear have been used. From 1970 to 1981 the survey was conducted by the RV *A.T. Cameron* using a Yankee 36 otter trawl. The *Alfred Needler* replaced the *Cameron* in 1982, and the survey has since been conducted using a Western IIA bottom trawl. In 2004 and 2007, the survey was conducted using the *Teleost* instead of the *Alfred Needler*. Based on an analysis of comparative fishing experiments by Fanning (1985), a conversion factor of 1.2 is required to calibrate the abundance series prior to 1982 to account for the effect of vessel and gear changes between the *A.T. Cameron* and the other two vessels. An analysis of comparative fishing experiments showed no conversion factor was required between the *Teleost* and *Alfred Needler* for haddock (Fowler and Showell 2009).

Industry Survey

A standardized groundfish survey has been conducted in 4X by the Individual Transferable Quota (ITQ) mobile gear <65' fleet since 1995. Sampling since 1996 has been sufficiently standardized for abundance estimates. The survey is conducted in July at about the same time as the summer RV survey by three commercial trawlers. All three vessels use a standardized Balloon 300 trawl equipped with a codend liner of the same mesh size as used by the summer RV survey. A fixed station design, based on the summer RV survey strata is used and standardized tows are made. The ITQ survey covers the entire 4X area including

a large inshore area off southwest Nova Scotia that is not covered by the summer RV survey. Abundance and biomass indices are not calculated separately for Bay of Fundy and Scotian Shelf tow

Description of Model

A traditional age-based Sequential Population Analysis using the ADAPT framework (Gavaris 1988) was used to produce estimates of population abundance in numbers. In addition to a base model, three other models were developed to explore some alternative assumptions (Mohn et al. 2010). The most recent assessment of stock status used the base model only (Showell et al. 2013).

The SPA model used is as follows:

The population model was expanded to estimate ages 11-13 rather than stopping at age 10. The catch is assumed to be known without error and the model was tuned to both the summer RV survey and the ITQ survey.

Parameters:

Population numbers at mid-year: $N_{i,2010}$ where $i = \text{ages } 2 - 13$

Calibration coefficients: $q_{1,i}$ where $i = \text{ages } 2 - 13$ for summer RV survey

$q_{2,i}$ where $i = \text{ages } 2 - 13$ for ITQ survey

Structure Imposed:

Error in catch assumed negligible

Partial recruitment fixed for age 1 in 2009

F on oldest age (13) set as average F of ages 9 – 11 adjusted by the partial recruitment of age 13 in 2010

No intercepts were fitted

$M = 0.2$ for all ages

Input:

$C_{i,t}$ where $i = \text{ages } 1 - 13$; $t = \text{years } 1970 \text{ to } 2010$ - catch at age for entire year

$J_{i,t}$ where $i = \text{ages } 2 - 13$; $t = \text{years } 1970 \text{ to } 2010$ - summer RV survey index

$ITQ_{i,t}$ where $i = \text{ages } 2 - 13$; $t = \text{years } 1996 \text{ to } 2010$ - ITQ survey index

Objective function:

$$\text{Minimise } \{ \sum \sum (\ln J_{i,t} - \ln q_{1,i} N_{i,t})^2 \} + \{ \sum \sum (\ln ITQ_{i,t} - \ln q_{2,i} N_{i,t})^2 \}$$

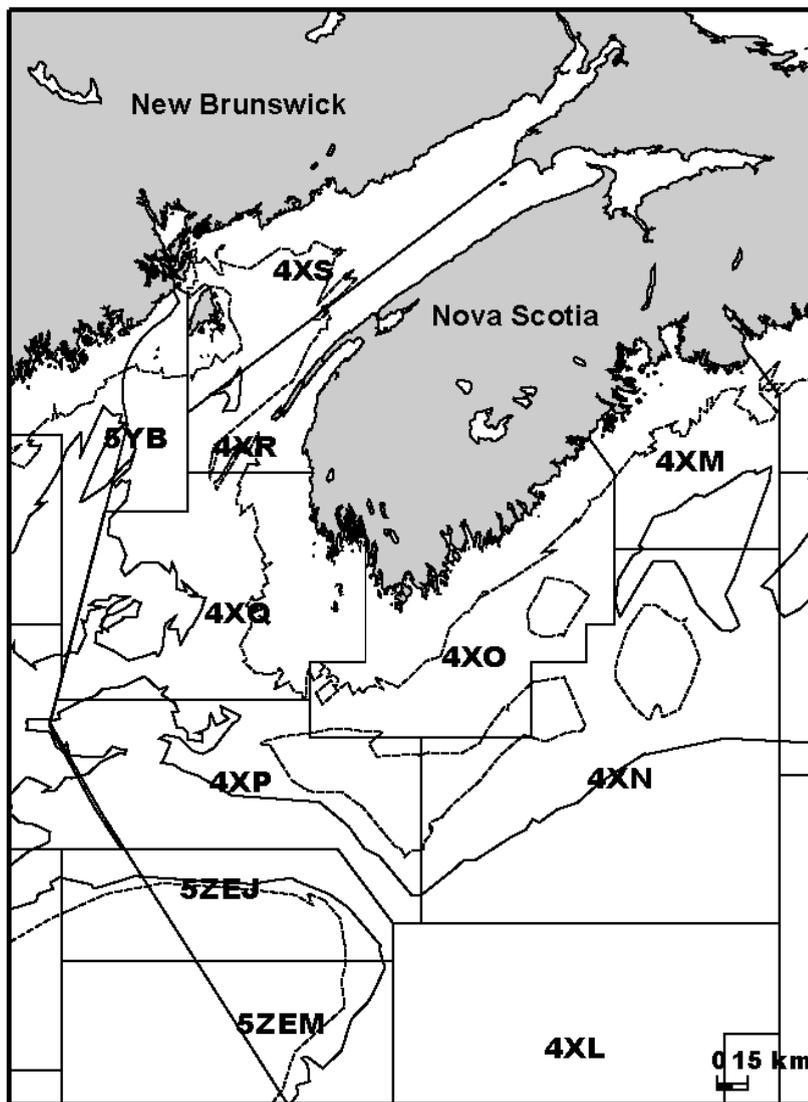


Figure 6. Map of NAFO statistical fishing areas in the Bay of Fundy and western Scotian Shelf. Haddock landed from statistical areas 5ZEM and 5ZEJ are not included in the 4X5Y haddock stock assessment.

4.3.1.2 Stock status

Catch

Haddock is harvested as part of a mixed, multi-species fishery that includes other groundfish such as cod, halibut, redfish, pollock and flounders, adding uncertainty in identifying a 'haddock' fishing trip. Consequently, catch is reported for all groundfish trips for mobile and fixed gear. To some extent the haddock fishery is limited by the incidental catch of cod. There are strict cod by-catch limits and haddock fishers choose time, location and methods to avoid interacting with cod. An increasing number of fishers are using separator panels to reduce cod by-catch, equipment that is mandatory on Georges Bank (Division 5Z). A seasonal spawning closure, instituted in 1970, currently extends from February 1st to June 15th. The history of this area closure is documented by Halliday (1988).

The TAC for haddock was 7,000 mt from 2006 to 2009, but was lowered to 6,000 mt for the 2010 and 2011 fishing years (Figure 7). Catches have been lower than the TAC, averaging approximately 5,700 mt since 2005. Landings in the fishing years ending 31 March 2010 and 2011 were 5,831 mt and 5,370 mt, respectively, relative to TACs of 7,000 mt and 6,000 mt. TAC in the 2011/12 fishing year remained at 6,000 mt. It was reduced by 15 % to 5,100 mt for the 2012/2013 and 2013/2014 fishing years.

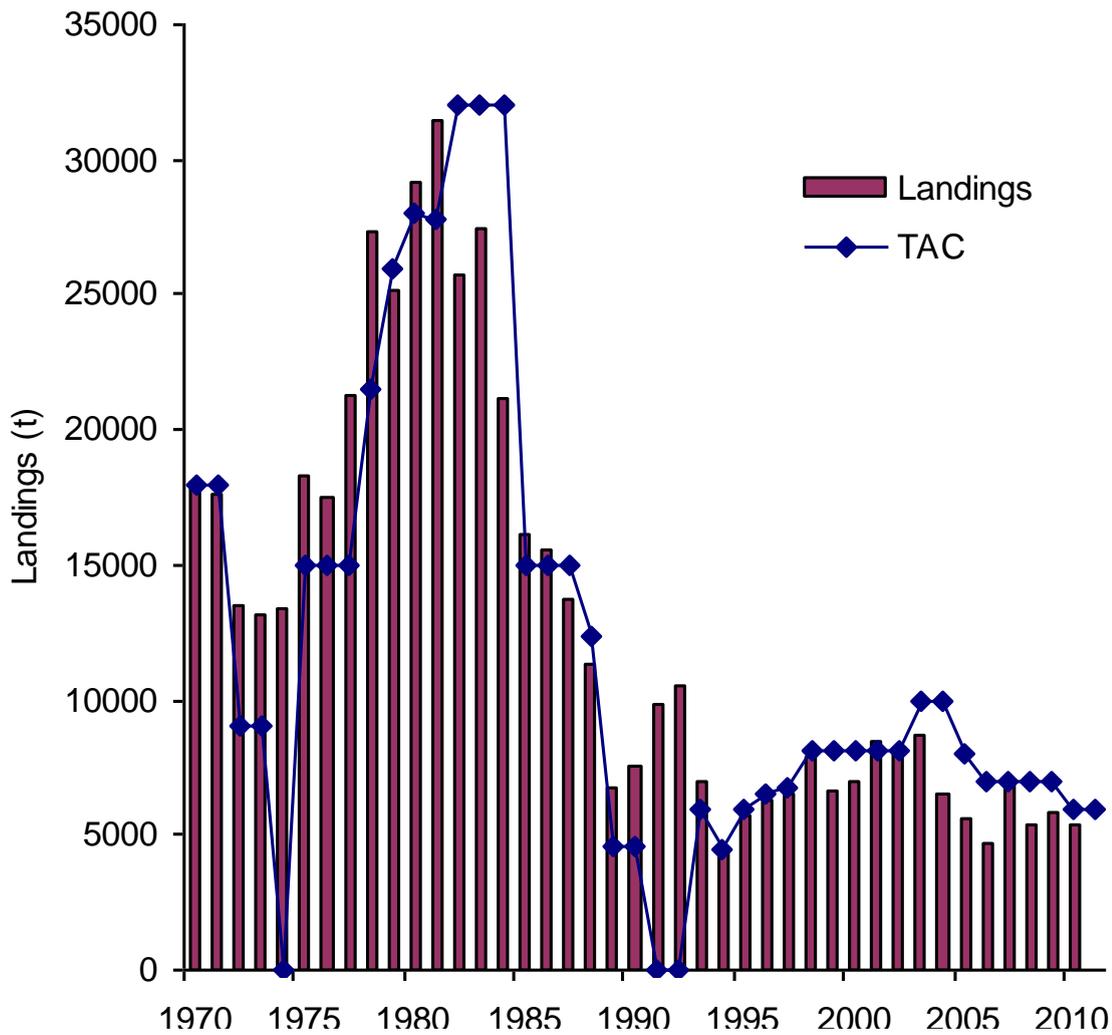


Figure 7. 4X5Y Landings and TAC from 1970 through 2011.

Stock Status

A stratified random design bottom trawl RV survey of the Scotian Shelf and Bay of Fundy has been conducted every summer since 1970. Survey trends in both numbers and biomass show relatively high abundance in the early to mid 1980s, followed by a decline to relatively low levels over the period 1987 – 1994. Abundance increased in 1998 – 2001, but declined subsequently (Figure 8) and has been relatively stable for the past eight years. The 2011 biomass index (47,874 mt) was below the short (5 year: 50,470 mt), medium (15 year: 51,434 mt), and long-term (since 1970: 56,686 mt) averages (Figure 8). The biomass index has been relatively stable over the past eight years.

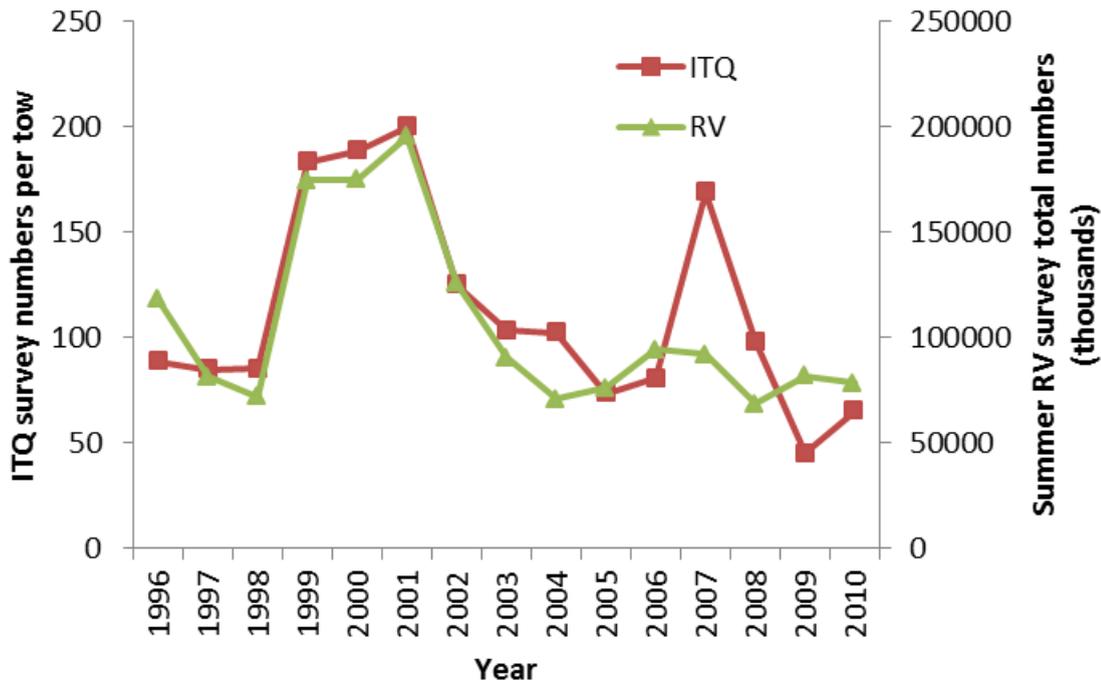


Figure 8. Comparison of trends in abundance of 4X5Y haddock caught in the summer RV (total numbers) and ITQ surveys (numbers per tow) from 1996 – 2010).

The proportion of the historical stock area encompassing 75% of the annual estimated survey biomass was calculated as an index of spatial distribution (Figure 9). The index declined in the late 1980s and early 1990s, but has increased subsequently, indicating that the 4X5Y stock is widely distributed within its range.

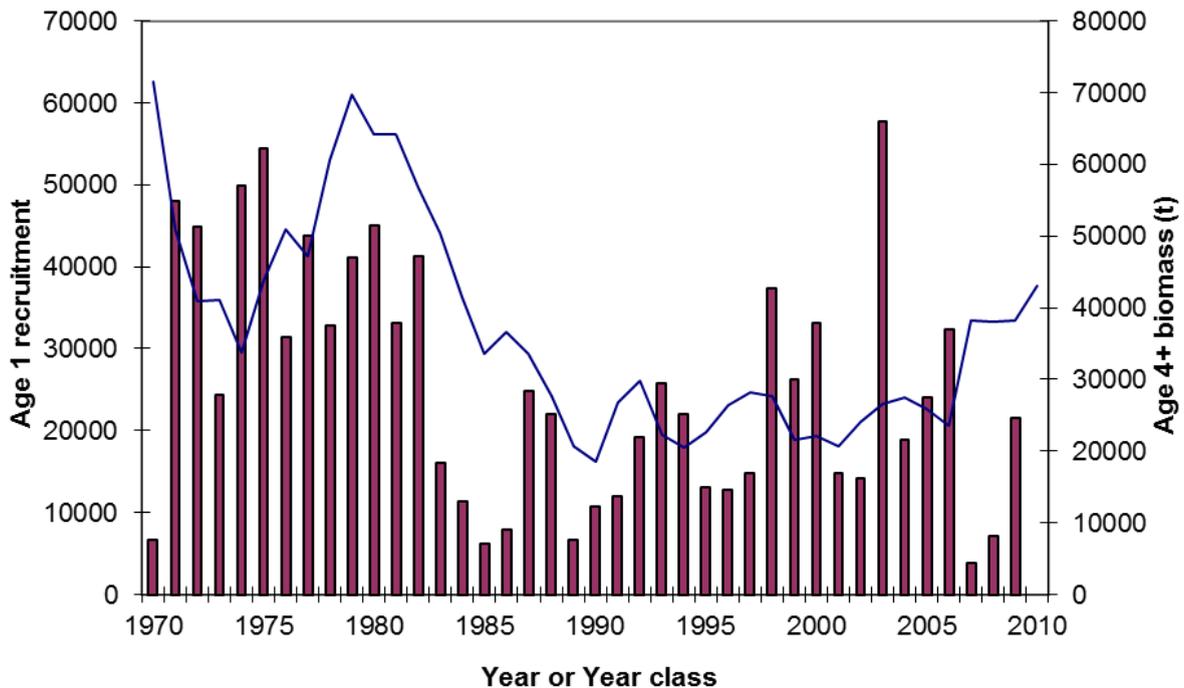


Figure 9. Spawning stock biomass (ages 4+ in tons) (line) and numbers of age 1 (bars) predicted for 4X5Y haddock from the population model from 1970 – 2010.

There are continuing strong retrospective patterns in the model, and poor model fit to survey indices in addition to significant sign of trending in the fits (Figure 10, Figure 11). The strong retrospective patterns in F and SSB reflect mismatch between the survey indices and catch information (Figure 10). Nevertheless, the model indicates that SSB has remained relatively stable over the past two decades and suggests an increase in SSB (age 4+) in the past few years, however, the strong retrospective pattern (tendency of the model to overestimate biomass and underestimate F) indicates that the recent values are likely overestimates.

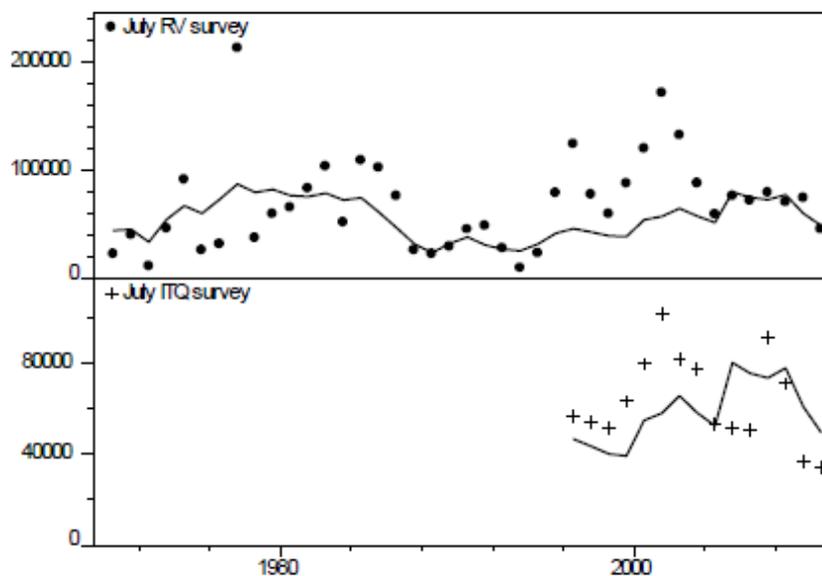


Figure 10. Population numbers x103 (ages 2 – 10) estimated from the model and the q-adjusted RV (upper) and ITQ (lower) surveys.

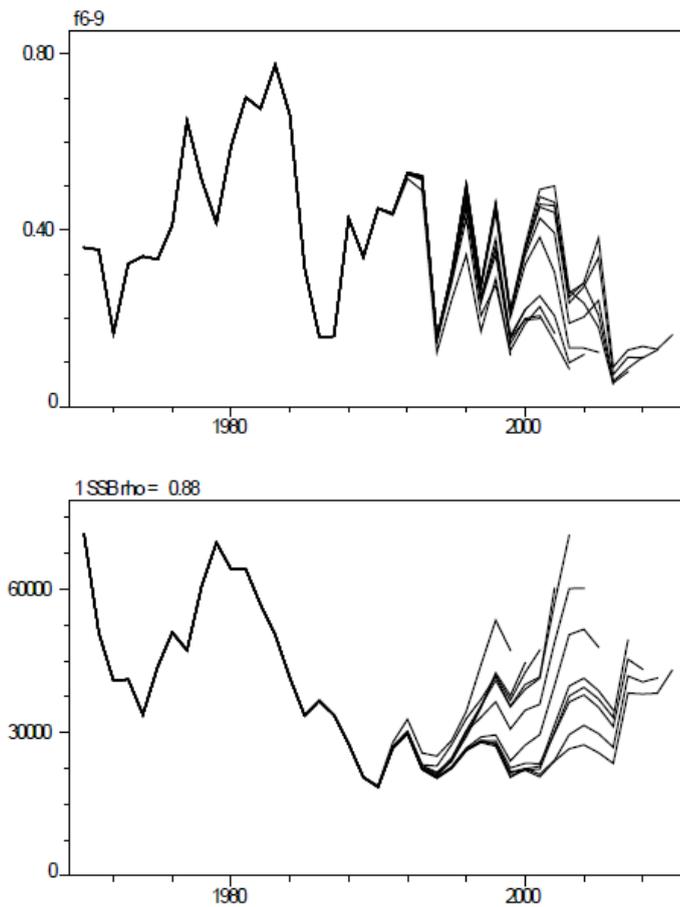


Figure 11. Retrospective patterns for the population model. Top panel shows trends in fishing mortality F for ages 6 – 9. Bottom panel shows trends in SSB.

Since the 1970s – early 1980s period, SSB for most years has been between the B_{USR} and B_{LIM} reference points, with some improvement in recent years. Thus the SSB of 4X5Y haddock is considered likely to be within the ‘cautious’ zone, that is, between the LRP and USR, and unlikely to be in the critical zone. However, careful interpretation of these results should be exercised given the notable sources of uncertainties in the assessment; for example disagreement between the survey and ITQ indices in the recent years. The SSB from the model shows a significant decline in SSB between 2006 and 2007. Finally the degree of retrospective pattern is strong and may possibly overestimate SSB and subsequently affect the assessment of the true stock status.

A review of the assessment framework for this stock has started and is expected to be completed by October 2015. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review.

Model results indicate that fishing mortality for fully recruited ages has been near or below $F=0.25$ ($F_{0.1}$) over the past 20 years (approximately an exploitation rate of 21 – 22%; (Figure 12).

Although the model results were considered insufficient to provide meaningful projections for 2013 and 2014, for illustrative purposes, if the Mohn’s Rho correction of 0.17 is applied to the model estimate (i.e., SSB in the past three years is reduced by 17% in an effort to account for the retrospective), and catches of 5,500 mt in 2012 (expected catch), 3,254 mt in 2013 ($F=0.25$), and 3,226 mt in 2014 ($F=0.25$) are assumed, SSB is projected to fall between the LRP and USR in 2012, 2013 and 2014. Given the ongoing mortality of the strong 2003 and 2006 year classes, the poor 2007 and 2008 year classes and limited growth of 4+ fish, it is expected that SSB would decline in 2013 and 2014 without any fishing.

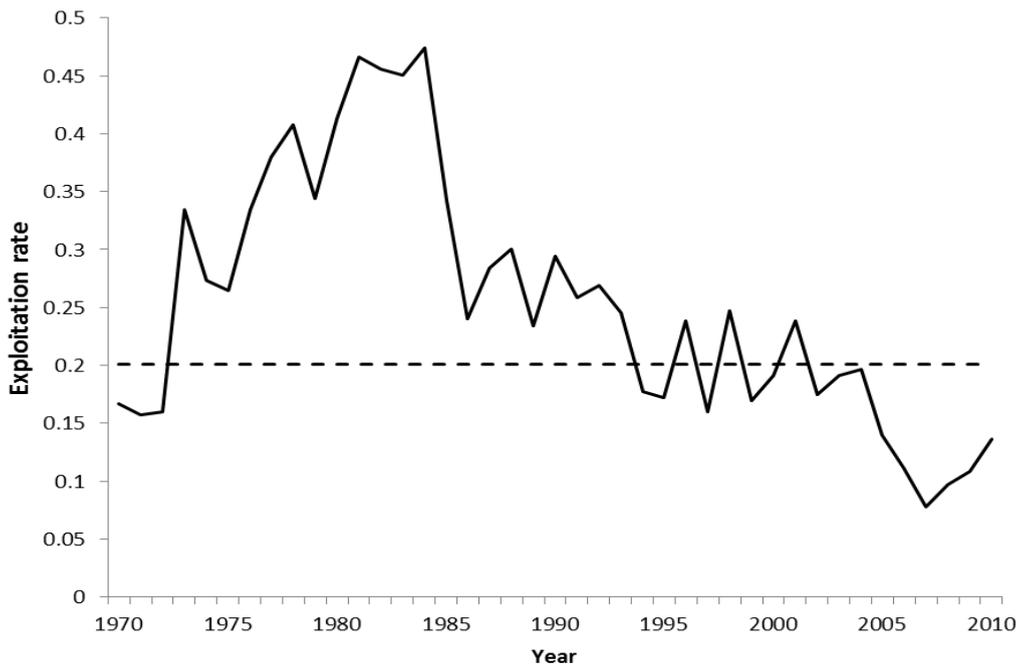


Figure 12. Averaged exploitation rate for ages 5-7 of 4X5Y haddock from 1970 to 2010 from the population model using 13 age groups. $F_{0.1}$ indicated by dashed line.

Armstrong and risk plots have been used in previous assessments to estimate the impacts of harvest levels. The projected yield at $F=0.25$ ($F_{0.1}$) is 4,500 t, while a harvest at F_{msy} would represent a catch of about 7,500 t (Figure 13). There is a 50% probability that fishing mortality will exceed $F_{0.1}$ at harvest levels above 3,800 t (Figure 14).

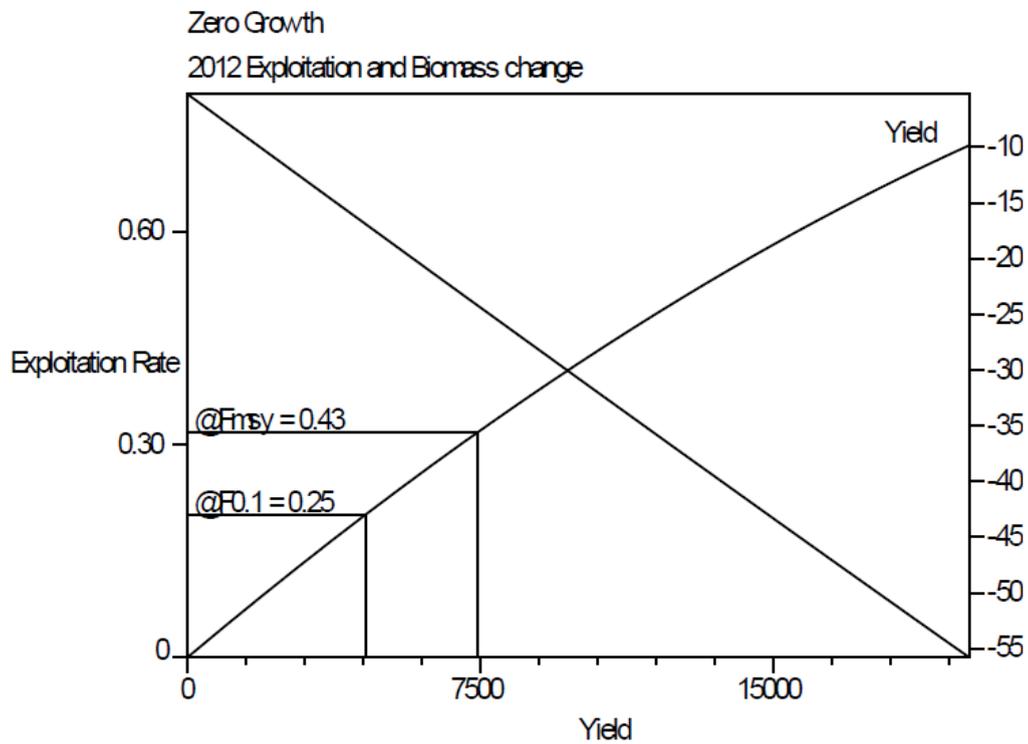


Figure 13. Armstrong plot showing trajectories of exploitation rate (left vertical axis) and change in spawning stock biomass (right vertical axis) at various levels of yield in 2012 with consequences of no fishing, fishing at $F_{0.1}$ and fishing at F_{msy} .

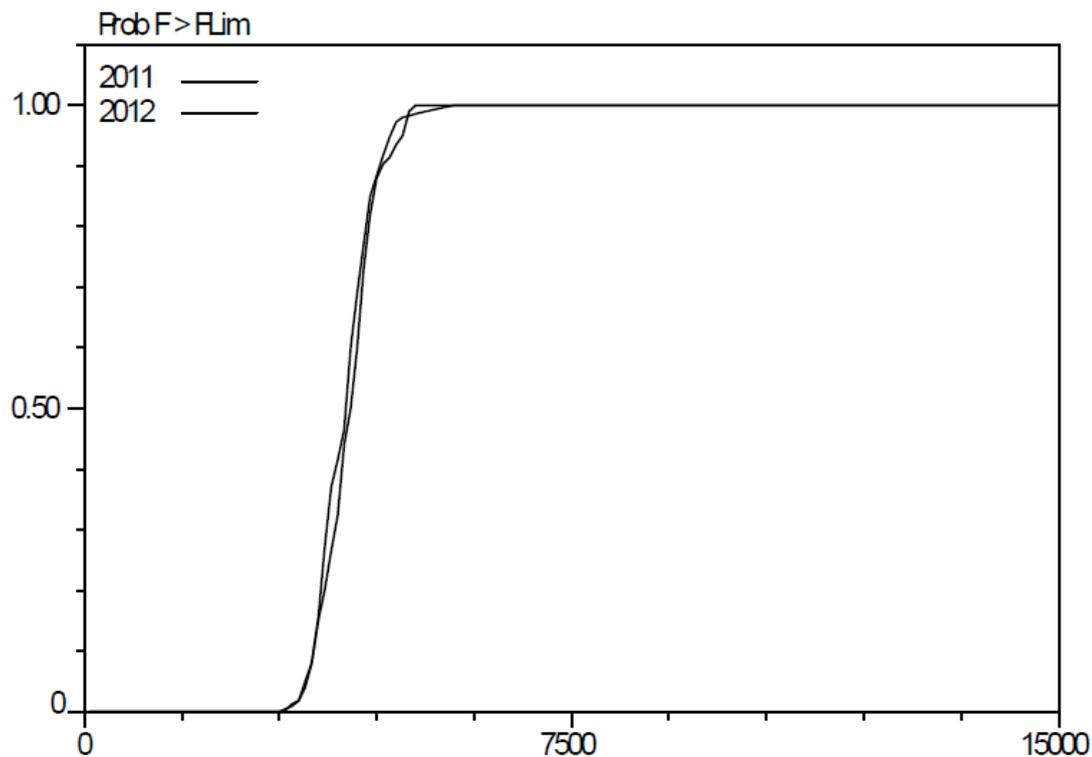


Figure 14: Probability that $F_{0.1}$ will be exceeded at levels of yield in 2011 and 2012.

Recruitment

Recent recruitment has been variable. The 2003 to 2006 and 2009 year classes were good but the 2007 and 2008 year classes were poor. The 2009 and 2010 year classes are strong and started contributing significantly to the SSB (4+) in 2013 and 2014. The 2013 RV survey indicates increased SSB over 2012. The survey index indicates further increase to 42,883 t in 2014, just below the 2009 – 2013 average (DFO 2015). The survey abundance at length in 2010 and 2011 were above the long-term average for lengths less than 12 cm and these small fish were especially abundant in 2013. Prospects for strong recruitment for both the Bay of Fundy and Scotian Shelf stock components are very good.

Both length/weight at age and condition (predicted weight at 43 cm; DFO 2013) of haddock in the Bay Fundy and the Scotian Shelf components have declined since the early 1990s. Many ages are at or near the smallest size observed in the RV time series. The weight at age of 3 year olds declined slightly but the decline in older fish has been more dramatic. Currently, the weight of a 7-year old is roughly equivalent to that of a 3-year old in the 1970s and early 1980s. An index of fish condition, predicted weight at 43 cm calculated from the summer RV survey has shown a decreasing trend since the early 1980s (Figure 15). This index shows that, as well as getting smaller at age, fish are getting emaciated.

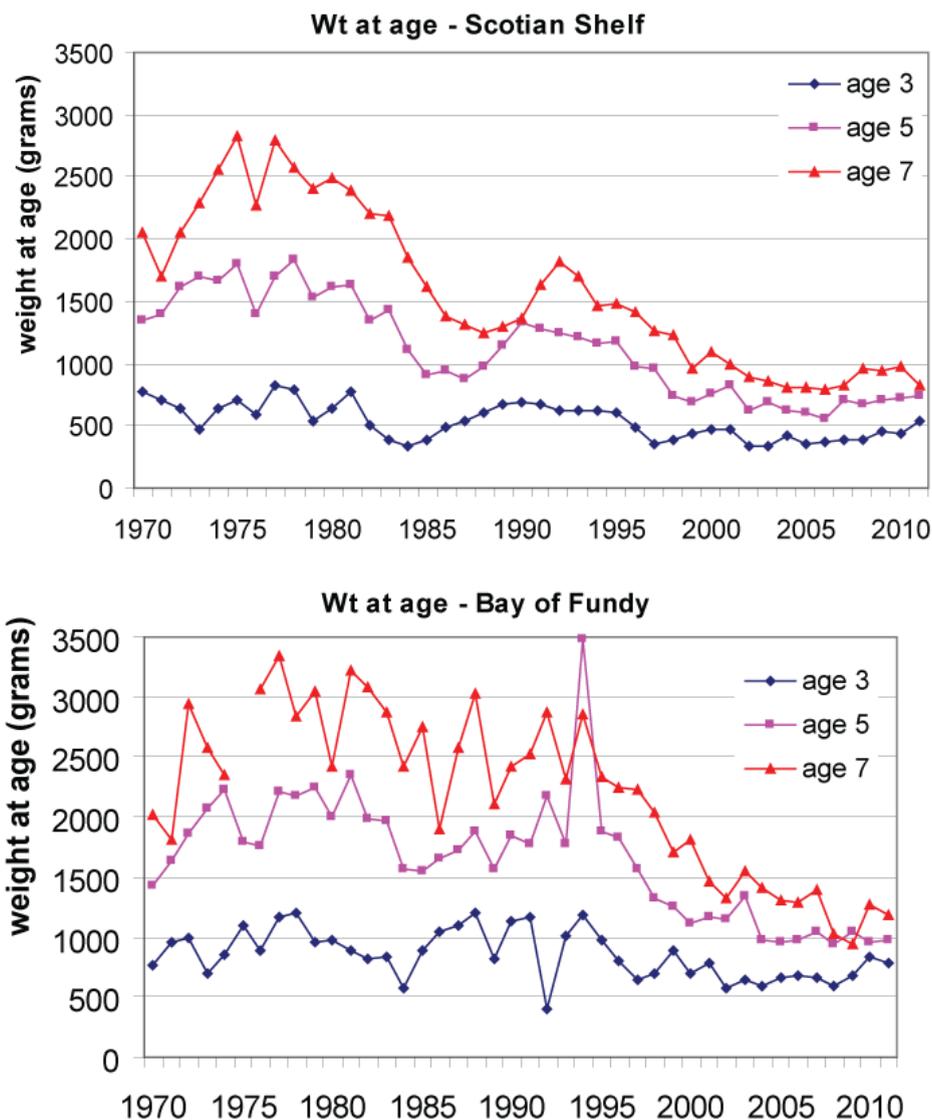


Figure 15. Mean weight at age (g) for Scotian shelf (top) and Bay of Fundy (bottom) 4X5Y haddock in the summer RV survey from 1970-2010.

4.3.1.3 Uncertainties

There are differences in growth between the Bay of Fundy and Scotian Shelf portions of this resource. Changes in fishing patterns may affect the development of the catch at age. Further, statistical areas and survey strata definitions of the respective areas are not identical.

From 2003 – 2008, mobile gear landed fish from the Bay of Fundy and the edge of Georges Bank and Browns Bank on the Scotian Shelf, while fixed gear landings were from the edge of Georges, Browns Bank and near Halifax. The distribution of the fishery has changed in the last decade with effort shifting from the Bay of Fundy to NAFO Unit Area 4Xp. About 80 – 90 % of the 4X5Y haddock fishery is on the Scotian Shelf and only about 10 % of the landings are from the Bay of Fundy. About 50 % of the haddock landings have come from Unit Area 4Xp in the last four years. This reflects directing for larger haddock in deeper water. Of the 4Xp landings, a substantial proportion (15 – 20%) was caught very close to the 4X/5Z boundary. It is unknown whether this is a fishery effect or a change in haddock distribution. An unknown amount of Georges Bank (5Z) fish may be caught along this line and at present, there is no established method to estimate the degree to which this may be occurring. The influence on model projections or advice is unknown.

The fishery is dominated by the mobile gear sector (variable, but >80 % of landings in some years). Fixed gear landings are primarily from longlines, with gillnets and handlines contributing a minor proportion of the total. The selectivity of the fishery may have changed as the proportion of the landings from mobile and fixed gear has changed or the as the gear has been modified over time. Changes in the geographic and seasonal distribution of the fishery, resulting from gear conflict with the lobster fishery starting in about 2002, may have affected the catch-at-age.

Recent changes in management have had a significant impact on the timing of the fishery. The change to an April-March fishing year in 2000 resulted in an increase in the proportion of fish landed during January to March. Both the mobile gear and fixed gear sectors indicate this is due primarily to the ability to direct for haddock with a minimal bycatch of cod. This change in timing of the fishery has been part of the changes in the distribution of catches. The increasing proportion of the catch from 4Xp is largely a result of the increase in the Winter fishery.

Both length/weight at age and condition of haddock in the Bay Fundy and the Scotian Shelf components have declined since the early 1990s. Many ages are at or near the smallest size observed in the RV time series. The production model analysis using moving windows identifies a change in the biology, specifically changes in recruitment and growth, but the projection model does not fully incorporate these changes. Furthermore, the reasons for the dramatic changes in growth or recruitment are not fully understood at present. As with previous assessments of this resource, the model residuals show some strong year effects, with positive residuals at all ages in some years and negative residuals at all ages in other years. The strong retrospective pattern seen in the SSB reflects a mismatch between the survey and catch information.

4.3.1.4 Reference points

A harvest strategy compliant with the Precautionary Approach would include the adoption of two biomass reference points, a Limit Reference Point (LRP) and an Upper Stock Reference (USR), which would divide stock abundance into three zones: critical, cautious and healthy (Figure 16). The LRP is the stock level below which productivity is considered sufficiently impaired to cause serious harm but is above the level where the risk of extinction becomes a concern. The USR is defined as the stock level below which the removal rate is reduced from the reference level.

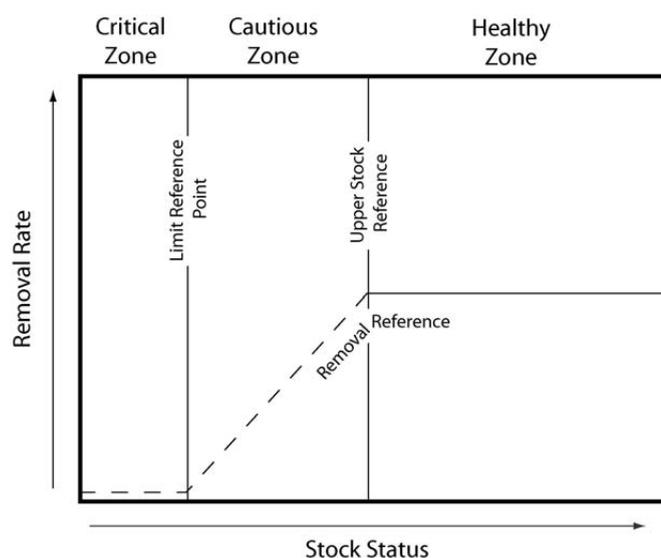


Figure 16. Illustration of a fisheries management framework consistent with the Precautionary approach.

When the spawning stock biomass (SSB) is above the USR, the exploitation rate is set at the removal reference level. If the SSB declines below the USR, a harvesting strategy compliant with the Precautionary Approach would progressively reduce the exploitation rate to promote stock growth to above the USR. Finally, if the SSB declines below the LRP, then removals from the stock should be kept to the lowest level possible.

Spawning stock biomass values below the USR represent undesirable stock levels. In some fisheries, target reference points are also used to maintain the stock at a level to achieve desired objectives, the latter taking into account a combination of biological and socio-economic considerations. These target reference points are never below the USR value (DFO 2006).

A Sissenwine-Shepherd production model was run using the population estimates from the model (Figure 17) using the entire summer RV survey time series. The model estimated Maximum Sustainable Yield (MSY) at 14,700 mt, SSB at MSY (SSB_{MSY}) at 52,000 mt, and F_{MSY} at 0.43. Biological reference points of 40% (20,800 mt) and 80% (41,600 mt) of SSB_{MSY} were suggested as the limit reference point (LRP) and upper stock reference (USR). For most of the years, SSB is between the B_{USR} and B_{LIM}, with some improvement in recent years (Figure 18). A target removal reference of 0.25 (F_{0.1}) was suggested. Despite uncertainties in the fit of the population model, the SSB of 4X5Y haddock is considered likely to be within the ‘cautious’ zone, that is, between the LRP and USR, and unlikely to be in the critical zone.

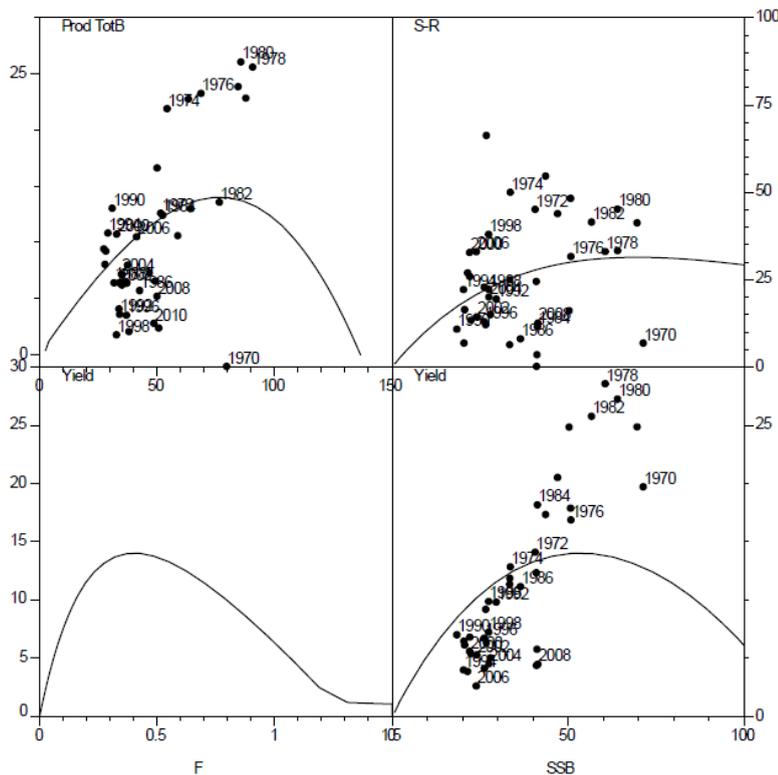


Figure 17. Sissenwine-Shepherd production model for 4X5Y Haddock. The upper left plot is production as a function of total biomass with the equilibrium line shown. The peak of this line at 14,700 t is MSY. The upper right plot is a stock-recruit relationship showing a Ricker curve. The lower left plot is yield (1,000 t) as a function of fishing mortality, and it shows F_{MSY} at about 0.43 and the lower right plot is yield as a function of spawning stock biomass.

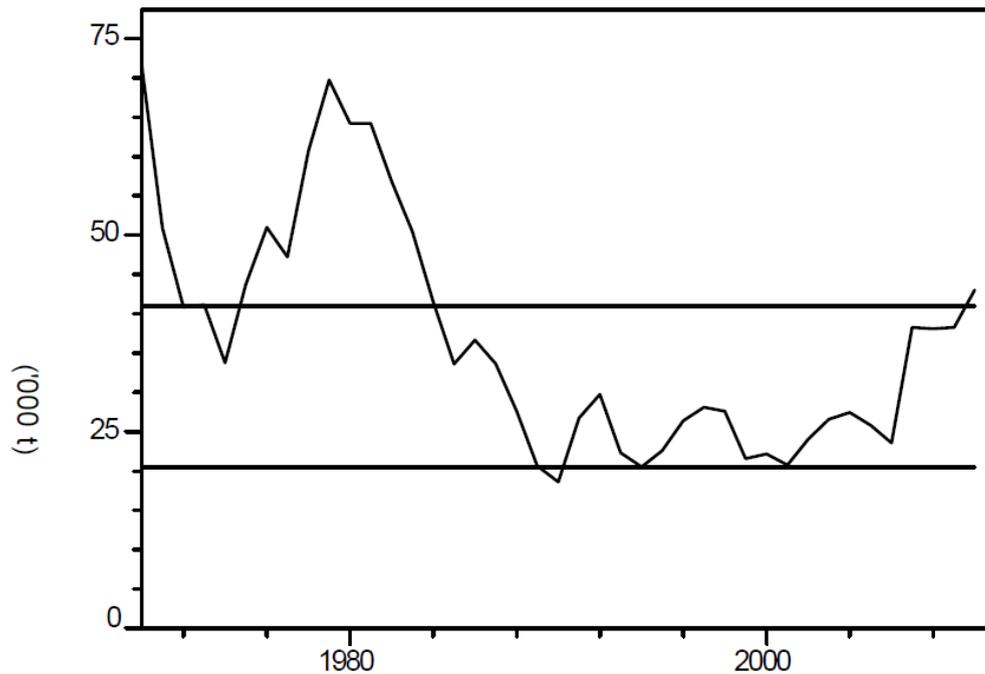


Figure 18. History of spawning stock biomass for 4X5Y Haddock with biological reference levels shown. The upper line is 0.8 of SSB_{MSY} and is the upper stock reference (USR). The lower line is the 0.4 SSB_{MSY} is the limit reference point (LRP).

4.3.1.5 Harvest Strategy, Harvest Control Rules and Tools

Haddock is harvested as part of a multi-species groundfish fishery. Participants are authorized to use otter trawl gear or fixed gears (e.g. baited hook and line, gillnets) to fish for haddock during the season which commences on April 1st and concludes on March 31st. The majority is caught using mobile gear. The 4X5Y haddock stock is comprised of the entirety of NAFO Division 4X, as well as the portion of NAFO Division 5Y which lies within Canada's Exclusive Economic Zone. Haddock is the target of a commercial, recreational and food, social and ceremonial (FSC) fishery.

Gears used to prosecute the fishery tend to capture a variety of groundfish species, irrespective of the target species. Conservation Harvesting Plans indicate which species may be the target of a directed fishery and set out the measures that apply to non-target species (e.g. Cusk, White hake, Monkfish). All non-groundfish species must be returned to the water, with the exception of those species whose retention is specifically permitted within licence conditions.

TAC management was introduced to the fishery in 1970. Biological reference points were introduced in 2012 as a basis for a Precautionary Approach to management. The harvest strategy is to maintain fishing mortality of 4X5Y haddock at a moderate level by using the reference points and risk tolerances to determine harvest control rules as follows:

- The TAC may be set with a neutral (50%) probability of exceeding the fishing mortality target reference (F_{REF}) when it is above the upper stock reference (USR).
- The TAC may be set with a low (less than 25%) probability of exceeding the fishing mortality limit reference ($F_{LIM}=F_{MSY}$) when the SSB is above B_{MSY} .

- The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A harvest strategy of F_{REF} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example.
- When the SSB is below the limit reference point (LRP), the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75 %). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline.

Catch monitoring within the commercial groundfish fishery has many components. All vessels are required to hail-out to the Department (DFO) prior to departing on a fishing trip and are also required to hail-in from sea prior to returning to port. The hail-in is captured by a third-party, independent dockside monitoring company who records information on the vessel as well as the catch on board. A variety of information such as effort, species composition, location of fishing activities, ETP interactions etc, must also be reported to the Department in fishery monitoring documents completed by the captain for each trip.

The majority of the commercial groundfish fleet is required to carry Vessel Monitoring Systems (VMS) on board when on a fishing trip. The VMS units transmit positional information to a communication service provider who, in turn, makes the information available to the Department.

The majority of 4X5Y haddock landings are monitored at the dockside point of offloading by dockside monitors; these monitors verify the weight and the species of fish offloaded.

The most reliable estimates of incidental catch in the multi-species groundfish fishery are obtained using data collected by at-sea observers. However, given continuing low observer coverage for all fleets within the 4X5Y fishery, estimates are not precise. To improve estimates of incidental capture of both target and non-target groundfish, as well as non-groundfish species, improved at-sea catch monitoring/reporting is required.

The disparity of low quotas for some species compared to the relatively high 4X5Y haddock quota may constrain the ability of industry to effectively harvest all haddock quota. This may lead to discarding fish at sea, an activity which is not permitted under the Regulations. Enhanced at-sea monitoring is required to detect this activity.

There is a regulated spawning closure on Browns Bank that occurs yearly from March 1 to May 31. Through licence conditions, this spawning closure was extended to include the period from February 1 to June 15. The intent of the closure is to minimize disturbance during spawning in an attempt to minimize any impact on spawning success.

Sharing arrangements for the 4X5Y Haddock stock are stable, with each commercial fleet receiving an allocation of the TAC each season, based on the percentages outlined in Table 2. The TAC applies to the commercial fishery only. Allocations are transferable within fleets and between fleets, subject to the Atlantic Canada Groundfish Transfer Guidelines.

Table 2. Percentage shares by fleet of the 4X5Y Haddock Total Allowable Catch.

Fleet Sector	Share
Fixed Gear 65' – 100'	0.56%
Mobile Gear 65' – 100'	0.56%
Offshore >100' *	4.85%
Mobile Gear <65'	52.36%
Aboriginal	8.20%
Fixed Gear 45' – 65'	4.21%
Fixed Gear <45'	29.26%

* The offshore quota will revert to the former 1984 proportional share of the TAC if and when the TAC increases to 25,000 mt.

To ensure effective management, periodic reviews of management measures are required. There are two forums through which this takes place for the 4X5Y haddock fishery: the Regional Advisory Process (RAP) and the Scotia-Fundy Groundfish Advisory Committee (SFGAC).

Through the RAP, an evaluation of many of the strategies and tactics can be conducted to determine whether they are appropriate to meet overall objectives related to productivity, biodiversity and habitat. However, it is crucial that the appropriate information is collected and provided to the Department to conduct this evaluation. This includes catch and effort information from the fisheries and regular standardized surveys of the population. A framework assessment meeting is tentatively scheduled for the 2016/17 planning year. Through the SFGAC, a scheduled management performance review will occur every four years with the next due in the 2016/17 planning year.

4.3.2 5Zjm

4.3.2.1 Stock assessment

Assessment Model and Abundance Indices

Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch (including discards). The VPA is calibrated to standardized trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Robustness testing includes model fit diagnostics and retrospective analyses are conducted to detect any tendency to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates.

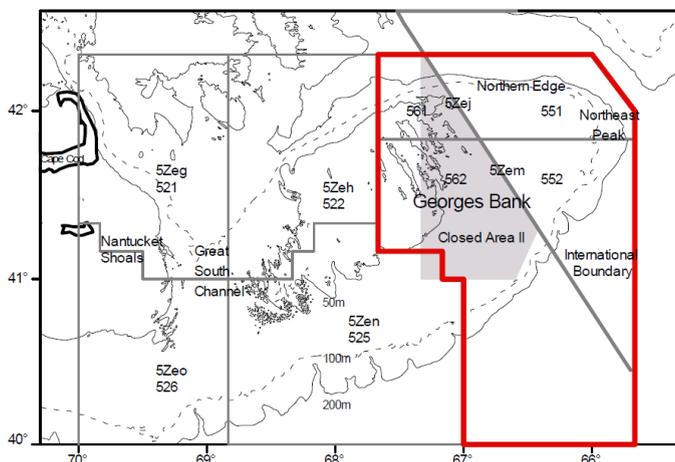


Figure 19. Fisheries statistical unit areas in NAFO Subdivision 5Ze (The Eastern Georges Bank management unit is outlined by the red line).

4.3.2.2 Stock status

Catch

Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Conservation Harvesting Plans indicate which species may be the target of a directed fishery and set out the measures that apply to non-target species (e.g. Cusk, White hake, Monkfish). All non-groundfish species must be returned to the water, with the exception of those species whose retention is specifically permitted within licence conditions.

Under the Canada – US Transboundary Resources Understanding for groundfish stocks, both countries are responsible for accounting for all fishing mortality under the respective country quota. Canada now accounts for two sources of fishing mortality on 5Zjm Haddock: landings from the directed groundfish fleet and also estimated legal discards from the offshore scallop fleet, the latter fleet that catches these stocks as an incidental catch. Recognizing that discards by the offshore scallop fishery were a significant source of fishery removals and that a strategy to cover these using in-season Canadian quota was desired, in 2006 the existing fleet shares were adjusted to create a bycatch reserve. Each season, 1.031 % of the Haddock quota for Canada is allocated to the bycatch reserve. Given that the offshore scallop fishery is required to return haddock to the water, it is a straight-forward process to use information gained from the observed scallop trips to estimate how much haddock has been discarded by the fleet throughout the entire season; this estimate is considered catch and counted against the bycatch reserve.

With the high haddock quotas available and the constraints of a low cod quota, it is suspected that groundfish fishers are likely illegally discarding cod in order to be able to extend the season for haddock fishing. A process has been in place since 2006 to estimate the amount of cod that is illegally discarded on Georges Bank. This is in addition to the mandatory use of a separator panel when fishing with otter trawl. The process to estimate the illegal cod discards during the groundfish fishery is to compare the cod to haddock ratios on the observed trips to the ratio on the unobserved trips. If no discarding was taking place, the ratios would be expected to be similar. However, when they are significantly different, discarding is assumed to have taken place and an estimate is provided, which is then added to the landings by the fleet.

For 5Zjm haddock, there is a regulated spawning closure on Georges Bank that occurs yearly from February 2 to June 1st. Through licence conditions, this spawning closure has been extended to include a period beginning in early February. The exact date selected uses a protocol incorporating spawning condition from previous years with the goal of closing when 30 % of the haddock are in spawning condition; in 2012, the fishery closed on February 6th.

Under restrictive management measures, combined Canada/USA catches declined from 6,504 mt in 1991 to a low of 2,150 mt in 1995, varied between about 3,000 mt and 4,000 mt until 1999, and increased to 15,257 mt in 2005 (Figure 20). Combined catches then decreased to 12,510 mt in 2007 but increased to 19,855 mt in 2009 and decreased the following years and were 5,066 mt in 2013.

The Canadian catch in 2013 decreased to 4,631 mt from 5,064 mt in 2012. The weight of all Canadian landings was monitored at dockside. Discards in the groundfish fishery are considered to be negligible. Discards of haddock by the Canadian sea scallop fishery ranged between 29 mt and 186 mt since 1969 and were 10 mt in 2013.

USA catches decreased from 569 mt in 2012 to 435 mt in 2013. Landings in 2013 were 344 mt and discards were estimated to be 91 mt (primarily from the otter trawl fishery with a small amount, 6 mt, from mid-water trawlers. Landings are reported by dealers and discards are estimated from at-sea observer data. .

The combined Canada/USA fishery catch (landings + discards) in 2013 was dominated by the 2010 year class (age 3) by numbers and weight. Both the Canadian and the US fisheries were sampled to determine length composition of the catch.

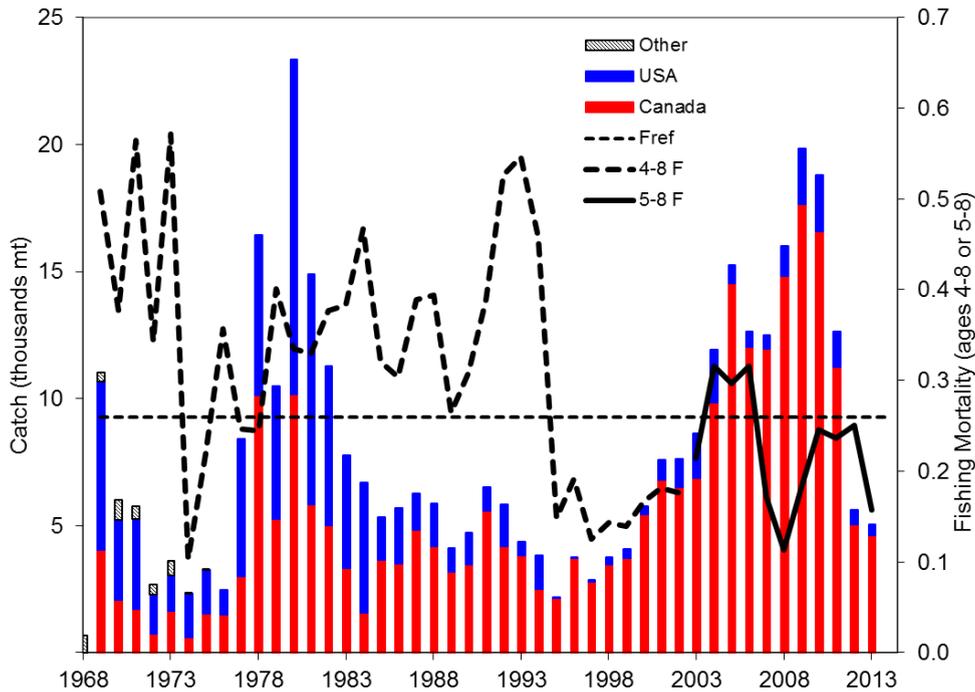


Figure 20. Catches (bars) and fishing mortality (line) 5Zjm Haddock; (F for ages 4-8 for 1969 – 2002 and ages 5-8 for 2003 – 2013).

Stock Status

Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that used fishery catch statistics and sampling for size and age composition of the catch for 1969 to 2013 (including discards) (TRAC 2014) . The VPA is calibrated to trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Robustness testing includes model fit diagnostics and retrospective analyses are conducted to detect any tendency to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates. Retrospective analysis showed lower biomass, higher F and lower recruitment for several years of the analysis, however, differences were not considered sufficient to warrant a rho adjustment in the retrospective analysis to reduce the degree of bias in estimates associated with the retrospective pattern in the latest assessment (TRAC 2014).

Fishing mortality (population weighted for ages 4-8) fluctuated between 0.27 and 0.47 during the 1980s, and increased in 1992 to 1994 to about 0.5, the highest observed. After 2002, the age at full recruitment to the fishery has been at age 5 (rather than age 4 previously) due to a decline in size at age of haddock. Fishing mortality (population weighted for ages 4-8 prior to 2003 and ages 5-8 for 2003-2013) was below $F_{REF} = 0.26$ during 1995 to 2003, fluctuated around 0.3 in 2004 to 2006, but has subsequently been below F_{REF} and was 0.16 in 2013 (80 % confidence interval: 0.14 – 0.20, Figure 20).

Recruitment

Several large recruitment events since 1990, lower exploitation, and reduced capture of small fish in the fisheries allowed the adult population biomass (ages 3+) to increase from near a historical low of 10,300 mt in 1993 to a historical high of 160,300 mt (80 % confidence interval: 123,500 mt – 206,400 mt)

at the beginning of 2014 (Figure 21). The more than doubling of the adult biomass after 2005 was due to the exceptionally strong 2003 year class, currently estimated at 243 million age 1 fish. The current estimate for the 2010 year class is 334 million age 1 fish, which would make it the largest cohort in the assessment time series: 1931 – 1955 and 1969 – 2013. The preliminary estimate for the 2013 year class is 1,546 million age 1 fish, the largest in the time series. Except for the strong 2000 and 2011 year classes and the exceptionally strong 2003, 2010 and 2013 year classes, recruitment has fluctuated between 2.1 and 27.3 million since 1990.

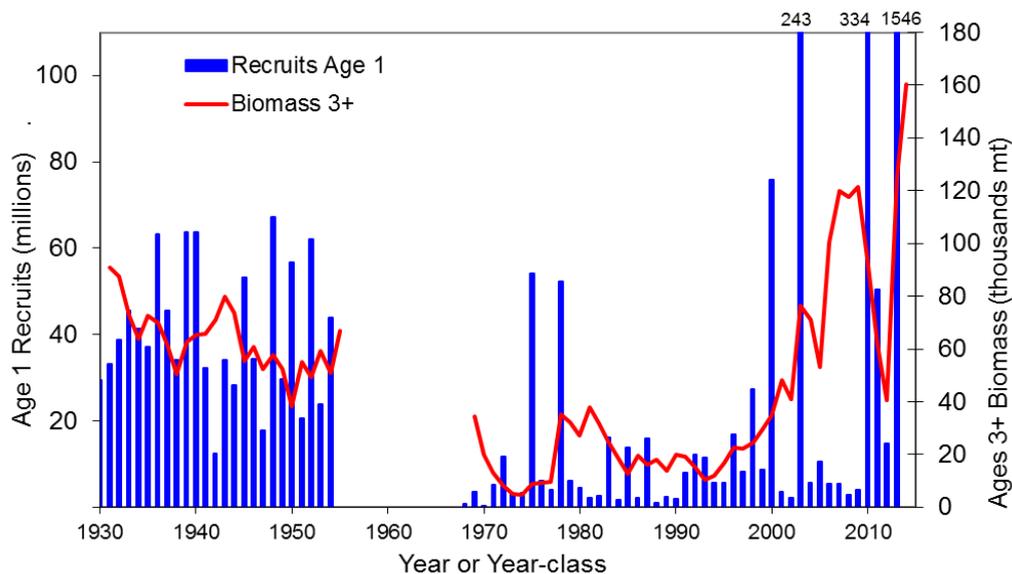


Figure 21. Biomass (line) and recruitment (bars) 5Zjm Haddock.

Recruitment, as well as age structure, spatial distribution and fish growth reflect changes in the productive potential (TRAC 2014). Recruitment, while highly variable, has generally been higher when adult biomass has been above 40,000 mt, which has been the case since 2001 (Figure 22). The population age structure displays a broad representation of age groups, reflecting improving recruitment and lower exploitation since 1995. The spatial distribution patterns observed during the most recent bottom trawl surveys were similar to the average patterns over the previous ten years. There has been an overall decline in weights at age since the late 1990s in the Scotian Shelf area and since the mid-1990s in the Bay of Fundy (TRAC 2014). The 2003 year class reached its maximum growth potential at a smaller average size than year classes from the 1990s. The 2010 year class is showing similar growth to the 2003 year class. Fish condition as measured by Fulton’s K derived from the DFO survey and the NMFS fall survey has generally been below the time series average since 2000 (TRAC 2014).

The primary processes that comprise the production response are growth, age at maturity, natural mortality and recruitment. As this may be used to evaluate harvest strategies, the fisheries exploitation pattern or Partial Recruitment (PR) by age is also a factor. There is no evidence for this stock of natural mortality and age at maturity changes. The relationship between length at age and year class strength has shown density dependent effects on fish growth. With management regulations intended to reduce the catch of younger fish after 1994 and with fish size changes since the early 2000s, the fishery fully recruited age shifted from age 3 in 1969 – 1994 to age 4 in 1995 – 2002, and age 5 in 2003 – 2010. If recent changes in size at age are assumed to be a density dependent effect, then these effects are transient, meaning that the stock could return to earlier conditions and no productivity regime change is considered to have occurred.

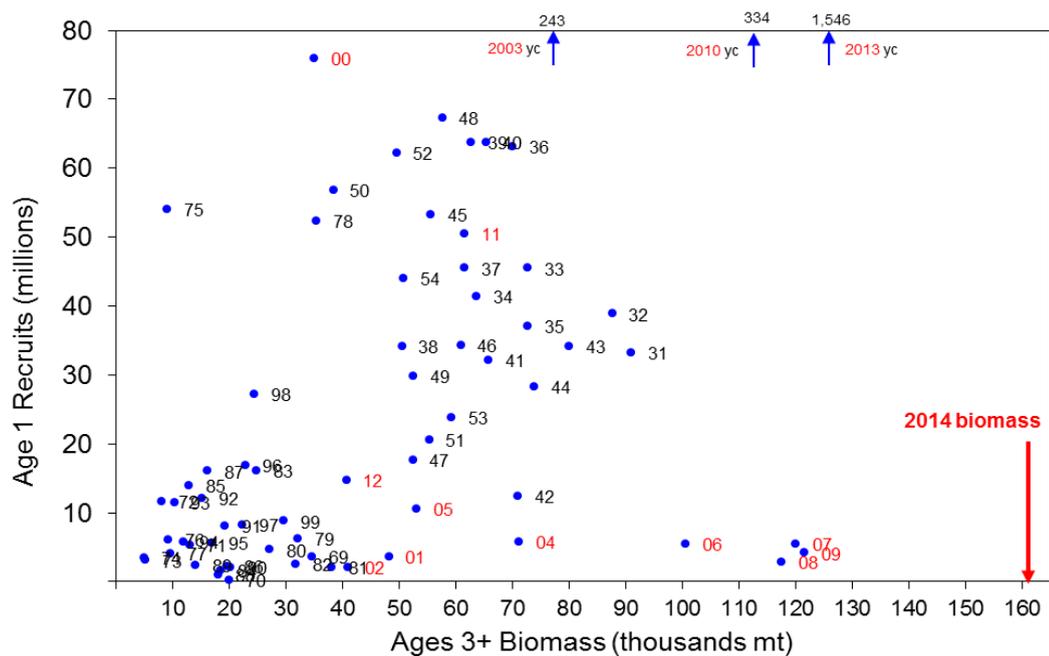


Figure 22. Haddock Stock recruitment patterns in 5Zjm.

Outlook

Uncertainty about current biomass generates uncertainty in forecast results, which is expressed as the probability of exceeding $F_{REF}=0.26$ and change in adult biomass from 2015 to 2016. The risk calculations assist in evaluating the consequences of alternative catch quotas by providing a general measure of the uncertainties. However, the risk calculations are dependent on the data and model assumptions and do not include uncertainty due to variations in weight at age, partial recruitment to the fishery, natural mortality, systematic errors in data reporting or the possibility that the model may not reflect stock dynamics closely enough.

For projections, the most recent 3-year survey and fishery average weights at age were used as inputs. Fishery partial recruitment (PR) was based on the 2003 to 2013 population weighted average except for age 4 where the 2003 year class value was used. The PR on the age 9+ group was 0.3 which is consistent with the model. The 2003 year class values were used for the 2010 year class for weights and partial recruitment due to similarity in growth. The 2010 year class values were used for 2013 year class weights. The weights of the 2005 and 2009 year classes were averaged for the 2011 year class.

Although the preliminary estimate of the 2013 year class is very high, its magnitude is highly uncertain. Given this uncertainty and the effect it will have on the 2016 biomass in the projection, this year class was set equal to the size of the 2010 year class. Assuming a 2014 catch equal to the 27,000 mt total quota, a combined Canada/USA catch of 44,000 mt in 2015 results in a neutral risk (50%) that the 2015 fishing mortality rate would exceed $F_{REF} = 0.26$ (Figure 23). The 2010 year class is expected to constitute the majority of the 2015 catch biomass. A catch of 37,000 mt in 2015 results in a low risk (25%) that the 2015 fishing mortality rate will exceed F_{REF} . A catch of 52,000 mt in 2015 results in a high risk (75%) that the 2015 fishing mortality rate will exceed F_{REF} . The probability that the 2016 biomass will not increase by 20% is negligible. Biomass at the beginning of 2016 is projected to be 234,300 mt fishing at F_{REF} .

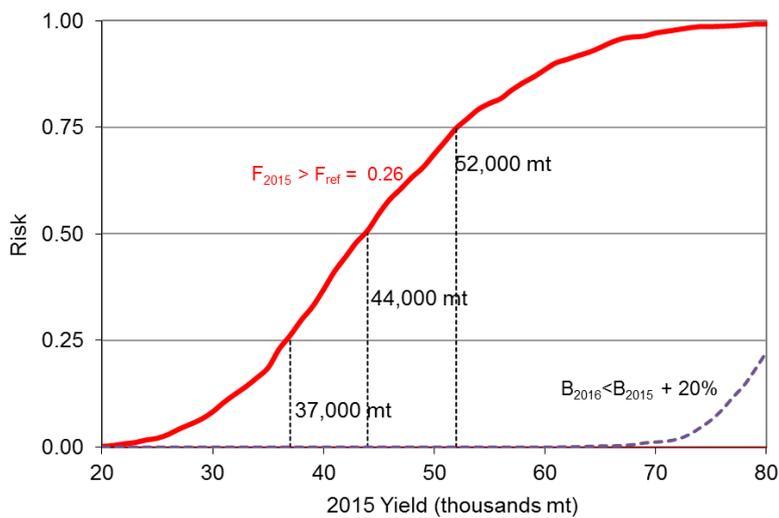


Figure 23. Projection risks for 5Zjm Haddock.

4.3.2.3 Uncertainties

Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, irrespective of the target species. All Eastern Georges Bank haddock landings are monitored at the dockside point of offloading by dockside monitors. These monitors verify the weight and the species of fish offloaded. Each country is responsible for accounting for all fishing mortality under its quota.

With the high haddock quotas available and the constraints of a low Cod quota, it is likely that groundfish fishers are illegally discarding Cod to be able to extend the season for haddock fishing. There is also significant discarding of haddock in the scallop fishery. In such situations, the management authority should be considering increasing the at-sea observer coverage levels to provide a basis for reliable estimates of any discarding occurring during fishing operations.

However, there is inherent uncertainty associated with haddock in 5Zjm being part of a transboundary stock on which there is a two-nation fishery. In addition, about 50% of haddock landings in the 4X5Y fishery have come from Unit Area 4Xp in the last four years. Of these, a substantial proportion (15 – 20%) was caught very close to the 4X/5Z boundary. It is unknown whether this is a fishery effect or a change in haddock distribution. An unknown amount of Georges Bank (5Z) fish may be caught along this line and at present, there is no established method to estimate the degree to which this may be occurring.

Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch (including discards). The VPA is calibrated to standardized trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Risk calculations are based on model projections and dependent on the data and model assumptions. They do not include uncertainty due to variations in weight at age, partial recruitment to the fishery, natural mortality, systematic errors in data reporting or the possibility that the model may not reflect stock dynamics closely enough.

4.3.2.4 Reference points

A harvest strategy compliant with the Precautionary Approach would include the adoption of two biomass reference points, a Limit Reference Point (LRP) and an Upper Stock Reference (USR), which would divide stock abundance into three zones: critical, cautious and healthy (Figure 24). The LRP is the stock level below which productivity is considered sufficiently impaired to cause serious harm but is above the

level where the risk of extinction becomes a concern. The USR is defined as the stock level below which the removal rate is reduced from the reference level.

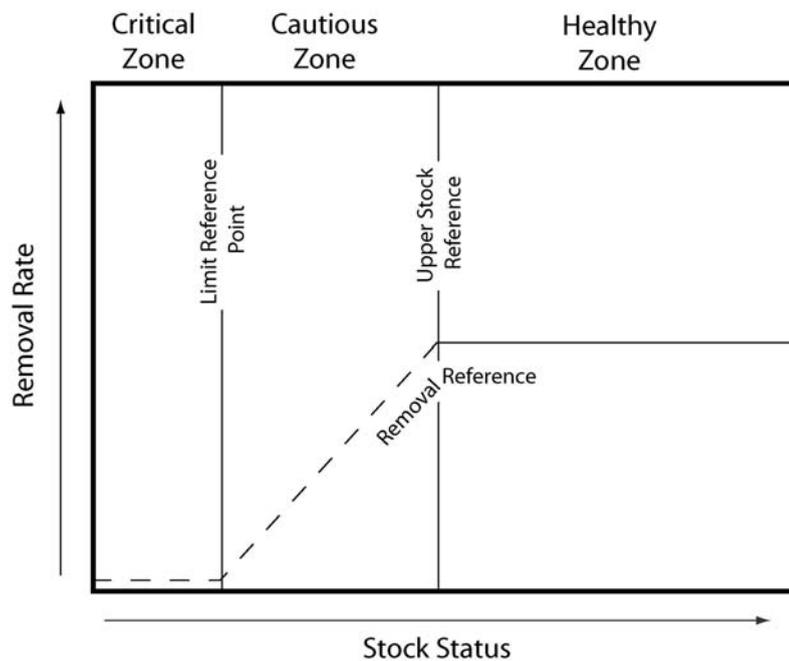


Figure 24. Illustration of a fisheries management framework for consistent with the Precautionary approach.

When the spawning stock biomass (SSB) is above the USR, the exploitation rate is set at the removal reference level. If the SSB declines below the USR, a harvesting strategy compliant with the Precautionary Approach would progressively reduce the exploitation rate to promote stock growth to above the USR. Finally, if the SSB declines below the LRP, then removals from the stock should be kept to the lowest level possible.

Spawning stock biomass values below the USR represent undesirable stock levels. In some fisheries, target reference points are also used to maintain the stock at a level to achieve desired objectives, the latter taking into account a combination of biological and socio-economic considerations. These target reference points are never below the USR value (DFO 2006).

The 5Zjm stock assessment is conducted using an age structured VPA. For consistency, the age-disaggregated Sissenwine-Shepherd production model was used for derivation of SSB_{MSY} . Examination of the SSB (age 3+) and recruitment relationship shows that recruitment has been highly variable. There is no evidence of a change in recruitment productivity based on different levels of productivity at the same biomass for two different time periods (Figure 25). Comparison of surplus production ($Biomass_{t+1} - Biomass_t - Catch$) during 1931 – 1955 to recent years suggests no productivity regime changes (Figure 21). Therefore, data from the long time period (1931 – present) is supported for calculating reference points.

SSB_{MSY} is determined by using a stock recruitment curve to derive equilibrium levels of catch and SSB for a range of fishing mortality rates. The average PR for 1995 – 2010, average fishery weight at age for 1931 – 2010 and spawning stock weight at age from the DFO spring survey from 1986 – 2011 are used for the yield and spawner per recruit analysis. The extremely large 2003 and 2010 year classes are excluded as outliers from the analysis. For the SSB and recruitment relationship analysis, the traditional parametric Beverton-Holt (BH) and Ricker (RK) stock-recruit models were fit to recruitment and SSB (Figure 26). A non-parametric Lowess smoother was applied and used to calculate SSB_{MSY} . A non-parametric bootstrapping approach results in a bias adjusted SSB_{MSY} of 78,000 mt with 95% confidence intervals of 60,000 mt and 91,000 mt (Figure 27).

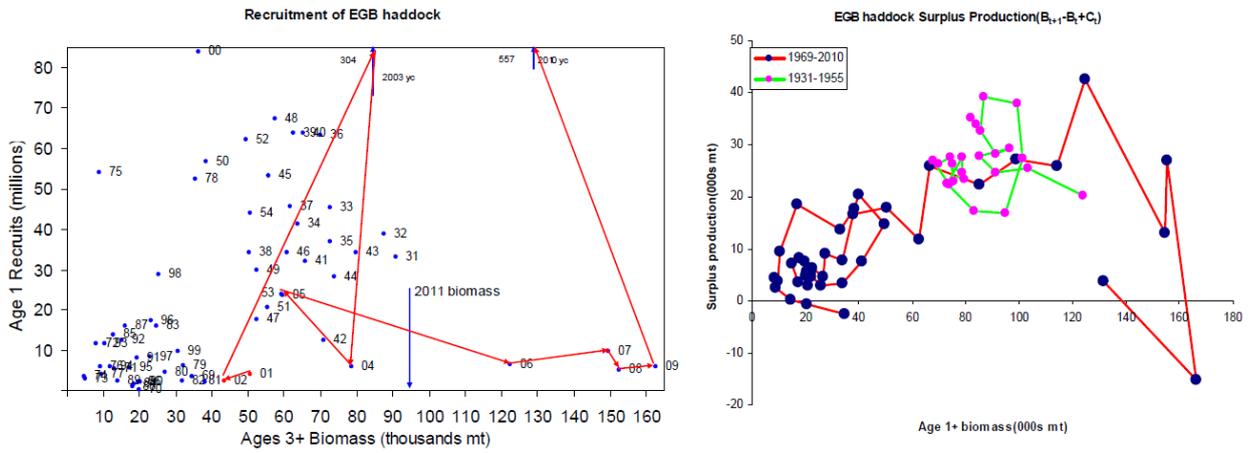


Figure 25. Relationship between Spawning Stock Biomass (SSB) and recruitment (left) and the surplus production (right; 1931 – 1955 and 1969 – 2010) of 5Zjm EGB Haddock. The red arrows (left) show recruitment after the year 2000

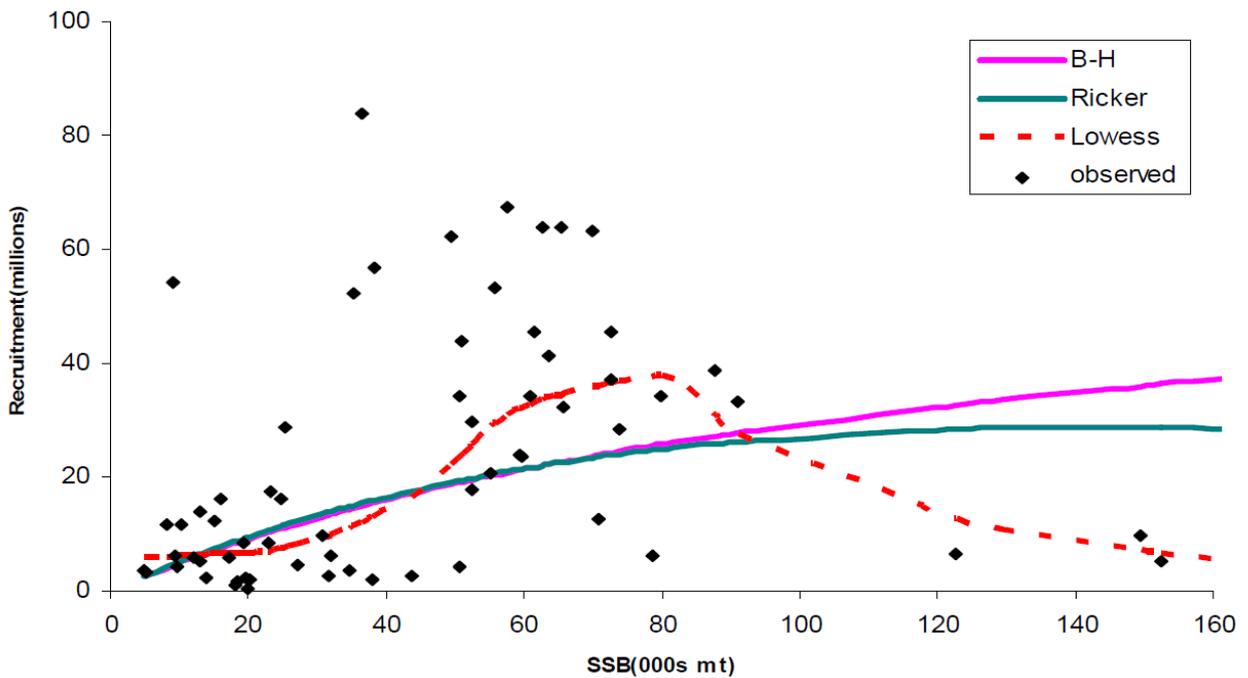


Figure 26. Parametric Beverton-Holt, Ricker, and non-parametric Lowess smooth stock recruitment curves fitted to EGB haddock Stock-Recruitment (S-R) data for 1931 to 1955 and 1969 to 2011. The 2003 and 2010 year classes were excluded as outliers.

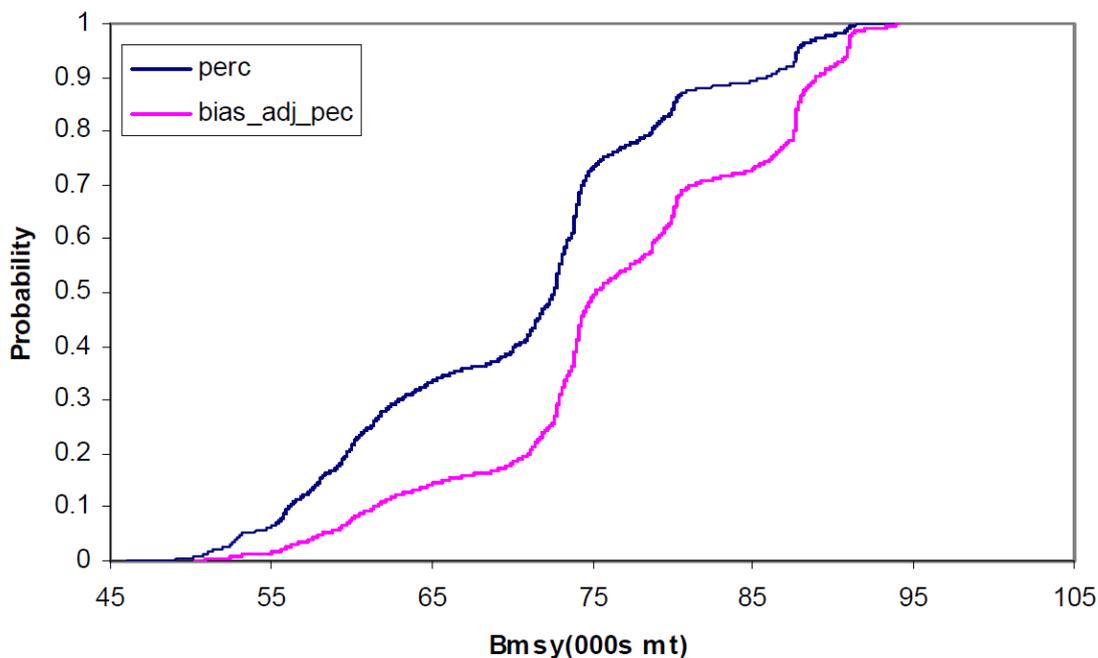


Figure 27. The cumulative probability distribution for EGB haddock BMSY using a non-parametric bootstrapping approach.

To avoid complicating the collaborative decision-making process, management of 5Zjm haddock has avoided specifying explicit biomass reference points. However, analyses of stock-recruitment data for 5Zjm haddock suggest that "the chance of observing a strong year-class is significantly lower for [age3+] biomass below about 40,000 mt, while the chance of observing a weak year class is very high". Thus, an Upper Stock Reference (USR) of 40,000 mt appeared to be a spawning biomass level below which average recruitment may decline. Management currently uses 40,000 t as the USR for 5Zjm haddock (DFO 2012b).

At the 2002 *National Workshop for Reference Points for Gadoids* (DFO 2002), five computational methods were retained for defining Limit Reference Points in terms of Spawning Stock Biomass. These five methods were:

1. $B_{RECOVER}$: the lowest historical biomass level from which the stock has recovered readily.
2. $Sb_{50/90}$: the SSB corresponding to the intersection of the 50th percentile of the recruitment observations and the replacement line for which 10% of the Stock-Recruitment (S-R) points are above the line.
3. BH_{50} : the SSB at which expected average recruitment is one half of the maximum recruitment predicted by assuming an underlying Beverton-Holt stock-recruit relationship (i.e. the recruitment that is 50% of the value at the asymptote).
4. RK_{50} : the lower SSB at which expected average recruitment is one half of the maximum recruitment predicted by assuming an underlying Ricker-type stock-recruit relationship (i.e. the recruitment that is 50% of the value at the peak of the dome).
5. NP_{50} : the estimate of the lowest SSB where the expected median recruitment is one half of the maximum recruitment calculated by non-parametric analysis (i.e. the recruitment that is 50% of the largest median recruitment achievable at any SSB within the range of historic observations).

At the 2002 *National Workshop for Reference Points for Gadoids* (DFO 2002), it was felt that a comparison amongst the five B_{LIM} candidates provided insight into the certainty of advice. If the results were clustered into one region, some level of confidence might be attributed to the result. These methods were applied to 5Zjm haddock. BH_{50} and RK_{50} were not considered due to the unreasonable fit of Ricker and Beverton-Holt stock-recruit models. At the *National Meeting on Precautionary Approach in Fisheries Management*

(DFO 2004), it was pointed out that NP_{50} looked promising as an estimator of the Healthy/Cautious boundary for stocks having two stock/recruit clouds like 5Zjm haddock), but not for the LRP boundary. $Sb_{50/90}$ was calculated as 11,000 mt. This stock experienced a secure recovery from a low biomass of 10,340 mt in 1993. The 95% confidence interval for this $B_{RECOVER}$ is 10,250 mt to 10,430 mt, which is derived from the 2011 VPA assessment result using conditional nonparametric bootstrapping of model residuals.

From the biomass history, 5Zjm haddock has been exposed to full exploitation over an extended time series and has recovered twice from low stock levels, in 1974 and in 1993 (Figure 28). Under the assumption of no productivity regime changes, $B_{RECOVER}$ reflects the stock biomass dynamics and its resilience under different fishing pressure.

Recommendations to adopt the foregoing LRP and USR were accepted at the 2012 Maritimes Region Reference Point Regional Peer Review meeting (DFO 2012a).

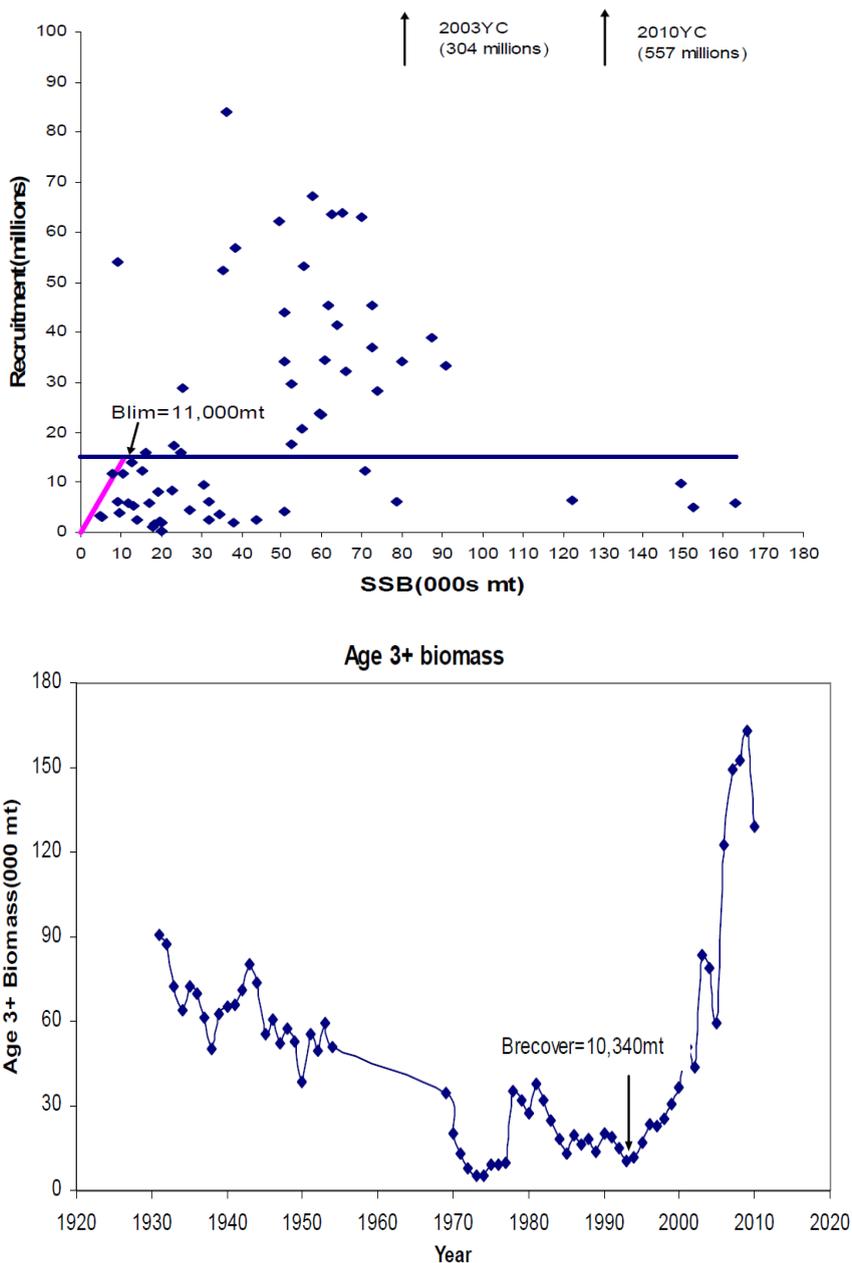


Figure 28. The $B_{RECOVER}$ (top) and $Sb_{50/90}$ (bottom) for 5Zjm Haddock.

4.3.2.5 Harvest Strategy, Harvest Control Rules and Tools

The Transboundary Management Guidance Committee (TMGC) has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality reference, $F_{REF} = 0.26 = F_{0.1}$ (TMGC 2003). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

The foregoing is achieved by using the following references and risk tolerances:

- The TAC should be set with a neutral (50%) probability of exceeding the fishing mortality limit reference (F_{REF}) when it is above the upper stock reference (USR).
- The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR = 40,000 mt). A low (25%) to neutral (50%) probability of exceeding F_{REF} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on the location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example.
- When the SSB is below the limit reference point (LRP = 10,340 mt), the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75%). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline.

The allocation shares for Canada and the US are based on a combination of historical catches (10% weighting) and resource distribution based on trawl surveys (90% weighting). Therefore, the relevant country shares are subject to change each year based on the distribution of the stock.

Domestic sharing arrangements are stable, with each commercial fleet receiving an allocation of the TAC each season, based on the percentages outlined in Table 3. Quota allocations are transferable within fleets and between fleets, subject to the Atlantic Canada Groundfish Transfer Guidelines.

Table 3. Percentage shares by fleet of the 5Zjm Haddock Total Allowable Catch

Fleet Sector	Share
Fixed Gear 65'–100'	0.990%
Mobile Gear 65'–100'	0.990%
Offshore >100'	23.422%
Mobile Gear <65'	42.311%
Aboriginal	7.958%
Fixed Gear 45'–65'	3.832%
Fixed Gear <45'	19.466%
Bycatch Reserve	1.031%

To ensure effective management, periodic reviews of management measures are required. There are two forums through which this takes place for the 5Zjm haddock fishery: the Canada - US Transboundary Resources Sharing Understanding process (including the Transboundary Resources Assessment Committee and the Transboundary Management Guidance Committee); and the Gulf of Maine Advisory Committee.

Through the first, an evaluation of the productivity related strategies and tactics can be conducted to determine whether they are appropriate to meet overall objectives. However, it is crucial that the appropriate information is collected and provided to the Department to conduct this evaluation. This includes catch and effort information from the fisheries and regular standardized surveys of the population. Stock assessment updates occur annually, while framework/benchmark assessments to review the stock assessment model occur when deemed necessary. The process involves a recommendation from the Transboundary Resources Assessment Committee, supported by the Transboundary Management Guidance Committee which must be endorsed by the Canada – US Transboundary Resources Steering Committee.

Through consultations with the Gulf of Maine Advisory Committee, as well as fleet sector advisory committees, on Conservation Harvesting Plans for the fishery, it will be evaluated whether the catch monitoring tools (e.g. dockside and at-sea monitoring) are efficient to provide information to achieve our objectives related to biodiversity, habitat and prosperity and whether the tools are being used satisfactorily. While individual tactics to achieve stated objectives may be evaluated on a case-by-case basis as the need arises, a scheduled evaluation will occur every four years with the next evaluation due in the 2016/17 planning year. Such an evaluation will be documented in the meeting minutes for the Gulf of Maine Advisory Committee and reflected in any updates to the IFMP.

4.4. Principle Two: Ecosystem Background

4.4.1. Retained Species

In Canadian waters, all groundfish must be retained, except for dogfish, sculpin and skates. The Conservation Harvest Plans (CHPs) for the different fleets state the total by-catch of species that can be taken on each trip in percentage terms relative to the total catch. If exceeded, observer coverage is increased and further action is taken. Provisions in the CHPs “small fish protocol” allow for fisheries to be closed if the volume of fish under the defined size for a species exceeds 15% of the total catch of that species.

In accordance with MSC V1.3, main retained species are defined as those that constitute over 5% of the total catch but there are cases that could be less than 5% when these specific species are considered vulnerable.

For the bottom trawl and long line fisheries, Table 4 presents the landed weight (mt) and proportion of retained catch on groundfish trips that had haddock landings from 2011 to 2013 (annual average for the period 2011 – 2013).

Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stated that with annual landings of under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). There are currently no data for handline in 4X5Y as this was suppressed by DFO to maintain fish harvester confidentiality. There is no handline effort in 5Zjm and the gillnet data was suppressed by DFO to maintain fish harvester confidentiality (Michael O’Connor GEAC, pers. comm 5/29/15).

Table 4. Average retained catch of non-haddock species in the “Directed” haddock fishery: DFO - Maritimes Region - Groundfish trips that had haddock landings with landed weight (mt) - 2011-2013 Quota Years. Species highlighted in yellow are main retained species.

Species	4X5Y				5Zjm			
	LL	%	OT	%	LL	%	OT	%
Haddock	686.8	27.8	3038.3	23.8	890.5	65.0	6092.9	81.9
American plaice	*	*	19.0	0.1	*	*	0.5	0.0
Cod	614.7	24.9	522.4	4.1	270.1	19.7	193.8	2.6
Cusk	277.0	11.2	15.6	0.1	75.9	5.5	1.4	0.0
Flounder, Unspecified	0.1	0.0	57.6	0.5	*	*	3.1	0.0
Greysole/Witch	*	*	75.6	0.6	*	*	0.6	0.0
Halibut	378.1	15.3	59.8	0.5	22.0	1.6	6.1	0.1
Monkfish	14.3	0.6	82.0	0.6	1.1	0.1	9.4	0.1
Pollock	47.3	1.9	2433.9	19.1	21.7	1.6	947.6	12.7
Redfish	10.0	0.4	4741.4	37.2	*	*	82.3	1.1
Sculpin	*	*	123.0	1.0	*	*	*	*
White hake	360.9	14.6	421.7	3.3	42.3	*	21.7	0.3
Winter flounder	*	*	1032.8	8.1	*	*	47.6	0.6
Yellowtail	*	*	4.7	0.0	*	*	22.3	0.3
Combined species	83.1	3.4	126.0	1.0	46.7	3.4	13.7	0.2
Total	2472.1	15.6	12753.8	80.4	1370.4	15.6	7442.2	84.4

*Refers to data not available per DFO confidentiality Policy.

DFO does not have an official definition of a "targeted fishery." Assessment of individual trip catches in the groundfish fishery show that many trips do not have any catch of haddock. This is the reason why analysis is based on haddock successful trips.

Evaluation of utilization of Bait as retained species

The bait used in the haddock fishery is mainly Argentina squid (*Illex argentines*) and the main Southwest Nova Scotia buyers estimate they purchase about 225 mt annually (source: Tim Nickerson; buyer, telephone conversation; Michael O'Connor GEAC, pers. comm). The quantity of bait used in the haddock fishery is less than 1% of the reported landings of Argentina squid and is not a main retained species. Argentine Squid reproduce and die quickly, often within one year, a lifecycle that potentially buffers them from heavy fishing pressure. Changes in environmental conditions influence their population sizes from year-to-year. South American and Asian distant-water jigging vessels dominate the fishery, which mainly occurs off the coasts of Argentina and the Falkland Islands and in International waters.

Illex argentines has been assessed as a species of Least Concern (IUCN)¹. It is an oceanic species with a wide geographic distribution and although it is subject to high fishing pressure, current levels are believed to be probably sustainable, and the stocks are actively managed. There has been an increasing trend in reported landings in recent years.

¹<http://www.fao.org/fishery/species/2713/en>

Table 5. Estimated Groundfish Longline Bait Usage (kg) - 4X5Y, 5Zjm Haddock (Source: Michael O' Connor, GEAC).

Fishing Year	2010/11	2011/12	2012/13	2011	2012	2013
NAFO subarea	4X5Y	4X5Y	4X5Y	5Zjm	5Zjm	5Zjm
Groundfish landings	2,977,432	2,649,111	1,789,889	2,143,524	1,308,123	659,492
Haddock landings	903,404	747,385	409,515	1,567,471	832,362	271,727
Trips with haddock (#)	923	831	799	202	171	140
Av. haddock landed/trip	979	899	513	7,760	4,868	1,941
Av. other groundfish landed/trip	2,247	2,288	1,728	2,852	2,782	2,770
Av. catch rate/trip/1000 hooks	129	128	90	322	232	143
Factor: bait/catch rate/1000 hooks	0.194	0.196	0.279	0.078	0.108	0.175
Est. bait used for haddock	175,034	146,530	114,254	121,864	89,766	47,589
Argentina Squid	2011	2012	2013			
Reported landings (mt)	204,869	340,622	525,383			
Est. bait for 4X5Y,5Z haddock (mt)	296.9	236.3	161.8			
Est. haddock bait/l. argentines landings (%)	0.14%	0.07%	0.03%			
Assumptions	4X5Y	5Zjm				
Av. # of hooks set/trip	25,000	33,000				
Av. weight of bait/1000 hooks (kg)	25	25				

Sources:

1. Haddock and other groundfish landings - DFO CDD20140151 Haddock 4X5Y_5ZE
2. Longline trips with Haddock Landings - DFO RQ20150322_Final_15/06/18
3. Avg baited hooks/trip and bait weight - estimated based on pers. conversations with local fishermen
4. Reported Catch of Argentina Illex - FAO Fish Stat; No conversion applied: tentacles and viscera used

Major Species

Accordingly, the reassessment team reviewed those species accounting for >5 % of the total catch based on those trips that landed haddock within in the groundfish fishery and also reviewed some species that are below <5 % of the total catch but are considered vulnerable. The listing of these species is as follows:

- 4X5Y OT: Cod, Pollock, Redfish, Winter flounder
- 4X5Y LL: Cod, Cusk, Halibut, and White hake
- 5Z OT: Cod, Pollock, Yellowtail Flounder
- 5Z LL: Cod, Cusk

Minor Species

- 4X5Y OT: American plaice, Cusk, Halibut, Sculpin, Monkfish, Witch flounder
- 4X5Y LL: Redfish, Pollock, Monkfish
- 5Z OT: Halibut, Monkfish, Redfish, White hake, Winter flounder
- 5Z LL: Halibut, Monkfish, Pollock

Assessment of Main Retained Species

Cod 4X5Y

The average retained catch of cod for the period (2011 – 2013) from trips with haddock in the catch by otter trawl and longline are 522 mt and 614 mt respectively; these values are higher than reported for year 2008 (263 mt OT and 126 mt BLL) in the original MSC assessment (MSC 2010).

Status

Cod biomass indices have remained low since 2000 when a rebuilding strategy was initiated. There is no indication of a decline in either total mortality or relative fishing mortality since 2000. Mortality for causes other than reported landings, including natural mortality, for cod of ages 4 and older has increased since 1996; in 2008, it was 0.7 (46%). While a target F of 0.2 was adopted for this stock during the 1980s, F has been above this level since 1980 and for 2008 it was 0.35.

SSB at the beginning of 2008 was 9,000 mt; this is the lowest level in a time-series that began in 1948. The B_{LIM} is estimated at 24,000t. Recruitment for the 2006 and 2007 year classes are below average, but about twice the abundance of the very low 2003 and 2004 year classes. The TAC for 2009 was reduced to 3,000 mt, and the catch (directed cod fishery plus by-catch in other fisheries) totalled about 2,591 mt, a reduction of about 33% from the previous two years.

Despite the low landings in recent years, the biomass survey indices estimates for 4X5Y Cod have been continuously declining. The stock is deemed to have declined by 59 – 64 % in the past generations, and was designated as “Endangered” by COSEWIC in 2010 (COSEWIC, 2010). The survey biomass index estimate for 2013 (2,058 mt) is the lowest from the time-series (1970 – 2013), representing a 37% reduction in relation to the previous year. This value is well below the short-term average 2007 – 2011 (6,413 mt), the medium-term average 1997 – 2011 (11,202 mt) and the long-term average (20,963 mt) (DFO, 2014a). Fishing mortality (F) remains above the reference level (0.2), and was estimated at 0.3 in 2008 (DFO, 2011). From a recent cod stock status update, F for fully selected areas for year 2014 was estimated to still be well above the reference level (0.2) indicating continuing overfishing occurring during the rebuilding period (DFO 2015).

The cod stock biomass and abundance has been in continuous decline. Major sources of mortality for the stock are natural mortality (including seal predation), fishing above F_{REF} , discards, and bycatch (DFO 2015). The stock is continuing to experience lower recruitment. Although fishing mortality has experienced a considerable drop in the mid-1990s, it has remained above the reference level ($F = 0.2$) since 1948.

Projections suggest a slight increase in SSB if fishing mortality is reduced to at least the reference F 0.2, but uncertainty is high (DFO, 2011).

Management Strategy

Area 4X5Y Cod is managed by a TAC of 1,650 mt over two years, for 2015/16 and 2016/17. The 2011 Recovery Potential Assessment (DFO 2011e) outlined the probability of achieving, at a minimum, a SSB equal to the LRP (24,000t) based on three different fishing mortality scenarios. Estimates of the TAC equivalent to each fishing mortality level was 3,000 mt at F_{REF} , 1,500 mt at $0.5F_{REF}$ and zero catch. Of the three fishing mortality scenarios that were explored at the RPA meeting, only two ($F = 0$ and $F = \frac{1}{2} F_{REF}$) could satisfy the rebuilding requirements within a reasonable timeframe and present a very low risk of preventable decline. A scenario slightly above $\frac{1}{2} F_{REF}$ (an estimated catch level of 1,500 mt) would also satisfy this requirement. A TAC of 1,650 mt (approximately $F = 0.11$) meets both the rebuild and preventable decline requirements, and therefore balances rebuilding requirements with socioeconomic considerations as allowed by the Sustainable Fisheries Policy (Clark et al 2011).

Management options for 4X5Y cod remain implemented through a precautionary TAC (1,650 mt) which is calculated to promote recovery (Clark et al, 2011). The most recent stock status update (2014) indicates that cod has not experienced the rebuilding previously predicted and expected with the 2011 reduction of TAC in 4X5Y from 3,000 mt to 1,650 mt. Previous projections estimated that cod stock biomass would reach the LRP by 2036 with moderate fishing, but it appears that this is not likely to be achieved based on current biomass projections. Major sources of mortality for the stock include fishing above F_{REF} , discards and bycatch, as well as high levels of natural mortality. DFO cod surveys for 2013 and 2014 indicate record low numbers. The assessment suggests that “Atlantic Cod from all fisheries should be reduced to the lowest possible level”.

Cod 5Zjm

The average retained catch of Cod for the period (2011 – 2013) from trips with haddock in the catch by otter trawl and longline are 193 mt and 270 mt respectively. Cod catch for the period (2011 – 2013) was lower than the last assessment for year 2008 (473 mt OT and 513 mt BLL).

Status

Adult population biomass declined substantially from 43,800 mt in 1990 to 8,500 mt in 1995; the lowest observed for the time series. Since 1995, adult population biomass (ages 3+) has fluctuated between 5,900 mt and 18,800 mt. The estimated adult population biomass at the beginning of 2014 from the VPA “M 0.8” model was 11,719 mt, which was about 20% of the adult biomass in 1978. The increase since 2005 was largely due to recruitment and growth of the 2003 year class. Recruitment at age 1 has been low in recent years. The 2003 year class is estimated to be the highest recruitment since 1998 (excluding 2010). The current estimate of the 2010 year class is stronger than the 2003 year class based on the 2013 assessment. The 2012 year class is the lowest on record. Fishing mortality (population weighted average of ages 4 – 9) was high prior to 1994 and declined in 1995 to $F = 0.11$ due to restrictive management measures. F in 2013 was estimated to be 0.04 from the VPA “M 0.8” model (TRAC, 2014).

Recruitment, age structure, fish growth, and spatial distribution typically reflect changes in the productive potential. The current biomass is well below 25,000 mt; when biomass is above this threshold, there is a better chance for higher recruitment. In absolute numbers, the population age structure displays fewer fish at ages 7+ compared to the 1980s. Average weight at length, used to reflect condition, has been stable in the past, but has started to decline in recent years. High natural mortality, lower weights at age in the population in recent years and poor recruitment have contributed to the lack of rebuilding (TRAC, 2014).

Management Strategy

Cod in the southwest area of 5Zjm (Georges Bank) is managed by fleet sector quotas; time, location and method of catch are chosen to minimize cod bycatch. The TMGC has adopted a strategy to maintain a low to neutral risk of exceeding the Fishing limit reference; $F_{REF} = 0.18$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. This stock is under a rebuilding strategy and catch is allocated through EAs, ITQs and community quotas. To protect spawning cod, seasonal closures are implemented on Georges Bank. The groundfish trawl fishery has imposed an additional measure in area 5Zjm of a separator panel to decrease cod catches. Small fish protocols and gear restrictions are mandated by fleet sector CHPs. Conservation limit reference points have been calculated for cod in 5Zjm using the Precautionary Approach in 2010. The B_{LIM} for cod in this area is 21,000 mt. The current estimation is that the SSB for 2013 is below the B_{LIM} at 9,260 mt. The strategy to reduce fishing pressure is to reduce fishing mortality to F_{REF} . At F_{REF} (0.18), the stock is expected to increase over the next 36 years or three generations (DFO 2011e). However, a new benchmark VPA "M 0.8" model was developed in 2013, in recent assessments $F_{REF} = 0.18$ was found not to be consistent with the assessment VPA "M 0.8" new model, therefore it was found not appropriate for the catch advice. TRAC recommended basing catch advice on an $F = 0.11$ (TRAC, 2014) lower than F_{REF} until a different F_{REF} is agreed on. Currently, the most recent assessment indicate that $F_{2013} = (0.04)$ is currently well below F_{REF} , (TRAC 2014).

Pollock 4X4VW+4Xmn

The average retained catch for Pollock during the period (2011 – 2013) from trips with haddock in the catch by otter trawl and longline are 2,434 mt and 47 mt. Pollock catch for the period (2011 – 2013) was higher than the last assessment for year 2008 (130 mt OTB and 2 mt BLL).

Status

Pollock in NAFO Areas 4VWX5 comprise two population components: a slower-growing Eastern Component including Divisions 4V and 4W, as well as Unit Areas 4Xm and 4Xn, and a faster-growing Western Component (WC) including 4Xopqrs and Canadian portions of Area 5 (DFO 2015).

The DFO Summer survey time series for the WC Pollock biomass index measured in kilograms per tow (kg/tow) extends from 1984 – 2014 (DFO 2015). The biomass index exhibited strong year-effects that reflect the semi-pelagic schooling behavior of Pollock and changes in availability arising from differing distributions in the water column at the times of the survey (DFO 2015). In general, there has been a declining trend in the index since the late 1980s through about 2002, an increasing trend from 2003 – 2007, followed by another decline to 2012. While the index increased in 2013, it declined again in 2014 (DFO 2015). The RV series using a 3-year geometric mean (GM) (three-year moving average) providing a better impression of long term trends by removing year effects and provides the monitoring data used in the HCR for calculating future catch limits.

The WC Pollock component has been the main focus of past analytical assessments, but scientific advice on stock status and catch limits using Virtual Population Analysis (VPA) modeling has been highly variable, especially since the mid-2000s (DFO 2015). For example, the 2008 assessment indicated that age 4+ population biomass was at 27,000 metric tonnes (mt) (Stone et al. 2009), while the 2010 assessment update indicated 4+ population biomass was either 23,000 mt or 17,000 mt, depending on whether the very low 2010 Fisheries and Oceans Canada (DFO) Research Vessel (RV) survey indices were excluded or included from the analysis (Stone 2011). Consequently, the Canadian fishing industry recommended exploration of alternative management approaches that would provide more stability in future catch limits to allow for more efficient business planning and promote a more stable fishery (DFO 2015).

In 2011, fisheries managers and the fishing industry decided to manage WC Pollock using a risk-management approach and embarked on a Management Strategy Evaluation (MSE) process, with the aid of government scientists and outside experts (DFO 2011, DFO 2015). MSE is a technique to explicitly consider the uncertainty in stock assessment inputs, model assumptions and harvest control, and to

compare the likely consequences to Management Objectives when a predetermined Management Procedure (MP) incorporating a Harvest Control Rule (HCR) is applied. The Pollock MP was selected on the basis of satisfying three medium-term objectives agreed upon for management of the resource which relate to sustainability, catch levels and the variability of annual catch changes. The MP model was built around an HCR, which either increased or decreased future catch limits based on results from ongoing monitoring from the annual DFO summer RV survey. An Exceptional Circumstances Protocol was put in place to cover situations that fall outside the range for which the MP was simulation tested and, if necessary, to allow for some form of intervention.

The Management Strategy Evaluation (MSE) approach was applied to manage WC (4Xopqrs+5) Pollock. The LRP was defined as the Survey Index Ratio ($J_y = \text{geometric mean}$) = 0.2, i.e., when the 3-year geometric mean survey biomass index falls to 20% of the geometric mean survey biomass index for 1984 – 1994 (DFO 2011). The status of this stock is above its LRP (2015).

Reference points were recently presented for the EC of 4VWX Pollock. These are based on a proxy for Bmsy. The Bmsy proxy is based on data for 1984 – 1993, a period of high biomass for this stock. The status of this stock is above its LRP (DFO 2015).

Management Measures and Strategies

Division 4VWX+5 Pollock has two management units in Canadian waters: 4VW and 4X+5. Pollock is managed with a TAC and additionally with CHPs for all areas. Medium-term management objectives have recently been made explicit through the recent Management Strategy Evaluation (MSE) for the western component (Rademeyer and Butterworth, 2011). For sustainability, the objective is to reach 1.5 times the Fishable Biomass of 2010 (B_{4-8}) by 2021. The evaluation included harvest control rule scenarios with 20 year projections but focused on the first 10 years. At the science review of the MSE (DFO 2011g), the findings from Rademeyer and Butterworth (2011) were found to be robust. The MSE also recommended allowing for changes to harvest control rules in exceptional circumstances. The TAC is set based on the recommended harvest control rules from the MSE and are projected to meet the management objectives for the western component.

CHPs provide further management with industry-imposed trip limits, small fish protocols and minimum mesh size for gillnets and hook gape size for longlines. As with other species, commercial landings are recorded and monitoring by land, sea and air patrols conducted by the DFO Conservation and Protection Branch.

A. Western Component (4Xopqrs5) Pollock

A Management Strategy Evaluation (MSE) approach has been applied to manage western component (4Xopqrs+5) Pollock. The LRP could be defined as the Survey Index Ratio ($J_y = \text{geometric mean}$) = 0.2, i.e., when the 3-year geometric mean survey biomass index falls to 20 % of the geometric mean survey biomass index for 1984 – 1994 (DFO 2011).

The pollock MP is linked to the HCR to calculate catch limits based on results from ongoing monitoring (Summer RV Survey) (DFO 2015). The catch limit either increases or decreases by up to 20% (with increases capped at 500 mt) depending on the value of the GM biomass index for the most recent 3 years (i.e. 2012 – 2014) as a proportion of the GM of the index for 1984 – 1994; a period of high productivity (also referred to as the Survey Index Ratio). The catch limit was initially set at 6,000 t in 2011 for the pollock MP model. The survey biomass index increased from 5.28 kg/tow in 2012 to 23.45 kg/tow in 2013 then decreased to 8.53 kg/tow in 2014; however, because the index was very low in 2012 (5.28 kg/tow), the 3-year GM value for 2012 – 2014 shows only a modest increase to 10.81 kg/tow and the resultant Survey Index Ratio is now at 0.28 (DFO 2015). Even though the 2012 – 2014 GM value was slightly higher than last year's value (9.6 kg/tow), the HCR calculates a catch limit of 2,781 mt for FY 2015/2016, down 9% from the 3,072 mt catch limit calculated for FY 2014/2015. This lag effect is due to the tuning parameters that are incorporated into the HCR formula for computing the TAC each year (Rademeyer and

Butterworth 2011). In order for the FY 2015/2016 catch limit to have increased, the summer survey biomass index for WC Pollock in 2014 would have had to have increased, the summer survey biomass index for WC Pollock in 2014 would have had to exceed to 10 kg/tow.

Using updated monitoring data, the HCR calculates a catch limit of 2,781 mt for WC Pollock for FY 2015/2016 (DFO 2015). If the DFO summer RV survey biomass index for WC pollock is greater than 5.5 kg/tow in 2015, then the catch limit will start to increase again.

The pollock MP and its HCR have responded to declining trends in the survey biomass index for WC pollock by bringing the catch limits down over the past few years. Unless an Exceptional Circumstance is triggered, application of the MP will provide the catch limit for WC pollock until 2016, after which there will be a thorough review, including a re-evaluation of the Reference Set of Operating Models to ensure they reflect current stock dynamics. At this time, Fisheries and Aquaculture Management, Industry and Science can address other issues such as additional biomass growth and further recovery. Management Objectives will also be reviewed, in particular the trade-offs between catch and sustainability exceed 10 kg/tow.

B. Eastern Component (4VWXmn) Pollock

The LRP and USR for the eastern component (4VWXmn) Pollock were presented for review, based on a proxy for B_{MSY} using data from DFO's summer Research Vessel (RV) survey time series (1970 – 2011). The proposed LRP (40% B_{MSY} proxy) was calculated to be 20,100 mt and the proposed USR (80% B_{MSY} proxy) was calculated to be 40,100 mt. The status of this stock was above its LRP (DFO 2015).

Cusk 4X5Y5Zc

The average retained catch for 4X5Y cusk during the period (2011 – 2013) from trips with haddock in the catch by otter trawl and longline are 15 mt and 277 mt and for 5zjm area it was 1.4 and 79 mt for otter trawl and longline. 4X5Y cusk retained catch for the period (2011 – 2013) was lower than the last assessment for year 2008 (24 mt OT and 674 mt BLL) but higher in 5Zjm (0 and 36 mt).

Status

There have not been absolute abundance estimates for cusk in Canadian waters, but population status can be inferred from long-term RV survey data. Surveys conducted by DFO and the National Marine Fisheries Service (NMFS) as well as commercial longline catch per unit effort (CPUE) suggest that abundance has decreased since the 1980s. However, the Halibut Industry survey and commercial CPUE indicate that the decline has ceased in the last decade. Industry surveys and commercial fishing data also indicate that the cusk range has not changed. In 2003, COSEWIC assessed the species as *threatened* based on trawl survey indices (COSEWIC,2003).

Cusk population abundance was first examined in the 1970s; and has continued to decline since the late 1990s. The mature portion of the population has declined by approximately 85% over three generations. Average fish size has also declined, consistent with a decline in abundance. According to DFO's Recovery Potential Assessment reported in SAR 2008/024, commercial landings in 4X of about 200 mt would result in a 75% chance of observing at least a 50% increase in biomass after 15 years (1 generation), while 4X landings of about 600 mt would result in about a 54% chance of observing at least a 50% increase in biomass after 15 years. These landings would have to be increased by 1.43 times to be applicable to the entire management area (4VWX+5Zc). The quota caps were set accordingly and landings for all areas in 2008/09 were 609 mt.

Biological reference points have recently been determined. Cusk were found to be in the "cautious zone" (DFO 2012b). CPUE-based reference points for cusk were calculated and scaled to the Halibut Industry Survey. The limit reference point is 13.3 kg/1000 hooks and the proposed upper stock reference point is

26.6 kg/1000 hooks (DFO 2012b). The Halibut Industry Survey provides an ongoing time series to be used for monitoring stock status (DFO2002a; DFO 2008b; Harris and Hanke 2010).

Management Strategy

The proposed LRP (13.3 kg/1000 hooks) and USR (26.6 kg/1000 hooks) were calculated as 40% and 80% of the MSY proxy (commercial longline catch per unit effort from period of high catches, 1986 – 1992).

In addition to trip limits, there are also overall bycatch caps for cusk. The caps and trip limits vary by gear type, vessel class and area and have been generally reduced since introduced in 1999. Management measures were enacted for Cusk with closures for some longline vessel classes in 2003 and 2007 to protect Cusk (Harris and Hanke, 2010). The CHP for midshore and offshore vessels 65' to 100' states that all non-quota groundfish are to be monitored to determine whether historical landing levels are increased (presumably due to targeting). CHPs also include maximum trip limits for Cusk to limit the level of fishing mortality.

White hake 4X5Y5Zjc

The 4X5Y average retained catch for the period 2011 – 2013 from trips with haddock in the catch by otter trawl and longline are 422 mt and 361 mt respectively. White hake catch for the period 2011 – 2013 was higher than the last assessment for year 2008 (40 mt OT and 54 mt BLL).

Status

Landings throughout 4VWX+5Y have declined from a peak of 8,700 mt in 1987; since 2003 landings have been below 2,000 mt, reflecting quota caps. In 4X there has been a general decrease in the abundance of White hake since the early 1990s. *F* is relatively low in all areas since the introduction of catch limits in 1996. Total mortality on the Scotian Shelf is high and its causes are unknown. Total mortality of White hake in the Bay of Fundy is variable without trend.

In 2013, the abundance of White hake in the Maritimes was reviewed. The updated assessment showed that abundance has continued to remain low since 2005. Overall, abundance of immature individuals on the entire Scotian Shelf was estimated to have declined by 60% since the 1980s, although current estimates of abundance are similar to abundance estimates seen in the 1970s. Abundance of adult fish has decreased overall by 56% since 1970 and by 77% since the 1980s (Simon and Cook 2013).

DFO's Stock Assessment Report (SAR) of 2010 shows White hake in 4VWX distribution throughout the survey area, with the largest catches in the Gulf of Maine (4Xpq), the Bay of Fundy, and in 4Vn. Biomass indices have risen for the last two years in all regions. In 4X East, abundance indices were above average for most lengths below 58 cm in 2009, but below average for larger fish. This is similar to what was seen in 2008. White hake abundance indices in 4X West were near average for most lengths in both 2008 and 2009. In the Maritimes region, catches of White hake were highest in 1986 and 1987 (around 8,000 mt), and remained relatively high (around 5,000 mt) into the mid-1990s. Catch restrictions were introduced in the mid-late 1990s, and since then catches have been at or below 2100 mt annually. Abundance has been in decline since the early 1990s despite efforts in reducing fishing mortality in all areas since the introduction of catch limits in 1996. The reason for the high total mortality on the Scotian Shelf is unknown. Biomass index from research survey for White hake in 4X have been below the long-term survey average (1970 – 2013), the medium-term 15 year average (1999 – 2013), and the short-term 5 year average (2007 – 2013).

At the present time there is no assessment model in place for 4X5 White Hake. The reference points and harvest control rules outlined below are, therefore, empirically-based using the DFO Research Vessel (RV) ecosystem survey which has been undertaken since 1970.

The following reference points were adopted for harvest strategy for the 4X5 White Hake stock:

- Biomass needed for maximum sustainable yield (BMSY) proxy = 13,867 mt. The BMSY proxy for the stock is the geometric mean 42+ cm biomass from the RV survey. This metric was selected to represent the spawning stock biomass during a relatively productive period. It was noted that the trend in mature biomass mirrors that of total biomass.
- Limit reference point (LRP) = 5,447 mt. The limit reference point is 40% of the BMSY proxy for the stock. The LRP is expressed as a relative survey biomass and not as absolute biomass.
- Upper stock reference point (USR) = 11,093 mt. The upper stock reference point is 80% of the BMSY proxy for the stock. The USR is expressed as a relative survey biomass and not as absolute biomass.

Where there are references to “the Index” in the strategies below, this refers to the three-year geometric mean of the 42+ cm RV survey biomass. The latest assessment shows the 2014 White hake adult abundance level to be on the cautious zone of the LRP (DFO 2015).

Management Strategy

The White Hake fishery was unregulated in NAFO Divisions 4X5Y until 1996 when it was placed under quotas regulations. Since 1999, the fishery has been a bycatch fishery only and is managed through incidental quotas. Fishing mortality was greatly decreased after bycatch caps were put in place in 1996 in 4VWX+5YZc.

Measures were established in recent years for the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. The Conservation Harvest Plans (CHPs) have additional measures where high landings from a particular vessel will trigger more observer coverage and weekly limits and small fish protocols (45 cm) are also in place. The stock is considered to be in the lower part of the cautious zone and so further reductions in the harvest rate were implemented for the fishing year 2013/14.

In 2015 an 4X5 White Hake harvest strategy was applied using the three-year geometric mean RV survey biomass of 42+ cm white hake (5,840t) indicating the stock fell to the lower level of the Cautious Zone. The harvest strategy outlines that when in the Cautious Zone, catch limits should be set to mitigate declines and, when possible, promote positive change in the Index over a three-year period. The management response will vary depending on location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is expected to continue, and indications of incoming recruitment. While a harvest rate in the range of 10% to 20% is acceptable, the secondary indicators listed above must be explicitly considered. Furthermore, the harvest rate should progressively decrease lower in the Cautious Zone. While TAC increases will be no more than 20% or 500 mt (whichever is greater) larger decreases may be considered if the stock is declining precipitously.

Atlantic halibut

The average retained catch for the period 2011-2013 from trips with haddock in the catch by otter trawl and longline are 59.8 mt and 378 mt respectively. Halibut catch for the period 2011 – 2013 was higher than the last assessment for year 2008 (0 mt OT and 9 mt BLL).

Status

In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase,

and it was concluded that there was little risk in harming the productivity of the stock at harvest levels <4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that F has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and F are also consistent with model projections (DFO 2012, DFO 2014). Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years.

A new statistical catch at length (SCAL) model was used to assess the stock status of Atlantic Halibut and the impact of the fishery on biomass/population trends (DFO 2015). SCAL model estimates of spawning stock biomass (SSB) between 1970 and 2013 indicate that the halibut stock has increased from the depleted state of the early 1990s to the present. The spawning stock biomass in 2013 is estimated to be 6,668 (SE = 234) mt; the highest in the time series.

SCAL model estimates of the legal-sized exploitation rate suggest that there were short periods of intense exploitation in the 1970s and early-1990s; current exploitation rates are the lowest on record and are below the estimated natural mortality rate ($M = 0.14$) (DFO 2015). Fishing mortality rates estimated from the multi-year mark-recapture model have also been declining and indicate that fishing mortality has been lower than natural mortality between 2007 and 2013.

Management Strategy

Landings of Atlantic Halibut have been recorded since 1883, and until 1988 the Atlantic Halibut fishery was not regulated by TAC. Although the exploitation rate is two fold higher than M and $F_{0.1}$, given that the abundance indices from the Halibut survey have been increasing recently and there signs of increasing or stable recruitment, a 15% increase in the TAC for the 2009-2010 fishing season was not expected to increase the risk to the stock as compared to the previous 4 years.

Previously precautionary reference points for 3NOPs4VWX+5 Atlantic Halibut, based on a modified Sissenwine-Shepard production model, have been calculated using the full time series. Forty percent of spawning stock biomass at maximum sustainable yield (SSB_{MSY}) was adopted as the LRP (1,960 mt), and 80% of SSB_{MSY} was adopted as the USR (3,920 mt). Fishing mortality at MSY ($F_{MSY} = 0.36$) was implemented as a limit RR. A target RR of 0.2 has also implemented.

More recently management used interim reference points because stock-recruit relationships could not be well described by the more commonly used models (e.g. Beverton-Holt, Ricker). The limit reference point (B_{LIM}) was defined as the minimum SSB in the time series (1982 – 2013) that produced 50% of the maximum recruitment and the upper stock reference point (B_{UPPER}) was defined as the highest SSB in the time series. Using the SCAL model, B_{LIM} was estimated to be 2,600 mt and B_{UPPER} was estimated to be 6,668 mt.

Redfish (*Sebastes fasciatus*) Unit 3: Divisions 4Vn, 4VsW and 4X5Y

The average retained catch for the period 2011 – 2013 from trips with haddock in the catch by 4X5Y otter trawl and longline are 4,741 mt and 10 mt respectively. 4X5Y Redfish catch for the period 2011 – 2013 was higher than the last assessment for year 2008 (66 mt OT and 1 mt BLL). The average retained catch for the period 2011 – 2013 from trips with haddock in the catch by 5Zjm otter trawl and longline are 82.3 mt and 1 mt respectively. 5Zjm Redfish catch for the period 2011 – 2013 was higher than the last assessment for year 2008 (2 mt OT and 0 mt BLL).

Status

Two main species of Redfish occur off the Canadian Atlantic, but they are difficult to distinguish (these are *Sebastes mentella* referred to as 'deepwater Redfish' and *Sebastes fasciatus* referred to as 'Acadian Redfish') and they have overlapping ranges (COSEWIC 2010). Genetic analyses indicate the stock in Unit 3 is comprised only of *S. fasciatus* (DFO, 2010).

Redfish landings and results from industry surveys have been variable but stable (COSEWIC 2010). Landings data are available for Unit 3 Redfish dating back to 1960. In the early 1960s the fishery was dominated by foreign landings with the Canadian catch being less than 1000 mt. There was a reduction in landings in the late 1960s before peaking in 1971 with 25,600 mt in total landings. Through the 1970s there was a reduction in both foreign and Canadian landings, reaching a low of 2,700 mt in 1979. By the late 1970s Canadian landings dominated the Redfish catches with the foreign fishery decreasing to a point where foreign Redfish landings were essentially eliminated by 1985. Canadian Unit 3 Redfish landings have remained significantly below the TAC since the 1980s.

Default empirical reference points based on the Precautionary Approach were adopted because a stock-recruit limit cannot be estimated. These reference points are $0.40B_{MSY}$ and $0.80B_{MSY}$ for the critical-cautious boundary (Limit Reference Point) and cautious-healthy boundary (Upper Stock Reference Point) (DFO 2012). Harvest control rules have been established since 2012.

Results from the first stock assessment concluded that *S. fasciatus* in Unit 3 are above $0.80B_{MSY}$ (99% CI) (McAllister and Duplisea, 2011). In 2015, based on information provided in the research vessel survey report and the harvest strategy for this stock relative to the reference points, Unit 3 Redfish is considered to be in the Healthy Zone.

Management Measures and Strategies

The Unit 3 management area for Redfish was first implemented in the 1993 Groundfish Management Plan. Redfish in this area were previously managed as part of the larger 4VWX management area. The 10,000 mt TAC, introduced in 1993 was based on the 1991 TAC for the previous management area prorated by historical (1981-90) catches in the Statistical Unit Areas which comprise Unit 3. The first scientific description of Unit 3 Redfish was a report to the Fisheries Resource Conservation Council in 1993 which was used as a basis for a recommendation for a 10,000 mt TAC for 1994. The TAC was reduced to 9000 mt in 2000. DFO also has in place a bycatch cap, small fish protocols and gear restrictions including minimum mesh size for directed gillnet fishing and hook gape for longline gear. TAC and quota allocations are in use and CHPs for Redfish include a 22 cm minimum size limit. In addition, there is a small closed area known as the "Bowtie" for juvenile rearing. LRPs were adopted in October 2011 (Richards 2011); Unit 3 SSB is well above the LRP.

Winter Flounder NAFO 4X

Status

In Canadian waters, Winter flounder are managed as three units: western Scotian Shelf (NAFO Div. 4X), eastern Scotian Shelf (NAFO Div. 4VW), and the southern Gulf of St. Lawrence (NAFO Div. 4T). Genetic analysis and parasite markers indicate that these Canadian management units are distinct. However, examination of inshore and offshore Winter flounder within division 4X suggests little interchange occurs between these groups.

Since 1970 summer surveys of the Bay of Fundy have been used to monitor trends in Winter Flounder abundance. However there are some problems in the monitoring. Winter Flounder prefer inshore areas during the summer, and these waters are too shallow for the survey vessels to fish. Thus sampling is limited to the outer margins of the population distribution of this species. Therefore, it is very uncertain

how representative any associated biological sampling (i.e. length, weight, maturity, sex, age, diet) of these fish would be of the population. The survey abundance time series shows a decline in larger sizes of Winter flounder since the 1990s, but an increase in abundance of pre-fishery sizes in the last decade. Given the most recent RV Survey data and the latest information on 4X5Y GB Winter flounder assessment there is a clear trend in improvement of this stock over the longterm. With the exception of the 2014 biomass survey point estimate the stock has been above the longterm average since 2000 and in recent years above the midterm and short-term average (DFO 2014).

Management Strategy

Management units of Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St. Lawrence (Morin et al. 2002; DFO 2005). Prior to 1994 on the Scotian Shelf (NAFO Divs. 4VWX), yellowtail flounder, Witch flounder and American plaice were managed as one stock complex because a large component of the catches was landed as “unspecified flounders”. During this period, Winter flounder in the area were excluded from management considerations (DFO 2002a). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western components (NAFO Div. 4X), Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two regions based on catch histories (DFO 2002b). In 2014 DFO established individual species quotas for flounder stocks as a management strategy. A TAC was implemented for fishing season 2015/16 for Winter Flounder for 1,600 mt with the remaining flounder stocks on a 20% bycatch.

Yellowtail Flounder Georges Bank

Status

Canadian fishermen initiated a directed fishery for Yellowtail Flounder on Georges Bank in 1993, but landings have been less than 100 mt every year since 2004, with less than 1 mt in both 2013 and 2014 (Table 6.(Source Mike O Connor GEAC Personal. Communication). Since 2004, with the exception of 2011 and 2012, there has been no directed Canadian Yellowtail Flounder fishery (the fishery is not permitted to target Yellowtail flounder, or use gear suitable for targeting Yellowtail); the Canadian quota has been reserved to cover bycatch in the commercial groundfish and scallop fisheries. From 2004 – 2011, and in 2013 and 2014, most of the reported Yellowtail landings were from trips directed for Haddock. The Canadian offshore scallop fishery is the only source of Canadian Yellowtail Flounder discards on Georges Bank.

Table 6. 5Z Yellowtail Relative F - Chart 2 (Source GEAC)

Year	Survey Biomass (mt)	Can. Grdfish Landings(mt)	Rel. F
2010	19,117	17	0
2011	7,328	22	0
2012	9,921	46	0
2013	4,938	1	0
2014	2,240	1	0
2015	2,241	-	-

Landings: TRAC 5Z Yellowtail SR Reports 2010-2014

Avg RV Survey Biomass (mt) est. -TRAC 5Z Yellowtail SR 2015

Because a stock assessment model framework is lacking for this stock, no historical estimates of biomass, fishing mortality rate, or recruitment can be calculated. As well, status determination relative to reference points is not possible because reference points have been defined (TRAC 2014). However, in 2014 TRAC accepted a non-model based framework approach to provide catch advice for this stock on an annual

basis. Specifically an empirical approach is employed which uses survey trends from three separate bottom trawl surveys (DFO winter, Northeast Fisheries Science Centre (NEFSC) spring and fall) to provide catch advice for the stocks (TRAC 2014).

Recruitment, spatial distribution, and fish growth typically reflect changes in the productive potential. Recent recruitment has generally been below average. Spatial distribution patterns from the three groundfish surveys generally follow historical averages. Growth has recently been variable without trend, and condition (weight at length) has improved from last year, although it is still below the long term average. Stock biomass is low and productivity is poor. The declining trend in survey biomass in recent years to low levels, despite reductions in catch to low amounts, suggests a poor state of the resource (TRAC 2014).

Management Measures and Strategies

The Georges Bank Yellowtail flounder stock is a transboundary resource. DFO manages the Canadian fishery on Georges Bank. The United States and Canada implemented a formal quota-sharing agreement in 2004 to share the harvest of yellowtail flounder in this area. The agreement includes total allowable catch quotas for each country as well as in-season monitoring of the U.S. catch of yellowtail flounder on Georges Bank.

Previously The TMGC adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.25$ (established in 2002 by the TMGC). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding (TRAC 2014).

In recent years the Canada US TMGC has managed this stock as a bycatch fishery and implemented reductions in TAC to reduce fishing mortality and rebuild the stock. Given the most recent RV Survey data and the latest information on GB Yellowtail flounder stock assessment there is a declining trend in survey biomass in recent years to low levels, despite reductions in catch to low amounts indicating a poor state of the resource (TRAC SR 2014/03). The Canadian catch of 5Z Yellowtail by all groundfish vessels has averaged 17 t over the past 5 years and relative F has been negligible.

During the June 2014 Transboundary Resources Assessment Committee (TRAC 2015) assessment, it was decided to no longer use the virtual population analysis model which had previously provided stock condition and catch advice. The 2014 Diagnostic Benchmark recommended an empirical approach to providing catch advice based on the three bottom trawl surveys and an assumed exploitation rate. Last year, the empirical approach for catch advice was used with a 16 % exploitation rate resulting in a total quota of 354 mt (TRAC 2015).

Assessment of Minor Retained Species

American Plaice

Status

American Plaice on the Scotian Shelf have been subject to research vessel surveys every year since 1970 (COSEWIC 2009). Abundance of adult American Plaice on the Scotian Shelf was estimated at approximately 29 million individuals in 2005. Adult abundance declined by 67% over the time series (1970 – 2005). In 2009, the American Plaice of the Maritime Designatable Unit (DU) was assessed as Threatened by COSEWIC, based on declines in adult abundance of 86% for the Gulf of St. Lawrence and 67% for the Scotian Shelf over the most recent 2.25 generations (COSEWIC 2009).

In the Scotian Shelf and Bay of Fundy area (4VWX), total survey abundance has fluctuated widely with a declining trend (COSEWIC 2009). Trends in adult abundance depend on assumptions concerning size at maturity after 1985. Based on sampling from the 2010 survey, a decline in the size at maturity relative to the period prior to 1986 was noted. A recovery potential assessment (RPA) was conducted by DFO Science to provide the information and scientific advice required to meet various requirements of the Species at Risk Act (SARA), including decisions regarding the listing of Maritime American Plaice under the Act and developing a recovery strategy (DFO 2011).

A Bayesian state-space model was applied to plaice grouped in stages based on sex and maturity. Projections of female spawning stock numbers (SSN) were made over 48 years under three levels of exploitation (DFO 2011). Assuming a decline in size at maturity from 1985 to 2009, the probability of SSN declining below the reference level is 25% with no exploitation, 28% at recent exploitation, and 39% with a 750 mt harvest (DFO 2011). Assuming no decline in size at maturity after 1985, projections were more pessimistic (probabilities of 32%, 36% and 44% respectively, of declining below the reference level).

Management

The fisheries for American Plaice on the Scotian Shelf (4VW and 4X) are managed under multi-species flatfish TACs (DFO 2011). The component species are not required to be identified in the commercial landings data (DFO 2011). This system may remove incentives for fishers to discard species due to quota restrictions, but confounds management measures and assessments on single species in the complex. TACs are frequently taken as bycatch in 4X Cod and haddock fisheries and trawls are the dominant gear landing American Plaice (DFO 2011).

The permitted landing of flatfish species under the label “unspecified flounder” has been a major impediment to assessing the status of the various flatfish populations on the Scotian Shelf and in the Bay of Fundy (DFO 2011). Past and potential magnitudes of landings reported as “unspecified flounder” make it difficult to use commercial catch data in stock assessments.

There is a combined directed species quota of 1,000 mt in 4VW (American Plaice, Yellowtail Flounder, Witch Flounder) and 2,000 mt in 4X5Y (American Plaice, Yellowtail Flounder, Witch Flounder, Winter Flounder) (DFO 2011). Since 1993, a number of measures have been put in place to mitigate threats to existing populations of American Plaice. These measures include changes in fisheries regulations such as:

- Mandatory landing of all fish caught (i.e. discarding became a violation);
- Mesh size increases;
- Small fish protocol regulations resulting in area closures when the number of fish caught below the minimum size is more than 15% of the catch;
- Minimum levels of observer coverage on trips in directed fisheries;
- Dockside monitoring of all catches with mandatory notification on leaving and returning to port; and
- By-catch limits on Cod and other species in the plaice-directed fishery and vice-versa have indirect effects on plaice catches, through increased monitoring and area closures.

Monkfish

Status

Monkfish is distributed throughout the western Atlantic Ocean, from the Labrador shelf to northern Florida. In Canadian waters, Monkfish is more abundant on the southern Grand Banks, through the Gulf of St. Lawrence, on the Scotian Shelf and in the Bay of Fundy (FISHAQ, 2001, DFO 2002). This species generally inhabits warm slope regions with a variety of sediment types. It can be found at all depths down to 650 m and can tolerate a wide range of temperatures, but prefers temperatures between 6 and 10°C.

Studies on seasonal distribution suggest that Monkfish will migrate to shallower bank waters during the summer and move to deeper waters during the winter.

Directed fisheries for Monkfish extend along much of the shelf and slope waters from the Carolinas north to the Grand Banks. Prior to 1991, there was no directed fishery for Monkfish on the Grand Banks, in the Gulf of St. Lawrence, or on the Scotian Shelf and annual catches remained less than 200 mt from 1977 to 1990 (FISHAQ, 2001, DFO 2002). During this period Monkfish was a common by-catch in otter trawl groundfish fisheries. By the early 1990s, Monkfish became a target for commercial effort, especially with the decline in traditional species (FISHAQ 2001, DFO 2002). Biomass index for Monkfish in 4X from the summer RV survey was found to be below the long-term survey average (1970 – 2013) and short-term 5 year average (2009 – 2013) (DFO 2014).

Management

This species is managed by DFO Maritimes region as part of the mixed Groundfish fishery (FISHAQ 2001). Among the management measures in place for this multi-species fishery include the following:

- Gear restrictions
- Small fish protocols
- Bycatch protocols
- Logbooks
- Third-party catch verification
- Hailing in and out
- At-sea observer coverage
- Vessel monitoring systems (VMS)
- Area and season closures

A CHP has been established and provides further details on management measures. However, there is limited knowledge regarding most aspects of Monkfish biology, distribution, and abundance; therefore, in 1995 to 1997, a precautionary quota restriction of 200 mt was introduced (FISHAQ 2001). In 1998, the quota was lifted and replaced with by-catch restrictions (closure due to excessive by-catch of restricted species).

Witch flounder

Status

Witch Flounder occur in the Northwest Atlantic from southern Labrador to Cape Hatteras, usually at 50-300m in water of 2 to 6°C¹. They occur most commonly in deep holes and channels and along the shelf slope on muddy bottom. The spawning period is protracted, and on the Scotian Shelf is thought to occur from May to October with a peak in July-August. The post-larval, pelagic phase is unusually long, lasting up to one year, and it is thought that the first few years of demersal life are spent in much deeper water than the adults. Food consists primarily of worms supplemented by other benthic invertebrates such as small crustaceans and bivalve molluscs. Witch Flounder is a long-lived, slow-growing species; a maximum age of about 30 yrs and a maximum size of 78 cm (weight of about 5 kg) have been recorded. Trends in abundance over the years appear similar across 4X and 4VW management areas¹. The abundance of fish over 32 cm declined from the 1970's until 1992, but have been increasing since 1992. The increase is likely due to record-breaking recruitment pulses in both the mid-1990's and mid-2000's.

Management

A TAC of 1,600 mt has been established for flatfish complex (10% bycatch Am. Plaice and Yellowtail, and 20% for Witch flounder²):

1. <http://www.bio.gc.ca/science/research-recherche/fisheries-pecheries/managed-gere/flatfish-poissonplats-en.php>
2. <http://www.dfo-mpo.gc.ca/decisions/fm-2015-gp/atl-009-eng.htm>

Sculpin

Status

Sculpin is a small demersal (bottom dwelling) fish from the family *Cottidae*. There are approximately 16 species of Sculpin found in the waters off the Atlantic coast of Canada. The most abundant species found in Canadian waters are the Longhorn Sculpin (DFO 2008, Comeau 2009).

Longhorn Sculpin is frequently found around the Magdalen Islands, the Miramichi estuary, the coast of Nova Scotia (including Banquereau and Sable Island Banks), and in shallower waters in the Bay of Fundy and St. Mary's Bay. Longhorn Sculpin found in waters off New England reach sexual maturity at 3 years¹ (DFO 2008, Comeau et al 2009). The approximate length at maturity is 21 cm. In Atlantic Canada, Sculpin typically reach sexual maturity at larger sizes than those off the east coast of the United States. Females will reach maturity between 23 and 25 cm in length, while males mature between 23 and 29 cm in length. The spawning season usually takes place in shallow inshore waters between December and January. Female Longhorn Sculpin can lay upwards of 8,000 eggs during the spawning season. The eggs are spherical, demersal, adhesive and between 1.9 and 2.3 mm in diameter. Eggs vary in colour from green, to red-brown or orange and are found in clusters attached to sponges and in cavities on clear, hard substrates. Hatching occurs between 36 and 65 days after fertilization. The newly hatched larvae are usually between 6.2 and 7.8 mm in length and grow rapidly during the first three years.

Sculpin landings first appeared in the Maritimes Region landings statistics in the early 1990s (Comeau 2009). The fishery at that time was a by-catch fishery mainly from the Bay of Fundy, Gulf of Maine, and Brown's Bank areas (DFO 2008). Landings were at low levels until the introduction of the directed fishery in St. Mary's Bay in 1999, at which point catches increased to fluctuate between approximately 100 and 200 mt. The majority of the Sculpin caught in other fisheries are caught outside St. Mary's Bay (Comeau et al 2009). Currently there is no TAC in this fishery.

There has been one assessment of the status of Longhorn Sculpin in St. Mary's Bay (DFO 2008). The initial findings of that assessment are as follows:

- Longhorn Sculpin landings in 4X fluctuated between approximately 100 and 200 t after the start of the directed fishery in 1999. The directed fishery is concentrated in the middle of St. Mary's Bay.
- Commercial catch rates of longhorn sculpin within St. Mary's Bay declined in the first few years of the directed fishery but appear to have stabilized. The catch rates from Stratum 490 of the DFO Research Vessel (RV) survey increased from the late 1970s to 1993 and then Maritimes Region Longhorn Sculpin subsequently declined.
- The abundance of larger (>23cm) longhorn sculpin in the directed fishery has declined, as has the mean length of sculpin from the RV survey in Stratum 490.
- Estimates of within-season exploitation rate on sculpin in St. Mary's Bay are substantial (greater than 30%). However there was insufficient information to determine if such an exploitation rate is sustainable.
- While local depletion is probably occurring within St. Mary's Bay and adjacent areas, there is no evidence that sculpin in other areas of NAFO divs. 4VWX have been affected.

Management

There is no traditional fishery for Longhorn Sculpin on the east coast of Canada¹. In New England, the Longhorn Sculpin has been captured with "trash fish" and processed into fishmeal and oil and in the production of dog and cat food. In Newfoundland and Labrador, Longhorn Sculpin has been captured around wharves by hook and line or by "jigging" and is considered a nuisance species, often interfering in commercial harvesting for more valuable fish species. No defined market for Longhorn Sculpin exists in the northwest Atlantic.

- www.fishaq.gov.nl.ca/research_development/.../sculpin_longandshort.pdf.

Winter Flounder 5Zjm

Status

Information on Winter flounder status is based on DFO surveys ((NEFSC 2015). The latest RV surveys show that despite considerable interannual variability, the relative abundance trends in the Canadian spring surveys showed an increasing trend during the 1990s and peaked in the early 2000s, followed by a declining trend during later years. After that, the Canadian spring indices remained stable at some of the lowest levels in the time series during 2008 – 2014 (NEFSC 2015).

Management

Management units of Winter flounder in Eastern Georges Bank are shared with US Authorities. Combined data of US and Canadian Winter flounder are used by NMFS to develop models for stock status and catch advice. Canadian landings generally comprised a low percentage (1-2%) of the total landings until 1994, at which time Canadian landings increased rapidly from 6% of the total to a peak of 24% in 2001 (529 mt).

The increasing trend in Canadian landings occurred primarily during the second half of the year because since 1994 Canadian groundfish fisheries on Georges Bank have, for the most part, been closed during January-May (Van Eeckhaute and Brodziak 2005). After 2001, Canadian landings declined rapidly to 1.5% in 2007 (12 mt). During 2008 – 2010, Canadian landings were very low, comprising only 1 – 3% of the total landings. Since 1994, the Canadian groundfish fishery on Georges Bank has, for the most part, been subject to a seasonal closure from January 1 – June 1. Since 2001 – 2003, mobile gear vessels without at-sea observers have been required to use separator panels to minimize the bycatch of cod when fishing haddock. This gear modification may also have reduce the bycatch of winter flounder in the haddock fishery because the lower panel has an open cod end to allow cod (and possibly flatfish) to escape, while the upper panel captures and retains haddock. There are no TACS or LRPs for this fishery in 5Zjm.

4.4.2. Bycatch Species

An Overview of Bycatch – Discard Species

In Canadian waters the groundfish species that may be legally discarded are spiny dogfish, sculpin and skate. In addition, harvesters can only retain species for which they have a commercial license. While fishing under a groundfish license, all non-groundfish such as striped bass, crab and lobster must be returned to the ocean in a manner that causes the least harm.

Discards are not regularly documented through the logbook system and thus discard levels are only estimated through the at-sea observer program. Estimates of overall discard levels have been made by extrapolating observed discard rates for the otter trawl and bottom longline fisheries. However, there are some notable uncertainties because these estimates have a number of limitations in that (i) they have not been analysed at fine temporal or spatial levels, and (ii) in the case of Area 4X5Y, they are based on low observer coverage levels (Table 7).

Table 7. Catch and Observer Rates (% of total catch observed) for Otter Trawl (OT) & Bottom Longline Gears (BLL) in Areas 4X5Y & 5Zjm (2004 – 2013) (n/a refers to incidences where no data were provided).

4X5Y Haddock Fishery						
	OT Haddock Catch (t)	OT Obs Had Catch (t)	OT % Obs	BLL Had Catch (t)	BLL Obs Had Cat (t)	% BLL Obs
2004	5376	150	2.80	1177	37	3.14
2005	4664	48	1.04	969	7	0.73
2006	3428	59	1.72	1318	9	0.69
2007	5290	24	0.45	1586	10	0.66
2008	4185	36	0.86	1176	7	0.61
2009	4563	21	0.46	933	7	0.73
2010	4394	304	6.92	1263	57	4.54
2011	2823	452	16.02	910	23	2.58
2012	3335	198	5.93	792	23	2.95
2013	3104	93	3.00	414	n/a	0.00
Avg (2004-13)	4116.2	138.5	3.92	1053.8	20	1.67

5Zjm Haddock Fishery						
	OT Haddock Catch (t)	OT Obs Had Catch (t)	OT % Obs	BLL Had Catch (t)	BLL Obs Had Cat (t)	% BLL Obs
2004	7744	1045	13.49	2000	180	9.00
2005	12115	2481	20.48	2368	158	6.69
2006	10088	3410	33.81	1896	141	7.45
2007	10034	9662	96.29	1854	37	2.00
2008	12615	5211	41.31	2164	339	15.66
2009	15407	3280	21.29	2185	354	16.22
2010	14100	2325	16.49	2476	250	10.10
2011	9664	2057	21.28	1566	331	21.15
2012	4201	1386	32.99	832	191	22.99
2013	4348	2789	64.14	272	64	23.59
Avg (2004-13)	10031.60	3364.60	36.16	1761.30	204.50	13.49

The estimated discards from the otter trawl and bottom longline fisheries are provided in Tables 7 to 10. As can be seen, the discards from these fisheries are dominated by dogfish and skates. Main species were distinguished from minor species if the percentage of the average weight across years of the former was >5% of the total average weight of the total catch. However, a minor species was also categorized as main species if the status of this species was found to be vulnerable.

Main species assessed as bycatch species included:

- 4X5Y OT: No main species found
- 4X5Y LL: Skates, Halibut, Cusk, Blue shark, Porbeagle shark
- 5Zjm OT: Skates, Porbeagle
- 5Zjm LL: Skates, Blue Shark

Minor Species assessed as bycatch species included:

- 4X5Y OT: Spiny Dogfish, Lobster
- 4X5Y LL: Spiny Dogfish, Halibut
- 5Zjm OT: Spiny Dogfish
- 5Zjm LL: Spiny Dogfish

While data on bycatch species from the gillnet (5zjm) and hand line (4X5Y,5Zjm) fisheries were not available to the assessment Team, previous MSC assessments concluded that annual landings at under 5 mt for both fisheries combined with their impact on other retained species populations were considered to be insignificant (MSC 2014, MSC 2013, MSC 2012). Currently in 5Zjm the data for gillnets is rolled into fixed gear because catches by this gear in the Georges Bank fishery are not significant. There are no handline catches (pers. comm Michael O'Connor GEAC).

The assessment team was also informed that there are significantly fewer vessels actively using gillnets and handlines in the fishery, and it is highly unlikely that these gears would exceed longline bycatch levels. In the case of gillnets, fishermen are operating mainly with a minimum of 140 mm mesh gear for pollock and other groundfish species. Haddock is a very small portion of the retained catch. Handline vessels are too small to comfortably carry an observer and so bycatch information from this source will continue to be rare. Over the past 10 years (2005-2014), combined gillnet and handline landings of haddock from 5Zjm have been <2 mt (i.e. 0.88 mt in 2014), with most of these originating from gillnet. There are no observed trips from the handline sector because they essentially do not fish on Georges Bank (personal com. from GEAC and DFO Heath Stone).

Table 8. Otter Trawl Haddock Directed Fishery: Discards in 4X5Y by Main Species (mt) (2004 - 2013). Species names in bold are major species.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	% Discarded	% Total Catch
Spiny dogfish	49.13	7.1	10.04	1.09	1.95	0	6.23	1.66	0.58	0.19	7.8	45.7	0.2
American lobster	6.67	2.72	2.02	3.04	0.83	0.07	3.9	2	5.18	2.84	2.93	17.2	0.1
Total discards	69.04	16.69	14.68	9.89	5.76	0.38	23.35	12.22	11.66	6.83	17.07	100	
Total catch	5376	4664	3428	5290	4185	4563	4394	2823	3335	3104	4116.2		0.3

Table 9. Otter Trawl Haddock Directed Fishery: Discards in 5Zjm by Main Species (mt) (2004 - 2013). Species names in bold are major species.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	% Discarded	% Total Catch
Spiny dogfish	0.34	0.07	41.48	59.2	9.35	1.37	2.54	6.15	41.33	2.66	14.95	24.1	0.1
Winter skate	2.32	8.58	9.77	11.54	8.44	1.41	5.47	9.26	31.61	4.75	8.47	13.6	0.1
Porbeagle	0.34	0.66	3.4	18.98	3.57	3.57	9.03	7.28	6.71	21.75	6.84	11.0	0.1
Thorny skate	17.49	3.51	7.79	12.9	4.3	1.54	7.21	4.9	4.44	3.46	6.14	9.9	0.1
Barndoor skate	3.49	3.43	6.56	7.53	5.04	2.5	8.41	3.34	14.28	5.97	5.5	8.9	0.1
Total discards	36.87	26.49	95.69	153.78	69.99	26.19	37.94	41.45	128.53	66.32	62.13	100.00	
Total catch	7744	12115	10088	10034	12615	15407	14100	9664	4201	4348	10031.6		0.50

Table 10. Bottom Longline Haddock Directed Fishery: Discards in 4X5Y by Main Species (mt) (2004 – 2012). Species names in bold are major species.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average	% Discarded	% Total Catch
Spiny dogfish	1.57	7.88	3.05	1.13	0.16	0.02	0.03	0.09	0.02	1.39	33.3	3.0
Barndoor skate	0.92	0.48	0.46	0.33	0.38	1.02	8.05	0.06	1.23	1.29	30.8	2.7
Thorny skate	0.82	0.18	0	0.38	0.08	0.05	3.02	0.49	0.05	0.51	12.1	1.1
Winter skate	0.01	0.07	0.57	0.38	0.01	0.08	0.73	0	0.25	0.21	5.0	0.4
Halibut	0.64	0.27	0.05	0.02	0.03	0.1	0.23	0.11	0.27	0.17	4.1	0.4
Skates (ns)	1.25	0.05	0	0	0	0	0.07	0	0.06	0.14	3.4	0.3
Cusk	0.03	0	0	0.35	1.02	0	0	0	0	0.14	3.3	0.3
Little skate	0	0.03	0	0	0.01	0	0.66	0.19	0.14	0.1	2.4	0.2
Blue shark	0.06	0	0	0	0	0.13	0.13	0	0.07	0.04	0.9	0.1
Porbeagle	0	0	0	0	0	0.16	0.05	0	0.03	0.02	0.6	0.1
Total bycatch	5.34	9.03	4.16	3.25	1.84	1.56	13.34	1.01	2.41	4.18	100.0	
Total catch	1177	969	1318	1586	1176	933	1263	910	792	1124.889		8.8

Table 10. Longline Haddock Directed Fishery: Discards in 5Zjm by Main Species (mt) (2004 – 2013). Species names in bold are major species.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	% Bycatch	% Total Catch
Barndoor skate	2.8	2.67	7.15	1.35	15.92	42.68	13.27	11.44	17.25	3.64	10.74	44.4	2.5
Spiny dogfish	0.97	1.25	13.76	0.42	0.07	1.81	0.01	0	13.12	5.53	3.36	13.9	0.8
Thorny skate	4.17	1.74	0.55	0.22	4.48	5.45	7.99	8.06	3.12	0.79	3.32	13.8	0.8
Winter skate	1.21	0.11	1.2	1.22	0.69	9.61	2.11	8.52	2.41	1.43	2.59	10.7	0.6
Skates (ns)	2.77	0.32	0.03	0.59	0.61	2.95	0.19	1.58	0	0.72	0.89	3.7	0.2
Little skate	0	0.14	0.11	0.01	0.28	0.25	2.17	3.72	1.14	0.42	0.75	3.1	0.2
Blue shark	0.34	0	0.19	0.12	1.38	0.64	0.11	0.87	1.06	0.6	0.48	2.0	0.1
Smooth skate	0	0.14	0	0	0.12	2.38	0	0.55	0.01	0.47	0.33	1.4	0.1
Total discards	22.24	6.91	24.05	4.61	24.7	67.75	26.07	36.54	38.88	14.21	24.14	100.0	
Total catch	2000	2368	1896	1854	2164	2185	2476	1566	832	272	1761.3		5.50

Assessment of Main Discarded Species

Skate

Skate discards are mainly found in the 4X5Y longline fishery and are found also in the trawl and longline fisheries in 5Zjm. Skate bycatch has remained fairly consistent in the longline and 4X5Y trawl fisheries but has declined from >1,000 mt per annum in 2003 to less than 100 mt since the introduction of the separator panel in the 5Zjm trawl fishery. The majority of the skates discarded by the longline fisheries (Tables 7-10) are the Barndoor skate (*Dipturus laevis*), with the trawl fisheries mainly discarding Winter skate (*Leucoraja ocellata*) and Thorny skate (*Amblyraja radiata*).

Barndoor Skate

Trends in survey abundance and biomass indices for Barndoor skate in shallow waters (<200 fathoms) are well documented for Canada (Cavanagh and Damon-Randall 2009). Minimum abundance from the US Fall RV survey (Div. 4X5ZY6) during 1963 – 1975 averaged 1.1 million juveniles and 62,000 adults annually (COSEWIC 2010). During 1976 – 1994, mean abundance was 54,000 juveniles and 2,800 adults. During 1995 – 2007, there were 79,700 juveniles and 112,000 adults (COSEWIC 2010). The average of the first four years of this survey was 3.2 million fish while the average of the last four years was 1.7 million fish or 53% of the earlier period (COSEWIC 2010).

Abundance estimates from the Canadian RV survey for Div. 5Z were calculated for the whole of Georges Bank as well as the Canadian portion only. (COSEWIC 2010). Abundance of all size classes on Georges Bank averaged 52,000 fish during 1987-1995 (COSEWIC 2010). During 1996 – 2008, abundance averaged 622,000 juveniles and 11,000 adults. On the Canadian side of the bank, total abundance of all sizes averaged 15,000 individuals during 1987 – 1995 (COSEWIC 2010). Since 1996, there was an average of 43,000 juveniles and 2,300 adults (COSEWIC 2010). On the Scotian Shelf, the data were grouped into 3 generations: 1970 – 1982, 1983 – 1995, and 1996 – 2008. The average number of juveniles was 152,000, 15,000, and 118,000 for each of these three respective time periods (COSEWIC 2010). Numbers of adults for the same time periods were 11,000, 0, and 39,000.

Winter Skate

Eastern Scotian Shelf – Newfoundland population¹

Abundance of mature individuals is estimated to have declined 98% since the early 1970s, and is now at a historically low level. This population's range size has varied over this time, having increased until the mid-1980s, with a decrease since then. Overfishing in the 1980s and 1990s, including from directed skate fisheries, may have contributed to declining abundance over that period. The main threats since then have been unsustainably high non-fishing mortality, possibly due to predation by Grey Seals, as well as fishing mortality due to bycatch in fisheries targeting other species.

The Eastern Scotian Shelf population of Winter Skate was assessed as Threatened in May 2005, and the Northern Gulf - Newfoundland population was assessed as Data Deficient in May 2005. The COSEWIC Guidelines for Recognizing Designatable Units (2013) were used to revise the population structure for the 2015 assessment, resulting in new designatable units. The new Eastern Scotian Shelf – Newfoundland population is composed of the former Eastern Scotian Shelf population and parts of the former Northern Gulf - Newfoundland population. The remaining subpopulations of the Northern Gulf - Newfoundland population were assigned to the new Gulf of St. Lawrence population. The Eastern Scotian Shelf – Newfoundland population was designated Endangered in May 2015.

Western Scotian Shelf - Georges Bank population²

Survey results since the 1970s were highly variable from year to year, but show no decline. The area occupied by this population also shows no trend. Neither fishing mortality nor predation by other species appears to be causing declines in this population. The species was designated Special Concern in May 2005; however, this was re-examined in May 2015 and designated Not at Risk.

¹http://www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm?id=1292&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=winter%20skate&scienceName=&returnFlag=0&Page=1

²http://www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm?id=881&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=winter%20skate&scienceName=&returnFlag=0&Page=1

Smooth Skate

Smooth skate were broadly distributed throughout the Maritimes Region in the 1970s with persistent areas of concentration (Simon et. al 2011). In the 1980s and 1990s, abundance fell across the Scotian Shelf and has continued to decline in Divs. 4VW. (Simon et. al 2011). In Div. 4X, abundance has increased in the 2000s, primarily driven by an increase in the number of juveniles (Simon et. al 2011). The decline in abundance over the whole Scotian Shelf was 80% for mature individuals while the decline when all lengths are considered was 58% (Simon et. al 2011). Smooth skate are uncommon on Georges Bank with only scattered reports on the edges of the northeast peak area of the Canadian Zone (Simon et. al 2011). Seasonal US RV surveys suggest that these observations are simply the southern edge of a population of smooth skate that are found throughout the Gulf of Maine (Simon et. al 2011). These seasonal US surveys provide contradictory evidence with slight decreases or increases in abundance depending on the survey. In Div. 4X, smooth skate abundance has been increasing over the last 15 years at the same time that removals have decreased by about half (Simon et. al 2011). Recruitment to the population has been increasing over the same period on both the eastern and western Scotian Shelf (Simon et. al 2011). Although the reduction in abundance in Divs. 4VW has resulted in some fragmentation in the population distribution, there is no evidence to suggest that the Scotian Shelf may comprise more than one designatable unit.

Thorny Skate

Early in the 2000s, bycatch of thorny skate was high relative to other species but has since declined (Simon et. al 2011). Thorny skate were widespread across the Scotian Shelf and Bay of Fundy with the highest concentration in Div. 4V and the Bay of Fundy prior to 1990 (Simon et. al 2011). Since the 1990s, there has been a dramatic reduction in the distribution of thorny skate on the central Scotian Shelf and the concentrations in the east and west are much reduced. An examination of the length frequencies collected during the Summer RV Survey indicates a progressive loss of the largest individuals in the population so that there are very few fish greater than 53 cm caught by the survey (Simon et. al 2011). The decline in abundance across the shelf of mature fish is 96%, while the decline when all lengths are considered is 82% (Simon et. al 2011). While these declines have occurred, recruitment of fish less than 21 cm has remained steady since 1970 (Simon et. al 2011). Thorny skate are distributed on Georges Bank primarily on the edges of the northeast peak of the bank and in the deeper waters north of the Great Southwest Channel (Simon et. al 2011). Their distribution is similar to that observed for smooth skate but they are also observed in slightly shallower waters as well (Simon et. al 2011). As for smooth skate, the US RV surveys suggest that thorny skate are found

throughout the Gulf of Maine and that the distribution observed during the Canadian survey in this area simply reflects the southern edge of this population (Simon et. al 2011) The mandatory use of separator panels in otter trawls and reduced fishing for yellowtail flounder have reduced the capture of this species substantially (Simon et. al 2011). Thorny skate by- catch has continued to be consistent over several years. There is no gear modification or alternate bait strategy to reduce the harvest of skate by longline vessels. Survival of returned fish is thought to be less than 50%. In Div. 4X, thorny skate abundance has continued to decline despite the reduction in removals by greater than half and steady recruitment over the last 15 years (Simon et. al 2011) . Industry surveys provide evidence that thorny skate continue to be distributed across the Scotian Shelf likely reflecting a single designatable unit (Simon et. al 2011).

There are no directed fisheries for smooth or thorny skate on the Scotian Shelf although these species are caught as bycatch in other fisheries. In Div. 4X, an examination of these other fisheries suggests that annual smooth and thorny skate bycatch was relatively stable at approximately 450 and 1,750 mt respectively from 1970 to 1992. Bycatch estimates declined for both species in the 1990s as catches in the traditional Cod, haddock, Pollock, and flatfish fisheries were reduced. In the last decade, removals have been less than half of what had been taken previously.

For 4X5Y skate species, DFO's 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and long-term (1970-2011) averages. For both species, the biomass index trend strongly indicates no evidence of stock recovery and rebuilding. Barndoor skate is showing a declining trend in the most recent surveys. However relative to a comparison of the short-term and long term this species is above the average. Both Winter and Little skate are up relative to the short-term. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean.

Management Measures and Strategies

There are no Canadian directed fisheries for Barndoor, Winter or Smooth skates. Mitigation measures include bycatch caps in all fisheries and the use of separator grates in the trawl fishery. all vessels may release skates in Maritimes Region. If returned to the water, it must be done in a manner that causes the least harm to the animal. Identification cards for skates are distributed with fishing licenses to aid in better identification of skate species by fishers.

Conservation Strategies and Management Measures were established in 2013 for the bycatch species in the 4X5Y haddock fishery including 4X5Y Skate species. The Conservation Strategy and Management Measures for skate includes a suite of actions including informing fishermen of the best practices for live release of skate; how to identify skate species; the recording of quantities released by species; a move away protocol when encountering high bycatch of Thorny Skate; and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.

For 4X5Y Skate species, DFO's 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and long-term (1970-2011) averages (Table 11). Barndoor Skate is showing a declining trend in the most recent surveys but relative to a comparison of the short-term and long-term this species is above the average. Both Winter and Little Skate are up relative to the short-term. Only Thorny Skate is considered to be below the LRP proxy of 40% of the long-term mean. The biomass estimates from the 2013 Maritimes Summer RV Survey are taken from the CSAS reference document and summarized as follows.

Table 11. Average Biomass trends of 4X5Y Skate Species.

Stock	Species	2007-2011 Avg as % of 1970-2011	2011-2013 Avg as % of 2007-2011	2011-13 Trend Relative to Shortterm	At risk of serious or irreversible harm relative to LRP proxy at 40% of longterm mean
4X5Y	Smooth	82%	65%	down	no
4X5Y	Thorny	17%	36%	down	yes
4X5Y	Barndoor	425%	48%	down	no
4X5Y	Winter	81%	148%	up	no
4X5Y	Little	124%	124%	up	no

Source: DFO RV Survey CSAS 2014/017 p3;

Note: Longterm is 1970-2011 average of biomass indices from RV surveys

Shortterm is 2007-2011 average of biomass indices from RV surveys

Trend is average of 2012-2013 biomass indices

A review of skate discards was estimated using a study on discards in the 4X5Y Groundfish fishery between 2007-2011 (Table 12) (DFO Working Document 2014/014). It is the second such analysis; the first one was completed in 2010 for the years 2002 -2007. In support of this condition the second study was used to evaluate the likely impact of discards for otter trawls and longline gear using the years 2010 and 2011 as a baseline. These were chosen because observer coverage levels were at their highest in 2010 at 9.8% for OT and 5.7% for LL and in 2011 at 10.7% for OT and 4.3% for LL. From this data average discards and the post mortality of discards was estimated. Results show encouraging trends of decreasing discards for thorny, winter and smooth skates. Conservation Strategy identifies a survival rate of 50% for OT discards and 80% for LL. However, in a recent study (Mandelman et al. 2013) on short-term post discard mortality on trawlers there was supporting evidence to conclude that skate are more resilient than previously indicated. A low average of 22% post mortality was found for commercial tow durations, albeit the conclusions were qualified with cautions for management concerning tow duration, temperature, species rates of injury, net biomass and individual animal size. In view of this study an alternate post survival:mortality rate of 75%:25% was also determined for OT skate discards in this review. It is likely that skate survival and mortality rates are within a range and vary by species.

Table 12. 4X5Y Skate Discards and Mortality by gear.**4X5Y Estimated Skate Discards and Mortality (mt) by Gear**

Longline 4X5Y	Skate Discards		Average Discards	Est Mortality 20%	2007-2011 Avg Indices
	2010	2011			
Barndoor	183	37	110	22	1,809
Smooth	0.1	0.4	0.3	0.1	400
Thorny	63	66	64	13	671
Winter	14	4	9	2	792

Otter Trawl 4X5Y	Skate Discards		Average Discards	Range of Mortality		2007-2011 Avg Indices
	2010	2011		50%	25%	
Barndoor	71	100	85	43	21	1,809
Smooth	17	4	11	5	3	400
Thorny	24	22	23	12	6	671
Winter	39	14	27	13	7	792

Notes: 1) Source: Working Paper 2014/014 Clark, K.J. et al.;

Overview of Discards in Canadian Commercial Groundfish Fisheries in 4X5Y - 2007-2011

2) OTB includes all groundfish fisheries.

3) DFO 2013 Summer RV 2007-2011 Avg Indices (Short-term)

For OT and LL gears in the groundfish fishery in 4X5Y, the discard mortality of Barndoor Skate is estimated to be between 43 and 65 mt. Relative to the short-term RV survey biomass indices this represents between 2.4% and 3.6% of the short-term average. For Thorny Skate the discard mortality is estimated to be between 19 and 25 mt. Relative to the short-term RV survey biomass indices this represents between 2.8% and 3.7% of the short-term average.

For an evaluation of longline gear in 5Zjm a similar approach was followed although current observer data is used because of the enhanced level of coverage in 5Zjm (Table 13). DFO’s 2014 RV Winter survey abundance indices indicate a downward trend for Thorny Skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor Skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth Skate is a minor species in 5Z and is above the long-term average. Only Thorny Skate is considered to be below the LRP proxy of 40% of the long-term mean. The biomass indices from the 2014 5Z Winter RV Survey were provided after the release of the reference document (Source GEAC, Mike O Connor).

Table 13. Average Trends in Biomass of 5Zjm Skate Species.

Stock	Species	2009-2013 Avg as % of 1987-2013	2012 -14 Avg as % of 2009-2013	2012 -14 Trend Relative to Shortterm	At risk of serious or irreversible harm relative to LRP proxy at 40% of longterm mean
5Z	Smooth	127%	55%	down	no
5Z	Thorny	35%	79%	down	yes
5Z	Barndoor	152%	97%	same	no
5Z	Winter	75%	109%	up	no
5Z	Little	85%	164%	up	no

Source: DFO RV Survey CSAS 2014/045; personal email Don Clark 10/27/14

Note: Longterm is 1987-2013 average of biomass indices from RV surveys

Shortterm is 2009-2013 average of biomass indices from RV surveys

Trend is average of 2012-2014

A review of skate discards by longline gear was estimated using annual observer estimates for discards for the last three years, extrapolated to the full catch, to estimate bycatch percentages (Table 14). The level of observer coverage in the 5Zjm Haddock fishery for fixed gear (made up mostly of longline gear) was 21% (2011), 23% (2012), 24% (2013). The most significant skate bycatch species were Barndoor followed by Thorny and Winter Skates. It is expected that recent improvements in the identification of skate species by fishermen and at-sea observers will reduce the incidence of reporting of non-specified skate.

Table 14. 5Zjm Estimated Skate Discards (mt) by Longline Gear.

5Zjm Estimated Skate Discards (mt) by Longline Gear						
Longline 5Zjm	2011 Discard	Discard %	2012 Discard	Discard %	2013 Discard	Discard %
Skate (NS)	7.91	0.37%	-	0.00%	3.09	0.47%
Barndoor	57.14	2.67%	76.74	5.87%	15.59	2.36%
Thorny	40.24	1.88%	13.89	1.06%	3.37	0.51%
Winter	42.55	1.98%	10.73	0.82%	6.14	0.93%
Smooth	2.73	0.13%	0.06	0.00%	0.20	0.03%
Little	18.58	0.87%	5.05	0.39%	1.80	0.27%

Notes: 1) Total Est. Discards= Observed Discards of Skate Species

X Total Landings all Species/Observed Landings all Species.

2) Discard % = Estimated Discards / Longline Catch in 5Z

3) Skate (NS) is non specified; species could not be verified by observer

4) Source: Observer data DFO; Commercial landings DFO.

For longline gear in the 2011-2013 groundfish fishery in 5Zjm, the discard mortality of Barndoor Skate is estimated to be an annual average of 10 mt (Table 15). Relative to the short-term RV survey biomass indices this represents about 4% of the short-term average. For Thorny Skate the discard mortality is estimated to be about 4 mt. Relative to the short-term RV survey biomass indices this represents 6.4% of the short-term average.

Table 15. Estimated Discard Mortality (mt)).

Longline 5Zjm	Discard Mortality@20%			2011-13	2009-13	% of
	2011	2012	2013	Avg	Indices	Indices
Skate (NS)	1.58	-	0.62	0.73	-	
Barndoor	11.43	15.35	3.12	9.97	251	3.97
Thorny	8.05	2.78	0.67	3.83	60	6.39
Winter	8.51	2.15	1.23	3.96	10,393	0.04
Smooth	0.55	0.01	0.04	0.20	14	1.42
Little	3.72	1.01	0.36	1.70	6,031	0.03

Note: 2009-13 avg biomass indices from 2014 5Z Winter RV Survey

The discard mortality at 20% for skate as specified in the Conservation Strategy may be on the high side for longline gear given the Mandelman et al (2013) study in trawl fishing and the general resilience of skate to the rigors of otter trawl capture. There should be less trauma and injury to Thorny Skate captured on longline gear. The mandatory release and increased emphasis on returning Thorny Skate back to the water will continue to reduce discard mortality.

Cusk

Status

The only fishery that discards this species is the bottom longline fishery in 4X5Y. Commercial catch rates for cusk have declined since the 1980s (DFO 2014). Management measures (e.g., trip limits, overall caps, and bycatch percentages) may have contributed to the reduction in catch rates and landings. It is noteworthy to say that commercial catch rates have not been used to monitor cusk abundance in over 10 years (DFO personal communication). Management restrictions have negated their usefulness as an index. It was thought that the decline noted in catch rate in the 1990's was related to declines in abundance.

Management

Proposed reference points for Cusk and other Maritimes Region stocks were reviewed at a DFO Regional Peer Review meeting in February 2012 (DFO 2014). The framework for these reference points followed the 2009 DFO policy document "A fishery decision-making framework incorporating the Precautionary Approach," which explains in detail how the precautionary approach (PA) will be put into practice. To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a Limit Reference Point (LRP) that delimits the boundary between a critical and cautious zone, and an Upper Stock Reference (USR) that delimits the boundary between a cautious and healthy zone on the stock status axis (DFO 2012). The Halibut Industry Survey provides an ongoing time series to be used for monitoring Cusk stock status. The USR and LRP for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks respectively. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP. Right now Cusk is in the cautious zone (DFO 2014).

Discarding of cusk is not legal unless a variation order permits it (DFO 2014). While it is thought that discarding occurred at some times in the first few years after quota caps were put in place, the fishery has not been reaching its cap in the last few years, so all catches can be landed and sold. Discarding is not known to be occurring (DFO personal communication)

Porbeagle shark

Status

The porbeagle, *Lamna nasus*, is a large pelagic shark. In the northwest Atlantic, porbeagle are widely distributed, with the highest numbers found between Newfoundland and the Gulf of Maine (COSEWIC 2004, 2014). They are commonly found on continental shelves but are also known to inhabit inshore and offshore waters from the surface to at least 700 m in depth. They have been sought after by fishers in the northwest Atlantic since the early 1960s due to their high meat quality (Fleming and Papageorgiou 1997; Fowler et al. 2004). The main market for porbeagle meat is in Europe while fins are usually destined for Asian markets.

In 2004, porbeagle were designated as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are being considered for listing on Schedule 1 of the *Species at Risk Act* (SARA). COSEWIC (2004) provides the following rationale for designating the porbeagle shark as endangered:

"This wide-ranging oceanic shark is the only representative of its genus in the North Atlantic. The abundance has declined greatly since Canada entered the fishery in the 1990s after an earlier collapse and partial recovery. Fishery quotas have been greatly reduced, and the fishery has been closed in some areas where mature sharks occur. The landings now are comprised mostly of juveniles. Its life

history characteristics, including late maturity and low fecundity, render this species particularly vulnerable to overexploitation.”

Porbeagle sharks produce few offspring and mature at a late age compared to the age of first capture. This combination of life history characteristics makes porbeagle highly susceptible to over-exploitation. The ESU for porbeagle in the NW Atlantic is represented by a single, largely Canadian population inhabiting the area from Georges Bank/Gulf of Maine to Newfoundland and the Gulf of St. Lawrence.

The virgin porbeagle population in the NW Atlantic was fished intensively at catch levels of about 4,500 mt per year in the early 1960s before the fishery collapsed 6 years later. The population slowly recovered during the 1970s and 1980s when annual landings averaged 350 mt. Catches of 1000 – 2000 mt throughout the 1990s appear to have once again reduced population abundance, resulting in very low catch rates and disturbingly low numbers of mature females. Based on an extensive reconstruction of porbeagle shark abundance, all indicators of population size have declined substantially since 1961. Current population size is estimated to be 10-20 % of that of the virgin 1961 population. All lines of evidence indicate that fishing mortality is largely or solely responsible for the decline in population abundance since 1961.

In 2014, COSEWIC (COSEWIC, 2014) re-evaluated the conservation status of the northwest Atlantic population of Porbeagle Shark as endangered. The evaluation was based on the status of the population to 2009. At that time, the stock decline appears to have abated; abundance was estimated at about 10,000t, which still only corresponded to 22% to 27% of the virgin biomass when directed fishing began in 1961.

Estimates for the average population size which could support the estimated number of discards (Ncrit) has been calculated to about 4,800. The best available estimate of population size is from 2007 was about 10,100, showing that the current populations around that time was above Ncrit. Based on the model simulations, there is a 23% probability that the population declined, while 77% of the simulated populations increased between 1986 and 2007. CPUE indices in U.S. waters show no evidence of a decline since 1979.

The latest Canadian assessment of the Northwest Atlantic porbeagle stock (Campana 2012) indicated that biomass is depleted to well below BMSY, but recent fishing mortality is below FMSY and recent biomass appears to be increasing. Additional modelling using a surplus production approach indicated a similar view of stock status, i.e. depletion to levels below BMSY and fishing mortality rates also below FMSY. The Canadian assessment projected that with no fishing mortality, the stock could rebuild to BMSY level in approximately 20-60 years, whereas surplus-production based projections indicated 20 years would suffice. Under the Canadian strategy of a 4% exploitation rate (TAC 187mt), the stock was expected to recover in 30 to 100+ years according to the Canadian projections. The porbeagle assessment has not been updated by ICCAT since 2010.

Recent estimates of Porbeagle bycatch among OTB and BLL gear are very low according to the recent Porbeagle RPA (DFO 2015) and observer data. Estimates of discards in Scotia Fundy OTB and BL fisheries are well below the bycatch limits (187mt) (Table 15). The level of bycatch in the haddock fishery totals only 1.29t in 5Zjm where observer coverage is very high; the overall total is estimated at 2.6t for 5Zjm plus 4X5Y, which is less than 3% of the 100t limit determined by the Recovery Potential Assessment (RPA); the total bycatch in all other fisheries is estimated at only 28.4t (Mike O' Connor, GEAC personal communication). When post-release mortality is incorporated, this reduces mortality to only 23t, which is well within the limits established through the RPA. At 0.02%, the rate of bycatch is extremely low relative to the directed fishery.

Table 15. Table 1 taken from Porbeagle RPA2015. Estimated discards (live and dead) of Porbeagle by DFO Maritimes Region (Scotia-Fundy) fisheries (upper section of the table). Estimated mortality (hooking + post-release) of Porbeagle discards in Canadian waters from all sources (lower section of the table). All values in metric tonnes (mt).

Category	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Porbeagle Discards by Fishery (mt):^a																			
Swordfish and Tuna LL ^b	9	13	10	11	20	20	31	34	38	41	40	35	31	27	52	60	61	62	61
Porbeagle LL	8	11	10	10	9	7	2	1	2	2	1	1	1	0	0	0	0	0	0
Groundfish LL	0	0	0	0	2	3	2	2	2	3	2	2	2	2	2	9	9	8	8
Groundfish Gillnet	2	5	4	3	5	4	4	5	4	1	1	1	1	1	11	6	5	4	5
Groundfish OTB	1	1	2	1	9	11	10	9	10	35	30	32	32	34	121	100	106	71	81
Total	21	30	25	26	53	45	56	53	56	83	75	70	67	64	194	176	181	146	155
Porbeagle Discards by Source (mt):^a																			
Reported Landings	1014	1223	916	951	884	497	225	139	219	203	190	93	125	62	83	31	34	19	9
Estimated Total Porbeagle Catch ^c	1046	1260	949	984	946	554	294	220	302	334	314	207	232	157	281	219	232	180	181
Hooking/capture Mortality ^d	10	16	13	13	20	19	20	24	25	26	24	21	19	17	52	49	48	45	46
Estimated Porbeagle Discards (live + dead)	21	30	25	26	45	45	49	53	56	83	75	70	67	64	194	176	181	146	155
Estimated Discard Mortality (hooking + post-release)	15	21	18	18	28	28	30	34	36	41	38	34	31	28	82	77	77	69	72
Sum of Landings and All Discard Mortality	1029	1245	934	969	912	524	255	173	255	244	228	127	156	90	164	108	111	88	81

^a Discard ratios calculated by five-year blocks.

^b Hooking and post-release mortality calculated separately for each gear type, as indicated in text.

^c The sum of total discards + landings does not necessarily equal the estimated total catch, since landings were measured and discards were estimated.

^d Discards have been calculated for all pelagic longline by catch and not separated between target species.

Examination of Observer Bycatch data shows very low Porbeagle bycatch estimates in the otter trawl and Bottom longline in both areas. The estimates of the discards are about less than 0.1 % of the volume of the total catch in the directed haddock fisheries (Tables 7-10).

Management Measures

Fishing is the only known source of human-induced mortality on Porbeagle in Atlantic Canada. With closure of the Canadian Porbeagle directed fishery in 2013, the only remaining source of fishing mortality in Canada's exclusive economic zone (EEZ) is bycatch (DFO 2015). In Canadian waters, Porbeagle bycatch mortality from all sources (capture + post release + landing) has averaged 110 metric tonnes (mt) annually since 2010. The swordfish and other tuna longline, offshore tuna longline, groundfish longline, groundfish gillnet and otter trawl are considered the greatest current threats based on landings records and discard estimates.

On the recent RPA 2015, a recovery target for the Northwest Atlantic Porbeagle population was proposed as achieving 80% of female spawning stock numbers (SSN) at Maximum Sustainable Yield (MSY), or *SSN80%*, within three generations (or approximately 54 years). Across the four productivity models examined, this would equate to 24,000 to 32,000 mature females.

Under what is considered the most realistic of the four productivity models that were examined recovery to *SSN80%* in the absence of fishing would occur around 2033, while recovery under recent fishing mortality rates (approximately 110 mt or 2%) would occur around 2042.

The current 2% mortality rate from all sources (based on 110 mt bycatch mortality since 2010) would allow the population to recover under all scenarios and at a faster rate than the 4% total allowable catch (185 mt) mortality rate. Total harm to the population (from all sources, including capture mortality, post release mortality, and landings) should not exceed a 4% mortality rate to allow the population to continue to increase and move towards the recovery targets.

In 2015 DFO revised its Shark conservation action plan. Management measures for this fishery include closed areas at certain times of the year to reduce fishing pressure on mature female sharks, 100% dockside monitoring of landings. completion of logbooks by all participants, prohibitions against finning etc.

Blue Shark

Status

The Blue shark (*Prionace glauca*) is a large temperate and tropical pelagic shark species of the family *Carcharhinidae* that occurs in the Atlantic, Pacific and Indian oceans. The species is highly migratory, with tagging results suggesting that there is a single well-mixed population in the North Atlantic (Casey and Kohler 1991). In Canadian waters the Blue shark has been recorded off southeastern Newfoundland, the Grand Banks, the Gulf of St. Lawrence, the Scotian Shelf and in the Bay of Fundy. At certain times of the year, it is probably the most abundant large shark species in eastern Canadian waters (Templeman 1963).

Although the Blue shark is among the more productive of pelagic shark species (Cortés 2000), a sustainable catch level or fishing mortality has never been calculated for blue sharks in the North Atlantic. Blue sharks are the primary bycatch species in most large pelagic fisheries, yet are not considered a desirable species by most nations. As a result, most of the sharks that are caught are then discarded, with some associated mortality. Discard statistics by all nations are poor (ICCAT 2009). An additional complication is the highly migratory nature of blue sharks, which splits their residency between the high seas and national water.

In 2006, the Blue shark was designated as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), with the following justification (see: COSEWIC 2006):

“This species is a relatively productive shark (maximum age 16-20 years, mature at 4-6 years, generation time 8 years, 25-50 pups every two years), but as an elasmobranch, populations are susceptible to increased mortality from all sources including from human activities. The species is considered to have a single highly migratory population in the North Atlantic, of which a portion is present in Canadian waters seasonally. The abundance index which is considered to best represent the whole population has declined 60% (1986-2000) but another index shows no long-term trend for the whole population (1971-2003). Indices of abundance in and near the Canadian waters show variable trends from no decline to 60% decline from the 1980s to early 2000s. There is evidence for a decline in mean length in longline fisheries in Canadian waters (1986- 2003). The primary threat is bycatch in pelagic longline fisheries; although the threat is understood and is reversible, it is not being effectively reduced through management.”

There are no fishery-independent indices of abundance for the North Atlantic blue shark population. The only index of abundance for the population as a whole is that based on the average of numerous catch-per-unit-effort (CPUE) indices from national pelagic longline fleets, where Blue sharks appear to be of intermediate vulnerability compared to other shark species in the North Atlantic (Cortés et al. 2010). The averaged ICCAT index for the North Atlantic shows no marked trend in relative abundance between 1958 and 1994, with a decline thereafter (ICCAT 2012). The net decline since 1958 was approximately 20-30%. A population model based on the CPUE indices indicated that biomass in 2010 remained above biomass at maximum sustainable yield (B_{MSY}) and that no overfishing was occurring,

There is no fishery-independent index of abundance for Blue sharks in Canadian waters. Standardized catch rates from observers on pelagic longline vessels provide an index of local, short-term abundance, but do not appear to reflect population abundance. Population abundance in the North Atlantic appears to have decreased modestly since 1994.

The reported catch of Blue sharks grossly underestimates both the actual catch (i.e. sum of landed catch and discards) and the catch mortality. In recent years, almost all catch mortality can be

attributed to hooking and post-release mortality in pelagic longlines. Mortality from derbies and recreational shark fishing accounts for less than 3% of overall fishing-related mortality in Canadian waters. Canadian sources of blue shark mortality remain a small percentage of total (international) mortality to the North Atlantic population.

Blue sharks have negligible commercial value in Canada and are discarded in large quantities, about 1,400 mt annually, by Canadian commercial pelagic fisheries (DFO 2015). The species persistence to this point is partly attributable to its productivity relative to other shark species, the fact that few mature females are caught either in Canadian or American waters, and the relatively low overall Canadian contribution to overall population mortality. At present, fishing-related sources of mortality in Canadian waters appear to be sustainable, although large quantities of discards remain unutilized.

A sustainable catch level for Blue Sharks is unknown for Canadian waters however tagging studies (Campana et al., 2011) do provide a reasonable estimate of post release mortality for Blue Shark in Atlantic Canada. Their 2010 estimate of mortality of 495t for Blue Shark is significantly higher than the total Atlantic Canada Blue Shark landings in 2010. To put this mortality into perspective Campana et al. 2015 applied virgin biomass, 2007 biomass and F_{MSY} values from the latest ICCAT assessment (ICCAT, 2012a) to model eight estimates of Blue Shark MSY ranging from 29,330 – 133,200 mt with an average of 69,800 mt. Since the majority of Blue Shark is caught as bycatch in the pelagic longline fleet, Canada's 2007 share of this gear type for swordfish/tuna (2.5%) was used to pro-rate a potential Canadian share estimated at 1550mt (range of 733t – 3,330t). Keeping in mind the level of uncertainty around both the biomass numbers and the share calculations the recent annual catch mortalities are probably sustainable

Finally, on the latest stock ICCAT assessment (2015) it was found that the North Atlantic Blue shark is not overfished nor overfishing is occurring (ICCAT 2015). The latest assessment used different stock assessment methodologies to evaluate the status such as Bayesian Surplus model, Stock Synthesis. For the North Atlantic stock, scenarios with the BSP estimated that the stock was not overfished ($B_{2013}/B_{MSY} = 1.50$ to 1.96) and that overfishing was not occurring ($F_{2013}/F_{MSY} = 0.04$ to 0.50). Estimates obtained with SS3 varied more widely, but still predicted that the stock was not overfished ($SSF_{2013}/SSF_{MSY} = 1.35$ to 3.45) and that overfishing was not occurring ($F_{2013}/F_{MSY} = 0.15$ to 0.75). Comparison of results obtained in the assessment conducted in 2008 and the current assessment revealed that, despite significant differences between inputs and models used, stock status results did not change drastically ($B_{2007}/B_{MSY} = 1.87$ - 2.74 and $F_{2007}/F_{MSY} = 0.13$ - 0.17 for the 2008 base runs using the BSP and a catch-free age-structured production model).

Management

Blue Shark is currently managed under the *Fisheries Act* and associated regulations. The Canadian Shark Research Laboratory conducts a tagging program on Blue Sharks in Canadian waters and also cooperates with the U.S. shark tagging program in Narragansett, Rhode Island. Under both programs, cooperating fishers (primarily sports fishers) in Canada insert darted tags into Blue Sharks caught in our waters, some of which are later recaptured (DFO 2015).

Other than dogfish, the Blue Shark is the most common shark in all bycatch in Canadian waters with the most significant catches in the large pelagic longline fishery (e.g. the Swordfish feet where the number of Blue Shark caught can be much larger than the number of Swordfish caught). Blue Shark is currently almost always discarded but when retained there is a precautionary allocation of 250t (DFO 2015). Landing information in all fisheries is collected by an independent monitoring company which weighs the catch as it is offloaded at the dock. Any landings by the large pelagic fleet are 100% dockside monitored and the level of dockside monitoring in the fixed gear <65' fleet ranges between 25% and 100%. Shark landings for groundfish licence holders cannot exceed 10% of the total weight

of the authorized groundfish on board the vessel (to a combined maximum of 500kg). There is no directed commercial fishery on Blue Shark and due to poor commercial value total landings have decreased to <0.5t in the last 4 years after a high of 1.1t in 2008 (DFO 2015)

Minor Species

Spiny Dogfish (*Squalus acanthias*) - 4X5Y+5Zjm

Status

Northwest Atlantic Spiny Dogfish (*Squalus acanthias*) is a small, cold-temperature shark found in waters throughout the Northwest Atlantic, with large numbers occurring between North Carolina and southern Newfoundland. Spiny Dogfish is a transboundary resource with significant catches in Canada and the US. Most Atlantic Canadian landings of Spiny Dogfish have historically been taken in longline and gillnet fisheries (DFO 2014).

Industrial (or trash) fishing between the mid-1950s and mid-1960s represented the largest directed fishery conducted on dogfish to that time. Commercial interest in dogfish continued with the arrival of foreign fishing fleets in the Northwest Atlantic, which caught appreciable numbers of dogfish between 1966 and 1977. Reported landings prior to extension of jurisdiction in 1977 were dominated by USSR (Russia) and other European countries, and peaked at about 25,000 mt annually. Domestic fleets supplanted the foreign fishery after 1977, but at lower exploitation levels until the 1990s. Since 1977, US commercial landings have accounted for most of the reported catch, peaking at more than 27,000 mt annually. The 2014 US quota was 18,960 mt. Canadian landings were a relatively small proportion of the total catch until 2000, at which point the introduction of quotas in the US made Canadian landings a significant portion of the total (DFO 2014).

Canadian landings averaged about 2,500 mt annually between 2000 and 2008, with the majority being directed catch by longline, followed by gillnets (DFO 2014). Landings since 2008 have been markedly lower, dropping to only 5 mt in 2010 and have remained at very low levels since, apparently due to demands by the European market for “green-certified” products. Reported landings in 2013 were also 5 mt (DFO 2014). Almost all of the Spiny Dogfish were caught in the Bay of Fundy, Southwest Nova Scotia or off Halifax during the summer. Catches were unrestricted prior to 2002. From 2002 onwards, precautionary directed catch quotas based on past catches were put in place. The quota for Spiny Dogfish has been set at 2500 mt since 2004. Since the mid-1950s, bycatch of Spiny Dogfish in longline, otter trawl, and gillnet fisheries on other species has been the largest source of fishing mortality. Bycatch has declined with the downturns in directed groundfish fisheries since 1992.

Both the DFO summer Research Vessel (RV) survey and the US National Marine Fisheries Service (NMFS) spring RV survey trends in biomass depict a period of low abundance at the start of the time series rising to high levels of abundance in the 1980s. A decline in abundance between 1990 and 2005 was followed by a subsequent increase in more recent years.

Population estimates from the latest stock assessment indicate a dramatic increase in abundance during the 1980s, peaking about 1992, and then declining, with recent increases since 2009, especially of juveniles, with a total population abundance of 789.2 million Spiny Dogfish for 2013 (DFO 2014). Adult females have remained at relatively high abundance since 2006 (DFO 2014).

Abundance of adult females (SSN) and fishing mortality on adult females (F_{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny dogfish, SSN_{MSY} (32.8

million) was proposed as the USR and 65 % of SSN_{MSY} (21.3 million) was proposed as a Lower Reference Point (LRP). $FSSN_{MSY}$ is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone (DFO 2014).

Management Measures and Strategies

Canadian catches of Spiny dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. A framework model representing a single population of North Atlantic dogfish through 2013 was reviewed and accepted, leading to the 2015/2016 TAC. For the 2015/2016 season a precautionary TAC is in place of 5000 mt for directed fishery and 5000 mt for bycatch from other gears.

Atlantic Lobster

Status

The American lobster, *Homarus americanus* (H. Milne Edwards, 1837), is a crustacean belonging to the family *Nephropidae*. It is distributed from Cape Hatteras in North Carolina to Newfoundland to the Strait of Belle Isle that separates Labrador and Newfoundland. The largest populations are found in the Gulf of Maine, southwest Nova Scotia and in the southern Gulf of St. Lawrence (DFO 2011a).

There is no direct measurement of lobster biomass (empirical or analytical). The lobster stock assessment is based on the analysis of trends of stock indicators. Scotian Shelf – Bay of Fundy lobster (SS=LFA 27-34, BoF=LFA 35-38) show some large changes associated with the early days of the fishery and other changes associated possibly with changes in effort (DFO 2011a). Peaks and troughs have been observed within all of the assessment units in the past with both rapid increases and rapid declines in landings. In all areas the lowest landings of the time series occurred during the 1970s highest landings occurred during the last 5 years. Recent increases in landings (2005-2010) are believed to reflect increased abundance. The specific factors controlling abundance and subsequent landings have not been determined (DFO 2013a).

Management

The IFMP (DFO 2011a) accepted to use the proxy of landings as the starting point. Some candidate interim thresholds for lobster fisheries have been developed based on landings. Currently landings in all LFAs are in the candidate healthy zone (80% of the median landings). Most LFAs are also above the median landings for 1985-2004.

Halibut

Status

Please see retained catch section.

Management

Please see retained catch section.

4.4.3. ETP species

According to MSC V1.3, ETP species are defined as those that are recognised by national legislation and those that are listed in Appendix 1 of the Convention on International Trade in Endangered Species (CITES). Species that appear exclusively on non-binding lists such as the IUCN Red List or that are only the subject of intergovernmental recognition (such as the FAO's International Plans of Action)

and that are not included under national legislation or binding international agreement are not considered as ETP species under MSC standards.

Legislative framework

Canada's *Species-at-Risk Act* (SARA) became federal law in Canada in 2002. The legislation's purposes are to prevent Canadian indigenous species, subspecies and distinct populations of wildlife from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and to encourage the management of other species to prevent them from becoming at risk.

In June 2003, the SARA recognized the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an advisory body, thus ensuring that wildlife species will continue to be assessed using the best available scientific and Aboriginal Traditional Knowledge. The COSEWIC, created in 1977, is a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada. Under the SARA, the government of Canada will take COSEWIC's designations into consideration when establishing the legal list of wildlife species at risk. More specifically, the Act:

- Requires that the best available knowledge be used to define long and short-term objectives in a recovery strategy and action plan;
- Creates prohibitions to protect listed threatened and endangered species and their critical habitat;
- Recognizes that compensation may be needed to ensure fairness following the imposition of the critical habitat prohibitions; and
- Creates a public registry to assist in making documents under the Act more accessible to the public; and is to be consistent with Aboriginal and treaty rights and respect the authority of other federal ministers and provincial governments.

The SARA is a result of the implementation of the Canadian Biodiversity Strategy, which is in response to the United Nations Convention on Biological Diversity. The Act provides federal legislation to prevent wildlife species from becoming extinct and to provide for their recovery.

Species-at-risk conservation is built on a cycle of assessment, protection, recovery planning, implementation, and monitoring and evaluation, as shown in Figure 29. It is premised on an adaptive management approach whereby monitoring progress towards achieving the stated conservation and protection objectives and evaluating the effectiveness of adopted strategies are performed on an ongoing basis and are incorporated into each of the different components of the conservation cycle. Early action at appropriate points on the cycle will be encouraged to expedite implementation of effective protection and recovery measures. Consistent with the 1996 Accord, lack of full scientific certainty will not delay measures to avoid or minimize threats to species at risk.

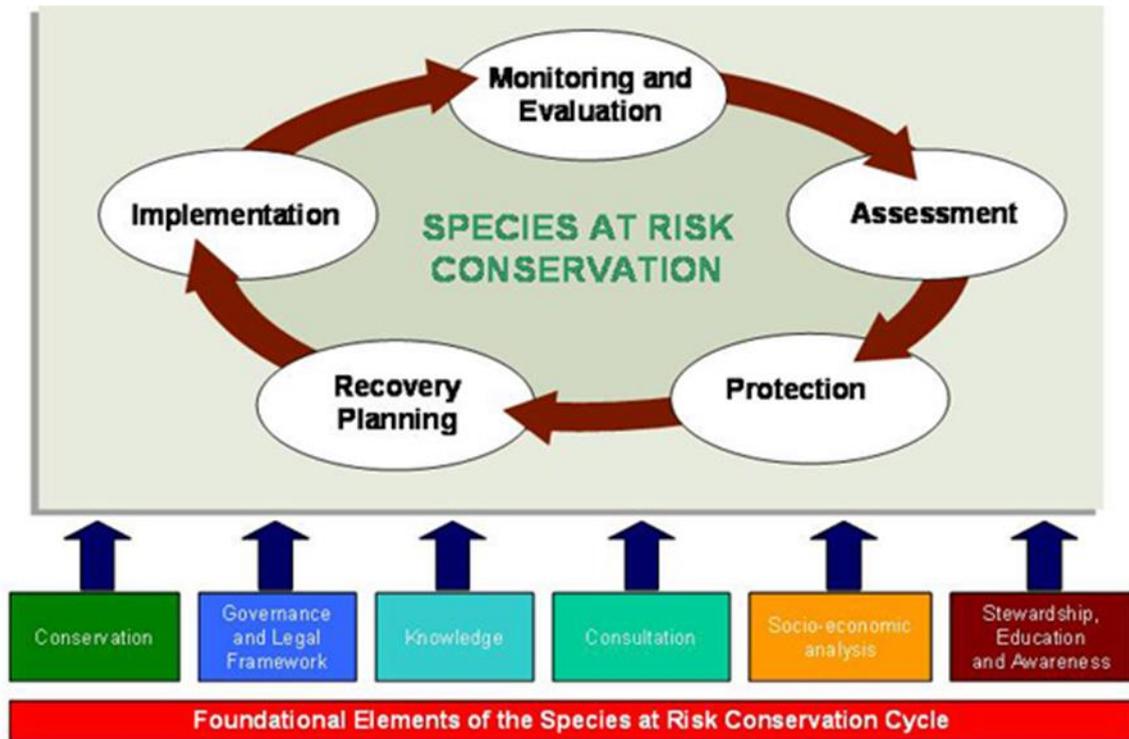


Figure 29. Diagram showing the Species at Risk conservation process.

Under the SARA, species are classified according to status, namely extinct, extirpated, endangered, threatened or special concern. Furthermore, species listed as threatened, endangered or extirpated are subject to immediate prohibitions. The Act prohibits killing, harming, harassing, capturing or taking such species and makes it illegal to destroy their critical habitat. DFO must plan their recovery by developing recovery strategies followed by action plans within the timelines set out in the Act. Recovery strategies must identify recovery objectives for the species to reach population objectives and specify the recovery feasibility. Species listed as special concern under the SARA are not subject to any prohibitions. However, DFO must develop management plans containing the actions needed for the conservation of these species and their habitats in order to ensure that they do not become threatened or endangered due to human activity.

ETP Species in the Maritimes Region are Wolffish, Leatherback turtle, Blue whale, Fin whale, Humpback whale and North Atlantic Right whale. There have been indications of interactions with these species except for Wolffish in the prosecution of this fishery. SARA logbooks are distributed along with license conditions and entries detail interactions with listed ETP species. The leatherback turtle is also listed by the IUCN Red list in Critically Endangered Species of Wild Fauna and Flora, and is included in the CITES, which reduces commercial exploitation of species at risk. Under the SARA, a recovery strategy has been implemented for the leatherback turtle.

In accordance with the recovery strategy for the Northern Wolffish (*Anarhichas denticulatus*), Spotted Wolffish (*Anarhichas minor*) and for the Leatherback Turtle (*Dermodochelys coriacea*), the licence holder/operator is permitted to carry out commercial fishing activities authorized under the *Fisheries Act* that may incidentally kill, harm, harass, capture or take the Northern Wolffish or the Spotted Wolffish or the Leatherback Turtle, as per subsection 83(4) of the Act. However, according to Section 7.2:

- a) This permission is only valid while commercial fishing is conducted under the authority of the licence issued under the *Fisheries Act* in all authorized waters under this licence;
- b) The licence holder/operator is required to ensure that, while the fishing activities are conducted, every person on board the vessel who incidentally catches a Northern Wolffish or the Spotted Wolffish or a Leatherback Turtle forthwith returns it to the place from which it was taken, and where it is alive, in a manner that causes it the least harm; and
- c) The licence holder/operator is required to provide information regarding interactions with species at risk while conducting fishing operations. The information that the licence holder/operator is required to collect and subsequently report to DFO and the method by which, the times at which and the person to whom the information is to be provided are set out in the Species-at-Risk Logbook.

Contact details are available in the IFMP for reporting of sightings of any whale and leatherback turtle and for reporting sick, injured, distressed or dead marine mammals and sea turtles.

ETP Management

Once listed, all SARA Schedule 1 species have recovery strategies developed that include short-term and long-term goals for protection and recovery. SARA recovery strategies aim to:

- Describe the particular species and its needs;
- Identify threats to survival;
- Classify the species' critical habitat, where possible;
- Provide examples of activities that are likely to result in destruction of the critical habitat;
- Set goals, objectives and approaches for species recovery;
- Identify information gaps that should be addressed; and
- State when one or more action plans relating to the strategy will be completed.

Action plans are also required to be developed within a year of listing for endangered species and two years for threatened or extirpated species. Management plans may also be developed that set goals and objectives for maintaining sustainable population levels for species that are particularly vulnerable to environmental factors and incorporate an ecosystem management approach a major consideration is therefore habitat protection. As previously noted, Canadian vessels are required to fill out a special logbook for SARA listed species if they are encountered during fishing operations. Another source of information is DFO's fishery observer database. ETP species that were evaluated as scoring elements are listed in Table 16 and described thereafter.

Table 16. Species that are considered ETP according to MSC are those that are given special protection by Canadian law.

Scientific Name	Common Name	CITES/SARA	Status
<i>Anarhichas lupis</i>	Atlantic wolffish	SARA	Threatened
<i>Anarhichas denticulatus</i>	Northern wolffish	SARA	Threatened
<i>Anarhichas minor</i>	Spotted wolffish	SARA	Threatened
<i>Balaenoptera musculus</i>	Blue whale	CITES/SARA	Endangered
<i>Balaenoptera physalus</i>	fin whale	CITES/SARA	Special Concern
<i>Megaptera novaeangliae</i>	Humpback whale	CITES/SARA	Special Concern
<i>Eubalaena glacialis</i>	North Atlantic Right whale	CITES/SARA	Special Concern
<i>Dermochelys coriacea</i>	Leatherback sea turtle	CITES/SARA	Special Concern

Wolffishes and fishery effects on outcome status

Three species of wolffish are considered ETP species: Atlantic (*Anarhichas lupis*), Northern (*A. denticulatus*) and Spotted (*A. minor*). Northern and spotted wolffish are considered *threatened* under SARA Schedule 1 and Atlantic wolffish is a *species of special concern*. Reports of live release are between 74% and 96% based on the SARA logbook queries. A wolffish release program was undertaken to determine the post release survivability of wolffish in commercial fisheries. If wolffish are returned to the water with minimal handling, survivability is reportedly high (Grant et al, 2005).

In the wolffish recovery and management plan (Kulka et al 2007), the level of take as bycatch as well as habitat destruction by trawl gear was cited as potential risk factors. An allowable harm assessment was conducted and determined whether, since the cessation of a directed fishery, the current level of bycatch from other fisheries was hindering recovery. Fishing was not found to be hindering recovery as populations were either stable or increasing (Kulka et al, 2007).

Wolffish management measures and strategies

A recovery and management plan was developed for all three SARA listed wolffishes (Kulka et al, 2007). The objectives of the recovery strategy include:

1. increasing knowledge of biology and life history,
2. conserving and protecting habitat,
3. mitigating human impacts,
4. promoting population growth and recovery, and
5. education.

Wolffish are encountered as bycatch, but must be returned to the water in a way that induces the least amount of harm (minimal handling, not disturbing the gills, etc.).

Wolffish information and monitoring

Wolffish indices of abundance are available from demersal longline surveys and multi-species DFO trawl surveys. These data also provide enough information to detect any changes in the spatial extent of their ranges. Biological samples and life history traits are recorded in the surveys to detect any changes in growth rates or age/sex structure. All interactions with fishing gear must be recorded on SARA logbooks and are entered into a queryable database. Additional information on bycatch rates are available from on-board observed trips.

Leatherback sea turtle (*Dermochelys coriacea*) and fishery effects on outcome status

Leatherback and loggerhead sea turtles are most often encountered in pelagic or near surface long line gear. Longline fishers are now employing circle hooks to lower the incidence of turtle hooking, increase survivability and assist in the ease of hook removal. COSEWIC recently completed an assessment of loggerhead sea turtles (COSEWIC 2011d). There are encounters recorded mostly in the offshore portions of 4XW. It is thought that loggerheads prefer water the slightly warmer temperatures of the Gulf Stream and that setting longline gear in colder waters may reduce impacts on loggerhead sea turtles (COSEWIC 2011d).

Leatherback sea turtle management measures and strategies

The leatherback sea turtle recovery strategy was implemented in 2006 and includes goals and strategies to protect and recover the species (ALTRT 2006). The goal for the recovery strategy is to “increase the population such that long-term viability of the turtles frequenting Atlantic Canadian waters is achieved.” Six recovery objectives were identified. These are:

1. Understanding Threats. Identify and understand anthropogenic threats to turtles in Atlantic Canadian waters;
2. Understanding Turtle Life History Characteristics. Support research and monitoring that will fill knowledge gaps concerning general organismal traits of leatherback turtles in Atlantic Canadian waters;
3. Habitat Identification and Protection. Identify and protect habitat of turtles in Atlantic Canadian waters;
4. Risk Reduction. Minimize risk of harm to turtles from anthropogenic activities under Canadian jurisdiction;
5. Education. Develop and implement education activities that support turtle recovery in Canada; and
6. International Initiatives. Promote international initiatives contributing to the recovery of turtles.

To achieve these objectives, the Nova Scotia Leatherback Turtle Working Group (NSLTWG) has initiated several of the strategies. The NSLTWG is a joint group that includes scientists, volunteers and fishing industry representatives. Many of the initiatives, from changing over to circle hooks, public education, additional observer information requirements (gear configuration) has come from the Government of Canada's Habitat Stewardship Programme (ALTRT 2006).

All non-groundfish are required to be returned to the water in a manner that facilitates the least amount of harm as a condition of licence. Rescue groups are dispatched whenever a gear interaction is reported. In the Maritimes Region, basic training is provided to DFO officers and volunteer fishermen. Most fishers employ circle hooks which have been found to hook turtles less frequently (Mug et al, 2008).

Leatherback sea turtle information and monitoring

The NSLTWG and the Canadian Sea Turtle Network (CSTN) are two entities dedicated to document leatherback and loggerhead sea turtle sightings by means of fishermen information. All vessel operators are required to fill out and turn in SARA Registry logbooks to identify any interaction with fishing gear. Records from logs and on-board observers were used to estimate the total number of leatherback sea turtle interactions. Leatherback fishing gear interaction survivability studies in the US were also evaluated (Dwyer et al, 2002). Results show that fisheries activities were not jeopardizing survival or recovery. The issue was addressed again during public review in March 2012 to develop terms of reference and action items.

North Atlantic Right whales (*Eubalaena glacialis*) and fishery effects

North Atlantic right whales migrate into the Scotia-Fundy area in the spring (May and June) and they over resident before migrating out again in November and December (Vanderlaan et al, 2011). Vessel strikes followed by gear entanglement are the greatest source of human induced mortality for North Atlantic right whales. Other dangers include destruction of habitat due to oil and gas development, acoustic disturbances and contaminants (Brown et al, 2009). They were listed as endangered under the SARA in 2005. A recovery strategy was developed and published in 2009 (Brown et al, 2009).

Of the four gear types assessed here, gillnets and longlines have the most potential to entangle migrating North Atlantic Right Whales due to gear design as well as the duration of soak time (Johnston et al, 2007; Vanderlaan et al, 2011). The probability of right whale entanglement increases during their near shore migration from July to September. There is high temporal cross-correlation with groundfish longline fishing in Scotia-Fundy near the northeast slope of Georges Bank (5Z). There is also risk associated with gillnets within the Critical Habitat Areas, Jordan Basin and north of Crowell

Basin (edge of 4X/5Z) (Vanderlaan et al, 2011). Both gear types have a higher risk of entangling right whales during the spring migration due to spatial-temporal overlap.

North Atlantic right whale management measures and strategies

The North Atlantic right whale recovery strategy was published in 2009 (Brown et al, 2009). Seven objectives were identified in the Recovery Strategy:

1. Reduce mortality and injury as a result of vessel strikes;
2. Reduce mortality and injury as a result of fishing gear interactions entanglement and entrapment);
3. Reduce injury and disturbance as a result of vessel presence or exposure to contaminants and other forms of habitat degradation;
4. Monitor population and threats;
5. Increase understanding of life history characteristics, low reproductive rate, habitat and threats to recovery through research;
6. Support and promote collaboration for recovery between government agencies, academia, environmental non-government groups, Aboriginal groups, coastal communities and international agencies and bodies; and
7. Develop and implement education and stewardship activities that promote recovery.

Critical Habitat Areas

There are two Right Whale Critical Habitat areas that are designed to protect whales migrating in the summer months - Roseway Basin and Grand Manan. The boundaries were defined by using whale sighting data and Sightings Per Unit Effort (SPUE) (Brown et al, 2009). The Roseway Basin is a voluntary "Area to be Avoided" from June to December for non-fishing vessels. Fishing is restricted seasonally in those areas to reduce North Atlantic right whale interactions. Emergency dispatch teams are available to assist in any entanglements. Basic training is provided to DFO officers and volunteer fishermen through the active Maritimes Marine Animal Response Network (MMARN). A voluntary Code of conduct including avoidance of setting gear within 2km of right whales and a fisher based right whale working group has also been convened (Brown et al, 2009). Most of the gear and deployment modifications have been implemented voluntarily, particularly in the lobster trap fisheries. Although not specific to a gear type, the requirement for fishers to tend soaking gear may potentially limit interactions.

North Atlantic right whale Information and monitoring

North Atlantic Right Whales are vulnerable to entanglement in fishing gear because they inhabit areas of intense fishing activity where high-risk gear is deployed (e.g., pots with buoy lines in the water column and nets with anchored ground lines) (Johnson *et al*, 2007). More than 83% of photo-identified individuals bear evidence of entanglement (Johnson *et al*, 2007; Knowlton *et al*, 2012). Head entanglements can interfere with feeding and lead to starvation, and are more common for Right Whales than other species of baleen whales (Johnson *et al*. 2005), Furthermore, head entanglements are particularly challenging to resolve through disentanglement techniques because rescuers are at greater risk of being struck by the whale's thrashing tail while trying to free the animal (compared to tail entanglements where the rescuers can position themselves well behind the whale's tail).

Although no changes to fishing gear have been mandated in Canada, entanglement risk may be lower in Canadian waters such as the Bay of Fundy than in U.S. waters because of how groundlines are recommended to be set in the Canadian Lobster (*Homarus americanus*) pot fishery (Brillant and Trippel 2010). In 61 entanglement events analyzed (30 involving Humpback Whales and 31 Right Whales), buoy lines and groundlines were the most common types of fishing gear (81%) involved

(Johnson *et al*, 2005). In U.S. waters, ropes are typically set 3 m above the sea floor where they pose the greatest risk of entangling whales (Brillant and Trippel 2010). However, in the Bay of Fundy, the ropes lie near the bottom. Nevertheless, entanglements continue to be reported in the Bay of Fundy (Johnson *et al*. 2007). Right Whales are known to forage on the sea floor at depths of ca. 200 m in the Bay of Fundy (Baumgartner *et al*, 2007 p 155) and "are frequently seen with mud on their heads" (Kraus and Rolland 2007, Colour Illustration 8). Right Whale surveys and Canadian fishing-gear deployment data suggest that the Lobster fishery poses the greatest threat to Right Whales during the spring and fall when migration occurs to and from the areas in Canada identified as Critical Habitat (Grand Manan Basin and Roseway Basin; Vanderlaan *et al*, 2011)

The greatest risk of entanglement is from groundfish hook-and-line during the summer when Right Whales reside in the Critical Habitats for several months (Vanderlaan *et al*, 2011). Relative threat of entanglement to Right Whales during summer (July to October) is 42% for the groundfish hook-and-line fishery and only 9.6% for offshore lobster trap fishery (Vanderlaan *et al*, 2011). 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).

No management measures have been imposed in Canada to reduce the risk of Right Whale entanglement in fishing gear. However, the World Wildlife Fund, for example, with the support and encouragement of the GEAC, has developed a voluntary program with fishermen to reduce encounters and entanglements with Right Whales. In addition, DFO and the Grand Manan Fisherman's Association have developed a mitigation plan to reduce interactions with lobster fishing gear. It is difficult to quantify gear specific entanglements, but the seasonal probability of gear entanglement based on current fishing practices has been estimated (Vanderlaan, 2011).

SARA Logbooks

As noted previously, fishers under licence conditions are required to report interactions with some species-at-risk such as Wolffish and Leatherback Turtles. These interactions are recorded using SARA log books. A DFO database analysis for trips that had landings of Haddock in 4X5Y or 5Zjm for 2010-2014 resulted in the following information:

- DFO does not permit any interaction with North Atlantic Right Whale, Fin Whale and Blue Whale; therefore, they are not selectable options on the SARA logbook.
- There were no reported interactions for the Leatherback Turtle.
- There were ≤ 5 reported interactions with Spotted, Northern and Striped Wolffish but DFO is prohibited by legislation from releasing any details in order to respect the privacy of licence holders, vessels and buyers associated with each data point.

Observer Information

There were no observer records of interactions with whales and/or leatherback turtles. However there were several interactions with the various species of wolffish as indicated in the following table. Note that spotted and northern wolffish must be returned to the water. Atlantic (striped) wolffish may be returned to the water or kept subject to bycatch caps.

Table 17. Observer data: Summary 2004-2013- Wolffish for 4X5Y and 5Zjm Regions.

Observer Data: Summary 2004 - 2013 - Wolffish (mt)								
Stock/ Gear	Spotted		Northern		Atlantic(Striped)		Unidentified	
	Kept	Discard	Kept	Discard	Kept	Discard	Kept	Discard
4X5Y Fixed	-	-	-	0.003	0.747	0.087	-	-
4X5Y Mobile	0.002	-	-	0.013	3.850	0.139	-	-
5Zjm Fixed	-	0.001	-	0.053	0.343	0.410	-	0.003
5Zjm Mobile	-	0.009	-	0.081	5.140	0.748	0.010	-

Source: 5Zjm, 4X5Y Observer Data 2004-2013 - DFO Files 10/24/14

Sea Turtles

The two sea turtle species known to inhabit Scotian Shelf waters are the leatherback (*Dermochelys coriacea*) and the loggerhead (*Caretta caretta*). On the Scotian Shelf, Loggerhead Sea turtle bycatch has been observed mainly in the pelagic longline fishery. (COSEWIC 12/2/10 Response Statement) (CSAS RD 2012/063). For leatherback turtles, the fishing gears in the haddock fishery that pose the greatest risk of entanglement are gillnet and longline (O'Boyle 2001). The species is rarely observed in the northern half of the Gulf of Maine and Bay of Fundy (Leatherback Turtle Recovery Strategy 2006). Leatherback turtles are a summer visitor to the Scotian Shelf and important habitats have been identified in waters east and southeast of Georges Bank, including the Northeast Channel near the south-western boundary of the Canadian EEZ in deeper waters near the 1,000 metre contour (CSAS SAR 2012/036) outside the haddock fishing grounds. Leatherback turtles exhibit a predictable migratory cycle, which includes annual return trips between southern feeding and breeding areas, and northern foraging habitat (James et al, 2005c). A sizeable number of the turtles are electronically tracked during their migrations and some are followed seasonally on the Scotian Shelf during summer foraging (June, July, August). The following map (COSEWIC Assessment and Status Report 2012 – Figure 30) would indicate, albeit with some variation, that leatherback turtle migration occurs largely outside the Scotia-Fundy haddock fishery and seasonally on the periphery of the main fishery for 4X5Y, 5Zjm haddock.

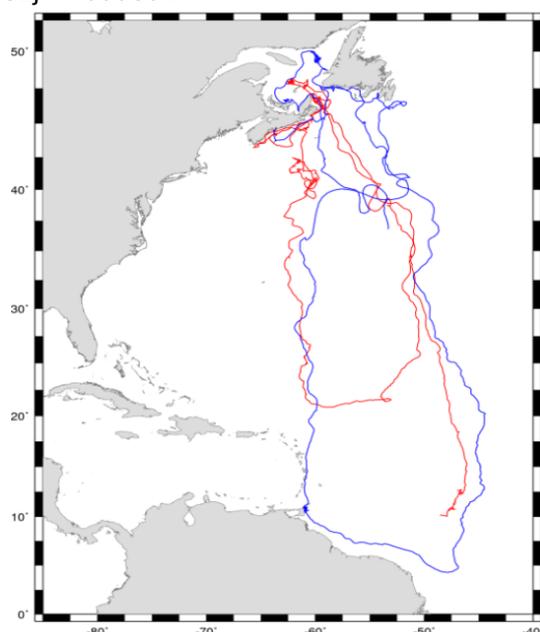


Figure 30. Return migrations of two Leatherback Sea turtle migration off Nova Scotia (adapted M. James from James et al. 2005b; c).

Whales

There are two right whale conservation areas in NAFO sub divisions 4X,5Y: Grand Manan and Roseway Basin. It is assumed that if whales are rarely seen (few recorded sightings) then there is less risk of an interaction between the whale and its entanglement in fishing gear. As well it is assumed if there are fewer sets of gear in the conservation areas, there is less risk of gear entanglement. It is also difficult to determine which fishing gear and which fishery might be responsible for the entanglement and when and where the interaction might have occurred if it was not reported by a fishers but determined from an opportunistic sighting. Moreover, multiple sightings and entanglements can occur with the same whale.

The main gears in the haddock fishery that represent a risk of whale entanglement are bottom longline and gillnet. Otter trawl is considered a low risk of interactions with marine mammals due to constant monitoring of the gear, short time for a set and need to avoid collisions with large whales. Fixed and baited handline gear use tended baited lines deployed from the vessel. It is also considered to be of low risk for right whale entanglement (Johnston et al, 2007).

The probability of an interaction with gear is greatest in the conservation areas when whales are resident in the summer months (Vanderlaan et al, 2011). There were no reports of collisions between the mainly inshore fishing vessels in this unit of certification and the whale species concerned.

Reports of Blue whale sightings are rare in the Scotia-Fundy haddock fishing areas. An average of five sightings have been reported annually during the summer months off Nova Scotia from 1966 to 2012 (DFO Sightings Database). This species is more often found offshore and seen during the spring, summer and fall, along the north coast of the Gulf of St. Lawrence and the east coast of Nova Scotia (CSAS RD 2012/157). There were no reports of interactions with blue whales in the Scotia-Fundy haddock fishery.

The other SARA-listed species as endangered is the North Atlantic Right Whale. The following table is summarized from annual reports from 2011 - 2014 (NARW Consortium). From 29 reported cases of new entanglements on the Atlantic coast over the four-year period, eight were first sighted in Canadian waters adjacent to Nova Scotia. Six of these sightings occurred close to Grand Manan Island; two involved herring weirs and the remaining gears are unknown. The gear types involved south of Yarmouth and in the Roseway Basin entanglements are unknown.

The North Atlantic Right whale migrates north annually from southern US waters spending the summer months feeding in the whale conservation areas and or moving on to other feeding grounds in Atlantic Canada. On average there have been 58 sightings of NARW off Nova Scotia during summer months from 1966 to 2012 (Table 18). The population has increased from 320 in 1998 to 509 in 2013 (NARW Consortium).

Table 18. North Atlantic Right Whale Entanglements

North Atlantic Right Whale Entanglements						
Report Dates		New Cases	First Sighting Location adjacent to NS			Gear
From	To					
11/01/13	10/31/14	7	3	2 - SE Grand Manan; 1 -160kms S Yarmouth		Unknown
11/01/12	10/31/13	4	1	1 - Roseway Basin		Unknown
11/01/11	10/31/12	7	2	2 - Grand Manan		Herring weirs
11/01/10	10/31/11	11	2	1- Wolf Island BoF; 1 - E Grand Manan		Unknown
Source: Reports to North Atlantic Right Whale Consortium 2011-2014						

In the last four years about 25% of the sets fished by longline gear in the Roseway Basin Conservation area (see following table 19) occurred during the summer months. Data is not available for gillnet gear given the limited fishing effort and DFO confidentiality obligations. There is no data available for either longline or gillnets in the Grand Manan Conservation area given the suspected limited fishing effort and confidentiality obligations . The Roseway Basin Conservation area is about 1,100 square nm and longline gear was broadly distributed through most of the area (Johnston et al, 2007).

Table 19. Longline/Gillnets sets inside Whale Conservation Areas from Groundfish Trips With Haddock Landings

Longline/Gillnet Sets Inside Whale Conservation Areas					
From Groundfish Trips with Haddock Landings					
Whale Conservation Area	Year	Gear	# Sets June-Aug	# Sets Year	% June-Aug
Grand Manan	2010	Longline	*	*	-
	2011	Longline	*	*	-
	2012	Longline	*	*	-
	2013	Longline	*	*	-
	2014	Longline	*	*	-
Roseway Basin	2010	Gillnet	*	*	-
		Longline	83	184	45%
	2011	Gillnet	*	*	-
		Longline	52	222	23%
	2012	Gillnet	*	*	-
		Longline	76	229	33%
	2013	Longline	44	313	14%
		2014	Longline	44	150
Notes:					
Source : DFO Commercial Data RQ20150431					
*Data points were excluded to preserve participant confidentiality.					
Data for the years 2013 through 2014 is preliminary					

In conclusion despite the low number of longline sets in the Roseway Conservation area during the summer months, there could have been an interaction between a right whale and bottom longline gear but this has not been confirmed. The reported case in 2012 could have originated in other jurisdictions and fisheries. As for the entanglements near Grand Manan they could have been associated with US inshore lobster gear which is fished year-round.

The Humpback and Fin whales are also listed by SARA as species of special concern. There were no reports of interactions with these species with fishing gears in the Scotia-Fundy haddock fishery.

4.4.4. Habitat

Legislative and Policy framework

On June 29, 2013 amendments to the *Fisheries Act* were approved. The newly-created Fisheries Protection Program (FPP) and its Policy Statements (November 2013) support changes made to the *Fisheries Act*. The mandate of the Fisheries Protection Program is to maintain the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries. The Fisheries Protection Policy Statement (FPPS) focuses on the management of impacts to fish resulting from habitats degradation or loss and alterations to fish passage and flow.

Through the FPPS, DFO objectives are to provide consistent guidance through regulations, standards and directives, and to make regulatory decisions in a timely manner. In this way, proponents will have the necessary information and direction to avoid, mitigate and offset harmful impacts to fish and fish habitat so that they will meet the goal of this policy, and thereby comply with the fisheries protection provisions of the *Fisheries Act*. The prohibition against serious harm to fish applies to fish and fish habitat that are part of or support commercial, recreational or Aboriginal fisheries. Section 35 of the *Fisheries Act* prohibits serious harm to fish which is defined in the Act as “the death of fish or any permanent alteration to, or destruction of, fish habitat.”

Proponents are responsible for avoiding and mitigating serious harm to fish that are part of or support commercial, recreational or Aboriginal fisheries. When proponents are unable to completely avoid or mitigate serious harm to fish, their projects will normally require authorization under Subsection 35(2) of the *Fisheries Act* in order for the project to proceed without contravening the Act.

The Subsection 35(1) prohibition will be applied to those projects that have the potential to cause serious harm to fish. These projects are likely to reduce the ability of the fish habitat to directly or indirectly support the life processes of fish or result in the death of fish. Relationships between typical project impacts (e.g., temperature change, sedimentation, infilling, reduction of nutrients and food supply, etc.) and the consequences to fish or fish habitat are described in various Pathways of Effects diagrams.

Projects requiring authorization are those likely to result in a localized effect to fish populations or fish habitat in the vicinity of the project. Localized effects may also lead to more widespread impacts on fish and fish habitat and, in turn, affect the ability of the area to produce fish. DFO interprets serious harm to fish as:

- The death of fish;
- A permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- The destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

In 2009, DFO published the Policy for Managing the Impact of Fishing on Sensitive Benthic Areas under the auspices of the Sustainable Fisheries Framework in response to the 2006 United Nations Resolution 61/105. The purpose policy is to help DFO manages fisheries to mitigate impacts of fishing on sensitive benthic habitats or avoid impacts of fishing that are likely to cause serious or irreversible harm to sensitive marine habitat, communities and species. This national policy applies to all

commercial, recreational and Aboriginal fishing activities licenced and/or managed pursuant to the *Fisheries Act* and the *Coastal Fisheries Protection Act*, including fishing inside and outside of Canada's EEZ.

A key tool for use in the implementation of the policy is the Ecological Risk Assessment Framework which outlines a process for identifying the level of ecological risk of fishing activity and its impacts as sensitive benthic areas in the marine environment. DFO has developed this framework specifically for use in managing coldwater corals and sponge-dominated communities. Both are currently the focus of international efforts to reduce the impacts of fishing on benthic environments (e.g. Food and Agriculture Organization International Guidelines for the Management of Deep-Sea Fisheries in the High Seas, Northwest Atlantic Fisheries Organization Vulnerable Marine Ecosystem impact assessments), and hence they are among the most well understood from a management perspective.

DFO's Ecological Risk Assessment Framework outlines a process whereby the ecological risk of fishing impacts is determined through the examination of two factors:

1. consequence, which examines the anticipated degree of impact on a sensitive benthic area resulting from an overlap between it and the fishing gear, and
2. likelihood, which examines the probability that the fishing gear will overlap with sensitive benthic areas.

The development of management options are guided by the ecological risk level. Where the fishing activity presents a low risk to the benthic habitat, no additional management options are generally required. Where risk levels are determined to be moderate, additional management options may be required based on the specific circumstances of the fishery and benthic habitat being investigated. Examples may include changes to the fishing methods. Where the risk has been determined to be high, additional management options will usually be required. Examples include fisheries closures or gear modifications and/or restrictions. Options would be determined on a case-by-case basis, in consultation with stakeholders and Aboriginal groups, using existing processes that would be adapted to the specific circumstances.

Assessment Areas Status – 4X5Y

Area 4X5Y is made up of a mosaic of bottom biotopes including several important fishing banks. Browns Bank, one of the most productive areas appears as two flat plateaus, with water depths ranging from < 50 m in the western area to almost 100 m in the east. The south-western edge of Browns Bank drops abruptly to the Northeast Channel (> 200 m), which is a major trough separating Browns Bank and Georges Bank. the Northeast Channel as the principal hydrodynamic connection between Scotian Slope water and the Gulf of Maine. Browns Bank is bounded to the north by a rough-floored bedrock channel with depths > 100 m.

To the west of 4X5Y is German Bank which has a moraine, parallel ridges, and rough topography. German Bank supports many economically important fisheries because it has as a scallop broodstock area, herring spawning area, groundfish aggregations and a deepwater lobster spawning area. Further west is the Bay of Fundy; an intense high-energy tidal zone. To the east there are several important fishing Banks and basins. The Roseway, Baccaro and LaHave Banks major habitats are gravel and boulder strewn and have limited trawlable areas.

Assessment Areas Status – 5Zjm

Georges Bank is a high-energy area with strong tidal action and strong ocean swells. Three major types of surficial sediment have been identified on eastern Georges Bank. Mobile sand dominates the shallowest part of the bank, gravel dominates the northern edge and northeast peak and gravelly

sand dominates the remainder of the bank. The sand comprises sheets and superimposed sand wave fields oriented perpendicular to the predominant semidiurnal tidal flow. Substantial areas of suitable substrate for haddock (i.e., sand, gravelly sand and gravel) are found on Georges Bank.

Gear/Habitat Interactions

It is well known that mobile bottom-contact fishing gears such as otter trawls do have impacts on benthic populations, communities, and habitats. Collie *et al* (2000) found that fauna in stable gravel, mud and biogenic habitats are more adversely affected than those in less consolidated coarse sediments. Studies at three sites in the Gulf of Maine (off Swans Island, Jeffreys Bank, and Stellwagen Bank) showed that mobile fishing gear altered the physical structure (complexity) of benthic habitats (Auster *et al*, 1996 & 1996). Complexity was reduced by direct removal of biogenic (e.g., sponges, hydrozoans, bryozoans, amphipod tubes, holothurians, shell aggregates) and sedimentary (e.g., sand waves, depressions) structures.

The recovery of marine habitats has also been extensively studied. Lindholm *et al* (2004) compared the habitat status of fishery-closed areas and fished areas on Georges Bank. They compared the relative abundance of seven common and two rare microhabitat types. There were only significant differences noticed on 2 of the 9 (shell fragment and sponge) microhabitat types. It was concluded that the lack of significant differences in the relative abundance of most of the common microhabitat resources inside and outside of the closed area may be interpreted as a consequence of the level of fishing effort matching the ability of the ecosystem to accommodate human-caused disturbances over short time periods.

The area covered by the Canadian groundfish bottom trawl fishery on Georges Bank has been estimated using fishing log records and information obtained at-sea by observers. In 2001 and 2002, a rough estimate indicated that the footgear disturbed less than 10% of the bottom while the bridles and warp swept less than 30%, and the doors impacted less than 1% of the bottom (Gavaris and Black, 2004).

In 2013 GEAC submitted a report entitled “Bottom Contact Assessment for Canadian Trawling Activity in 4X/5Y”, including Appendix A - The Effect of Grid Size on the Calculation of Bottom Contact Areas, and Appendix B - Yearly Grid maps, showing the distribution of fishing effort for each year during the period 2002-2011. The conclusion reached after analysis was that the average bottom contact was 5.3% for bridles and warp, 1.5% for the footgear, and 0.1% for the doors. Over this period there was a general decline in bottom contact, from a maximum of 7.4% in 2003 to 2.7% in 2011 for the bridles and warp, and from 2.1% to 0.8% for the footgear.

With respect to sensitive benthic areas, DFO has reported that their data indicates no haddock directed sets in DFO identified sensitive benthic areas, nor has there been reported coral bycatch in identified coral concentration areas. With respect to sponge concentration areas, DFO data pertaining to the number of haddock directed sets of fixed and mobile gear in sponge concentration areas for the period 2008-2012 is 1,686, with an average of 337 per year. During the period, the client reports that there was no sponge bycatch: data received by the team indicated observed set number versus total set number, but not observer data records. Data received also indicate that 7 areas were not observed at any time between 2008 and 2013 (“0 observed sets” in areas where fishing was occurring in areas of sponge concentration). Of these, most had very few sets (<5) and only one area had a large number of sets (Area 4, n=159 sets) A total of 200 observed sets were available for a total of 1686 sets within sponge/coral areas, representing 12% coverage.

In February 2015, the CAB received from the GEAC a 2015 edition of “The Footprint of the Scotia-Fundy Haddock Fishery”. The additional data runs to December 31, 2013. Highlights of the Scotia-Fundy 4X5Y5Z haddock footprint analysis, as averaged for the period 2009-13, follows:

- According to the underlying surficial geology, the 4X5Y5Z quota area is composed of 64% sand-gravel, 17% drift, 12% clay and 8% silt.
- The average figures for the 5-year period suggest that, on average, 82% of the fishing effort occurred on sand or sand and gravel habitats, which are known to be high energy environments and resilient.
- During the 5-year period, the equivalent of 6,394 hours of fishing activity, or 4% of the total fishing hours, have occurred in the vicinity of areas of significant sponge concentrations. Only 4.8% of this effort was inside the boundary of the delineated sponge polygons, where the probability of encountering sponges is the highest. The other 95.2% of the overlapping effort was in the periphery of the delineated sponge polygons, where the probability of encountering sponges approximates zero.
- Six of the nine sponge polygons have very little overlapping effort, ranging from zero hours in S8 to 112.8 hours in S14. 86% of the overlapping effort took place in sponge polygons S1 and S2, which are on Georges Bank, where observer coverage is at its highest. No sponge catches were reported by observers in any of the nine sponge areas.
- There are no identified areas of significant coral concentrations in the 4X5Y5Z area.
- Estimates of swept area, based on average figures for the 2009 to 2013 time period, suggest that less than 6% of the 26,423 nm² area was swept.
- Estimates of swept area also suggest that, on average, 69% of the effective swept area originated from the bottom third of the fishery, where the effective swept area is only 34% of the sea area of those corresponding grid cells.

There have been some documentation of effects of longline activities with habitats. It has been shown that the terminal anchors of bottom-set longlines interact with the bottom habitat. Otherwise this gear has little or momentary contact with that bottom habitat and as such has little physical impact during controlled fishing. Hooks and complete snoods (i.e. branch lines) may, however, be lost or deliberately discarded, especially when gear is damaged or tangled during fishing.

Controlled use of fixed gears such as bottom-set gillnets is considered to have a minimal direct impact on the environment as the spatial footprint is limited and the pressure on bottom sediments low. In Canadian waters, each gillnet fisherman is restricted to 40 nets with an overall length no greater than 50 fathoms. Gillnets can, however, be lost both accidentally and deliberately (Macfadyen et al, 2009) and this may lead to the smothering, abrasion or “plucking” of organisms with mesh closing around them and the translocation of sea-bed features. Canadian Atlantic gillnet fisheries were estimated to suffer a 2 % loss rate (8,000 nets per year) up to 1992 (Chopin et al, 1995).

To avoid the risk of lost nets and gear conflict, gillnets cannot be left unattended by fishers for more than 48 hours in 4X5Y and must be attended by fishermen at all times in 5Zjm. In both areas during the winter months, gillnets must be tended at all times outside 12 miles from any land and, anytime a licensed vessel leaves home, mandatory tending of nets is required.

The low levels of effort involved, combined with the minimal impact on the benthic and pelagic environments, means that hand lines have negligible impacts on the marine habitats.

Management Strategies for Controlling Fishing Pressure on Sensitive Benthic Environments

In 2005, DFO conducted a study to assess the impacts of trawl gears and scallop dredges on benthic habitats, populations and communities (DFO, 2006b) which led to it outlining a policy for the

“Managing the Impacts of Fishing on Sensitive Benthic Areas”. It is planned to adopt the following process:

1. Assemble and map existing data and information that would help determine the extent and location of benthic habitat types, features, communities and species; including whether the benthic features (communities, species and habitat) situated in areas where fishing activities are occurring or being proposed are important from an ecological and biological perspective;
2. Assemble and map existing information and data on the fishing activity (see next section);
3. Based on all available information, and using the Ecological Risk Analysis Framework, assess the risk that the activity is likely to cause harm to the benthic habitat, communities and species, and particularly if such harm is likely to be serious or irreversible;
4. Determine whether management measures are needed and implement such management measures; and
5. Monitor and evaluate the effectiveness of the management measure and determine whether changes are required to the management measures following this evaluation.

Two pilot projects have been initiated – one on Georges Bank and the second in coastal areas of 4X5Y. Results will help to inform the Maritimes Region’s EAM Framework and be used to fine-tune the approach for the wider roll-out of the strategy.

Documentation presented by GEAC indicates that an evaluation of the habitat structure and function of the 4X5Y Haddock fishery has been completed by multi-layer mapping with the principal forms of surficial geology, fisheries effort and catch weight from 2008-2012 for the main fishing gears, location of sponges and key sensitive areas. DFO’s Oceans and Coastal Management Division (OCMD) in the Maritimes Region provided a "read me" mapping illustration for this purpose.

The illustration purportedly suggests that the majority of the 5Zjm Haddock otter trawl fishing effort occurs on sand and gravel. In 4X5Y there is some fishing effort on silt and clay but the majority of otter trawl effort is on sand and gravel and sand habitat. These are high energy habitats subject to vigorous tides. It was indicated that the interactive multi-layer maps were a credible tool for clarifying how fishing intensity interacts with sensitive areas. The client further indicated that a comparison of bottom trawl fishing effort (2008-2012) for haddock, Cod and Pollock and areas where sponge concentrate reveals there was minimal fishing effort by trawls in those areas during this period. One exception was a small area north on Georges Bank where there is more fishing effort that coincides with a sponge area. However, there would be little evidence that sponge are being caught by otter trawls as the use of separator trawls in 5Zjm reduces Cod catch and most likely any sponges as well.

Figure 31 represents a snapshot of otter trawl fishing effort and sponge area concentrations. The Client’s submission restates that the majority of otter trawl fishing effort occurs outside sponge areas and was unlikely to cause serious or irreversible harm.

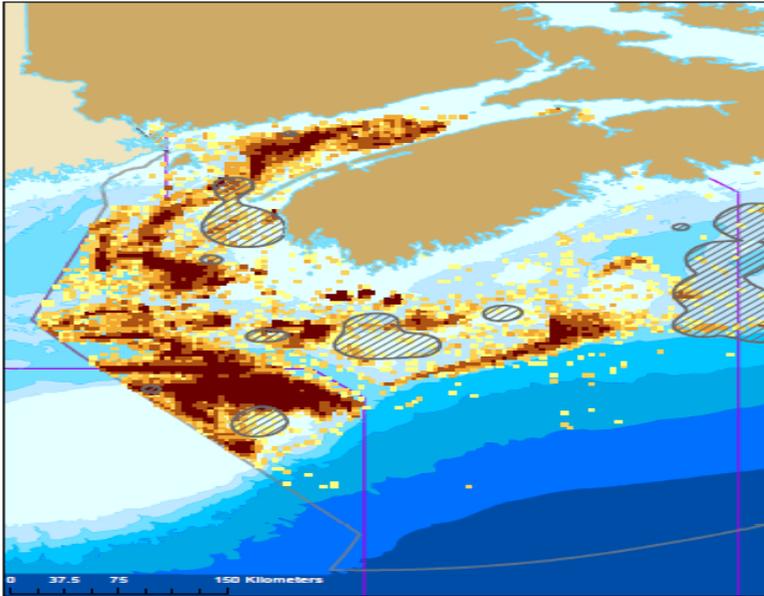


Figure 31. Map of Trawl Effort Distribution.

According to the Client, the 4X5Y Haddock otter trawl fishery is unlikely to reduce habitat and function as these areas have been fished by this gear for many years without serious or irreversible harm. According to DFO, the mapping of Ecologically and Biologically Significant Areas (EBSA) is an ongoing process requiring further research and information. They are subject to further refinement.

There are currently 18 areas identified in the Scotia-Fundy Region. There are four EBSA-proposed exclusive to 4X5Y and one to 5Zjm. In 4X5Y, the Client stated that the majority of the otter trawl fishing effort relative to the Haddock fishery occurs outside these areas. More importantly the characteristics that are selected to categorize an area as an EBSA and define the area such as seabird guilds and phytoplankton biomass, do not preclude an ongoing bottom gear fishery for haddock. For instance on Brown's Bank, there are moraine features that may be an important refuge for groundfish. These areas have yet to be delineated and are not likely fished with otter trawl because the bottom is too rough. On Roseway Basin, the principal concern in identifying this area as an EBSA is for right whales habitat. Fishermen have a Code of conduct on what to do in the event of whales are in the fishing area. For the Canadian portion of Georges Bank, further research is required to delineate tube worm habitat. Encounter protocols are being developed by DFO for corals and sponges. The Sensitive Benthic Areas Policy is being implemented to initially protect corals and sponges (Brodie and White, 2011, NAFO 2011). Protecting areas of sensitive coral densities, several fishing closures are in place. These include: (i) the large area (NAFO Div. 3O) coral closure that protects corals on the slope of the Grand Bank, (ii) the Lophelia Coral Conservation Area near the eastern edge of 4Vs near southeastern 3Ps, (iii) "the Gully" Marine Protected Area in 4X, and (iv) the Northeast Coral Conservation Area, also in 4X. Sponge grounds have been formally protected by NAFO in its regulatory area (NAFO CEM 2011 for example). A maximum threshold for sea pens, corals and sponges is in effect throughout the NAFO regulatory area. Longline fishing is not permitted in the Lophelia Coral Conservation Area. There are fishing restrictions in the Northeast Channel Coral Conservation Area and the Gully Marine Protected Area (MPA). On the Scotian Shelf, these protected areas include significant concentrations of large structure-forming sponges that are globally unique (Kenchington et al, 2010).

Marine Protected Areas and Strategy

There are a number of Marine Protected Areas (MPAs) that are designated under the *Ocean Act* (1996), including several areas of interest that are at various stages of progress towards designation. These areas are ecologically significant, with species and/or properties that require special consideration. MPAs are one among various other management tools that contribute to the improved

health, integrity and productivity of Canada's marine ecosystems and help advance integrated ocean management. These areas are part of Canada's network of MPAs.

The MPA designation process includes public input to determine the costs and benefits of MPA designation. Areas of Interest (AOI) are identified and will undergo a detailed biophysical and socio-economic evaluation and public consultations before a decision is made to formally designate it as a MPA. Consultation with First Nations, stakeholders, industry and interested groups provide opportunities to contribute to the evaluation and analysis of impacts of MPA designation, establishment of appropriate conservation and management objectives, and development of the regulatory package.

MPAs start as an AOI when unique structures or functions are identified. A detailed biophysical and socio-economic evaluation is completed and public consultation initiated. Parties consulted include government, fishing industry representatives, First Nations, environmental groups and the public. A consultation committee is formed to identify specific conservation and management measures appropriate for the area. Consultations are quite comprehensive and whether and when the re-designation from an Area of Interest to a Marine Protected Area may take several years.

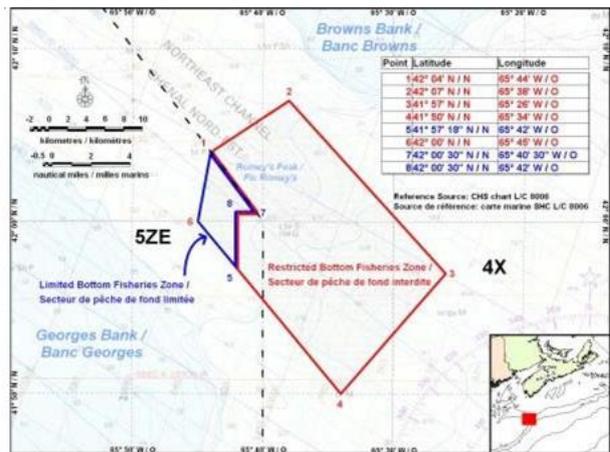
Canada's Federal Marine Protected Areas Strategy (DFO, 2005c) provides a basis under which general spatial management, closed areas, gear modifications and effort reductions could provide some mitigation of the effects of mobile bottom-contacting gears on benthic habitats, populations and communities. These include:

- Gully Marine Protected Area: a 2,364 km² area protecting the large canyon feature and associated habitats of the Gully near Sable Island (Figure 32A).
- Northeast Channel Coral Conservation Area: a 424 km² area protecting deep water coral concentrations adjacent to Georges Bank (Figure 32B).
- Lophelia Coral Conservation Area: a 15 km² area protecting the only known living *Lophelia pertusa* coral reef in Atlantic Canada (Figure 32C).
- Right Whale Conservation Areas in Roseway Basin and Grand Manan Basin: two important areas for the endangered right whales subject to voluntary avoidance and traffic control measures for navigation (Figure 32D).

A. The Gully



B. Northeast Channel Coral Conservation Area



C. Lophelia Coral Conservation Area



D. Right Whale Conservation Areas in Roseway Basin and Grand Manan Basin

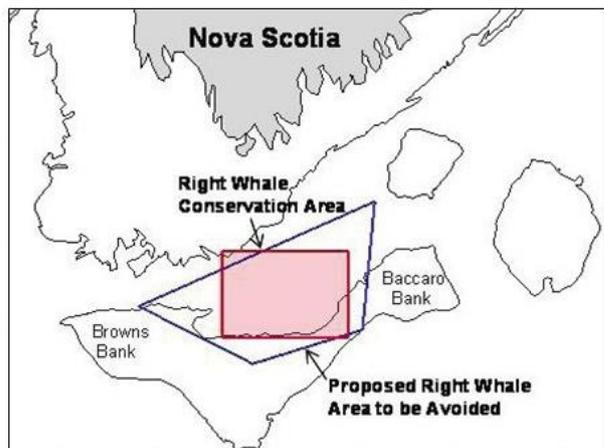


Figure 32. Location of key MPAs relevant to the assessment area.

Voluntary practices to minimize impacts of GN, LL or OT on the habitats

Currently there is a Right Whale voluntary practice by fixed gear groundfish vessels < 45 (Appendix d). There have been other voluntary practices by the industry in the past which have evolved into regulatory requirements. Such practices were initiated by the fishing industry as voluntary and include: the Emerald/Western Bank Juvenile Haddock closure; the use of separator trawls to minimize the capture of 5Zjm Cod; the North Channel Coral Closure and the Russian Hat closure.

Information and Monitoring – Fishing Pressure

DFO’s Oceans and Coastal Management Division (OCMD) and Population Ecology Division (PED) are undertaking a joint program to build and maintain a “recognized fishing picture” computer application for several marine conservation areas on the Scotian Shelf. This ‘Virtual Data Center’ (VDC) is a compliance and monitoring tool to track illegal fishing in relation to the closed Northeast Channel Coral Conservation Zone, among other conservation areas in Maritimes Region. The VDC could be used to track fishing pressure in the haddock fishery on broader scales.

The rationale and impetus for this program is based on the on-going need to demonstrate and apply capabilities for monitoring human activity in special management and conservation areas, using all available information sources and tools. The program builds and maintains near real-time information on fishing activity by combining data from four DFO information systems:

- Maritime Fisheries Information System (MARFIS): the primary source of commercial fishing data obtained through logbooks, vessel hauls and other reporting systems;
- VMS: vessel positions from onboard black boxes;
- Canadian Fisheries Information Network (CFIN): DFO's offshore fisheries surveillance information system (e.g., aerial surveillance information); and
- At-Sea Observer System: data provided through DFO's on-board fisheries observer program.

Using the mapping, statistical and query functions available through the VDC, analysts can select, view and analyze information on fishing activity according to a range of parameters, such as gear type, vessel name, information source (i.e. VMS, logbook etc.) and catch composition.

4.4.5 Ecosystem

Ecosystem Impacts - Status

During the course of 30 years there have been changes on many features of the Scotian Shelf ecosystem. They include:

1. A major cooling of bottom waters occurred in the mid-1980s;
2. Zooplankton abundance was low in the 1990's when phytoplankton concentrations were high and the opposite pattern during the 1960s / early 1970s;
3. A number of groundfish species have declined while small pelagic species and commercially exploited invertebrate species have increased;
4. Average body size of groundfish have declined along with curtailed condition and stunted growth; and
5. Increased numbers of grey seals up to around 300,000, triple that in the early 1990s.

Ecosystem models before and after the collapse have been developed to explore how the structure, function and key species of the ecosystem had changed (Bundy, 2005). A comparison of two ecosystem modes indicated there were changes in predator structure, trophic structure and energy flow. Biomass has significantly increased for forage fish species, grey seals and silver hake. Composition of trophic levels has changed as a result of the mean increase in trophic level of many species-groups. Furthermore the ecosystem has changed from a demersal-feeder-dominated system to a pelagic-feeder-dominated system. Piscivore fishes abundance has increased, presumably because of the high abundance of small pelagic fish, and the ratio of pelagic feeders to demersal feeders has increased from 0.3 to 3.0.

Management – Framework and Policies

Under the *Oceans Act* and the Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada, DFO is committed to the development of large-scale and local integrated management plans for all of Canada's oceans. This includes implementation by DFO of an Ecosystem Approach to management (EAM) in all activities for which it has management responsibility. The governance, regulation and management of activities within and surrounding the Atlantic Canadian waters are shared between a wide variety of government departments and agencies involved in, or with an interest in, the use and management of resources within its coastal, estuarine and marine environments. The process is intended to involve all stakeholders. There is a strategy in place that is being implemented and will continue to develop under new national policies.

Canada has developed a Sustainable Fisheries Framework (SFF) which builds on existing fisheries management practices to form a foundation for implementing an ecosystem approach in the management of its fisheries to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the SFF is to ensure that Canada's fisheries are environmentally sustainable, while supporting economic prosperity. It is designed to foster a more rigorous, consistent, and transparent approach to decision making across all key fisheries in Canada. It also incorporates existing policies with new and evolving policies using a phased-in approach, and develops tools to monitor and assess results of conservation and sustainable use in order to identify areas that may need improvement. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.

The Framework comprises two main elements: (1) conservation and sustainable use policies, and (2) planning and monitoring tools.

The Conservation and Sustainable Use policies incorporate precautionary and ecosystem approaches into fisheries management decisions. These policies include:

- A Fishery Decision-Making Framework Incorporating the Precautionary Approach (April 2009)
- Managing Impacts of Fishing on Benthic Habitat, Communities and Species (April 2009)
- Policy on New Fisheries for Forage Species (April 2009)
- Ecological Risk Assessment Framework for Coldwater Corals and Sponges dominated communities (April 2013)
- Policy on Managing Bycatch (April 2013)
- Guidance on Implementation of the Policy on Managing Bycatch (April 2013)

The implementation process uses adaptive management principles, whereby experience applying the policies to fisheries management guide future applications. Integrated Fisheries Management Plans (IFMPs) continue to play a critical role as the primary resource management tool through which the Framework's policies are applied.

Ecosystem Science is the foundation for the science needed to support the integrated management of diverse human activities and is needed to inform departmental policies and management practices. DFO's Ecosystem Science Framework was developed to provide an effective and comprehensive approach for identifying, monitoring, and interpreting trends important to ecosystem sustainability and integrating knowledge about the effects of human activities on ecosystem components. A Five-Year Research Plan (2008-2013) has been developed to support the ecosystem science through its 20 components and their connections.

The Plan previously outlined how four of the priority areas would be addressed primarily through Ecosystem Research Initiatives (ERIs) that guide regional research priorities. Although the ERIs were recently concluded, they served to direct various activities including: Fish Population and Community Productivity, Habitat and Population Linkages, Climate Change/Variability, and Ecosystem Assessment and Management Strategies. Each of the ERIs, including the Centres of Expertise and the Climate Change Science Initiative strongly influenced by the Ecosystem Science Framework produced new knowledge and improved existing knowledge that was needed for integrated management. Each ERI served as a pilot for DFO's ecosystem-based approach by focusing on regional research priorities. This allowed integrated research on a particular ecosystem with predefined geographical boundaries and the knowledge gained from large-scale ecosystem studies allowed the development and testing of tools required to manage human activities within aquatic ecosystems.

DFO has many tools for protecting habitats and ecological areas, and adheres to federal policies and practices of good risk management and application of precaution. Identifying Ecologically and Biologically Significant Areas is not a general strategy for protecting all habitats and marine communities that have some ecological significance. Rather, it is a tool for calling attention to an area that has particularly high Ecological or Biological Significance, to facilitate provision of a greater-than-usual degree of risk aversion in management of activities in areas of especially high ecological and biological significance (DFO 2004).

Information

The marine ecosystem dynamics of the Scotian Shelf and Bay of Fundy area have been well studied, particularly in respect to understanding groundfish population dynamics (Peer, 1970, Mills *et al*, 1984; Wildish *et al*, 1989; Wildish *et al*, 1992; Desrosiers *et al*, 2000 and Breeze *et al*, 2002).

The main impacts of the different gears under assessment can be inferred from existing information, which are well understood for target and incidental catch fish removals (through individual stock assessments, especially for key groundfish species), trawl effects (DFO, 2006b) and any structural changes to key commercial fish populations. However some issues, such as the extent and impact of ghost fishing and the impact of fish removals on the trophic structure of the Bay of Fundy and Scotian shelf, have not been investigated in detail.

Sufficient information is available on the impacts of the fishery on the target and incidental retained by-catch, discards, ETP species and habitats to allow the main consequences of the fisheries subject of this assessment on the ecosystem to be inferred. Information is sufficient to support the development of strategies to manage ecosystem impacts. These were present in the Groundfish Management Plan (2002-2007) and are expected to be considerably more advanced in the updated version of the plan.

4.5. Principle Three: Management System Background

4.5.1. The Legal Basis and Scope of the Management System

4.5.1.1. Federal Legislative Authority (4X5Y and 5Zjm)

The Canadian fisheries management system is based primarily on the extensive powers contained in the *Fisheries Act (1867)*¹ of Canada. The Act gives the Minister of Fisheries and Oceans (DFO) broad discretionary powers including the absolute authority to issue licences (Section 7) and enact regulations (Section 43) for the management of those subsistence, recreational and commercial fisheries which fall within the scope of section 91 of the *Constitution Act, 1982 (formerly the British North America Act, 1867)*. Regulations pertaining to fish harvesting operations are made pursuant to the *Fisheries Act*; the principal ones for Atlantic fisheries include the *Fishery (General) Regulations (1993)*², the *Atlantic Fishery Regulations (1985)*³, and the *Aboriginal Communal Fishing Licenses Regulations (1993)*⁴. The *Coastal Fisheries Protection Act (1985)*⁵ (and the regulations made thereunder) which apply to the activities of foreign vessels operating within the Canadian Exclusive Economic Zone (EEZ) is the other main source of the Minister's fisheries management powers. The DFO's primary legislation also includes the *Oceans Act (1996)*⁶, which, among other things, gives the Minister the authority to lead integrated oceans management and to implement the precautionary approach. The Department is also one of the three responsible federal authorities under the *Species at Risk Act (2002)*⁷ which provides the legal framework for the protection of species that are determined to be endangered, threatened or of special concern. Canada's national network of marine protected areas is administered by Parks Canada pursuant to the *Canada National Marine Conservation Areas Act (2002)*⁸.

The legal basis and scope of the management system for federally-managed fisheries in Canada is also influenced by a number of other legal instruments including the *Charter of Rights and Freedoms*, the *Financial Administration Act*, the *Canadian Environmental Assessment Act*, and statutes governing marine transportation. From time to time, legal rulings arising from Canada's judicial system will impact the use and scope of the Minister's authorities over such matters as fisheries access, enforcement and control, aboriginal inherent and treaty rights, and trade.

Transport Canada administers a number of acts and regulations related to transportation, including marine transportation. Chief among its marine legislation is the *Canada Shipping Act (2001)*⁹ whose key objectives are to protect the health and well-being of vessel crews, promote safety in marine transportation, protect the marine environment, and establish an effective inspection and enforcement program. Regulations of relevance to the fishing industry include *Small Fishing Vessel Inspection Regulations*, the *Marine Personnel Regulations*, and the *Collision Regulations*.

¹ http://www.sustainablefisheries.ca/download_files/LSP_Grafto_CH30.pdf

² <http://laws.justice.gc.ca/eng/regulations/SOR-93-53/>

³ <http://laws-lois.justice.gc.ca/eng/regulations/SOR-86-21/>

⁴ <http://laws-lois.justice.gc.ca/eng/regulations/sor-93-332/index.html>

⁵ <http://laws-lois.justice.gc.ca/eng/acts/C-33/index.html>

⁶ <http://laws-lois.justice.gc.ca/eng/acts/O-2.4/>

⁷ <http://laws-lois.justice.gc.ca/eng/acts/S-15.3/index.html>

⁸ <http://laws-lois.justice.gc.ca/eng/acts/C-7.3/index.html>

⁹ <http://laws-lois.justice.gc.ca/eng/acts/C-10.15/page-2.html>

4.5.1.2. Domestic Management System (4X5Y and 5Zjm)

Canada's jurisdiction over ocean space is recognized through the declaration of the territorial sea, the contiguous zone, the exclusive economic zone, and the continental shelf. Only Canadian-registered fishing vessels direct for haddock within Canada's jurisdiction. There is a transboundary area with the US (a portion of 5Z and 5Y) that is entirely under domestic management.

The fishery management system is further characterized by a comprehensive array of strategic national and regional policy frameworks and supporting instruments (including Integrated Fisheries Management Plans or IFMPs, Conservation Harvest Plans or CHPs, Licence Conditions, Notices and Orders) which compliment the regulatory system and inform the operational requirements of the domestic management system for the fishery. Examples of broad-based DFO policy frameworks of application to both Management Areas include: fisheries sustainability, protecting fragile marine areas and species, species-at-risk, ecosystem-based science, ecosystem approach to management, commercial licensing, implementation of the precautionary approach, bycatch management, and decision-making and stakeholder consultations.

More specifically, general licensing regulatory requirements are found in Part II of the *Atlantic Fishery Regulations (1985)* while regulations specific to the haddock fishery are outlined in Part VIII. *The Fishery (General) Regulations* provide the basis for haddock licence conditions, and the authority to issue Variation Orders such as to establish closed times and areas, and for the catching and landing of groundfish.

Fisheries and Oceans is a duly constituted department of the Canadian Federal Government as set forth by the *Department of Fisheries and Oceans Act*.¹⁰ Section 4 of the act stipulates that the powers, duties and functions of the Minister extend to and include all matters over which Parliament has jurisdiction, not by law assigned to any other department, board or agency of the Government of Canada, relating to

- sea coast and inland fisheries;
- fishing and recreational harbours;
- hydrography and marine sciences; and
- the coordination of the policies and programs of the Government of Canada respecting oceans.

Organizationally, the department's headquarters is located in Ottawa. With few exceptions, the department's programs and services are structured within 'sectors' with accountabilities and authorities assigned accordingly. Many of the programs and services are decentralized where their impacts are most felt and are best evaluated. The organizational structure of the department is outlined at Figure 33. DFO reports that in 2011-12, more than eight of every ten employees worked outside national headquarters in one of its six regions. National objectives, policies, procedures, and standards for the Department and the Canadian Coast Guard are established at national headquarters. Regions are responsible for delivering programs and activities in accordance with national and regional priorities and within prescribed national performance parameters.

¹⁰ <http://laws-lois.justice.gc.ca/eng/acts/F-15/index.html>

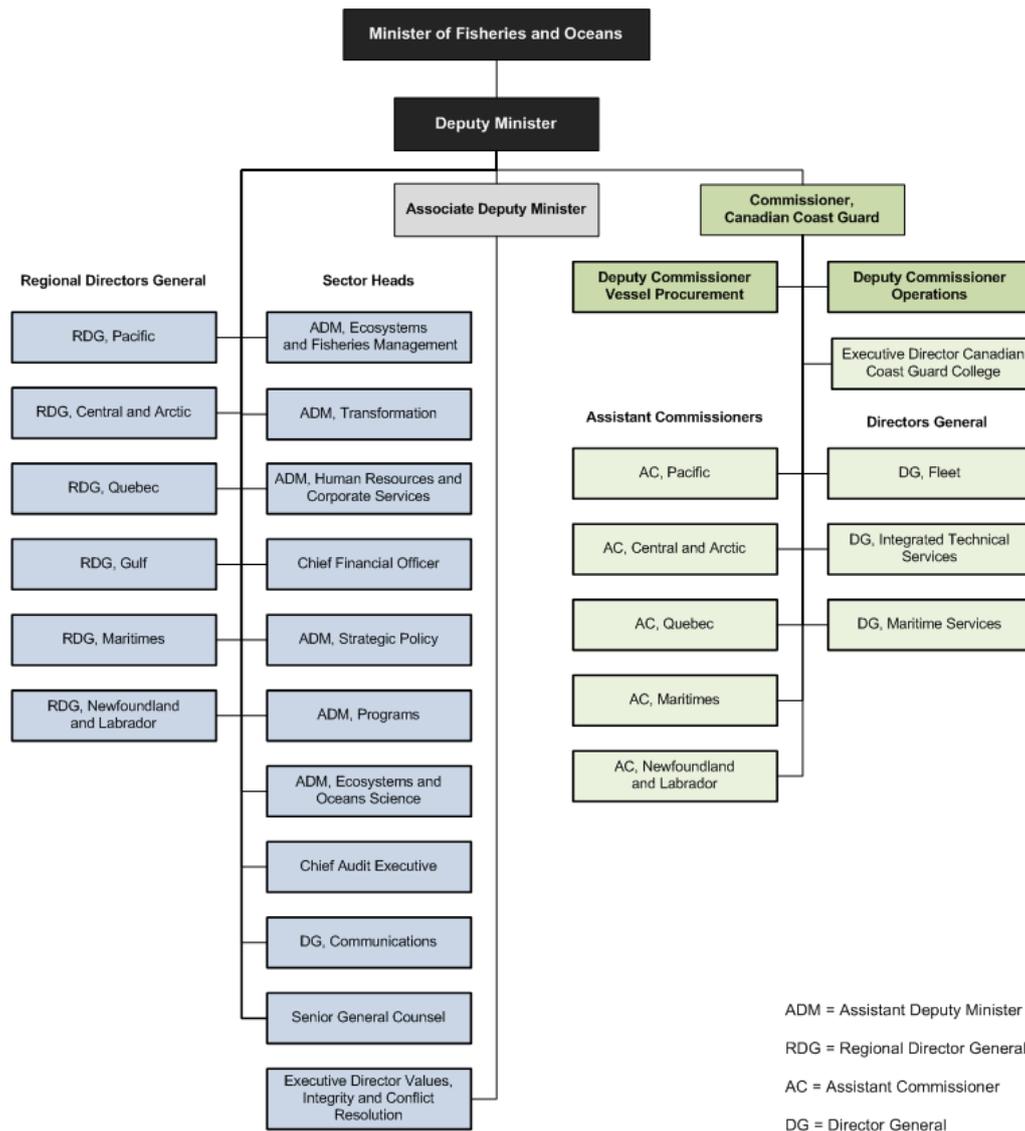


Figure 33. Organizational Chart of the Department of Fisheries and Oceans.

For the purpose of this fishery reassessment, the haddock fishery in 4X5Y and 5Zjm is managed by DFO’s Maritimes Region headquartered in Dartmouth, Nova Scotia. Also known as the Scotia-Fundy Fisheries Management Sector, the region’s geographical boundary extends from the northern tip of Cape Breton to the New Brunswick-Maine border.

4.5.1.3. Aboriginal Fishing (4X5Y and 5Zjm)

The inherent and treaty rights of the members of the Aboriginal communities in New Brunswick and Nova Scotia in respect of the fishery are recognized and affirmed by the *Constitution Act, 1982*. The Supreme Court of Canada, in a number of important decisions, found that the members of the Mi’gmaq and Maliseet First Nations had an inherent right to fish for Food, Social and Ceremonial (FSC) purposes, and a treaty right to engage in commercial fishing for the purpose of pursuing a moderate livelihood. These rights must be accommodated by DFO subject only to valid conservation requirements for the fishery.

In response, DFO developed and implemented a national Aboriginal Fisheries Strategy¹¹ that encompasses a suite of programs and services aimed at providing access to the fisheries (licences, vessels, gear) including skills development to operate their enterprises successfully and to participate in the various fisheries management. The objectives of the strategy include to:

- provide a framework for the management of fishing by Aboriginal groups for food, social and ceremonial purposes;
- provide Aboriginal groups with an opportunity to participate in the management of fisheries, thereby improving conservation, management and enhancement of the resource;
- contribute to the economic self-sufficiency of Aboriginal communities;
- provide a foundation for the development of self-government agreements and treaties; and
- improve the fisheries management skills and capacity of Aboriginal groups.

DFO issues communal FSC licences based on agreements negotiated with the First Nations in which fishery access and management measures are identified. Communal licences are issued in accordance with the provisions of the *Aboriginal Communal Fishing Licences Regulations*.¹² Aboriginal participation in the commercial fishery is communal in nature meaning that licences are issued in the name of the First Nation or Aboriginal Organization who then designates operators to fish the licences. Management measures for the communal commercial fisheries are similar to those in effect for the non-aboriginal commercial fisheries. First Nations and other Aboriginal Organizations participate fully in DFO's advisory and consultation processes.

4.5.1.4. Canada-US Transboundary Management System (5Zjm and 5Y)

Canada is a signatory to the United Nations Convention on the Law of the Sea (UNCLOS) as well as the subsequent United Nations Fish Stocks Agreement (UNFA). It has adopted the FAO Code for Responsible Fisheries and assisted the domestic development of the Canadian Code of Conduct for Responsible Fishing operations. The Canadian Code has been ratified by some 60 Canadian fisheries organizations representing 80 % of domestic landings.¹³ Canada has also supported the four International Plans of Action (IPOA) in respect of seabirds, sharks, fishing capacity and illegal, unreported and unregulated fishing that have emerged under the FAO Code.

Canada is a member of several Regional Fisheries Management Organizations (RFMO) around the world, including (but not limited to) the Northwest Atlantic Fisheries Organization (NAFO), the North Pacific Anadromous Fish Commission (NPAFC), the Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tunas (ICCAT), the North Atlantic Salmon Conservation Organization (NASCO) and the Western and Central Pacific Fisheries Commission (WCPFC).

Eastern Georges Bank (5Z)¹⁴

In October 1984, a binding decision by the International Court of Justice (ICJ) decision established the official boundary between Canada and the United States in the Gulf of Maine known as the "Hague Line" (Figure 33). The ICJ decision did not address the overlapping claims within the 12 mile limit. Given the strategic importance of Georges Bank to the fisheries (and other) sectors of both countries, a number of formal mechanisms were developed or have evolved to facilitate international collaboration, cooperation and information exchanges on matters relating to fisheries management,

¹¹ <http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/afs-srapa-eng.htm>

¹² <http://laws-lois.justice.gc.ca/eng/regulations/sor-93-332/index.html>

¹³ http://www.dfo-mpo.gc.ca/international/media/bk_fao-eng.htm

¹⁴ As reported in DFO Maritimes' IFMP (2012) for the 5Zjm Haddock fishery.

stock assessment, ecosystem-based management approaches, habitat, species-at-risk and oceans management. These are highlighted below.

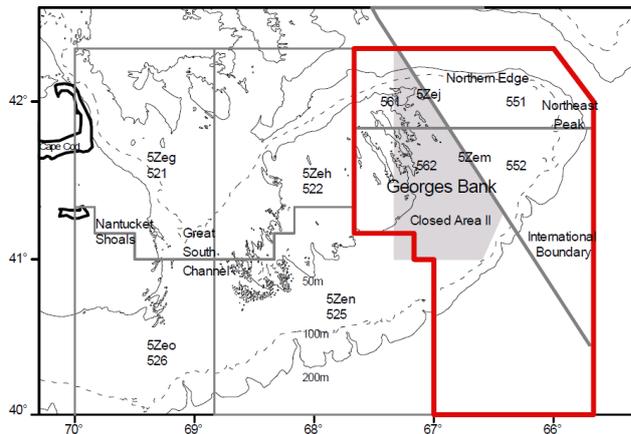


Figure 33. Canada's Eastern Georges Bank (red area).

Canada-US Transboundary Resources Steering Committee (TRSC)

Established in 1995, the Canada-US Transboundary Resources Steering Committee (TRSC)¹⁵ facilitates bi-annual discussions between both countries on transboundary integrated fisheries and ecosystem management issues associated with the Gulf of Maine and Georges Bank marine environment. It strives to develop complementary and integrated approaches that can be implemented domestically, as required by both countries. The steering committee, and its associated working groups and sub-committees assist each country move towards their respective domestic conservation and protection agendas while each pursues sustainable economic policies.

Under the leadership of the TRSC, several initiatives have been undertaken. Scientific collaboration was formalized in 1998 with the creation of the Transboundary Resource Assessment Committee (TRAC)¹⁶. In 2000, the Transboundary Management Guidance Committee (TMGC)¹⁷ was established. It provides a mechanism whereby sustainable harvest strategies for groundfish stocks that straddle the maritime boundary can be developed. The TMGC process led to the 2003 resource sharing agreement for Cod, haddock and yellowtail flounder on Georges Bank.

In the early-to-mid 2000s, the TRSC broadened its scope to include additional working groups related to integrated marine management. These groups were: Species at Risk (2003); Habitat (2004); and an ad-hoc Oceans Working Group (2005). In 2005, the TRSC instituted the Integration Committee (IC)¹⁸ to function as its' operational arm. The IC's primary function is to integrate and support the working group processes in order to facilitate integrated ecosystem-based management in the Gulf of Maine. Further details on the Canada-US transboundary approach, including the role of the Integration Committee, can be found within the Canada-US Regional Transboundary Guidance document (September 19, 2005).

Transboundary Resource Assessment Committee (TRAC)

Since 1998, the TRAC has reviewed stock assessments and projections necessary to support management activities for shared resources across the Canada-US boundary in the Gulf of Maine-Georges Bank region. These assessments advise decision makers on the status of these resources and likely consequences of policy choices. When TRAC was established, it was recognized that its work and

¹⁵ <http://www.bio.gc.ca/info/intercol/sc-cd/index-eng.php>

¹⁶ <http://www2.mar.dfo-mpo.gc.ca/science/TRAC/trac.html>

¹⁷ <http://www2.mar.dfo-mpo.gc.ca/science/tmgc/TMGC-e.html>

¹⁸ <http://www.bio.gc.ca/info/intercol/sc-cd/ic-ci-eng.php>

documentation would evolve in order to adapt to new realities and would build on experience. Beginning in 2000, the formation of the TMGC and the development of arrangements for consistent management of Cod, haddock and yellowtail on eastern Georges Bank have placed new demands on the TRAC process and for TRAC documentation. The TRAC process and the documents necessary to fulfil requirements in the near future are described here.

Structure and Schedule

TRAC is the scientific arm of the TMGC and advice is provided in the TRAC Status Reports. The US National Marine Fisheries Service (NMFS) and Canada's DFO appoint one person each to act as TRAC co-chairs. The co-chairs administer the TRAC review process, the publication of product documents, and schedule TRAC review meetings. Meetings are scheduled as required to provide the necessary advice to TMGC for management of the transboundary shared resources across the USA Canada boundary of the Gulf of Maine-Georges Bank region. Draft remits and agendas are posted along with scheduled dates for upcoming meetings as soon as they become available.

Documentation

Reference Document: These documents provide the documentation of the scientific and technical information used in the assessments, including the assessment results. Information would be presented on current and future stock status, as well as catch projections. The documents are based on the analyses conducted and reflect the working papers, discussions and consensus views reached by the TRAC. The documents are externally reviewed prior to finalization and publication.

- **Status Report:** These reports provide the consensus summary of the TRAC on stock status and future resource outlook. Status is provided (where possible) with respect to any agreed (Canada-US common) harvest and biomass reference points, and risks identified with harvest levels that exceed F reference points and/or generate biomass declines. Subsequent to the TRAC meeting, the reports are reviewed for readability, accuracy and completeness. Any suggested revisions must be approved by the TRAC co-chairs. The final reports are submitted to the TMGC.
- **Proceedings:** This series documents TRAC meeting terms of reference and participation and consolidates the record of deliberations into a single source. The deliberations include brief presentation highlights of the working papers, e.g. an abstract, along with a report of the ensuing discussion. Subsequent to the TRAC meeting, the reports are reviewed by meeting participants for accuracy and completeness. As well, editorial reviews are conducted for readability. Any suggested revisions must be approved by the TRAC co-chairs. Technical descriptions of working paper methods and analyses are generally not incorporated but when included in the proceedings they are placed in appendices.

Transboundary Management Guidance Committee (TMGC)

The TMGC was established in 2000 as a government - industry committee composed of representatives from Canada and the United States. The Committee's purpose is to develop non-binding guidance in the form of harvest strategies, resource sharing and management processes for Canadian and US management authorities for the Cod, haddock and yellowtail flounder transboundary resources on Georges Bank. The first task addressed by the TMGC was development of a Canada-US resource sharing formula for the transboundary resources of Cod, haddock and yellowtail flounder on Georges Bank. The 3-5 December 2001 meeting of TMGC arrived upon a recommended allocation sharing proposal which included using 5Zjm as the management unit for Cod and haddock, the application of a responsive smoothing procedure, employing the average of 3 surveys for yellowtail flounder and haddock and the average of 2 seasons for Cod, base landings on the 1967-1994 time period and incorporating a fixed 7-year transition schedule. As an additional consideration, as part of the sharing agreement, the parties agreed to develop a common fishing

mortality based harvest strategy for the shared management units. The parties agreed in 2002 to formalize the elements of the sharing arrangement under what is known as the US-Canada Transboundary Resources Sharing Understanding.

The underlying motivation that fuelled the effort to reach an agreement was the recognition that each country's independent conservation actions could be compromised and that the full benefits of management actions were more likely to be realized if there was consistent management by the US and Canada.

Since inception, the TMGC has successfully coordinated management of three trans-boundary groundfish resources. A common data base (historical catch, research vessel survey data, biological data) for transboundary resources in the Gulf of Maine has been developed characterized by appropriate time and spatial and scales as deemed reasonable by both countries. Annual harvest levels have been established, consistent with the legal and policy requirements of both countries.

Terms of Reference (initial) and Structure

The TMGC's terms of reference include:

- Developing a process for implementation of the TMGC's recommendations;
- Recommending F-based harvesting strategies that are consistent with US and Canadian objectives;
- Providing guidance on principles and options for determining a US/Canadian resource sharing strategy;
- Making recommendations for actual US and Canadian harvest levels; and
- Making other recommendations that are mutually beneficial to US and Canadian fisheries.

The ToRs are revised periodically as deemed necessary by the members. At its September 2014 meeting, the TMGC agreed that it would be beneficial to document and review its 10-year history and administrative functions. The review is intended to focus on the following elements¹⁹:

- Catalog past meeting minutes and materials, guidance documents, and policies and procedures. Prepare and finalize past meeting minutes, as necessary;
- From catalog of pertinent documents:
 - Identify and evaluate any outstanding business or overlooked issues.
 - Summarize discussions and status of various issues and topics the TMGC has addressed (e.g., multi-year assessments, quota trading, etc.);
- Evaluate the TMGC's administrative functions, including development of agendas, distribution of meeting materials, website maintenance, preparation of meeting minutes and guidance documents, and other topics, as necessary. Based on this evaluation, recommend standards and establish roles and responsibilities for provision of information;
- Develop easily accessible record of allocation shares, TACs, catch, etc. from 2004 through present for all three transboundary stocks;
- Develop a new TMGC website to catalog pertinent TMGC documents and other products from 10-year review; and
- Based on the review:
 - Develop recommendations for topics and issues the TMGC may consider.
 - Develop potential criteria the TMGC could use to evaluate its performance moving forward.

The Committee consists of 6 members (2 government and 4 industry) from each country and is of Canada and the USA, to be co-chaired by members from each country.

¹⁹ Review of proposed Terms of Reference were provided by the Client following the November 2014 site visit.

Process and Documentation

The TMGC meets as required, considers the scientific advice contained in Transboundary Status Reports, incorporates information received from fishermen, reaches agreement by consensus and produces a common guidance document for the management of transboundary resources that is communicated to national fisheries management authorities. The Committee's annual guidance documents are a summary of the basis of its guidance to both countries for the forthcoming fishing year (defined as the calendar year for Canada; and from May 1 to April 30 of the following year for the US). Pertinent reference documents and consultations used in the TMGC deliberations are included in the reports.

Meetings

The TMGC convenes working meetings to deliberate over and develop guidance for consistent management of transboundary resources. It also presides over public consultations to receive information from invited experts and fishermen about management considerations for transboundary resources. Meetings are open to members of the public and notice of upcoming meetings are posted on the TMGC website.

Gulf of Maine Integration Committee (GMIC)

The main objectives of the Integration Committee are to:

- Expedite ecosystem-based management in the Gulf of Maine;
- Integrate species-based approaches into a comprehensive governance regime;
- Institutionalize flexibility to promote effective cooperation to address and reconcile common concerns and approaches to resource management; and
- Ensure consistency in approach across working groups and minimize disputes through a collaborative approach.

The Committee's key functions include:

- Ensuring consistency in approach between the TRAC, TMGC and Working Groups. The IC will help the Steering Committee (SC) anticipate and resolve potential inconsistencies that may arise as groups separately pursue their Terms of Reference (ToRs). The IC will also monitor progress on and consistency with all ToRs as an administrative support function;
- Providing multi-disciplinary feedback to groups on reports and proposed recommendations. There is a growing understanding that ecosystem approaches to ocean resource management create the need for integration of other issues such as species at risk, habitat, etc. The IC will work to ensure that each group considers the broader range of potential impacts to other resources, consistent with ecosystem principles;
- Providing analyses and submitting recommendations to Steering Committee co-chairs. The IC will serve as a policy advisory group that considers the output of all SC structures and makes its own recommendations to Regional Directors and/or the Steering Committee;
- Recommending dispute resolution processes to the TMGC and Steering Committee. Although a dispute settlement function would not rest with the IC, it may be part of developing a dispute settlement process; and
- Providing record keeping, archival, coordination and general secretariat services to the Steering Committee and working groups. All SC structures should be current with essential information. The IC will ensure that all parties are apprised of relevant activities via regular email updates and developing and maintaining a new SC website. The IC will be responsible for record-keeping and administrative services for the SC, and if appropriate and available to each group.

4.5.1.5. Domestic Management System (4X5Y and 5Zjm)

Management area 5Zjm comprises the eastern edge of Georges Bank and is located entirely within Canada's exclusive economic zone. As previously detailed, the transboundary characteristics of various groundfish species gave rise to the establishment of various formal collaborative arrangements between the US and Canada in relation to stock assessments, ecosystem-based management approaches, species-at-risk, habitat, oceans management, and fisheries management. While the highly interconnected nature of the transboundary processes are instrumental in arriving at outcomes that are reflective and supportive of each country's legal, regulatory and policy frameworks, the fishery management regime for 5Zjm is supported and governed entirely by Canadian federal statutes, regulations, policies and decisions.

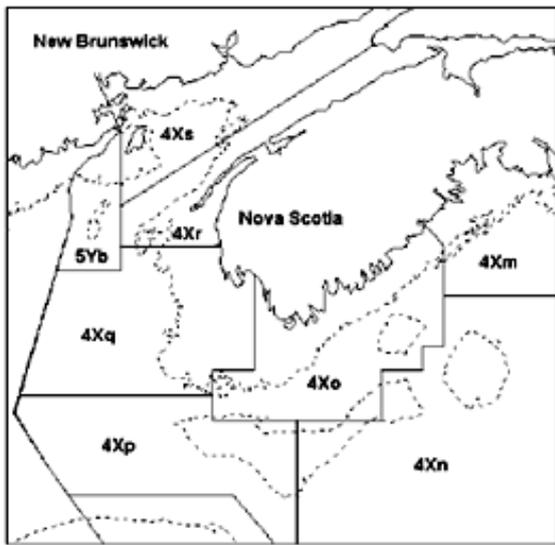


Figure 34. Haddock Stock and Management Area 4X5Y.

Management Area 4X5Y

This is also true for the 4X5Y management area where 5Y overlaps both US and Canadian waters of the Gulf of Maine (Figure 34). As with 5Zjm, there are international fisheries considerations in play because of the migratory nature of some species which cohabitate the Gulf of Maine.

Gulf of Maine Advisory Council (GOMAC)²⁰

GOMAC provides a forum for fishing industry and government representatives to jointly develop and provide advice to DFO on Gulf of Maine fisheries issues. The Committee advises on operational, technical and scientific analyses necessary to support formal discussions with the US. Its Terms of Reference are to be formally reviewed during Winter 2015.

Administration

- Membership includes all of the regional fishing fleet sectors and gear types, the offshore scallop fleet, aboriginal harvesters, fish and seafood processors, and the provincial governments of NB, NS and NL. The Canadian industry representative to the TMGC is also a member of GOMAC;
- If a member cannot attend, an alternate may be nominated and the Chairman notified as far in advance of the meeting date as possible;
- Changes to the structure and administration of the Committee will be decided by the membership;

²⁰ Terms of Reference were provided to the Assessment Team on December 29, 2014.

- Ad hoc subcommittees/working groups can be established to review and assess specific policy options and management measures;
- The Committee will meet at least twice a year and where feasible, at times and places convenient to the membership;
- No formal voting procedures will be established; the Committee will seek to operate on a consensus basis;
- Minutes of meetings will be prepared and distributed by DFO; and
- The Committee will be supported by a working group of DFO officials who will consolidate scientific, economic and management advice for the Committee's consideration.

Gulf of Maine Council on Marine Environment²¹

Established in 1989, the Council is a Canada-US partnership of government and non-government organizations working to maintain and enhance environmental quality in the Gulf of Maine to allow for sustainable resource use by existing and future generations (also its mission statement). It provides a focus for regional partnership on cross-border issues such as ecosystem conditions, water quality, and climate change within the Gulf of Maine watershed. The Council includes representatives from Nova Scotia, New Brunswick, the states of Maine, Massachusetts and New Hampshire who sit as partners on the council. This body aims to foster cooperative actions within the Gulf of Maine watershed to preserve its common heritage and advance sustainable resource use.

The work of the Council in the Gulf of Maine ecosystem is guided by a set of principles. Each principle is congruent with international protocols, as well as state, provincial, and national legislation in Canada and the United States. The principles include:

- Ecologically sustainable development;
- Ecosystem-based planning and management;
- Environmental protection through precaution; and
- Public information and participation-based planning and management

The Working Group oversees the work and activities of the committees. The Working Group is made up of representatives of (i) state and provincial governments (Nova Scotia, New Brunswick, Maine, New Hampshire, and Massachusetts), (ii) federal agencies (Environment Canada, Fisheries and Oceans Canada, U.S. Environment Protection Agency, National Ocean and Atmospheric Administration, and U.S. Department of Interior), and (iii) committee co-chairs. The Working Group is chaired by the state and provincial government representatives on a rotating basis, and meets quarterly. Its functions include:

- Prepare policy options for the Council's considerations;
- Conduct strategic planning;
- Develop 5-year Action Plan and oversee its implementation by the Committees; and
- Develop annual work programs and budget for Council's activities

The Council's Committees include (i) Habitat, (ii) Contaminants, (iii) Maritime Activities, (iv) Crosscutting Committees, and (v) Service Committees. They are responsible for implementing the goals of the 2012-2017 Action Plan which include (i) restored and conserved habitat, (ii) environmental and human health, and (iii) sustainable communities. They operate under work plans reviewed and approved by the Working Group, report to the Working Group quarterly, and meet as needed in the interim.

²¹ <http://www.gulfofmaine.org/2/gomc-home/gomc-about-the-council/>

Scotia-Fundy Groundfish Advisory Committee (SFGAC)²²

This longstanding forum serves as the pre-eminent consultative forum for the provision of advice to DFO on the management of the groundfish fishery resource in the Scotia-Fundy Sector (NAFO Divisions 4VWX, 5Yb and 5Zjm). Representatives include various sectors of DFO, provincial governments, fish harvester associations, fish and seafood processors, aboriginal communities and organizations. The Committee's terms of reference (currently under administrative review) include:

Scope

- Providing advice on annual fishing plans, regulatory measures, fishing seasons, licensing policies, size limitations, by-catch provisions and gear restrictions;
- Making recommendations on annual Total Allowable Catches, quotas, the administration of enterprise allocation programmes, the allocation of foreign quotas and on the introduction of new fishing technologies into the fishery that may affect existing management measures; and
- Giving consideration to biological, marketing and other information as it affects the management of the resource.

Administration

- Any changes to the structure and administration of the Committee will be decided by the Committee membership;
- Ad hoc subcommittees/working groups can be established to review and assess specific policy options and management measures;
- Meetings will be held in a central location. Reasonable efforts will be made to ensure the meeting times are convenient to the membership;
- The Committee will seek to operate on a consensus basis. No formal voting procedures will be established but the views of the individual Committee members will be canvassed and recorded in the meeting minutes when consensus on an issue cannot be achieved;
- Minutes of the committee's meetings will be prepared and distributed by DFO;
- Unless a majority of Committee members say otherwise before a meeting starts, the proceedings of the Committee will be open to the public and the media;
- The Committee will be supported by a working group of DFO officials who will consolidate scientific, economic and management advice into draft fishing plans for the Committee's consideration;
- The Committee will meet at least once a year. Additional meetings can be held if required.
- If a member of the Committee cannot attend, an alternate may be nominated as a replacement. The Chair should be notified as far in advance of the meeting date as possible;
- The position of Committee Chair will be held by a DFO official. An industry Co-Chair may be appointed at the discretion of Committee members; and
- The membership of the Committee will be made up of representatives from fishermen associations and unions, processors, individual fishermen, other industry representatives, provincial governments and DFO.

Scotia-Fundy Fishing Sector Roundtable²³

The increased competition for use of ocean space, the greater public interest in marine conservation and biodiversity, and the cumulative effects of multiple oceans use activities are having more and more of a direct impact on the activities and interests of the fishing industry. The Roundtable was established as an umbrella organization to consolidate the views of the industry on inter-fleet and oceans issues and to facilitate a common strategic direction on ecosystem-based management.

²² Documentation provided to the Assessment Team following the November 2014 site visit.

²³ Documentation provided to the Assessment Team following November 2014 site visit.

Mandate

- Develop a Scotia-Fundy fishing industry perspective on broad conservation issues, including but not limited to habitat protection, biodiversity protection, and ecosystem-based management;
- Fill the coordination void that currently exists within the fishing industry on broad marine conservation issues, address internal conflicts related to oceans use and as an end product, to provide advice to various decision-making bodies, including the DFO Regional managers, for action;
- Address issues which require multi-fleet, multi-sector resolution or interaction including but not limited to management, safety, habitat, and science issues; and
- Further the understanding of complex ocean and fishery issues and interactions across the industry.

Membership

Membership is to be representative of the fishing industry (harvesters, processors) and to include First Nations. A nominal limit of 20 to 25 members will be established for industry members; the provinces of NB and NS will be represented, as will DFO's Area Directors and representatives of the Fisheries Management, Science, Oceans, and Coast Guard Sectors.

Frequency of Meetings

The Committee is to meet a minimum of twice a year and more frequently at the call of the DFO Chair. Meetings will be open to observers upon request, and non-representatives of government and industry can attend as the agenda requires.

Working Groups and Workshops

Sub-committees or standing committees will be formed as required to address specific items. They will have a mandate to report to the Roundtable as a whole with Chairs drawn from the membership. Workshops may be initiated on individual topics, including policy or operational issues that require in depth review or analysis. They might also be used to present information to or receive information from a broader segment of the fishing sector.

Agendas and Support

Agendas will consist of items identified by industry, DFO or the Provinces relating to oceans use, ecosystems, or issues that cross fisheries and require coordinated action. Information items may also form part of the agendas. Communications and logistical support will be provided by DFO. Communications will be handled through face-to-face meetings where possible and through existing Advisory Committee structures. Information will be shared electronically to the greatest degree possible.

Advice

Advice generated through the Roundtable will flow to government or industry bodies as appropriate, including:

- Fishery Advisory Committees;
- Regional Oceans Committees;
- Advice on issues for which no mechanism exists directed to DFO will be conveyed to the Regional Director General; and
- Advice to other federal or provincial bodies

Fisheries and Oceans Canada (Maritimes Region) and Marine Environmental Non-Governmental Organizations (ENGOS) Dialogue Forum²⁴

The Forum, established in April 2013, is the primary body for discussions between DFO and ENGOS on overarching policy issues of relevance to all organizations involved in the forum, regarding the sustainable development and conservation of Canada's marine resources.

Scope

The Forum provides a vehicle for discussion (not decision-making) between the parties and serves to facilitate information exchange, relationship building, and dialogue on strategic policy issues of relevance to all organizations involved in the forum, regarding the sustainable development and conservation of Canada's marine resources. While the goal is to have discussions at the strategic level, specific operational examples may be used to demonstrate and/or clarify broader policy objectives. As such, agendas will be established collectively between the co-chairs of the Forum such that discussions of specific operational issues do not form the basis for the majority of the meeting. The forum is not a vehicle for "work".

The Forum is a stand-alone body; it does not report to a higher-level body nor are there, or will there be, linkages for the purposes of collaborative work with other bodies. The Forum is not meant to replace or supersede existing bodies focused on specific issues or bilateral meetings with DFO officials that would ordinarily occur.

Membership

ENGO membership will be reviewed annually and a call for new members will be circulated by the Nova Scotia Environmental Network (NSEN) specifically to include ENGOS with a broad, marine-focused mandate. No individual ENGO will have more than one member on the Forum, although alternates may be considered on an individual meeting basis. The ENGO members will be responsible for selecting a co-chair, to be reviewed on an annual basis. ENGO membership will be comprised of:

- Ecology Action Centre (co-chair);
- World Wildlife Fund;
- Canadian Wildlife Federation; and
- Canadian Parks and Wilderness Society

DFO Maritimes Region membership will be comprised of the following:

- Regional Director General (co-chair);
- Regional Directors of Science, Fisheries Management, Ecosystem Management; and
- Director, Resource Management

For both parties, guests including resource people for agenda items, will be permitted as required and as approved by the co-chairs. DFO will provide secretariat services.

Logistics

- Meeting agendas will be developed by the Forum Secretariat in consultation with the ENGO co-chair and DFO members, and must be approved by the co-chairs;
- Meetings will occur three times per year, and will generally be 2 hours duration depending on its agenda;
- For a meeting to take place, a quorum of three ENGO and three DFO representatives must be present; and
- Records of Discussion will be developed by the Secretariat for each meeting and will be distributed to forum members; attributions will not be included in the records.

²⁴ Documentation provided to the Assessment Team following the November 2014 site visit.

Terms and Conditions

The co-chairs will initiate a review of the effectiveness of the forum and its terms of reference on an annual basis. All members shall be invited to participate in the review.

Community-Based Groundfish Management Boards²⁵

A number of local groundfish management boards representing various fish harvester associations were established several years ago across DFO's Maritimes Region whose mandate is focussed primarily on the preparation of annual Conservation Harvesting Plans (CHPs) for the fleet and gear sectors based in a specified geographical area, such as the Shelburne County Groundfish Management Board for 4VWX+5. There are now 11 Management Boards in the Maritimes Region. The management boards' authority is subject to operational guidelines approved by DFO in 1998 as well as their respective civil legal agreements. Annual CHPs typically reflect fishery access eligibility criteria, quota allocations to associations' members, quota transfers in the event of overruns, trip hail-in and hail-out provisions, at-sea observer coverage and dockside monitoring requirements. Plan components are reflected in licence conditions issued and enforced by DFO.

Fleet-Specific Committees

In addition to the SFGAC's umbrella process, there exists four subsidiary (or fleet) committees where industry stakeholders can engage with DFO on issues specific to their respective harvesting plans. For the inshore groundfish fleets, there are two subsidiary committees:

- The Fixed Gear Advisory Committee consisting of industry representatives drawn from the Community Management Boards; and
- The Individual Transfer Quota (ITQ) Advisory Committee which consists of representatives based on quota holdings by area in specific tonnage groupings.

Consultations also occur on an Atlantic-wide basis with members of the Groundfish Enterprise Allocation Council (GEAC) for the greater than 65 feet Mobile Gear fleet, and with the Mid-Shore Groundfish Vessel Owners (MIGVO) for the 65-100 feet Fixed Gear fleet.

4.5.1.6. Dispute Resolution Mechanisms

Management Area (4X5Y)

Unresolved disputes within the Canadian fisheries management system can be, and have been, taken to the Canadian judicial system for a final decision. The most notable of these over the last two decades have been the "Sparrow", "Marshall" and "Larocque" decisions. The first two affirmed aboriginal rights to fish under specific circumstances subject to conservation requirements and the latter outlawed the use of fish to pay for services provided to, or on behalf of, government without the approval of Parliament²⁶. The Minister's power to allocate for reasons other than conservation (such as for social or economic purposes) was also confirmed in another earlier court challenge. There is provision for an appeal of licensing decisions to independent Regional and Atlantic License Appeal Boards but the Minister is not legally bound to accept recommendations made by them.

DFO regularly obtains legal advice from Department of Justice lawyers assigned to DFO prior to providing recommendations to the Minister on such undertakings as new policy initiatives, important changes to management strategies, regulatory amendments, and new licence conditions for the fishery. Legal advice may reflect any number of elements of constitutional, administrative, aboriginal,

²⁵Community Management Board Operational Guidelines (December 1998) were provided to the Assessment Team following the November 2014 site visit.

²⁶The *Fisheries Act* was subsequently amended in 2013 to grant the Minister of Fisheries and Oceans the authority to allocate fishery resources to parties under formal agreements for the purpose of undertaking specific activities in support of fisheries management and research.

fisheries and criminal law. Seeking legal opinions often avoids costly and protracted legal disputes before the implementation of programs, activities or policies, thereby minimizing acts of non-compliance with applicable legislation and policies (prior to their implementation).

Moreover, DFO takes proactive measures to avoid legal disputes through such fora as the Transboundary Committees, the SFGAC and the GOMAC by engaging all key stakeholders on a timely basis in discussions related to, *inter alia*, proposed changes to legislation and fisheries management measures. This usually allows the parties to identify any concerns and issues and to resolve any differences in lieu of legal challenges.

There is no evidence to indicate that the fishing industry does not comply or would not comply with judicial decisions. Lastly, quite apart from the established advisory committee process, a number of other stakeholder engagement fora are used by DFO when significant strategic policy, regulatory and program changes are proposed to which industry and /or other stakeholders groups can contribute their views. Examples include parliamentary committee hearings, independent panels, inter-governmental roundtables, commissions of inquiry, and judicial reviews of ministerial decisions – all of which can lessen the likelihood of legal challenges.

Management Area 5Zjm

The Canada-US TRSC is a forum that is available to the parties for resolving disagreements that may arise in relation to various aspects of the fisheries management system for the area. The parties have consistently demonstrated a commitment to arriving at a negotiated solution to their differences in the interest of safeguarding their shared goals and objectives, rather than relying upon the legal system or some third party process. Once decisions are taken, the dispute resolution mechanisms described previously for 4X5Y are available to industry groups.

4.5.2. Consultation Processes

The considerable number of formal DFO-Industry consultative committees identified in the previous section is tangible proof of a well-established and structured approach to engagement between DFO, fishing industry stakeholders and other groups. Nationally, the formal consultative process is overseen by a departmental framework first published in 2004²⁷ and which consists of 3 broad themes, 9 principles and 37 guidelines, all of which are in support of building a common understanding and coordinated approach to consultation and the decision-making process. A consultation toolbox was developed to guide staff in planning and evaluating consultation processes²⁸. A second, parallel framework, approved for use by the Treasury Board Secretariat in 2011, addresses how the federal government can meet its specific legal duty to consult and accommodate aboriginal peoples when their aboriginal and treaty rights may be impacted.

Transboundary and Regional Processes: Fisheries Management

DFO Maritimes Region's approach to formal industry engagement on fisheries management issues is centered on advisory committees consisting of representatives of various accredited fish harvester associations, aboriginal groups, processors, provincial government representatives and, in some cases, representatives of environmental non-governmental organizations. Other federal department representatives and, on occasion, subject-matter experts may be invited to participate when other industry-impacting issues are considered.

In addition to the regional processes, there are DFO consultative committees for fleet sectors to

²⁷ <http://www.dfo-mpo.gc.ca/Library/282187.pdf>

²⁸ <http://www.dfo-mpo.gc.ca/Library/282189.pdf>

discuss management and conservation issues that are specific to their respective fleet sectors.

The formal Fisheries Management advisory committees are not decision-making bodies per se; rather, they generate advice and recommendations that are further considered by the Minister of DFO or ministerial staff in accordance with established authorities and practices.

The transboundary fisheries management fora, presented earlier, serve to promote and achieve ongoing collaboration between Canada and the US in relation to the sustainability and conservation of fish stocks that are harvested on both sides of the international maritime boundary by their respective industry sectors.

Comments provided to the Reassessment Team during the November 2014 site visit indicate that industry stakeholders have a good understanding of their roles and responsibilities, committee procedures, and the decision-making process. The vast majority of representatives have been involved in the consultation processes for many years, and, as a result, are familiar with committee protocols and administrative rules, and thus they contribute to a respectful and effective work environment. There is a general level of satisfaction among fish harvester stakeholders that the processes provide them with the opportunity to present and debate their issues, and offer recommendations for consideration. The committees operate on a consensus basis (no voting). While members can be polled for their position on any item when a consensus is not achieved, the objective of reaching consensus on common issues and recommendations appears to work in the majority of cases.

Transboundary and Regional Processes: Science

DFO's Regional Advisory Process (RAP) was established in 1993 to provide peer reviewed information on the status of the fisheries and marine mammal resources in the Atlantic zone, and was expanded in 1997 to include the remaining DFO administrative regions. In the Maritimes Region, the RAP addresses issues in the Bay of Fundy, on the Scotian Shelf and on Georges Bank. The Maritimes RAP also undertakes the review of technical analysis relating to regional habitat and fisheries management issues. The principles that guide RAP are:

- being timely, responsive and flexible to client needs;
- employing the most appropriate and credible scientific methods;
- providing technical review on the full range of regional resource management issues;
- involving industry, stakeholders, and outside scientific experts in the review process;
- providing a visible and public document trail; and
- fostering interaction with the other regional RAPs, as well as facilitating the advancement of resource science through zonal and national meetings and workshops.

The RAP's governance system is a separate entity from the fisheries management processes, and is subject to different administrative, policy and procedural rules. These rules are laid out on the Canadian Science Advisory Secretariat's (CSAS) website.²⁹ As noted, the goal of DFO's science peer review and advisory processes is to provide high quality scientific advice and information through rigorous peer review with the overall objective of providing the best possible science advice to the Minister, managers, stakeholders and the public. All participants attending a CSAS science peer-review and advisory meeting are encouraged to question, comment and constructively challenge the science presented; as well as seeking consensus on conclusions during the meeting. Peer review meetings are intended to be a forum for review and challenge of scientific information leading to objective consensus. Science peer review processes are evidence-based, objective, impartial and respectful. DFO strongly encourages that participants be chosen for their knowledge of the topic(s) (e.g., species, modeling) under review, their understanding of the nature of peer review, their role as contributors

²⁹ <http://www.dfo-mpo.gc.ca/csas-sccs/process-processus/process-processus-eng.htm>

of knowledge and perspective, and in controlling the quality of information and advice resulting from the meeting through constructive criticism and consensus decision-making. All participants at science peer review meetings are expected to participate as objective and knowledgeable individuals on the subject matter under review, and not as advocates or representatives of any interest group. Attendance at CSAS meetings is not intended to provide participants with information or “early” advice on an issue prior to the approval and release of the scientific advice. Participation at DFO science peer-review meetings is by invitation only.

The reporting of the outcomes of the discussions from the management and sciences fora differs. For the science-based RAP process, the Science Advisory Reports, Research Documents, Proceedings, and Special Science Responses are recorded and published in both official languages on the CSAS website. By contrast, with the exception of the proceedings of the various Transboundary Committee deliberations, meeting minutes from the regional and local groundfish advisory committees are not posted on the DFO website but are distributed to participants by email. The processes also differ in how they deal with attendance by non-core participants and the general public. In the case of the regional and local committees, the public may attend however media representatives are not permitted to record, video or photograph the proceedings. RAP meetings are not open to the general public.

Canada – Nova Scotia – Mi’kmaq Consultation Frameworks

In Nova Scotia, the federal and provincial governments and the leadership of the 13 Mi’kmaq First Nations entered into a number of important agreements that define and guide how the parties will engage and conduct consultations on a wide range of sectoral issues. In August 2010, they concluded an agreement which established ‘an independent, clear and efficient means for Canada and Nova Scotia to consult the Mi’kmaq of Nova Scotia on proposed activities or projects’.³⁰ The Agreement on consultation is part of the broader negotiations to resolve outstanding questions in relation to Aboriginal and treaty rights and self-government between Canada, Nova Scotia and the Mi’kmaq of Nova Scotia, called the ‘Made-in-Nova Scotia Process’. It addresses the direction provided by the Supreme Court of Canada in the 2004 Haida and Taku River decisions regarding the legal duty to consult.

A further agreement was concluded which governs how the parties will consult whenever Canada or Nova Scotia wishes to conduct consultation on the record and with prejudice with one or more Mi’kmaq Bands respecting established or asserted Mi’kmaq Aboriginal or treaty rights, including consultation in respect of a decision or activity concerning Crown land, water or a natural resource³¹.

Previously, in 2007, the parties had concluded a framework agreement, known as the Mi’kmaq - Nova Scotia - Canada Framework Agreement³² to promote efficient, effective, orderly and timely negotiations towards a resolution of issues respecting Mi’kmaq rights and title. To that end, the Agreement established: (i) objectives for the negotiations; (ii) subject matters that are to be included in negotiations; (iii) process parameters such as interim, or incremental, measures or agreements, approvals, the negotiation process, funding, termination and amendment; and (iv) other conditions that will foster a helpful environment for negotiations.

Canada – New Brunswick – Mi’kmaq/Maliseet Consultation Framework

In September 2011, both levels of government and representatives of the 15 Mi’gmaq and Maliseet First Nations of New Brunswick signed the Mi’gmaq Wolastoqiyik / New Brunswick / Canada Umbrella

³⁰ <http://www.aadnc-aandc.gc.ca/eng/1100100015373/1100100015377>

³¹ <http://www.aadnc-aandc.gc.ca/eng/1100100031918/1100100031919>

³² <http://www.aadnc-aandc.gc.ca/eng/1100100031915/1100100031916>

Agreement³³ which established an effective and orderly process to help guide future discussions among the parties towards the conclusion of a tri-partite Framework Agreement on Aboriginal and treaty rights and self-government, and a consultation agreement.

4.5.3. Long Term Objectives

DFO's **vision statement** is to *advance sustainable aquatic ecosystems and support safe and secure Canadian waters while fostering economic prosperity across maritime sectors and fisheries.*

DFO's **mission statement** is described as: *Through sound science, forward-looking policy, and operational and service excellence, DFO employees work collaboratively toward the following strategic outcomes:*

- *Economically Prosperous Maritime Sectors and Fisheries*
- *Sustainable Aquatic Ecosystems*
- *Safe and Secure Waters*

A. The **Atlantic Fisheries Policy Framework (2004)**³⁴ provides policy direction for the management of fisheries on the Atlantic coast over the long term. It advocates a broad, inclusive approach to fisheries management while managing in a manner consistent with the constitutional protection provided to Aboriginal and treaty rights. The framework identifies two core objectives and two supporting objectives. These four objectives describe the outcomes that Fisheries and Oceans Canada will strive to achieve in collaboration with resource users and others who have an interest in the Atlantic fisheries. The principles that underpin these objectives and strategies are outlined below.³⁵

The two core objectives are:

Conservation and Sustainable Use

Conservation of marine resources and habitat, and rebuilding of resources and restoration of habitat where necessary, will remain the highest priority for the management of all fisheries. Within the limits of available knowledge, all fishing activities will be conducted in a manner that leads to sustainable levels of resource use.

Self-reliance

Self-reliant fisheries and collaboration among all orders of government will contribute to the well-being of coastal communities. To be more self-reliant, resource users will have more flexibility to make decisions about their own economic and social objectives.

The two supporting objectives are:

Shared Stewardship

³³ <http://www.aadnc-aandc.gc.ca/eng/1315679203831/1315679413935>

³⁴ <http://www.dfo-mpo.gc.ca/fm-gp/policies-politiques/afpr-rppa/framework-cadre-eng.htm>

³⁵ Policies and strategies in support of the AFPR objectives and principles are described in the aforementioned footnote.

Participants will be effectively involved in fisheries management decision-making processes at appropriate levels; they will contribute specialized knowledge and experience, and share in accountability for outcomes. Achieving shared stewardship requires:

A Stable and Transparent Access and Allocation Approach

The access and allocation of fisheries resources will be more stable and predictable, and decisions will be made and conflicts resolved through fair, transparent and rules-based processes

The principles that underpin these objectives and strategies are outlined below. They are intended to guide decision making on management of the Atlantic fisheries. They will also serve as a tool for evaluating future fisheries management policies and decisions and ensuring their coherence with the framework's objectives. There are nine principles:

- **Conservation of fisheries resources and habitat** — defined as sustainable use that safeguards ecological processes and genetic diversity for present and future generations — is the first priority of fisheries management decision making;
- The fishery is a **common property resource** to be managed for the benefit of all Canadians, consistent with conservation objectives, the constitutional protection afforded Aboriginal and treaty rights, and the relative contributions that various uses of the resource make to Canadian society;
- The **Minister** of Fisheries and Oceans, on behalf of all Canadians, **retains authority** for the sustainable use of fisheries resources and their habitat, and for the access and allocation thereof;
- DFO recognizes the **historic and continued importance of commercial fisheries** on the Atlantic Coast as well as the legitimacy and importance of other users, such as recreational fishers and aquaculturists;
- Governments, resource users and others with an interest in the fisheries **share responsibility** for the sustainable use and economic viability of fisheries;
- Fisheries management decision-making processes will provide opportunities for **increased Aboriginal participation and involvement**;
- Fisheries management **decision-making processes** must be, and must be seen to be, fair, transparent and subject to clear and consistent rules and procedures;
- Fisheries management **decision-making processes** will be more inclusive so that resource users and others will have appropriate opportunities to participate;
- and **Operational decision making** affecting specific fisheries will normally be made as close to those fisheries as possible and will primarily involve resource users.

B. DFO's **Sustainable Fisheries Framework**³⁶ provides the basis for ensuring Canadian fisheries are conducted in a manner which support conservation and sustainable use. It incorporates existing fisheries management policies with new and evolving policies. The framework also includes tools to monitor and assess those initiatives geared towards ensuring an environmentally sustainable fishery, and identifies areas that may need improvement. Overall, the Framework provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.

The Framework comprises two main elements: (1) conservation and sustainable use policies, and (2) planning and monitoring tools.

³⁶ <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm>

(1) Conservation and Sustainable Use policies incorporate precautionary and ecosystem approaches into fisheries management decisions to ensure continued health and productivity of Canada's fisheries and healthy fish stocks, while protecting biodiversity and fisheries habitat. Combined, these policies demonstrate Canada's commitment to the principles of ecosystem-based fisheries management. These policies include:

- A Fishery Decision-Making Framework Incorporating the Precautionary Approach (April 2009);
- Managing Impacts of Fishing on Benthic Habitat, Communities and Species (April 2009);
- Ecological Risk Assessment Framework (ERAF) for Coldwater Corals and Sponge Dominated Communities (April 2013); and
- Policy on New Fisheries for Forage Species (April 2009)

(2) The application of the sustainable use policies will be implemented into the fisheries management process through various **Planning and Monitoring Tools**. Integrated Fisheries Management Plans identify goals related to conservation, management, enforcement, and science for individual fisheries; and they describe access and allocations among various fish harvesters and fleet areas. The plans also incorporate biological and socio-economic considerations that are factored into harvest decisions. Integrated Fisheries Management Plans are an important reporting tool, and a valuable source of information on a given fishery for fisheries managers, industry, and other resource users. They also include a requirement to conduct a regular review of the fishery against the plan's objectives. In addition, self-diagnostic tools like the Fishery Checklist (a tool for internal use) can help the Department monitor improvements that support sustainable fisheries, and identify areas of weakness that require further work.

DFO has developed additional strategic policy frameworks such as for Integrated Fisheries Resource Management, Sustainable Aquaculture, Species at Risk, Integrated Ocean Management, and Aquatic Invasive Species. These also contain long term objectives with implications for the fishery and are presented elsewhere in this report.

C. The aforementioned departmental mission statement is supported by long term strategic objectives pursuant to DFO's **Fisheries Renewal Initiative**.³⁷ These objectives include:

- **Long Term Stability** – enabling DFO and resource users to achieve strong conservation outcomes through risk management frameworks incorporating the ecosystem and precautionary approach;
- **Economic Prosperity** – aligning fisheries policies and decision-making processes to support economically prosperous fisheries for Canadians; and
- **Improved Governance** – increasing stability, transparency and accountability in fisheries management and promoting shared stewardship.

D. DFO's fisheries management programs are informed by five overarching strategic objectives which embrace an **Ecosystem Approach to Management**. These are also reflected in the current IFMPs for the Haddock fisheries in 4X5Y and 5Zjm, and include:

Conservation objectives

- *Productivity*: Do not cause unacceptable reduction in productivity so that components can play their role in the functioning of the ecosystem.

³⁷ <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/index-eng.htm>; several components of the AFPR have since been integrated into the Fisheries Renewal Initiative.

- *Biodiversity*: Do not cause unacceptable reduction in biodiversity in order to preserve the structure and natural resilience of the ecosystem.
- *Habitat*: Do not cause unacceptable modification to habitat in order to safeguard both physical and chemical properties of the ecosystem.

Social, cultural and economic objectives

- *Culture and Sustenance*: Respect Aboriginal and treaty rights to fish.
- *Prosperity*: Create the circumstances for economically prosperous fisheries.

The conservation objectives require consideration of the impact of the fishery not only on the target species but also on non-target species and habitat. The social, cultural and economic objectives reflect the Aboriginal right to fish for food, social and ceremonial purposes. They also recognize the economic contribution that the fishing industry makes to Canadian businesses and many coastal communities. While the economic viability of the commercial fisheries depends on the industry itself, DFO is committed to managing the fisheries in a manner that helps participants be economically successful while using the ocean's resources in an environmentally sustainable manner.

4.5.4. Incentives for Sustainable Fishing

DFO has developed and implemented a Sustainable Fisheries Framework which builds on existing fisheries management practices to form a foundation for implementing an ecosystem based and precautionary approach to fisheries management and to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the Framework is to ensure that Canada's fisheries are environmentally sustainable, while supporting economic prosperity.

Consistent with Principles 1 and 2, there are no apparent capital or operating subsidies offered by governments to the 4X5Y and 5Zjm groundfish fleets that would contribute to unsustainable fishing practices.

Implementation of a formal catch share program (ITQs and EAs) has provided a management regime that creates economic and social incentives which support sustainable fisheries and MSC Principles 1 and 2. This is an important mechanism that moves fish to operators that need it and helps ensure that the total fishery catch remains within sustainable harvest levels. In Scotia-Fundy, all groundfish vessels over 45 feet are managed under ITQs or EAs. Fixed gear vessels under 45 feet operate under the direction of CGMBs. There are 11 CGMBs and some use informal catch shares while others use trip limits to manage vessel access and catch.

It has been generally acknowledged that catch share regimes change the incentive structure from one of maximizing catch to maximizing value from a fixed catch allocation and avoiding negative incentives. Experts have concluded that the incentive to maximize catch, which has been closely associated with input control management, generally results in investment in excess harvesting capacity, TAC overages, misreporting of catch, an poor product quality and prices. Catch shares, by definition, limit catch and provide incentives to improve value and prices, all of which can create improved fleet economic performance. The extent to which catch shares actually do positively enhance behaviour depends on the extent to which catch shares are used, the extent and ease of transferability, the level of monitoring in the fishery, and consequences for non-compliance.³⁸

³⁸ [Observations from the MSC Fishery Assessment for Atlantic Halibut \(2013\)](#), pp 126-127.

The Reassessment Team was provided with a draft document entitled: *Summary of the Pilot Project for ITQ/EA Fleets Flexible Groundfish Temporary Quota Transfers*. The project's objectives, established in June 2010, are to: (i) improve flexibility (fostering industry self-reliance leading to profitability), and (ii) improve quota utilization in the groundfish fishery in Maritimes Region. Performance indicators, some measurable, were also identified. They included:

- Quota utilization patterns and fishing effort distribution;
- Fishing behaviour;
- Quota utilization; and
- Vessel productivity

The pilot project was initially intended to be in place for two fishing seasons (2008 and 2009) but was extended to a third season to allow for a review by both industry and DFO. The review was completed through the summer and fall months of 2010 with all participating fleet sectors in agreement that the guidelines that were established through the pilot project be accepted for the future and incorporated in the Atlantic Groundfish Transfer Guidelines.

There are several important incentives within the management regime's regulations, licensing policies and licence conditions for the haddock mobile and fixed gear fleets that promote and contribute to sustainable fishing practices. Examples include: security of access, the ability to transfer licences and quotas, and a stable enterprise revenue stream all of which serve to protect the licence holder's investment and add value to his commercial lobster fishing licence over time. These economic incentives contribute to the fishery's sustainability by motivating licence holders to protect the resource, focus on maximizing value over volume, and minimizing impacts of the fishery on marine habitat and the ecosystem.

The haddock fishery in 4X5Y and 5Zjm is managed by annual Conservation Harvest Plans approved by DFO and supported by a suite of controls which are backed by regulations and licence conditions, and constitute enforceable measures. Many of the following measures are common to both fleet and gear sectors³⁹:

- Fixed number of license holders (limited entry), defined seasons and times;
- Gear restrictions and gear specifications (mesh size, length, hook size, use of separator panel for MG vessels);
- Closed areas and times, including for spawning and vulnerable marine species and habitats;
- Stowage of gear when transiting through unauthorized fishing zones;
- Prohibition against leaving gillnets unattended in the water for more than 48 consecutive hours;
- Hail-out and hail-in requirements prior to departing and upon returning from a fishing trip;
- Separating fish on board by species while at sea;
- Mandatory dockside monitoring of all landed fish prior to offloading; requiring dockside monitoring documents to be kept current and accurate, and provided to Dockside Observer at time of landing;
- At-sea observer coverage when stipulated by DFO (industry now pays 100% of the costs);
- Returning forthwith to the sea SARA-listed species that are caught while fishing, and maintaining an accurate Species-at-risk logbook of all occurrences; and
- Non-retention of certain species (other than SARA-listed species; and
- Bycatch limits (percentage of fish onboard or fleet bycatch quotas);

³⁹ Summarized from the CHPs provided to the assessment Team following the November 2014 site visit.

All licence condition documents reviewed by the Assessment Team included measures to protect species-at-risk, vulnerable marine habitat, and biodiversity (sponges/corals closed areas or others). Visible and effective surveillance and enforcement activities minimize the likelihood of unauthorized fishing or offloading; an effective system of court-imposed fines, forfeitures and licence suspensions, and media scrutiny of violators all serve to promote compliance, sustainable fishing practices and resource conservation. In combination, these systems, measures and practices engender a strong sense of stewardship toward the resource, habitat and the ecosystem, and support sustainability objectives.

Management policy and procedures for the groundfish fishery are reviewed regularly, normally at the end of each fishing season. This review is done internally at DFO and externally through the various transboundary and domestic advisory committees, as well as by the Scotia-Fundy Roundtable in regard to the Maritimes Region's broad range of strategic fisheries and oceans policies. The annual DFO internal review also serves to update the Fisheries Sustainability Checklist (an internal management tool used to monitor progress on sustainability initiatives).

During the November 2014 site visit, DFO and Industry representatives reported that the management system for the fishery is generally proactive in anticipating potential issues that could give rise to negative economic or social incentives. This is characterized by thoughtful analysis of their impacts and acting on a timely basis to ensure incentives support sustainable fishing. Industry representatives also commented that their decision to seek MSC reassessment of the 4X5Y and 5Zjm haddock fishery as well as their ongoing efforts to develop, test and implement new conservation practices and measures were indicative of their commitment to sustainable fishing practices.

4.5.5. Fishery Specific Objectives

The 2012 IFMPs for the 4X5Y and 5Zjm haddock fishery contain specific information relative to the strategies and tactics used to support the five objectives for the fishery (refer to Tables 20 and 21). The various F values and corresponding reference points listed in the tables are based on the 2009 RAP for 4X5Y and the TMGC guidance document for 5Zjm. These are revised on a regular basis to reflect peer-reviewed scientific advice, and the principles of the department's sustainable fisheries framework including precautionary approach requirements.

(Note: The Reassessment Team anticipates that the strategies and tactics for groundfish/haddock will be revisited when the Haddock IFMPs are updated in 2015-2016).

Table 20. Fishery-specific strategies and tactics incorporating the candidate reference points for 4X5Y Haddock.

STRATEGIES	TACTICS
Productivity	
<p>Keep fishing mortality of 4X5Y Haddock moderate by using the following references and risk tolerances:</p> <ul style="list-style-type: none"> • The TAC may be set with a neutral (50 %) probability of exceeding the fishing mortality target reference (F_{REF}) of $F=0.25$ when it is above the upper stock reference (USR) of 41,600 mt (80 % of B_{MSY}). • The TAC may be set with a low (less than 25 %) probability of exceeding the fishing mortality limit reference (F_{LIM}) of 0.43 when the SSB is above B_{MSY} of 52,000 mt. • The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A harvest strategy of F_{REF} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example. • When the SSB is below the limit reference point (LRP) of 20,800 mt, the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75 %). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline. 	<ul style="list-style-type: none"> • Total Allowable Catch
<p>Keep fishing mortality of Cusk, White hake, Atlantic wolffish and Monkfish moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.</p>	<ul style="list-style-type: none"> • Bycatch limits • Fleet bycatch caps
<p>Keep fishing mortality of skates and Sculpins moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.</p>	<ul style="list-style-type: none"> • Bycatch limits • Permitted release • Mandatory release of thorny skate
<p>Keep fishing mortality of all sharks moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.</p>	<ul style="list-style-type: none"> • Retention limits
<p>For all groundfish species not listed above and for which there is no TAC allocated, keep fishing mortality moderate and within</p>	<ul style="list-style-type: none"> • Bycatch limits

STRATEGIES	TACTICS
biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.	
Biodiversity	
Control unintended incidental mortality for all non-groundfish species.	<ul style="list-style-type: none"> • Mandatory release
Control unintended incidental mortality for spotted wolfish, Northern wolfish and North Atlantic right whales.	<ul style="list-style-type: none"> • Mandatory release
Distribute population component mortality in relation to component biomass.	<ul style="list-style-type: none"> • Fleet quotas by area
Habitat	
Manage area disturbed of habitat.	<ul style="list-style-type: none"> • Coral conservation area
Culture and Sustenance	
Provide access for food, social and ceremonial purposes.	<ul style="list-style-type: none"> • Annual negotiations of food, social and ceremonial licences
Support recreational participation.	<ul style="list-style-type: none"> • Open access
Prosperity	
Limit inflexibility in policy and licensing among individual enterprises/licence holders.	<ul style="list-style-type: none"> • Exempted fleet licences • Substitute operators/ Designated operators • Harvest benefit combining • ITQ quota pools
Minimize instability in access to resources and allocations by limiting annual changes in the TAC to no more than 15 %, unless the SSB is below the Upper Stock Reference and declining precipitously.	<ul style="list-style-type: none"> • Fleet shares • Individual quotas, enterprise allocations and community quotas. • Annual TAC variation
Limit inability for self-adjustment to overcapacity relative to resource availability.	<ul style="list-style-type: none"> • Quota transferability • Harvest Benefit combining
Support certification for sustainability.	<ul style="list-style-type: none"> • Provision of data, where available

Table 21. Fishery-specific strategies and tactics incorporating the candidate reference points for 5Zjm Haddock.

STRATEGIES	TACTICS
Productivity	
<p>Keep fishing mortality of 5Zjm Haddock moderate by using the following references and risk tolerances:</p> <ul style="list-style-type: none"> • The TAC should be set with a neutral (50 %) probability of exceeding the fishing mortality limit reference (F_{REF}) of $F=0.26$ when it is above the upper stock reference (USR) of 40,000 mt • The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A low (25 %) to neutral (50 %) probability of exceeding F_{REF} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on the location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example. • When the SSB is below the limit reference point (LRP) of 10,340 mt, the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75%). The TAC (if appropriate) should be set with a very low (less than 5 %) risk of preventable biomass decline. <i>(Note: The TMGC harvest strategy is to maintain a low to neutral risk of exceeding the fishing mortality limit reference point, F_{REF}. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.)</i> 	<ul style="list-style-type: none"> • Total Allowable Catch
<p>Keep fishing mortality of Cusk, White hake, Atlantic wolffish and Monkfish moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.</p>	<ul style="list-style-type: none"> • Bycatch limits • Fleet bycatch caps
<p>Keep fishing mortality of skates and Sculpins moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.</p>	<ul style="list-style-type: none"> • Bycatch limits • Permitted release • Mandatory release of thorny skate

STRATEGIES	TACTICS
Keep fishing mortality of all sharks moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.	<ul style="list-style-type: none"> • Retention limits
For all groundfish species not listed above and for which there is no TAC allocated, keep fishing mortality moderate and within biologically-based limits or, where biologically-based limits are not available, within historic levels for the fleet.	<ul style="list-style-type: none"> • Bycatch limits
Biodiversity	
Control unintended incidental mortality for all non-groundfish species.	<ul style="list-style-type: none"> • Mandatory release
Control unintended incidental mortality for spotted wolfish and Northern wolfish.	<ul style="list-style-type: none"> • Mandatory release
Habitat	
Manage area disturbed of habitat.	<ul style="list-style-type: none"> • Coral conservation area
Prosperity	
Limit inflexibility in policy and licensing among individual enterprises/licence holders.	<ul style="list-style-type: none"> • Exempted fleet licences • Substitute operators/ Designated operators • Harvest benefit combining • ITQ quota pools
Minimize instability in access to resources and allocations.	<ul style="list-style-type: none"> • Fleet shares • Individual quotas, enterprise allocations and community quotas
Limit inability for self-adjustment to overcapacity relative to resource availability.	<ul style="list-style-type: none"> • Quota transferability • Harvest benefit combining
Support certification for sustainability.	<ul style="list-style-type: none"> • Provision of information, where available

4.5.6. Decision-Making Process

The decision-making process associated with the commercial fisheries of Atlantic Canada and Quebec revolves primarily around fish harvest considerations (TACs, fleet access and allocation policies, sharing arrangements, harvest control rules, socio-economic implications, species-at-risk considerations, and habitat/ecosystem interactions). Decisions are made by the Minister or the Regional Directors General. Ministerial authority is typically required for the multi-regional fisheries, international fisheries, and fisheries that are deemed 'sensitive'⁴⁰.

The decision-making process for the Haddock fishery in 4X5Y and 5Zjm falls within this framework. In view of the importance of the management measures and engagement processes in use, DFO's Fisheries and Aquaculture Management organization (particularly the Resource Management group) at the local, regional and national levels plays a critical role in the process.

Decision memoranda along with relevant attachments are required when seeking decisions from the Minister or the Regional Directors General. The purpose of these memoranda is to provide information about a fishery or an issue along with options and recommendations for decision-making. The decision memoranda requires that all internal and industry stakeholders' perspectives are reflected and that positive and negative outcomes for each option are described. Resource Management is responsible and accountable for the development of these memoranda. The development of the decision memoranda is generally initiated by the post-seasonal review of a fishery to present recommendations for next cycle's fishery management. However, it can also be triggered when an important in-season issue arises (i.e. conservation risks).

Advisory committees have been established for the region's commercial groundfish fisheries. As part of the post-seasonal review, committee participants meet to review the performance of the fishery's suite of management measures and applicable policies. This is also undertaken within the specific fleet and gear sector committees thereby allowing industry stakeholder representatives to hear directly from licence holders and to prepare their positions and recommendations for the broader, regional engagement processes. Prior to the regional consultations, Resource Management would request information from all applicable DFO sectors, namely, Science, Oceans, and Policy and Economics. Following consultation meetings, fishery information is consolidated by Resource Management and is eventually used to inform the decision-making process.

The outputs of Resource Management decisions have a high impact on sustainability of fisheries and economic viability. This is particularly true for commercial fisheries that transcend provincial or DFO administrative boundaries where competing stakeholders' interests and agendas must be balanced against the strategic objectives for the fishery as a whole. Figure 34 illustrates the various steps associated with a typical Resource Management decision-making mapping process for inter-provincial and inter-DFO regional commercial fisheries.

⁴⁰ <http://www.dfo-mpo.gc.ca/ae-ve/audits-verifications/09-10/6B205-eng.htm#ch3.1>

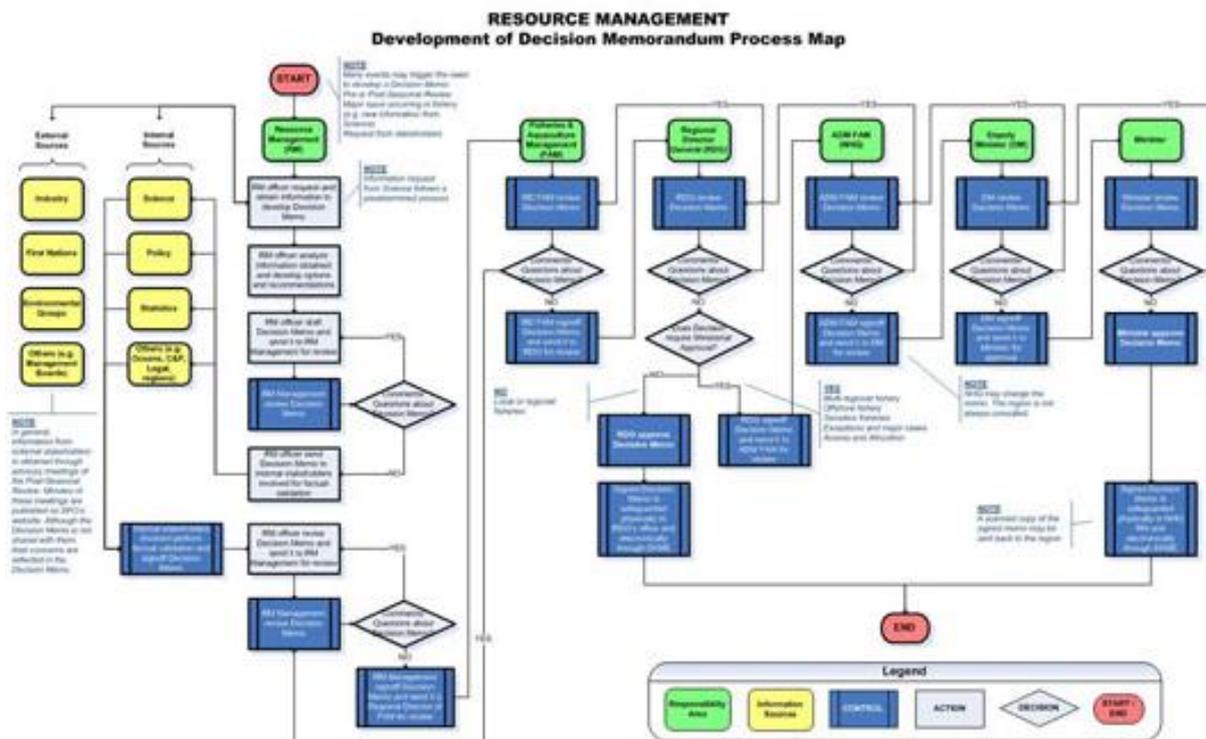
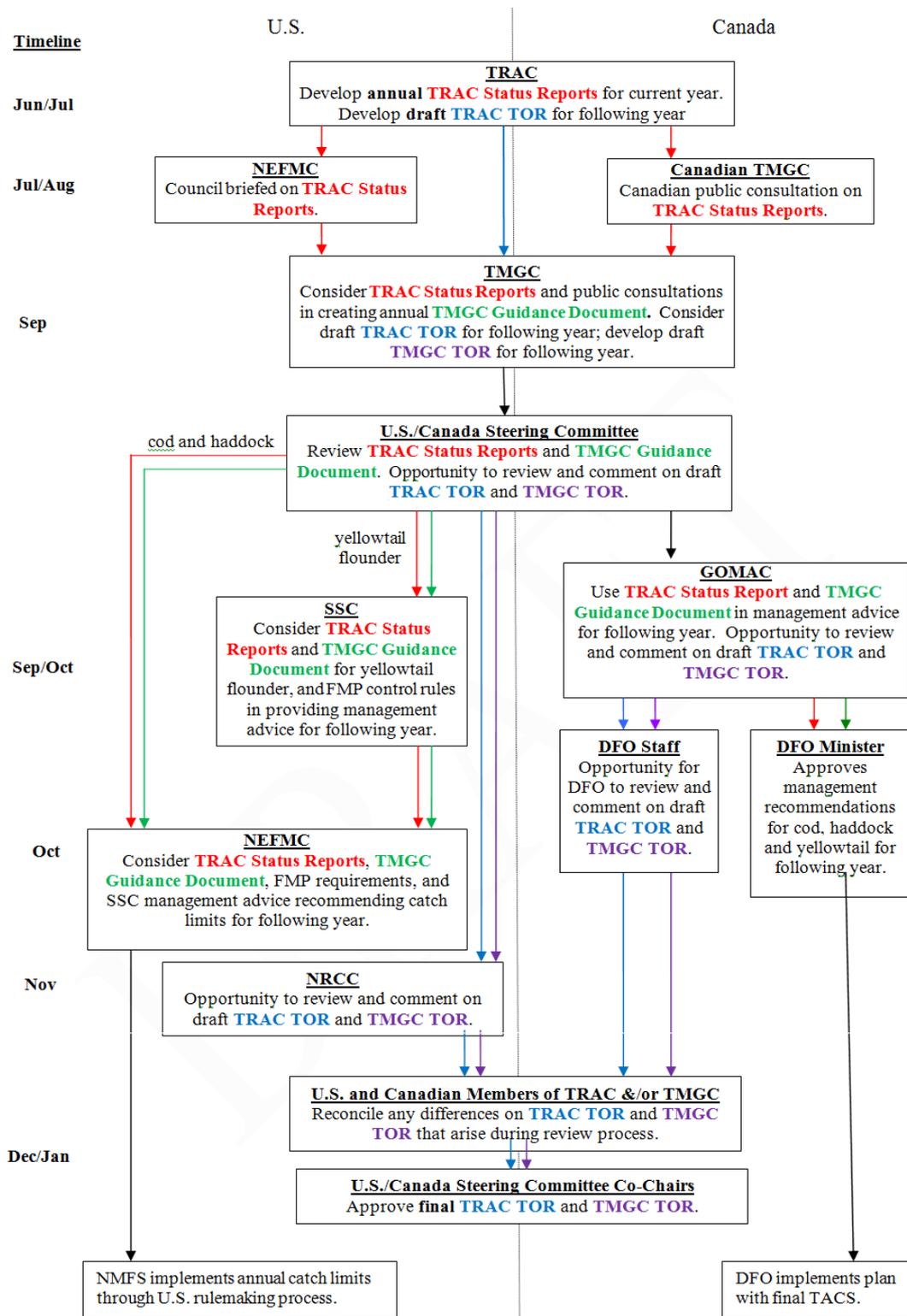


Figure 34. Resource Management Decision-Making Mapping Process⁴¹.

The fisheries management decision-making process for this fishery is characterized by transparency and informed judgments in which the views and opinions of departmental, industry and provincial government representatives are encouraged and considered. This is also true of DFO’s science stock assessment process prior to the publication of CSAS documents. Decisions regarding the fishery’s management measures including harvest control rules are finalized following the conclusion of the RAP and advisory processes. Approved measures are communicated to committee industry stakeholders and provincial government representatives generally via email from the regional resource Management group

For the transboundary groundfish stocks of 5Z and 5Y, the decision-making process is not appreciably different from the aforementioned process and mapped schematic for groundfish stocks that are located entirely within Canada’s exclusive economic zone (refer to Figure 35).

⁴¹ Source: DFO Audit of Supporting Statistical Information on Fisheries, Appendix A, March 2010; Available at: <http://www.dfo-mpo.gc.ca/ae-ve/audits-verifications/09-10/6B205-eng.htm#ch7>



Notes:

Acronyms:

- TRAC – Transboundary Resource Assessment Committee
- TMGC – Transboundary Management Guidance Committee
- NEFMC – New England Fishery Management Council
- GOMAC – Gulf of Maine Advisory Committee

- PDT – Plan Development Team (under NEFMC)
- SSC – Science and Statistical Committee of NEFMC
- FMP – Fishery Management Plan
- NRCC – Northeast Region Coordinating Committee (Members from NMFS, NEFMC, Mid-Atlantic Fishery Management Council, and Atlantic States Marine Fisheries Management Commission)

Figure 35. US-Canada Annual Process for Transboundary Management (revised June 8, 2010)⁴²

⁴² <http://www.bio.gc.ca/info/intercol/tmgc.cogst/documentation-eng.php>

The TMGC meets as required, considers the scientific advice contained in Transboundary Status Reports, incorporates information received from fishermen, reaches agreement by consensus and produces a common guidance document for the management of transboundary resources that is communicated to national fisheries management authorities. The process for determining and implementing annual harvest levels and adopting management measures for transboundary resources of Cod, haddock and yellowtail flounder on Georges Bank is depicted below. If the Council or GOMAC disagree with TMGC recommendations, they will be referred back to the TMGC for further refinement.

4.5.7. Monitoring, Control and Surveillance

The Compliance and Enforcement Program promotes and maintains compliance with legislation, regulations, and management measures implemented to achieve the conservation and sustainable use of Canada's aquatic resources and the protection of species at risk, fish habitat, and oceans. The program is delivered through a balanced regulatory management and enforcement approach, including the promotion of compliance through education and shared stewardship; monitoring, control and surveillance activities; and the management of major cases/special investigation related to complex compliance issues.

The monitoring, compliance and surveillance (MCS) component is particularly germane to the MSC's Principle 3. DFO's program consists of a number of traditional compliance and enforcement activities aimed at detecting and deterring illegal activities. Monitoring fishing and other activities provides an oversight function to determine participants' compliance with the legislation, regulations, and management measures in effect. Surveillance activities are supported by the use of modern technology such as vessel monitoring systems (VMS), third-party services such as at-sea and dockside observers, as well as partnerships and joint operations with other enforcement agencies. The general public assists in reporting violations through Crime Stoppers and "observe, record and report" initiatives).

The Director General of Conservation and Protection (C&P), as the senior DFO enforcement official, promulgates technical policies and procedures to facilitate the delivery of the department's compliance and enforcement program. Program delivery is highly decentralized under the Regional Directors General. The Director of C&P for the Maritimes Regions has direct line authority over Area-level C&P Fishery Officers, reports to the Regional Director of Fisheries and Aquaculture Management, and receives functional guidance and direction from the Director General at National Headquarters.

National Program Internal Audit

A C&P national audit conducted in 2012⁴³ found that, overall, the Conservation and Protection governance framework and control activities for commercial and aboriginal fisheries were well established; however, the program was currently not assessing the effectiveness of the controls to ensure that compliance with relevant regulations and legislation was being achieved and maintained. The Audit Team identified the following observations:

- The Conservation and Protection governance framework is well established and operational plans are linked to Fisheries and Oceans Canada's strategic outcome for sustainable fisheries. However, the collaborative relationship between Conservation and

⁴³ <http://www.dfo-mpo.gc.ca/ae-ve/audits-verifications/11-12/6B236-eng.htm>

Protection and Resource Management with regards to initiatives within Ecosystems and Fisheries Management needs improvement;

- The selection and review of control activities for commercial and aboriginal Fisheries does not effectively include consideration of their relevance and appropriateness to the risk and related objective. The allocation of resources is not aligned to Conservation and Protection's enforcement strategy;
- The C&P National Fisheries Intelligence Service unit has been recently established. This unit will provide sharing of intelligence gathering and process across regions in a uniformed manner ;
- Performance measures have been identified; however, the performance indicators are largely output based and do not provide useful information in terms of results to allow the program to adjust course as needed to ensure compliance efforts are strategically focused. Financial controls are appropriate to carry out operational plans. There is adequate monitoring of budgets, forecasts, and resource allocations. However, the manner with which funds are allocated to Major Case Management and special investigations does not adequately address the financial needs of this activity; and
- Conservation and Protection lacks a national training program for Major Case Management and Special Investigations.

DFO Management has accepted the audit findings and recommendations and undertook to develop Action Plans along with implementation timeframes. The following email from DFO C&P Management was provided on January 29, 2014 in response to another Atlantic commercial fishery assessment:

In the March 2012 Audit report of Commercial and Aboriginal Fisheries – Conservation and Protection, the auditors commented that C&P had developed a Performance Measurement Strategy but that this document focused primarily on output-based measures which aren't a true measure of the program's effectiveness. In the report, it acknowledges that Conservation and Protection has provided some national direction. To date, this has primarily been in the form of discussions with regions in terms of the need to develop outcome-based performance indicators. While there has been considerable discussion on these, a full suite of outcome-based indicators has not yet been developed. Most regions continue to assess their performance based on output indicators through the Operational Planning and Budgeting Program process.

There is a national initiative underway to develop a National Catch Monitoring and Reporting Framework which will feed into any regional efforts in this area. This is a multi-year initiative and will be referenced in the 2014-15 Report on Plans and Priorities for DFO - C&P.

National Conservation and Protection Compliance Framework

The Department has in place a national framework consisting of strategies and related components which collectively serve to guide the planning and delivering of the program across DFO's six administrative regions. The framework was provided to the assessment team in the form of a pamphlet. It consists of three "pillars" which are intended to also support the Department's vision and mission statements noted previously. The pillars and their components are summarized as follows:

1. Education and Shared Stewardship (Building support for the Future)

Informal Education: informal interactions with clients and stakeholders at wharves, on general patrols and at community events;

Formal Education: presentations to client/stakeholder groups including school visits or community programs; formal advertisements/promotion campaigns; and

Co-Management/Partnerships: promoting engagement of clients, NGOs and other interest groups in management and compliance decisions; promoting stakeholder engagement and participation in the delivery of compliance functions; ensuring consideration of compliance in the development of IFMPs; promoting client funding of compliance activities; promoting the use of “resource-oriented” court orders.

2. Monitoring, Control and Surveillance (Traditional Enforcement Activities)

Departmental MCS Programs: regular land, air and sea patrols, inspections, surveillance and stakeholder audits; audits of third-party service providers; general plant/buyer inspections;

New Technologies: vessel monitoring system, mobile office, electronic logbooks, remote monitoring;

Third Party Monitoring Activities: at-sea and dockside observers; and

Inter-agency Partnerships: Department of Justice (regulatory initiatives, prosecutions); Royal Canadian Mounted Police and Canada Revenue Agency; provincial and municipal agencies.



3. Major Case Management (Enhanced Investigative Capacity)

Formal Intelligence Gathering and Analysis: inter-agency intelligence networking and resource exchange programs;

Retroactive Offence Detection and Investigation: alignment of inter-departmental and inter-governmental data collection processes and systems; and

Training and Recruitment of Specialized Skills: specialized warrants; computer forensics; fishery profiling; undercover agent operations; data analysis.



DFO Fast Response Zodiac



DFO Fixed Wing Surveillance Aircraft

Access and effort are regulated through specific fishing areas, seasons, gear specifications, minimum legal size, and vessel and crew registration. Area C&P Officers conduct fisheries surveillance activities using boarding platforms for marine patrols and aircraft for aerial sorties as required. Dockside inspections are also performed. The region’s statistical information systems track catch data from monitoring documents provided through the Dockside Observer Program.

Licence conditions stipulate that fishers are required to embark at-sea observers for independent monitoring and scientific data collection purposes at the discretion of the department. A similar requirement exists in regard to the carriage of an approved VMS device on some fleets.

Compliance and Enforcement Strategy

The Maritime Region’s C&P Program has a comprehensive compliance strategy in place for the commercial fisheries managed by the region, and consists of the following components:

- *Description:* the strategy promotes and maintains compliance with legislation, regulations and management measures to achieve the conservation and sustainable use of Canada’s aquatic resources, and the protection of species at risk, fish habitat and oceans.
- *Delivery:* the strategy is delivered through a balanced regulatory, management and enforcement approach which include education and shared stewardship, MCS activities, management of major cases and special investigations, and program resources.
- *Planning:* annual work plans are prepared at the local level in consideration of operational priorities, industry feedback and recommendations, budgetary and equipment requirements; local plans are rolled up at the regional level where additional planning takes place, including addressing new operational requirements that arise from changes to the resource management functions.
- *Priority-Setting:* operational priorities are established by C&P management staff where in most cases, fishery conservation requirements take precedence and are supported by a comprehensive air-land-sea presence, intelligence gathering, and advances in new technology.
- *Evaluation:* year-end operational reviews take place at the local and regional levels based on input from C&P staff, other DFO programs, and stakeholders. The results of these reviews serve to inform the planning cycle for the subsequent year.

The 2012 IFMPs for the 4X5Y and 5Zjm haddock fishery make no mention of the Department’s C&P program activities, compliance strategies and risks, mitigation strategies and operational profile. However, the Reassessment Team’s personal knowledge of the program’s components and information contained in the MSC Initial Fishery Assessment Report for Atlantic Halibut in 2013 (same client, similar Units of Certification, similar fleet and gear sectors) allows for the following compliance activities to be reported:

- A. Land-based patrols: catch inspections, fishing gear inspections, licence checks, and both overt and covert patrols
- B. Sea patrols: vessel inspections to check lobster gear and catch as well as licence verifications
- C. Aerial patrols: surveillance of closed areas and periods, and investigating unauthorized activities
- D. Detachment Supervisors: prepare annual work plans in which they allocate human, materiel and financial resources, and establish priorities
- E. Program staff assists in making recommendations and /or proposing solutions to issues that arise during the fishing season

The program attaches considerable attention and dedicated resources to the region’s shared stewardship initiatives and interactions with key stakeholders. Examples of activities undertaken include:

- Interactions with fishers and members of the aboriginal communities on the wharves, their fishing vessels and communities;
- Participation in community events and school visits;
- Community volunteering outside work hours; and
- Participation in internal regional post-season reviews and analyses to assess the effectiveness of enforcement activities and to develop action plans for implementation in the following season.

The program's effectiveness is informed using a number of program outputs such as:

- Total Fishery Officer hours
- Total Groundfish patrol hours
- Number of charges laid
- Number of warnings issued
- Number of seizures made
- Number of vessels inspected
- Level of fines issued
- Observer coverage achieved

The following C&P program statistics were provided to the Reassessment Team by DFO Maritimes Region for the period from January 1, 2011 to December 31, 2014. Data apply to the Groundfish fishery in 4X5Y and 5Zjm unless specified otherwise for the haddock fishery and are collected and warehoused in DFO's National C&P data bases known as FEATS (Fisheries Enforcement Activity and Tracking System) and Departmental Violation System (DVS). They are considered reliable and official.

Table 22. Conservation & Protection – Information regarding Patrols for Groundfish Fishery.

Platform	4X5Y				5Zjm				Total
	2011	2012	2013	2014	2011	2012	2013	2014	
Air Surveillance Hours	220.35	248.77	538.4	577.58	45.4	40.03	17.87	41.54	1,729
Patrol Vessel Days	60.8	78.2	79.5	39.48	19.63	26.68	16	2.58	322.87

Platform	Fixed Gear				Mobile Gear				Total
	2011	2012	2013	2014	2011	2012	2013	2014	
Total Patrol Hours	2,659	3,118	3,021	2,442	1,607	1,903	1,483	1,953	18,188

Note: Total Patrol Hours include vessels, air, vehicle, boats and foot.

Table 23. Conservation & Protection - Information regarding Dockside Monitoring for Groundfish Fishery.

Year	Trip Description		DMP Description		Coverage
2011	Number Trips FG	2,468	Number FG DMP Trips	1,678	68%
	Number Trips MG	1,850	Number MG DMP Trips	1,809	98%
	Total Number Trips Made	4,318	Total Number Trips DMP	3,487	81%
2012	Number Trips FG	2,188	Number FG DMP Trips	1,351	62%
	Number Trips MG	2,061	Number MG DMP Trips	2,019	98%
	Total Number Trips Made	4,249	Total Number Trips DMP	3,370	79%

2013	Number Trips FG	850	Number FG DMP Trips	761	90%
	Number Trips MG	1,327	Number MG DMP Trips	1,262	95%
	Total Number Trips Made	2,177	Total Number Trips DMP	2,023	93%
2014	Number Trips FG	1,758	Number FG DMP Trips	1,192	68%
	Number Trips MG	1,179	Number MG DMP Trips	1,087	92%
	Total Number Trips Made	2,937	Total Number Trips DMP	2,279	78%

Table 24. Conservation & Protection - Information regarding At-Sea Observers for the Haddock Fishery.

Fixed Gear				Mobile Gear			
Year	Area	Trips	Sea days	Year	Area	Trips	Sea days
2011	4X5Y	7	24	2011	4X5Y	24	97
	5Z	34	177		5Z	114	589
	Total	41	201		Total	138	686
2012	4X5Y	8	37	2012	4X5Y	16	78
	5Z	36	197		5Z	168	997
	Total	44	234		Total	184	1,075
2013	4X5Y	0	0	2013	4X5Y	12	69
	5Z	32	166		5Z	211	1,122
	Total	32	166		Total	223	1,191
2014	4X5Y	1	4	2014	4X5Y	6	23
	5Z	25	125		5Z	295	1,320
	Total	26	129		Total	301	1,343

Table 25. Conservation and Protection - Information regarding Warnings, Convictions and Seizures for the Groundfish (Unspecified) Fishery.

Enforcement Action	Fixed Gear				Mobile Gear				TOTAL
	2011	2012	2013	2014	2011	2012	2013	2014	
Warnings	17	50	58	16	28	27	26	9	231
Convictions	8	10	7	3	5	2	2	2	39
Value (\$) -Fines	10,410	14,050	10,500	6,500	8,400	1,410	2,750	10,000	64,020
Value (\$) - goods seized	44,896	48,546	30,554	69,339	26,973	1,652	67,040	14,019	303,023

Note: Groundfish – Unspecified can include Haddock and other species such as Cod, Herring, Pollock, Redfish and Halibut. Convictions/fines frequently straddle more than one calendar year due to the length of court procedures.

Analysis of Enforcement Activity Outcomes

The Reassessment Team examined how the 2014 enforcement and compliance program outputs matched up against similar outputs generated during the years 2011, 2012 and 2013 when annual surveillance audits of the fishery were undertaken. Outcomes achieved during these two time periods were noticeably different in several cases, and fairly consistent in others. Understandably, surveillance effort and outcomes were higher in 4X5Y than 5Zjm given the level of intensity of the fishing activity and the number of participating vessels in the fishery. As indicated at Table 22, the number of 4X5Y aerial surveillance hours (577.58) reached its highest level in 2014, however, the number of surface patrol vessel days (39.48) to the area was at its lowest. A similar outcome was observed for 5Zjm. When examined in relation to fishing vessel gear types for the two time periods, there were fewer surface patrol hours dedicated to fixed gear vessels in 2014 than during the previous three years. This trend was reversed, however, for mobile gear vessels where the highest number of patrol hours were logged in 2014.

The third party Dockside Monitoring Program is an important contributor to DFO's overall enforcement and compliance strategy. All vessels licensed to participate in the 4X5Y and 5Zjm haddock fisheries are required to comply with the DMP requirements specified in their licence conditions. Table 23 summarized the DMP coverage level outcomes for the fixed and mobile gear vessel fleets during the 2011-2014 fishing seasons. For the mobile gear fleet, DMP coverage averaged 95 % and higher in 3 of the 4 years, while DMP coverage for the fixed gear vessels ranged in the mid 60 % except for 2013 when coverage was at 90 %.

The deployment of trained fishery observers also plays a vital role in the success of DFO's Conservation and Protection program. Observers are instrumental in helping deter incidents such as the misreporting of catch and area fished, use of illegal gear, and the underreporting of discards at sea. Table 24 summarizes the number of at-sea observer days that were logged by fishing area and vessel fleet sector over the 4 years in question. In the absence of corresponding data regarding the number of vessel fishing days, it is not possible to calculate the levels of observer coverage achieved across the fleet sectors while fishing the 4X5Y and 5Zjm areas. However, information available to the Assessment Team during the various annual surveillance audits showed that observer coverage averaged better than 20% in 5Zjm but declined considerably in 4X5Y to between 2 -3% in 2011 and 2012, including no coverage in 2013. Observations by the Reassessment Team over the very low coverage levels in 4X5Y for the fixed gear fleet were noted in its 4th annual surveillance audit report (December 2014) as requiring attention.⁴⁴

Table 25 outlines the outcomes of enforcement activities undertaken by DFO between 2011 and 2014. As is the case with the other tables, the data are presented for the groundfish fishery as a whole. During the November 2014 site visit, DFO and the Client reported that compliance with the regulatory framework by the mobile and fixed gear fleets in 4X5Y and 5Zjm was generally positive, and that there was no indication of systemic non-compliance by licence holders. The Reassessment Team is inclined to concur with this view; however, the team notes that no evidence was provided to indicate that DFO undertakes formal performance evaluations of the outcomes and effectiveness of the C&P program. The team is cognizant of the fact that the 2012 departmental internal audit of C&P's enforcement and compliance program for the commercial and aboriginal fisheries concluded that any performance indicators in use were largely output based and did not provide useful information in terms of results to allow the program to adjust course as needed to ensure compliance efforts were strategically focused. National program performance indicators are being developed presently with a delivery date of March 2015. The absence of a formal compliance strategy with accompanying risk assessment and mitigation measures (such as exists for the region's lobster and scallop fisheries) is a program

⁴⁴ The client has indicated that 4X5Y at-sea observer coverage levels are scheduled to be discussed at a SFGAC meeting on March 23, 2015.

shortcoming. Coupled with program data that are not, for the most part, haddock fishery specific made it impossible for the Reassessment Team to determine the program's overall level of effectiveness and whether resources were being deployed strategically in response to possible non-compliance risks. A formal compliance strategy with accompanying risk assessment and mitigation measures is included in the new IFMP templates. When the IFMP is updated, this information will be included.

4.5.8. Research Plan

Numerous ongoing research (and departmental policy) initiatives contribute to the information needs of science and management and to the requirements associated with MSC Principles 1 and 2 in respect of both 4X5Y and 5Zjm units. These initiatives provide timely and reliable information that is used to ascertain the overall health of the resource, understand ecosystem interactions, and contribute to the development of integrated fishery management plans to ensure that conservation and sustainability objectives are achieved. Industry representatives contribute to the research priority-setting process through both the management and science advisory processes, and by their participation in multi-group networking meetings for both the 4X5Y and 5Zjm haddock fisheries. Industry also partners with DFO in the conduct of research-related projects that promote greater knowledge and understanding of the interactions between the fishery and ecosystems/habitats.

The Department's major science-based policy initiatives are mandated by the *Fisheries Act*, the *Oceans Act*, and the *Species-at-Risk Act*. The following frameworks, guidelines and policies represent important components of DFO's fisheries sustainability agenda:

- A Decision-making Framework incorporating the Precautionary Approach (April 2009);
- Policy for Managing the Impact of Fishing on Sensitive Benthic Areas (April 2009);
- Procedures for Monitoring and Control of Small Fish Catches and Incidental Catches in Atlantic Groundfish Fisheries (2008);
- New Emerging Fisheries Policy (revised 2008);
- Policy of New Fisheries for Forage Species (April 2009);
- Policy on Managing Bycatch (April 2013);
- Guidance on Implementing of the Policy on Managing Bycatch (April 2013);
- Guidance for the Development of Rebuilding Plans under the Precautionary Framework: Growing Stocks out of the Critical Zone (April 2013); and
- Ecological Risk Assessment Framework (ERAF) for Ecosystem-based Oceans Management (2012)
- Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada (2002)

Transboundary Stock Assessment Research (Groundfish)

Since 1998, the TRAC has reviewed stock assessments and projections necessary to support management activities for shared resources across the US-Canada boundary in the Gulf of Maine-Georges Bank region. These assessments are necessary to advise decision makers on the status of these resources and likely consequences of policy choices. TRAC is the scientific arm of the TMGC; its advice to the TMGC is provided in the TRAC Status Reports.

The process which culminates in the production of TRAC Status Reports is well documented on both the NMFS and DFO websites. Each organization appoints a co-chair to oversee the annual stock assessment review process, including the drafting of the remit which is a succinct statement of the analyses, review, required products and timelines that are required of the TRAC. The TRAC then

designates a co-experts from each organization who are responsible for coordinating data preparation, leading the conduct of analyses, facilitating the preparation of working papers for TRAC and their presentation at TRAC.

The TRAC employs a two-tiered review process in which each of the stocks periodically undergoes an intensive peer review of the assessment model and assumptions. This is termed a *benchmark assessment review*. The benchmark assessment framework is applied as required, generally on an annual schedule, to provide the peer reviewed assessment of the resource status to fisheries managers. This is simply termed an *assessment review*. It is considered preferable to conduct benchmark assessment reviews during meetings dedicated to that task rather than in conjunction with an assessment review. The aim is to conduct benchmark assessment reviews well enough in advance of assessment reviews to permit incorporation of a new framework in the assessment.

Peer review of a benchmark assessment framework involves evaluation of the technical aspects surrounding analysis of fisheries data and requires participation of local technical experts as well as those solicited from the international community to bring particular knowledge and experience to the table. As well, stakeholders with particular insights into interpretation of the data being considered are required. The mandate of a benchmark review meeting is to reach consensus on a framework to be applied for determination of stock status and to fully document that framework in the Proceedings.

The mandate of the assessment peer review is to appropriately apply the benchmark assessment framework to fishery, survey and biological data acquired since the last assessment in order to elucidate the current status of the stock. Participation in this process by both assessment scientists and stakeholders with particular insights into the fisheries and stocks being evaluated is encouraged to foster interpretation, communication and understanding of the results.

The TRAC is responsible for generating a number of supporting documents. These include:

- Reference documents: scientific and technical information used in the stock assessments, including the assessment results, that are externally peer-reviewed;
- Status reports: provide the consensus summary on stock status and future resource outlook; status will be provided (where possible) with respect to any agreed (US/Canada common) harvest and biomass reference points, and risks will be identified with harvest levels that exceed F reference points and/or generate biomass declines; and
- Proceedings: This series would document TRAC meeting terms of reference and participation and consolidate the record of deliberations into a single source. The deliberations would include brief presentation highlights of the working papers, e.g. an abstract, along with a report of the ensuing discussion.

Departmental Science Framework

DFO has developed a multi-year research plan for the period 2008-2013⁴⁵ which supports current and emerging priorities and identifies areas that required new scientific knowledge in the medium and longer term. One of the key objectives of the research program is to create new knowledge and methods in support of ecosystem-based management. The multi-year plan is evergreen in nature, meaning it is updated on a go-forward basis. The plan is supported by a comprehensive research agenda⁴⁶, the first of its kind for DFO, which provides strategic direction on how effort and resources will be focused to ensure their alignment with federal and departmental priorities.

⁴⁵ <http://www.dfo-mpo.gc.ca/science/Publications/fiveyear-plan-quinquennal/index-eng.html>

⁴⁶ <http://www.dfo-mpo.gc.ca/science/Publications/fiveyear-quinquennal/index-eng.htm>

Domestic Stock Assessment Research (Groundfish)

DFO Maritimes Region has undertaken comprehensive annual research vessel trawl surveys of the Scotian Shelf (4VWX) and Bay of Fundy (5Y) during the summer since 1970, and of the Georges Bank (5Z) during the Winter since 1987. The surveys follow a stratified random sampling design, and include sampling of fish and invertebrates using a bottom otter trawl. These surveys are the primary data source for monitoring trends in the areas' species distribution, abundance, and biological condition within the region.

Research in the Scotia-Fundy Sector is conducted primarily out of DFO's St. Andrews Biological Station and the Bedford Institute of Oceanography. The former's research focus is centered on (i) aquaculture and biological interactions, (ii) coastal oceans, and (iii) population ecology while the latter's is centered on (i) supporting fisheries, (ii) aquaculture, (iii) oceans and habitat management, ocean resource development, and (iv) safety around the water.

Stock assessment advice is provided on a schedule determined jointly by the SFGAC, DFO Resource Management and DFO Science. The RAP provides the forum to review and update the scientific assessment which supports the management of the region's commercial fisheries and the Species-at-Risk Program.

Assessment of Secondary Groundfish Stocks - Planning Methodology⁴⁷

DFO Maritimes Region has produced a protocol describing priority stocks for fishery assessment and management of departmental resource allocation with an overall objective of better alignment between the science provided and the resulting management strategy. This protocol separates stocks into "primary" and "secondary" categories that define the difference in the DFO response to requests for advice and allocation of departmental human and financial resources. Secondary groundfish stocks include groundfish stocks being caught by the groundfish fisheries, or caught as bycatch in other fisheries, where the value and volume of landings of that stock are relatively small, and where the stock has not otherwise been identified as a priority by the region (e.g., because of an important ecological role played by the stock or because the stock has important cultural uses).

Formal stock assessments are not conducted by DFO Science for secondary stocks in the Maritimes Region. However, trends in Research Vessel survey indices are reported annually for some secondary groundfish stocks. Research vessel survey information has been used to set reference points for some groundfish stocks in the Maritimes Region.⁴⁸

The protocol will be further informed through a methodology that will be developed for using research vessel survey data to assess secondary groundfish stocks in the Maritimes Region, and, more specifically, to provide advice on an appropriate method for calculating reference points for the following secondary groundfish stocks:

- White Hake (4X5Yb, 4VW)
- Haddock (4VW)
- Monkfish (4X5Yb)
- Thorny Skate (5Z, 4X5Yb)
- Little Skate (5Z, 4X5Yb)
- Barndoor Skate (5Z, 4X5Yb)

⁴⁷ http://www.dfo-mpo.gc.ca/csas-sccs/schedule-horraire/2014/12_16-17-eng.html

⁴⁸ http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2012/2012_035-eng.html

- Smooth Skate (5Z, 4X5Yb)
- Longhorn Sculpin (5Z, 4X5Yb)

Domestic Fishery Research Work Plans (Groundfish)

Population Ecology Division

The Division's current research work plan includes both a five-year objective and priority projects for 2014-2015.⁴⁹

A. Five-Year Objective

- TRAC assessments for Georges Bank Cod, haddock and yellowtail flounder will be completed annually and Regional assessments on a multi-year schedule for Scotian Shelf Cod, haddock, Pollock, and shrimp including the following framework issues:
 - i. Resolution of Georges Bank (GB) Cod model between Canada and the US
 - ii. GB haddock low condition and availability of 9+ age group to fishery
 - iii. 4X haddock modeling uncertainties, low condition, and mixed fishery
 - iv. Develop a plan for Pollock MSE renewal in 2015-16
 - v. Interpretation of shrimp recruitment, SSB forecast, and secondary indicators
 - vi. Science support for TRAC allocation sharing.
- Determine and implement any changes needed for Cod and yellowtail closure advice;
- Multi-species modeling to determine source of high natural mortality on GB Cod;
- Reference points for high natural mortality on GB Cod; and
- Mentor 2 new gadoid BI-02s and shrimp technician

B. Priority Projects

- Surveys, assessment modeling, and data inputs for 4X haddock; 4Vn, 4VsW, 4X, and 5Z Cod; 4X and 5Z haddock; 5Z yellowtail (data inputs only); western Pollock (MSE data and review) and Scotian Shelf shrimp;
- Advice on closures to reduce bycatch of groundfish in directed and non-directed fisheries;
- Natural mortality of EGB Cod; and
- 4X haddock framework

Oceans and Ecosystem Science, and Coastal Ecosystem Science Divisions

The research plans and priorities for these sectors are established on a yearly basis through the CSAS scheduling process, and are available publicly.⁵⁰

Oceans and Coastal Management Division

The elements of the Division's proposed 5-year plan were provided to the Reassessment Team in a February 2014 email. They include:

- Marine protected areas network design in place;
- Completion of the evaluation and assessment of ecologically and biologically significant areas (EBSAs) with accompanying advice;
- Completion of the Atlantic Coral Strategy including activities to measure the effectiveness of coral protection and ascertain the distribution of corals/sponges based on environmental factors; and
- Updating of the mapping series of catch and effort fisheries footprints.

⁴⁹ Document provided to Assessment Team by Client following the November 2014 site visit.

⁵⁰ <http://www.dfo-mpo.gc.ca/science/ecosystem-eng.htm>

Precautionary Approach Model for Maritimes Region Groundfish Fisheries

A Regional Science Advisory meeting was held on February 6-9, 2012 to review precautionary approach compliant reference points for a variety of stocks (including groundfish) in the Maritimes Region.⁵¹ To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a Limit Reference Point that delimits the boundary between a critical and cautious zone, and an Upper Stock Reference that delimits the boundary between a cautious and healthy zone on the stock status axis. They should also include a Removal Reference that defines the maximum amount of fishing pressure for each zone.

The proposed reference points for 5Zjm and 4X5Y haddock are indicated below.

5Zjm Haddock

- Biomass at MSY (B_{MSY}) and an LRP for 5Zjm haddock were presented for review.
- B_{MSY} (78,000 mt) was calculated using a Sissenwine-Shepherd production model for the full time series. The LRP (10,340 mt) was based on $B_{RECOVER}$.

4X5Y Haddock

- PA reference points for 4X5Y haddock, based on a Sissenwine-Shepard production model using the full time series, were presented for information only.
- Forty percent of SSB_{MSY} was presented as the LRP (20,800 mt), and 80 % of SSB_{MSY} was defined as the USR (41,600 mt).

Further work was undertaken in 2013 with the development of science-based advice on the determination of harvest decision rules (also referred to as harvest control rules) in the management strategy for Canadian fish stocks.⁵² The CSAS-published Research Document (2013/080) is intended as an aid to the development of guidelines for harvest decision rules (HDR) in Canada, and addresses general considerations that influence HDR design, the requirements for HDRs and the role of Science therein, the relation to reference points, and the treatment of risk and uncertainty.

Research in support of Marine Protected Areas (MPAs) and Ecologically and Biologically Significant Areas (EBSAs) - Maritimes Region

Canada has made several international and domestic commitments to establishing MPA networks in support of integrated coastal and ocean management. Internationally, this includes endorsing the objectives from the *2010 Conference of the Parties to the Convention on Biological Diversity* and, domestically, through enactments like the *Oceans Act*, the *Federal Marine Protected Areas Strategy (2005)*, the *Health of the Oceans Initiative*, and the *National Framework for Canada's Network of MPAs (2011)* which is to be designed and implemented through component bioregional networks.

Guidance on bioregional MPA network planning and design is set out in the National Framework and is further informed by several DFO publications, including Science Advisory Report 2009/061 and Research Documents 2012/126 and 2013/066. Guidance indicates that effective networks should include a number of recognized properties and components, including Ecologically and Biologically Significant Areas (EBSAs). DFO reports that it has made considerable progress over the past decade on identifying EBSAs in Canadian waters. EBSAs are areas of particularly high ecological or biological significance compared to other areas in a region. The identification of an area as an EBSA does not

⁵¹ http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2012/2012_035-eng.html

⁵² http://www.dfo-mpo.gc.ca/csas-sccs/publications/resdocs-docrech/2013/2013_080-eng.pdf

give it any special legal status or automatically trigger a management response. Rather, an EBSA-designated area is signalled out in a broad range of coastal and oceans management and planning processes, including environmental assessments, environmental emergency response, fisheries policies and Marine Protected Area network planning. Each EBSA undergoes an evaluation to identify potential management needs. The evaluations consider the nature and extent of human activities and the level of risk posed by those activities to important ecological features.

In the Scotian Shelf Bioregion, which roughly corresponds to the Maritimes Region, there have been several science-based publications aimed at identifying, characterizing EBSAs and their , using a variety of approaches. The offshore component of the Scotian Shelf Bioregion has been assessed as having 18 separate EBSAs.⁵³ A similar exercise of identification of EBSAs in the Bay of Fundy and Gulf of Maine was published in the Canadian Technical Report of Fisheries and Aquatic Sciences 2788 in December 2008.⁵⁴ A further examination of the delineation of sensitive benthic areas in the Bay of Fundy was requested by DFO Fisheries Management and was considered in June 2014. A CSAS publication is expected in 2015.

DFO Maritimes Region has established two strategic conservation objectives for the network of MPAs in the Scotian Shelf Bioregion.⁵⁵ These are:

- Protect EBSAs and other special natural features that may benefit from long-term, year-round, spatial management; and
- Protect representative examples of all marine ecosystem and habitat types based on coastline, coastal subtidal and offshore classifications, along with their associated biodiversity and ecological processes.

Ongoing research by DFO with important contributions from its partners, discussions with Industry representatives and independent studies have contributed substantially to improving the knowledge and understanding of ecosystem-based management needs for the groundfish fisheries and dependent habitat and ecosystem interactions. Examples of recent research include:

- MacLean M, Breeze H, Walmsley J and Corkum J (eds). 2013. *Marine Habitats and Communities - State of the Scotian Shelf Report*. Can.Tech.Rep.Fish.Aquat.Sci. 3074;
- Horsman T, Serdynska A, Zwanenburg, K, and Shackell, N. 2011. *Report on Marine Protected Area Network Analysis for the Maritimes Region of Canada*. Can.Tech.Rep.Fish.Aquat.Sci. 2917;
- Horsman T and Shackell N. 2009. *Atlas of Important Habitat for Key Species of the Scotian Shelf, Canada*. Can.Tech.Rep.Fish.Aquat.Sci. 2835;
- Fader, G. *Classification of Bathymetric Features of the Scotian Shelf*. Atlantic Marine Geological Consulting Ltd. (undated);
- Hebert D, Pettipas R, Brickman D and Dever M. 2013. *Meteorological, Sea Ice and Physical Oceanographic Conditions on the Scotian Shelf and in the Gulf of Maine during 2012*. Canadian Science Advisory Secretariat – Research Document 2013/058;
- Worcester T and Parker M. 2010. *Ecosystem Status and Trends Report for the Gulf of Maine and Scotian Shelf*. Canadian Science Advisory Secretariat – Research Document 2010/070;

⁵³ http://www.dfo-mpo.gc.ca/csas-sccs/publications/sar-as/2014/2014_041-eng.pdf

⁵⁴ <http://www.dfo-mpo.gc.ca/Library/336749.pdf>

⁵⁵ http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2012/2012_126-eng.pdf

- Araújo, J.N. and Bundy A. 2011. *Description of three ecosystem models of the Bay of Fundy, Western Scotian Shelf and NAFO Division 4X*. Can. Tech. Rep. Fish. Aquat. Sci. 2952: xii + 189 pp;
- Araújo, J.N. and Bundy A. 2012. *The relative importance of environmental change, exploitation and trophodynamic control in determining ecosystem dynamics on the western Scotian Shelf, Canada*. Mar. Ecol. Prog. Ser., 464:51–67; and
- Curran K, Bundy A, Craig M, Hall T, Lawton P and Quigley S. 2012. *Recommendations for Science, Management, and Ecosystem Approach in Fisheries and Oceans Canada, Maritimes Region*. Canadian Science Advisory Secretariat – Research Document 2012/061

DFO's Strategic Program for Ecosystem-Based Research and Advice (SPERA) continues to provide a science-based foundation for management and decision-making related to the larger departmental move toward EAM. Research needs are identified by an advisory committee comprise of DFO representatives from the Science, Management and Policy Sectors. SPERA's work is grouped under three main themes: (i) quantifying ecosystem impacts of human activities, (ii) assessing and reporting on ecosystems, and (iii) developing tools for an EAM. Selective projects that have been approved include:

A. Project: Exploration of approaches to assess cumulative impacts of activities in the coastal zone within an Ecosystem Approach to Management Framework (EAM) (Maritimes)

Description: This project aims to support the advancement of an EAM in the Maritimes by defining a method to assess the impacts of human activities on coastal regions within an EAM context. A regional workshop will focus on furthering the implementation of this approach and determining how best to provide scientific advice on the impacts of human activities. This project will also compile available examples of habitat and resource maps, and information on zones of human activity, to assess the usefulness of mapping and modeling tools.

B. Project: Biodiversity measures for use in the Ecosystem Approach to Oceans management (Maritimes, Canada-wide)

Description: Meeting Canada's commitment under the Convention on Biological Diversity requires that DFO be able to measure and report on the level of biodiversity in marine and freshwater ecosystems. This project will evaluate international information on biodiversity indicators, with a focus on their application to Canadian waters. It will lead to a technical report providing detailed recommendations for consistent and scientifically sound reporting of biodiversity.

C. Project: Ecosystem indicators for ecosystem monitoring at different scales (Maritimes)

Description: Progress on EAM requires evaluation and selection of useful indicators of ecosystem status that can provide an assessment of past and current effects of fishing on ecosystems to ocean and fisheries managers. This project will enhance the ability of Fisheries and Oceans Canada to move ahead with an EAM. It will review the current use of ecosystem indicators and their effectiveness, select and evaluate a series of indicators to assess their utility for DFO, use these indicators to assess the status of the western Scotian Shelf, and to determine whether they are useful to assess the effectiveness of closed areas, such as protected and conservation areas.

D. Project: Identification of benthic Ecologically and Biologically Significant Areas (EBSAs) on the Scotian Shelf (Maritimes)

Description: Ecologically and Biologically Significant Areas (EBSAs) are identified and prioritized using criteria that include uniqueness/rarity and aggregation of an area compared to other areas; how the loss of an area would compromise a population; how natural or undisturbed the habitat is; and the area's resilience to physical disturbance. Prior to this project, there has not been a systematic review

of species and habitats in benthic marine areas (the lowest region of a body of water) in Maritimes Region for the purpose of identifying EBSAs. This project will apply the above criteria to identify EBSAs in the Scotian Shelf using data on benthic species and habitats.

Industry

Fish Harvester Organizations like GEAC also contribute to the body of research in support of groundfish fisheries management initiatives of the Maritimes Region. Where necessary, these activities are carried out under the aegis of DFO Science-based projects and protocols. Examples provided to the Reassessment Team in a February 2014 email include:

- Haddock Assessment Framework Review: SFGAC Meeting - September 26, 2012 (item 6);
- Skate Conservation Strategy: SFGAC Meeting - September 26, 2012 (items 7 a and b);
- 100% observer coverage on otter trawl gear on Georges Bank: GOMAC Meeting - January 2014;
- Voluntary closure of area in 4X with concentrations of *Vazella Pourtalesi* sponges;
- Disincentive protocol on bycatch levels of 4X5Y Redfish, Cod, haddock and Pollock through the use of quota multiplier: 2013 GEAC Conservation Harvest Plan
- Northeastern Channel Coral Closure in 4X for all gear types except hook and line: *Mortensen et al.*; and
- Review of 4X5Y and 5Z haddock conversion factors for all gear types: SFGAC Meeting – September 26, 2012 (item 8).

Comprehensive Reporting

For transboundary groundfish fisheries, there is an interactive and regular exchange of information between representatives of the management agencies (NMFS for the US and DFO for Canada), the fishing industry and other stakeholders, including environmental organizations. The websites of both agencies are well populated with past and current documentation in relation to transboundary fisheries management, such as meeting minutes, scientific reports, and working group papers. The documentation is frequently cross-referenced on each country's website and so is easily accessible to the general public.

Domestic scientific reports are available on DFO's CSAS website and are also explained to, and discussed with, industry and others at management advisory and science assessment committee meetings, special workshops, and industry association annual meetings. The communications approach is somewhat less transparent for domestic groundfish fisheries management as DFO's website does not routinely report on GOMAC and SFGAC meeting outcomes, for example. However, committee members do receive all of the associated documents and information, usually by email. The public can obtain similar information by completing an Access to Information request. The Reassessment Team was informed that DFO Management and Science staff provided regular explanations and feedback on recommendations made by the groundfish industry during the advisory committee process. and as indicated by management measure announcements⁵⁶. The information dissemination process is comprehensive, providing engagement, feedback to stakeholders, and demonstrating that relevant information is provided to stakeholders on a regular and timely manner.

⁵⁶ <http://www.dfo-mpo.gc.ca/decisions/fm-2013-gp/atl-009-eng.htm>

4.5.9. Monitoring and Evaluation of the Haddock Management System

The current IFMP for 4X5Y identifies 3 areas for plan enhancements (Section 7). They include:

- Accounting for all catch of 4X5Y haddock within the scientific assessment of the stock, whether caught recreationally, under a food, social and ceremonial licence or as bycatch in a non-groundfish fishery;
- Improved data collection at sea to be able to determine precise estimates of bycatch and discards; and
- An evaluation of the candidate reference points and associated harvest control rule for TAC setting.

The client has reported that work on these enhancements is underway.⁵⁷ For example, the 4X5Y Haddock Framework Assessment was launched in October 2014; the scientific findings regarding 4X5Y discards from commercial fisheries underwent peer review in October 2014; and existing reference points will be updated during the next formal stock assessment in 2017.

Management Area 4X5Y

Section 6 of the 2012 IFMP describes the review process for monitoring the performance of the haddock management system in relation to the plan's stated strategic objectives (Section 4.1). Departmental and stakeholder inputs are obtained through Fisheries Management's SFGAC and Science's RAP processes as well as Industry's fleet sector committees. Performance is evaluated against the fishery's strategies and tactics as indicated in Section 4.2 of the plan, including various components of the CHPs for each fleet sector. The IFMP indicates that "while individual tactics to achieve the stated objectives may be evaluated on a case-by-case basis as the need arises, a scheduled evaluation will occur every 4 years with the next evaluation due in the 2016-2017 planning year."

The plan further indicates that a framework assessment is scheduled for the 2014-2015 planning year. The Reassessment Team was provided with the Terms of Reference for the framework assessment, and can confirm that the assessment has begun.

Management Area 5Zjm

The 2012 IFMP's strategic objectives (Section 4.1) for the transboundary haddock fishery are identical to those for the 4X5Y area. Periodic reviews are undertaken through two fora: (i) the TRSC's Sharing Understanding (which includes the TRAC and TMGC), and (ii) the GOMAC.

Through the first, the performance evaluation of the productivity-related strategies and tactics can be conducted to determine whether they are appropriate to meet the plan's overall objectives. Stock assessment updates occur annually, while framework/benchmark assessments to review the stock assessment model occur when deemed necessary. The process involves a recommendation from the TRAC, supported by the TMGC and endorsed by the TRSC.

The performance evaluation of the plan's objectives relating to biodiversity, habitat and prosperity are undertaken by GOMAC and the industry's fleet sector committees. As is the case in 4X5Y, the various CHPs form the basis for determining the degree to which the plan's tactics and strategies are contributing to the strategic objectives for the management area. And like the 4X5Y IFMP, the 5Zjm plan will be formally evaluated in the 2016-2017 planning year. The evaluation will be documented in the meeting minutes for the GOMAC and reflected in any updates to the IFMP. The performance of

⁵⁷ As described in a client email dated February 5, 2014 to the Assessment Team.

the fishery is also evaluated through interactions with and advice provided by Provincial Government partners, Industry and Environmental NGO stakeholders, and other entities.

Internal Mechanisms (Government and Industry Stakeholders) - 4X5Y and 5jm

- Precautionary Approach: DFO Sustainability Checklist for the fishery (not available to Reassessment Team);
- Stock Assessment: RAP and TMGC formal peer-review processes, and Framework Assessment;
- Ecosystem Interactions: Ongoing scientific and technical research; workshops; DFO's Sustainability Checklist for the fishery;
- Compliance and Enforcement: Post-season review involving various DFO regional program sectors; regional and fleet sector advisory committees;
- Economic and Social : DFO cost-earning studies;
- Fishery performance: Tactics as per the IFMPs;
- Management Measures: Post-season review involving various DFO regional program sectors; regional and fleet sector advisory committees; special government-industry roundtables; occasional study by Parliamentary Committee (SCOFO); and
- Departmental Fisheries Programs and Services: Program Evaluations and Audits (Ongoing).

External Mechanisms (Parliamentary Oversight, Ministerial Panels/Roundtables, Academia, Private Sector) - 4X5Y and 5Zjm

A number of formal external reviews or studies of the performance of various aspects of the Maritimes Region's groundfish fishery have been undertaken over the course of the past two decades. They include:

- Atlantic Council of Fisheries and Aquaculture Ministers (and related working groups);
- Independent Panel on Access and Allocation (2002);
- Atlantic Fisheries Policy Review (2004);
- Senate of Canada Standing Committee on Fisheries and Oceans;
- House of Commons Committee on Fisheries and Oceans;
- Provincial Ministerial Roundtables; and
- Auditor General of Canada

Reports commissioned by various agencies and departments of the Government of Canada are available to the public in electronic format where they can be easily accessed by industry stakeholder organizations and their membership. Frequently, the work undertaken by the government bodies is informed by expert witnesses and leading stakeholder representatives who appear and provide their perspectives and advice. Recommendations contained in these reports must be addressed by the appropriate department, typically within a prescribed timeframe; responses are also published.

5.0. Evaluation Procedure

5.1. Harmonised Fishery Assessment

Certification Bodies assessing fisheries that have areas of overlap are required to ensure consistency of outcomes so as not to undermine the integrity of MSC fishery assessments. Section Annex CI of the CR requirements provides guidance for harmonisation where a fishery in assessment overlaps with an already certified fishery.

The MSC wishes to discourage overlapping assessments to avoid potential financial, consistency and credibility costs, including:

- fisheries managers, scientists and stakeholders receiving duplicate requests for information
- duplication of costs for a fishery's certification, including that expense incurred by fishery management agencies pre- and post-certification; and
- the possibility of different assessments placing different conditions upon the same fisheries managers and upon different fishery clients.

There are no overlapping fisheries associated with this fishery.

There are no harmonization requirements for this fishery.

5.2. Previous assessments

The Scotia-Fundy Haddock Fishery was previously assessed by Moody Marine against MSC Principles and Criteria and was certified in October 2010. The findings of the Public Certification Report showed that:

- A total of 40 Performance Indicators (PIs) in the 8 Units of Certification had failed to achieve a score of 80. Where possible these have been treated collectively, resulting in 8 conditions to the certifications;
- As a standard condition of certification, the client (GEAC) was required to develop an Action Plan for Meeting the Conditions for Continued Certification, to be approved by Moody Marine. An Action Plan was submitted and accepted prior to initial certification.

Throughout the three annual surveillance audits undertaken following the initial full assessment, the CAB of record determined that GEAC was deemed to be in conformance with the general conditions of certification.

On September 11, 2014, GEAC changed CAB's from SCS Global Services to SAI Global Assurance Services for the 4th annual surveillance audit as well as for the reassessment of the fishery. The required notification was posted to the MSC's website

During the fourth surveillance audit held on November 18, 2014 it was found that two conditions had not been met in regard to Performance Indicators 2.21 and 2.2.3 and remained open.

5.3. Assessment Methodologies

The MSC Principle and Criteria for Sustainable Fishing Standard sets out the requirements for a certified fishery. The Certification Methodology adopted by the MSC involves the interpretation of these Principles and Criteria into specific Performance Indicators against which the performances of the fishery can be measured according to pre-specified guideposts. A fishery is assessed against three Principles. The default assessment tree developed by the MSC includes 31 Performance Indicators. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock belongs to; and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations.

PRINCIPLE 1: Sustainable fish stock

A fishery must be conducted in a manner that does not lead to overfishing 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.

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria

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

PRINCIPLE 2: Minimizing environment impact

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

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

Criteria

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.
3. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within the specified time frame.

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.

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

Management system Criteria

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

The management system shall:

2. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishery-dependent communities shall be addressed as part of this process.
3. appropriate to cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedure for implementation and a process for monitoring and evaluating performance and acting on findings;
4. observe the legal and customary and long term interests of people dependent on fishing for food and livelihoods, in a manner consistent with ecological sustainability;
5. incorporate an appropriate mechanism for the resolution of disputes arising within the system;
6. provide economic and social incentives that contributes to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
7. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
8. incorporate a research plan - appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interest parties in a timely fashion;
9. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;
10. specify measures and strategies that demonstrably control the degree of exploitation of the resource;
11. contains appropriate procedures to effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

Operational Criteria

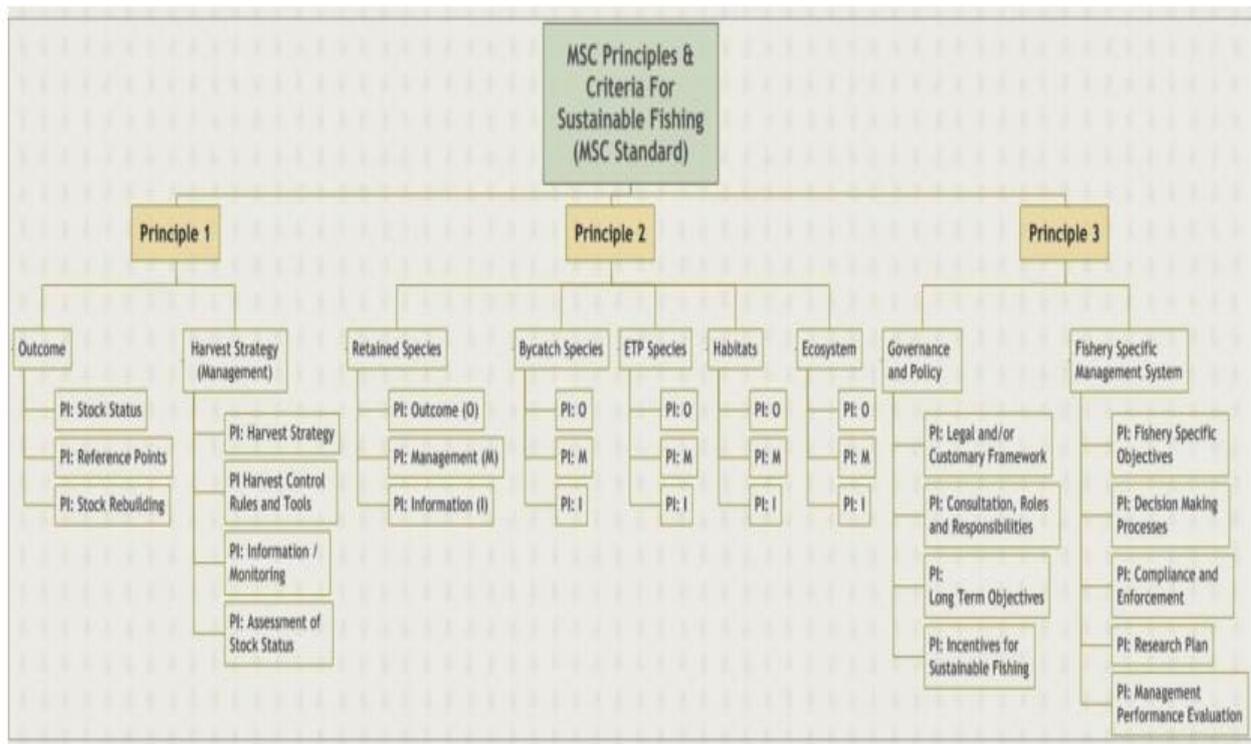
Fishing operations shall:

12. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimize mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
13. implement appropriate fishing methods designed to minimize adverse impacts on habitat, especially in critical and sensitive zones such as spawning and nursery areas;
14. not use destructive fishing practices such as fishing with poisons or explosives;
15. minimize operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
16. be conducted in compliance with the fishery management system and all legal and administrative requirements; and

17. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

Table 26. MSC Current Scheme Documents

MSC Current Scheme Documents	Version
MSC Fishery Standard - Principles and Criteria for Sustainable Fishing	1.1
MSC Certification Requirements	1.3
Guidance to MSC Certification Requirements	1.3
MSC Guidance to Certification Bodies on Stakeholder Consultation in Fishery Assessment	2.0
MSC Full Assessment Reporting Template	1.3
MSC PSA Worksheet	1.1



5.4. Evaluation Processes and Techniques

5.4.1. Site Visit

Initial client and stakeholder consultation process (Table 27) and meetings were held in Dartmouth, Nova Scotia in November 2014, and are recorded at Tables 28a and 28b. The objectives of the consultation meetings were to provide information and understanding of the activities of the CAB and to discuss the fishery management organizational roles in the management of the Scotia-Fundy Haddock fishery resources. The consultation meetings were designed to be inclusive of all organizations and representatives of the Scotia Fundy Haddock fisheries. However, the consultation plan was designed to strategically capture sufficient information to ensure understanding and confidence with respect to full reassessment scoring.

The on-site consultation also served other important functions. These included:

- Responding to questions and comments raised by participants in the fishery at this initial stage in the reassessment.

- The client group provided information, documents, and a list of stakeholders as required by SAI Global. This served to allow the reassessment team to collect general information on the fisheries, identify information gaps and identify key stakeholders for the information gathering exercise.
- Following the collation of general information on the fishery, a number of meetings with key stakeholders who expressed an interest to meet were scheduled by the team to fill in information gaps and to explore and discuss areas of concern.

5.4.2. Consultations

Public announcements of the progression of the full reassessment were made as follow:

Table 27. Stakeholder consultation process.

Date	Purpose	Media
2/10/2014	Fishery Enters Reassessment	Notification on MSC website Direct email/letter
2/10/2014	Reassessment Team Nomination	Notification on MSC website
14/10/2014	Reassessment Team Confirmation	Notification on MSC website
14/10/2014	Default reassessment Tree	Notification on MSC website
16/10/2014	Site Visit Scheduled	Notification on MSC website Direct email/letter

Table 28a. Client and DFO Meetings - and Fishery Reassessment.

Fishery: Canada Scotia-Fundy Haddock		
Location: Fisheries and Oceans Canada, Marine House, Dartmouth, Nova Scotia		
Date: 18th November, 2014		
Time: 9:00 am - 4:00 pm		
Representatives	Organization/Location	Position
Dr. Ivan Mateo	SAI Global Assurance Services, Rhode Island, USA	Reassessment Team (Lead)
R.J. (Bob) Allain	SAI Global Assurance Services, Dieppe, NB	Reassessment Team
Dr. Jerry Ennis	SAI Global Assurance Services, St. John's, NL	Reassessment Team
Bruce Chapman	Groundfish Enterprise Allocation Council, Manotick, ON	Executive Director
Alain d'Entremont	Groundfish Enterprise Allocation Council, Yarmouth, NS	Member
Michael O'Connor	Groundfish Enterprise Allocation Council, Chester, NS	Client Liaison Officer
Marilyn Clark	NS Fish Packers Association, Yarmouth, NS	Executive Director
Colleen A. Smith	Fisheries and Oceans Canada - Dartmouth, NS	Eco-certification Coordinator

Scott Coffen-Smout	Fisheries and Oceans Canada, Dartmouth, NS	Biologist - Oceans & Coastal Management
Carl MacDonald	Fisheries and Oceans Canada, Dartmouth, NS	Senior Advisor - Groundfish, Resource Management
Thomas Wheaton	Fisheries and Oceans Canada, Bridgewater, NS	Area Chief - Oceans, Habitat and Species at Risk
Heath Stone	Fisheries and Oceans Canada, St. Andrews, NB	Biologist - Population Ecology
Lou van Eeckhaute	Fisheries and Oceans Canada, St. Andrews, NB	Biologist - Population Ecology
Noel d'Entremont	Fisheries and Oceans Canada, Barrington Passage, NS	Fishery Officer - Conservation and Protection
Margaret Lever	Fisheries and Oceans Canada, Dartmouth, NS	Staff Officer - Program Planning and Analysis, Conservation and Protection

Table 28b. Stakeholder Meeting - Fishery Reassessment.

Fishery: Canada Scotia-Fundy Haddock		
Location: Holiday Inn Harbourside, Dartmouth, Nova Scotia		
Date: 18th November, 2014		
Time: 5:00 pm - 6:15 pm		
Representatives	Organization/Location	Position
Dr. Ivan Mateo	SAI Global Assurance Services, Rhode Island, USA	Assessment Team (Lead)
R.J. (Bob) Allain	SAI Global Assurance Services, Dieppe, NB	Assessment Team
Dr. Jerry Ennis	SAI Global Assurance Services, St. John's, NL	Assessment Team
Dr. Susanna Fuller	Ecology Action Centre, Halifax, NS	Marine Conservation Coordinator
Catharine Grant	Ecology Action Centre, Halifax, NS	Marine Policy & Certification Coordinator

5.4.3. Evaluation Techniques

Each PI under each Principle is weighted so that each of the three Principles is equal to one other (refer to Table 29). At the Level of the Performance Indicator, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. Accordingly, 100 represents a theoretically ideal level of performance and 60 a measureable shortfall.

The Scoring Guideposts (SGs) identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator.

The scoring methodology is fully explained in the MSC Fisheries Assessment Methodology. It can be summarized as follow:

- Scoring is a qualitative process, involving discussion between team members and arrival at a joint agreed score. Scores should be normally assigned in divisions of 5 points
- The only narrative guidance that is available is at 60, 80 and 100 SGs. Intermediate scores must therefore reflect a failure to meet all the scoring issues⁵⁸ specified in a SG.
- The following system should then be used to determine the overall score for the PI from the scores of the different scoring issues. This system combines a primary approach based on the combination of scores achieved by the individual scoring issues (a to i) listed below:
 - a) Score 60: all issues meet SG60, and only SG60. Any scoring issues within a PI which fails to reach SG60, represents a failure against the MSC standard and no score shall be assigned.
 - b) 65: all issues meet SG60; a few achieve higher performance, at or exceeding SG80, but most do not meet SG80.
 - c) 70: all issues meet SG60; some achieve higher performance, at or exceeding SG80, but some do not meet SG80 and require intervention action to ensure they get there.
 - d) 75: all issues meet SG60; most achieve higher performance, at or exceeding SG80; only a few fail to achieve SG80 and require intervention action.
 - e) 80: all issues meet SG80.
 - f) 85: all issues meet SG80; a few achieve higher performance, but most do not meet SG100.
 - g) 90: all issues meet SG80; some achieve higher performance at SG100 but some do not.
 - h) 95: all issues meet SG80; most achieve higher performance, at SG100; only a few fail to achieve SG100.
 - i) 100: all issues meet SG100

⁵⁸ Scoring issues: The different parts of a single scoring guidepost, where more than one part exist covering related but different topics.

Table 29. Weights assigned to each component and PI within the Reassessment tree structure.

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle		
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	0.333	0.1667
				1.1.2	Reference points	0.5	0.25	0.333	0.1667
				1.1.3	Stock rebuilding			0.333	0.1667
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125		
				1.2.2	Harvest control rules & tools	0.25	0.125		
				1.2.3	Information & monitoring	0.25	0.125		
				1.2.4	Assessment of stock status	0.25	0.125		
		Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667
2.1.2	Management					0.333	0.0667		
2.1.3	Information					0.333	0.0667		
By-catch species	0.2			2.2.1	Outcome	0.333	0.0667		
				2.2.2	Management	0.333	0.0667		
				2.2.3	Information	0.333	0.0667		
ETP species	0.2			2.3.1	Outcome	0.333	0.0667		
				2.3.2	Management	0.333	0.0667		
				2.3.3	Information	0.333	0.0667		
Habitats	0.2			2.4.1	Outcome	0.333	0.0667		
				2.4.2	Management	0.333	0.0667		
				2.4.3	Information	0.333	0.0667		
Ecosystem	0.2			2.5.1	Outcome	0.333	0.0667		
				2.5.2	Management	0.333	0.0667		
				2.5.3	Information	0.333	0.0667		
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	0.25	0.125		
				3.1.2	Consultation, roles & responsibilities	0.25	0.125		
				3.1.3	Long term objectives	0.25	0.125		
				3.1.4	Incentives for sustainable Fishing	0.25	0.125		
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1		
				3.2.2	Decision making processes	0.2	0.1		
				3.2.3	Compliance & enforcement	0.2	0.1		
				3.2.4	Research plan	0.2	0.1		
				3.2.5	Management performance evaluation	0.2	0.1		

6.0. Traceability

6.1. Eligibility Date

In accordance with CR Requirements CR 27.6 MSC product eligibility date may be up to a maximum 6 months prior to the publication of the Public Comment Draft Report (PCDR). The client representative has indicated the client member groups desire to have the opportunity, if they so wish, to take full advantage of this 6 month period. The date was revised from a previous date to accommodate the identification of any existing haddock product from the reassessment fishery and held in frozen storage by supply chain entities that are already certified to the MSC Chain of Custody Programme. This product may become eligible for identification with an MSC claim on eventual certification of the fishery.

The PCDR will be published on the 15th February 2016. Therefore, the proposed target eligibility date is August 2015.

6.2. Traceability within the Fishery

6.2.1. Introduction

This report deals only with the harvesting of Scotia-Fundy caught haddock at the point of landing, and not beyond processing which constitutes the first step in the chain-of-custody process. All Scotia-Fundy haddock harvested by the registered fleet of approximately 400 vessels operating from home ports in Northwest Atlantic Canada will be eligible to display the MSC logo; however, only those companies that have a certificate sharing arrangement with the client group, the Groundfish Enterprise Allocation Council's member associations, may carry the MSC label and claim forward through the MSC chain of custody.

Currently, the following companies are part of the certification and are eligible to sell certified product. Notification of any changes will be provided to the MSC.

1. Sea Star Seafoods Ltd
2. Ocean Choice International Ltd
3. Inshore Fisheries Ltd
4. Charlesville Fisheries Ltd
5. Nova's Finest Fisheries Ltd
6. Acadian Fish Processors Ltd
7. Fisherman's Market International Inc
8. James L. Mood Fisheries Ltd
9. O'Neil Fisheries Ltd
10. Doucet Fisheries Ltd
11. R. Baker Fisheries Ltd

6.2.2. Findings

The findings of the Assessment Team are that a credible catch monitoring program takes place during harvesting and offloading operations to identify the fishery of origin for all landed haddock. The regulatory requirements include mandatory logbook completion prior to catch landing (ie. vessel name, CFV number, estimated catch onboard, location of catch, port of landing, date, and number of

nets fished), a daily trip limit, trip hail-outs and hail-ins, and mandatory third party dockside monitoring of landed catch. These requirements would be sufficient to allow a future Chain of Custody to be established from the point of landing forward.

At-sea Processing and Transshipment

Haddock harvested in this fishery are landed iced and whole, there is at-sea processing per se. The identity of the species therefore can be easily established at point of landing. The catch must be logged by the receiving vessel in accordance with the regulatory requirements noted previously.

Points of landing

Vessels are required by licence condition to hail-in before landing their catch at a DFO-designated port. This allows the dockside monitor to be in place before the vessel arrives for offloading. The Dockside Monitoring Company which provides the services is required to comply with strict conditions established by the Federal Government, and their operations are subject to audits as necessary. Calibrated scales are used by the dockside monitors to validate the amount of haddock landed. Moreover, DFO Fishery Officers conduct random surveillance activities at offloading sites to ensure the dockside monitors are performing their duties in accordance with approved practices.

6.3. Eligibility to Enter Further Chains of Custody

The fishery's management system is sufficient to allow a Chain of Custody to be established from the point of landing forward for all haddock harvested from the Scotia Fundy Haddock fishery. MSC chain of custody certifications were not carried out in this reassessment, and, therefore, will need to be undertaken on a separate and individual basis for those entities that may wish to identify and/or label products derived from the fishery.

The client group has determined that for chain of custody purposes, the point of landing at each designated port will also be the point of first sale. This is the point at which ownership passes from the licence holder to an onshore operator. The group has identified 2 types of onshore operators: (i) plants with their own buyers, and (ii) independent buyers under commission to deliver raw material to specific plants for processing.

All licence holders/harvesters in Scotia Fundy region and Eastern Georges Bank will be eligible to land MSC-certified haddock and any onshore enterprise will be eligible to acquire haddock as MSC-certified provided the enterprise is a named member of the client group and has successfully undergone a Chain of Custody assessment.

It is understood that beginning on September 1, 2015, any under-reassessment product from the Scotia Fundy Haddock fishery must be handled in accordance with section 5.6 of the MSC CoC Standard v4.0, which states:

- Under-reassessment products shall be clearly identified and segregated from certified and non-certified products;
- The organization shall maintain full traceability records for all under-reassessment product, demonstrating traceability back to the unit of certification and including the date of harvest; and
- Under-reassessment products shall not be sold as certified or labelled with the eco-label, logo, or trademarks until the source fishery or farm is certified.

Main Risks to Chain-of-Custody at Landing

The fishery's management system and its supporting regulatory requirements and compliance program for Scotia Fundy Haddock Fishery are such that the risk associated with any mixing of certified and non-certified product before the point of landing is considered to be extremely low. Theoretically, there could be some risk associated with haddock caught outside 4X5Y and 5Zjm units of certification, but the reporting and monitoring obligations described previously are considered to be sufficient to discern the origin of the fish caught.

Entities included in the Fishery Certificate

On successful MSC certification of GEAC, the following members (Table 30) will be MSC-certified as a sustainable and well managed fishery, and products from this fishery would be eligible for the MSC eco-label.

Table 30. List of eligible vessels (date 15/02/2015).

Company	Location
Sea Star Seafoods	Clarke's Harbour, NS
Fisherman's Market International Inc.	Bedford, NS
James L. Mood Fisheries Ltd.	Wood's Harbour, NS
Inshore Fisheries Limited	Middle West Pubnico, NS
Charlesville Fisheries Ltd.	Lower East Pubnico, NS
O'Neil Fisheries Ltd/Scotia Harvest Seafoods Inc./Marro Management Inc.	Digby, NS
Acadian Fish Processors Ltd.	Lower West Pubnico, NS
Doucet Fisheries Limited	Weymouth, NS
Nova's Finest Fisheries Inc.	Middle West Pubnico, NS
Ocean Choice International	St. John's, NL

7.0. Evaluation Results

The Scotia-Fundy Haddock fishery achieved a score of 80 or higher on each of the three MSC Principles independently and did not score less than 60 against any indicator. Scores achieved in each Principle and for each Performance Indicator are shown in Tables 31-39.

Although the Reassessment Team found the UoC in overall compliance, it also found the performance of the Scotia-Fundy Haddock fishery on 5 PIs - PI 2.1.1 Retained species outcome, 2.1.2 Retained species management, PI 2.2.1 Bycatch species outcome, 2.2.2 Bycatch species management and 2.2.3. Bycatch species monitoring - to be below the established compliance mark . Therefore, five conditions were attached to the fishery, which must be addressed within a specific timeframe. Full explanation of these conditions is provided in Appendix 1.3. Also, a full explanation of how the Client intends to meet these conditions is provided in the Client Action Plan in Appendix 1.3.

7.1. Principle level score

Refer to Section 7.2

7.2. Summary of Scores

Units of Certification - 4X5Y

The scores assigned to the PIs are shown in Tables 31 to 34.

The performance of the **Otter Trawl Fishery** in 4X5Y (UoC 1) in relation to MSC Principles 1, 2 and 3 is shown in Table 31 and summarised below:

Principle 1 - Target species	91.9
Principle 2 - Ecosystem	83.7
Principle 3 - Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

This fishery attained a score below 80 against three of the PIs. This has led to conditions to certification being raised. Once these conditions have been satisfied these PIs will be re-scored.

Table 31. Performance Indicators scoring assigned to the Otter Trawl Fishery in 4X5Y (UoC1).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	90
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	95
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	80
				1.2.4	Assessment of stock status	0.25	0.125	90
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	75
				2.1.2	Management	0.333	0.0667	75
				2.1.3	Information	0.333	0.0667	90
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	100
				2.2.2	Management	0.333	0.0667	100
				2.2.3	Information	0.333	0.0667	70
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	90
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC 2: **Bottom Longline Fishery** in 4X5Y in relation to MSC Principles 1, 2 and 3 is shown in Table 32 and summarised below:

Principle 1 - Target species	91.9
Principle 2 – Ecosystem	80.3
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

This fishery did not achieve a score of 80 against five PIs. This has led to conditions to certification being raised. Once these conditions have been satisfied these PIs will be re-scored.

Table 32. Performance Indicators scoring assigned to the Longline Fishery in 4X5Y (UoC2).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	90
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	95
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	80
				1.2.4	Assessment of stock status	0.25	0.125	90
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	75
				2.1.2	Management	0.333	0.0667	75
				2.1.3	Information	0.333	0.0667	90
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	75
				2.2.2	Management	0.333	0.0667	75
				2.2.3	Information	0.333	0.0667	70
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	90
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC 3: **Gill Net Fishery** in 4X5Y in relation to MSC Principles 1, 2 and 3 is shown in Table 33 and summarised below:

Principle 1 - Target species	91.9
Principle 2 – Ecosystem	81
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

Table 33. Performance Indicators scoring assigned to the Gillnet Fishery in 4X5Y (UoC3).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	90
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	95
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	80
				1.2.4	Assessment of stock status	0.25	0.125	90
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	80
				2.1.2	Management	0.333	0.0667	80
				2.1.3	Information	0.333	0.0667	80
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	80
				2.2.2	Management	0.333	0.0667	80
				2.2.3	Information	0.333	0.0667	80
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	80
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC 4: **Hand Line Fishery** in 4X5Y in relation to MSC Principles 1, 2 and 3 is shown in Table 34 and summarised below:

Principle 1 - Target species	91.9
Principle 2 - Ecosystem	81
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

This fishery did achieve a score of 80 against thirteen PIs.

Table 34. Performance Indicators scoring assigned to the Handline Fishery in 4X5Y fishery (UoC4).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	90
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	95
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	80
				1.2.4	Assessment of stock status	0.25	0.125	90
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	80
				2.1.2	Management	0.333	0.0667	80
				2.1.3	Information	0.333	0.0667	80
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	80
				2.2.2	Management	0.333	0.0667	80
				2.2.3	Information	0.333	0.0667	80
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	80
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

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The scores assigned to the PIs are shown in Tables 35 to 39.

The performance of the UoC5: **Otter Trawl Fishery** in 5Zjm in relation to MSC Principles 1, 2 and 3 is shown in Table 20 and summarised below:

Principle 1 - Target species	97.5
Principle 2 - Ecosystem	84.3
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

This fishery did not achieve a score of 80 against two PIs. This has led to conditions to certification being raised. Once these conditions have been satisfied these PIs will be re-scored.

Table 35. Performance Indicators scoring assigned to the Otter Trawl Fishery in 5Zjm (UoC5).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	100
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	100
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	90
				1.2.4	Assessment of stock status	0.25	0.125	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	85
				2.1.2	Management	0.333	0.0667	85
				2.1.3	Information	0.333	0.0667	100
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	75
				2.2.2	Management	0.333	0.0667	75
				2.2.3	Information	0.333	0.0667	90
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	90
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	90
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	85
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC 6: **Bottom Long Line Fishery** in 5Zjm in relation to MSC Principles 1, 2 and 3 is shown in Table 36 and summarised below:

Principle 1 - Target species	97.5
Principle 2 - Ecosystem	84.3
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any indicator.

This fishery did not achieve a score of 80 against two PIs. This has led to conditions to certification being raised. Once these conditions have been satisfied these PIs will be re-scored.

Table 36. Performance Indicators scoring assigned to the Longline Fishery in 5Zjm (UoC6).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	100
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	100
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	90
				1.2.4	Assessment of stock status	0.25	0.125	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	85
				2.1.2	Management	0.333	0.0667	85
				2.1.3	Information	0.333	0.0667	100
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	75
				2.2.2	Management	0.333	0.0667	75
				2.2.3	Information	0.333	0.0667	90
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	90
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	90
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	90
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC 7: **Gill Net Fishery** in 5Zjm in relation to MSC Principles 1, 2 and 3 is shown in Table 37 and summarised below:

Principle 1 - Target species	97.5
Principle 2 - Ecosystem	81
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any indicator.

Table 37. Performance Indicators scoring assigned to the Gillnet Fishery in 5Zjm (UoC7).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	100
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	100
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	90
				1.2.4	Assessment of stock status	0.25	0.125	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	80
				2.1.2	Management	0.333	0.0667	80
				2.1.3	Information	0.333	0.0667	80
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	80
				2.2.2	Management	0.333	0.0667	80
				2.2.3	Information	0.333	0.0667	80
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	80
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

The performance of the UoC8: **Hand Line Fishery** in 5Zjm in relation to MSC Principles 1, 2 and 3 is shown in table 39 and summarised below:

Principle 1 - Target species	97.5
Principle 2 - Ecosystem	81
Principle 3 – Management	90.9

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

Table 39. Performance Indicators scoring assigned to the Handline Fishery in 5Zjm (UoC8).

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in Principle	Score
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	100
				1.1.2	Reference points	0.5	0.25	100
				1.1.3	Stock rebuilding	0.333	0.1667	n/a
		Management	0.5	1.2.1	Harvest strategy	0.25	0.125	100
				1.2.2	Harvest control rules & tools	0.25	0.125	90
				1.2.3	Information & monitoring	0.25	0.125	90
				1.2.4	Assessment of stock status	0.25	0.125	100
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667	80
				2.1.2	Management	0.333	0.0667	80
				2.1.3	Information	0.333	0.0667	80
		By-catch species	0.2	2.2.1	Outcome	0.333	0.0667	80
				2.2.2	Management	0.333	0.0667	80
				2.2.3	Information	0.333	0.0667	80
		ETP species	0.2	2.3.1	Outcome	0.333	0.0667	80
				2.3.2	Management	0.333	0.0667	80
				2.3.3	Information	0.333	0.0667	80
		Habitats	0.2	2.4.1	Outcome	0.333	0.0667	90
				2.4.2	Management	0.333	0.0667	80
				2.4.3	Information	0.333	0.0667	85
		Ecosystem	0.2	2.5.1	Outcome	0.333	0.0667	80
				2.5.2	Management	0.333	0.0667	80
				2.5.3	Information	0.333	0.0667	80
Three	1	Governance And policy	0.5	3.1.1	Legal & customary framework	0.25	0.125	90
				3.1.2	Consultation, roles & responsibilities	0.25	0.125	95
				3.1.3	Long term objectives	0.25	0.125	90
				3.1.4	Incentives for sustainable fishing	0.25	0.125	100
		Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1	80
				3.2.2	Decision making processes	0.2	0.1	95
				3.2.3	Compliance & enforcement	0.2	0.1	85
				3.2.4	Research plan	0.2	0.1	85
				3.2.5	Management performance evaluation	0.2	0.1	95

7.3. Summary of Conditions

Table 41. Summary of Conditions

Condition number	Condition	Performance Indicator	Related to previously raised condition? (Y,N,N/A)
1, 2	(UoC1- 4X5Y OT, UoC2-4X5Y LL); The client must provide evidence that there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of retained species (4X5Y Cod)	2.1.1, 2.1.2	Y
3, 4	(UoC 1-4X5Y OT, UoC2-4X5Y LL, (UoC 5-5Zjm OT, UoC6- 5Zjm LL) The client must provide evidence there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of bycatch species (Thorny Skates)	2.2.1, 2.2.2	Y
5	(UoC1-4X5Y OT, UoC2-4X5Y LL) The client must provide evidence that qualitative information and some adequate quantitative information are available on the amount of main bycatch species affected by the fishery.	2.2.3	Y

7.4. Certification Recommendation

On completion of the reassessment and scoring process, the Assessment Team has ***provisionally*** recommended that the Scotia-Fundy Haddock Fishery is eligible to be certified according to the MSC Principles and Criteria for Sustainable Fishing.

7.5. Determination, Formal Conclusion and Agreement

(REQUIRED FOR FR AND PCR)

(REQUIRED FOR PCR)

8.0. References

Agler, B. A., J. A. Beard, R. S. Bowman, H. D. Corbett, S. W. Frohock, M. P. Hawvermale, S. K. Katona, S. S. Sadove and I. E. Seipt. 1990. Fin whale (*Balaenoptera physalus*) photographic identification: methodology and preliminary results from the Western North Atlantic. Rapport de la International Whaling Commission, édition spéciale. 12:349-356.

Atlantic Leatherback Turtle Recovery Team 2006. Recovery Strategy for Leatherback Turtle (*Dermochelys coriacea*) in Atlantic Canada. *Species at Risk Act Recovery Strategy Series*. Fisheries and Oceans Canada, Ottawa, vi + 45 pp.

Banville, Y. 2010. Identification d'innovations en vue de limiter les prises accessoires de mammifères marins. Pêches et Océans Canada. 84p.

Beauchamp, J., Bouchard, H., de Margerie, P., Otis, N., Savaria, J.-Y., 2009. Recovery Strategy for the blue whale (*Balaenoptera musculus*), Northwest Atlantic population, in Canada [FINAL]. *Species at Risk Act Recovery Strategy Series*. Fisheries and Oceans Canada, Ottawa. 62 pp.

Begg, G.A. 1998. A review of stock identification of haddock, *Melanogrammus aeglefinus*, in the northwest Atlantic Ocean. *Mar. Fish. Rev.* 60: 1-15.

Bianchi, G., Gislason, H., Graham, K., Hill, L., Jin, X., Koranteng, K., Manickchand-Heileman, S., Payá, I., Sainsbury, K., Sanchez, F., and Zwanenburg, K. 2000. Impact of fishing on size composition and diversity of demersal fish communities. *ICES Journal of Marine Sciences*, 57: 558-571.

Bigelow, H. B. and W. C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish and Wildl. Serv., *Fish. Bull.*, 74, Vol.53: 1–576.

Boudreau S.A. and B. Worm 2010. Top-down control of lobster population in the Gulf of Maine: insights from local ecological knowledge and research surveys. *Marine Ecology Progress Series* 403: 181-191.

Brillant, S.W., and E.A. Trippel. 2010. Elevations of lobster fishery groundlines in relation to their potential to entangle endangered North Atlantic right whales in the Bay of Fundy, Canada. *ICES Journal of Marine Science* 67:355-364.

Brodziak, J. 2005. Essential fish habitat source document: Haddock, *Melanogrammus aeglefinus*, life history and habitat characteristics, 2nd edition. NOAA Tech Mem. NMFS-NE-196, 74 pp.

Brown, M.W., Fenton, D., Smedbol, K., Merriman, C., Robichaud-Leblanc, K., and Conway, J.D. 2009. Recovery Strategy for the North Atlantic Right Whale (*Eubalaena glacialis*) in Atlantic Canadian Waters [Final]. *Species at Risk Act Recovery Strategy Series*. Fisheries and Oceans Canada. Vi + 66p.

Campbell, J. S and Simms, J.M. 2009. Status on Coral and Sponge Conservation in Canada, DFO: vii + 87 p.

Campana, S. J. Smith, and P. C. F. Hurley. 1989. A drift-retention dichotomy for larval haddock (*Melanogrammus aeglefinus*) spawned on Browns Bank. *Can. J. Fish. Aquat. Sci.* 46:93–102.

Campana, S. E., Gibson, J. F., Marks, L., Joyce, W., Rulifson, R., & Dadswell, M. (2007). Stock structure, life history, fishery and abundance indices for spiny dogfish (*Squalus acanthias*) in Atlantic Canada (Rep. No. 2007/089).

Campana, S.E., J. Brading, and W. Joyce. 2011. Estimation of pelagic shark bycatch and associated mortality in Canadian Atlantic fisheries. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/067: vi + 19 p.

Campana, S.E., Gibson, A.J.F., Fowler, M., Dorey, A. and Joyce, W. 2013. Population dynamics of Northwest Atlantic porbeagle (*Lamna nasus*), with an assessment of status and projections for recovery. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/096. iv + 84.

Campana, S.E., Fowler, M., Houlihan, D., Joyce, W., Showell, M., Miri, C., and Simpson, M. 2015. Current Status and Threats to the North Atlantic Blue Shark (*Prionace glauca*) Population in Atlantic Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/026. v + 44 p.

Cavanagh, M.F., and K. Damon-Randall. 2009. Status of the barndoor skate (*Dipturus laevis*). National Marine Fisheries Service Report, Northeast Regional Office. 77 pp.

Casey, J. G. and Kohler, N. E. 1991. Long distance movements of Atlantic sharks from the NFS cooperative shark tagging program. Underwater Naturalist 19:87-91.

Cassoff, R.M., S.E. Campana, and S. Myklevoll. 2007. Changes in baseline growth and maturation parameters of Northwest Atlantic porbeagle, *Lamna nasus*, following heavy exploitation. Can. J. Fish. Aquat. Sci. 64:19-29.

Clapham, P.J., S.B. Young and R.L. Brownell Jr., 1999. Baleen whales: conservation issues and the status of the most endangered populations. Mammal review, 29: 35-60.

Clark DC, Clark KJ, Andrushchenko IV. 2011. Precautionary Approach Limit Reference points for Atlantic Cod (*Gadus morhua*) in NAFO Divisions 4Z5Yb and 5Zjm. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/085: vi +6p. Available at: http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2011/2011_085-eng.pdf

Comeau, P.A., M.J. Tremblay, S. Campana, G. Young, C. Frail, and S. Rowe. Review of the St. Mary's Bay Longhorn Sculpin Fishery. 2009. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/051. vi + 75 p.

Cortés, E. 2000. Life history patterns and correlations in sharks. Reviews Fish. Sci. 8:299-344.

Cortés, E., Arocha, F., Beerkircher, L., Carvalho, F., Domingo, A., Heupel, M., Holtzhausen, H., Santos, M. N., Ribera, M., and Simpfendorfer, C. 2010. Ecological risk assessment of pelagic sharks caught in Atlantic pelagic longline fisheries. Aquat. Living Resour. 23:25-34.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2006. COSEWIC assessment and status report on the blue shark *Prionace glauca* (Atlantic and Pacific Populations) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa"vii + 46 pp.

COSEWIC. 2009. COSEWIC assessment and status report on the American Plaice *Hippoglossoides platessoides*, Maritime population, Newfoundland and Labrador population and Arctic population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 74 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2012. COSEWIC assessment and status report on the Cusk *Brosme brosme* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 85 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2012. COSEWIC assessment and status report on the Thorny Skate *Amblyraja radiata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 75 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2013. COSEWIC assessment and status report on the White Hake *Urophycis tenuis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 45 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2014. COSEWIC Assessment and Status Report on the Porbeagle Shark (*Lamna nasus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 75 pp.

2001. Department of Fisheries and Aquaculture, Government of Newfoundland and Labrador. Monkfish. Emerging Species Profile Sheets. p4.

2001. Department of Fisheries and Aquaculture, Government of Newfoundland and Labrador. Sculpin, Shorthorn (*Myoxocephalus scorpius*) and Longhorn (*Myoxocephalus Octodecimspinosus*) Emerging Species Profile Sheets. p4.

DFO. 2002. Proceedings of the National Workshop on reference points for gadoids; 5-8 November, 2002. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2002/033.

DFO. 2004. Proceedings of the National Meeting on applying the precautionary approach infisheries management. December, 2004. DFO Can. Sci. Advis. Sec. Proceed. Ser.2004/003.

DFO. 2006. A Harvest Strategy Compliant with the Precautionary Approach. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2006/023.

DFO. 2012a. Reference points consistent with the Precautionary Approach for a variety of stocks in the Maritimes Region. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/035.

DFO. 2012b. 5Zjm Haddock. Integrated Fishery Management Plan (Summary). Maritimes Region 2012.

O'Boyle, R. N. 1981. An assessment of the 4X haddock stock for the 1962-1980 period. CAFSAC Res. Doc. 81/24.

DFO. 2010. Assessment of the status of Division 4X5Y haddock in 2009. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/005.

DFO. 2012a. Assessment of the status of 4X5Y haddock in 2011. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/023.

DFO. 2012b. 4X5Y Haddock Integrated Fisheries Management Plan (Summary). Maritimes Region.

DFO. 2014. Maritimes Research Vessel Summer Survey Trends. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/017.

DFO. 2015. 2014 Maritimes Research Vessel Trends on the Scotian Shelf and Bay of Fundy. Can. Sci. Advis. Sec. Sci. Resp. 2015/013.

DFO. 2002. Monkfish on the Scotian Shelf and Northeast Georges Bank (4VWX and 5Zc). Stock Status Report A3-30.

DFO. 2008. St. Mary's Bay Longhorn Sculpin (*Myoxocephalus octodecemspinosus*) Assessment. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2008/051.

DFO 2008. Framework and Assessment for the American Lobster, *Homarus americanus*, Fisheries in the Southern Gulf of St. Lawrence: LFA 23, 24, 25, 26A and 26B. Can. Sci. Advis. Sec. Res. Doc. 2008/054.

DFO 2010b. Potential impacts of fishing gears (excluding mobile bottom-contacting gears) on marine habitats and communities. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/003.

DFO 2011a. Integrated Fishery Management Plan for Inshore Lobster in Lobster Fishing Areas 27-38. Scotia-Fundy Sector. DFO Maritimes Region.

DFO. 2011. Recovery Potential Assessment (RPA) for the Southern Designatable Unit (NAFO Divs. 4X5Yb and 5Zjm) of Atlantic Cod (*Gadus morhua*). DFO Can. Sci. Advis. Sec. Advis. Rep. 2011/034.

DFO. 2011. Recovery Potential Assessment of the Maritime Designatable Unit of American Plaice (*Hippoglossoides platessoides*). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2011/043.

DFO. 2012. Reference points consistent with the precautionary approach for a variety of stocks in the Maritimes Region. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2012/035.

DFO 2012e. Definitions of harmful alteration, disruption or destruction (HADD) of habitat provided by eelgrass (*Zostera marina*). DFO Can. Sci. Advis. Sec. SAR 2011/058.

DFO. 2014. Maritimes Research Vessel Summer Survey Trends. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/017.

DFO. 2014. Update to the Recovery Potential for Cusk in Canadian Waters. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/048 Res. Doc. 2010/113: viii + 52 p.

DFO. 2014. Offshore Ecologically and Biologically Significant Areas in the Scotian Shelf Bioregion. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/041.

DFO. 2014. 2014 Stock Status Update for Lobster Fishing Area 41 (4X + 5Zc) Lobster. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/051.

DFO. 2014. Assessment of Spiny Dogfish in the Northwest Atlantic. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2014/055.

DFO. 2014. Stock Status Update of Atlantic Halibut on the Scotian Shelf and Southern Grand Banks (NAFO Divs. 3NOPs4VWX5Zc). DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/016.

DFO. 2014. 2014 Maritimes Winter Research Vessel Survey Trends on Georges Bank. DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/045.

DFO. 2015. Western Component (4Xopqrs5) Pollock Harvest Control Rule Update Report. DFO Can. Sci. Advis. Sec. Sci. Resp. 2015/003.

DFO. 2015. Recovery Potential Assessment for Porbeagle (*Lamna nasus*) in Atlantic Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2015/048.

DFO. 2015. Atlantic Canadian Conservation Action Plan For Selected Pelagic Shark Species. DFO Can. Sci. Advis. Sec. Sci. Res.

Dulvy N.K., Sadovy Y. & Reynolds J.D. (2003) Extinction vulnerability in marine populations. *Fish and Fisheries*, 4, 25-64.

Dwyer, K.L., C.E. Ryder, and R. Prescott. 2003. Anthropogenic mortality of leatherback turtles in Massachusetts waters. Page 260 in Seminoff, J.A. (compiler). *Proceedings of the Twenty-second Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-503.

Grant, S.M., W. Hiscock, and P. Brett. 2005. Mitigation of capture and survival of wolfish captured incidentally in the Grand Bank yellowtail flounder otter trawl fishery. Centre for Sustainable Aquatic Resources, Marine Institute of Memorial University of Newfoundland, Canada. P-136, xii + 68 p.

Frank, K. T. 1992. Demographic consequences of age-specific dispersal in marine fish populations. *Can. J. Fish. Aquat. Sci.* 49:2222–2231.

Fuller S., C. Picco, J. Ford, C.-F. Tsao, L. E. Morgan, D. Hangaard, R. Chuenpagdee 2008. *How We Fish Matters: Addressing the Ecological Impacts of Canadian Fishing Gear*. Ecology Action Centre, Living Oceans Society, and Marine Conservation Biology Institute. ISBN 978-0-9734181-7-0.

Gibson, A.J.F., and S.E. Campana. 2005. Status and recovery potential of porbeagle shark in the Northwest Atlantic. *CSAS Res. Doc.* 2005/053.

Halliday, R.G. 1988. Use of seasonal spawning area closures in the management of haddock fisheries in the Northwest Atlantic. *NAFO Sci. Council. Studies* 12:27-36.

Harding, G.C., Kenchington, E.L., Bird, C.J., Pezzack, D.S., and Landry D.C. 1997. Genetic relationships among subpopulations of the American lobster (*Homarus americanus*) as revealed by random amplified polymorphic DNA. *Canadian Journal of Fisheries and Aquatic Science* 54: 1762-1771.

Harris, L.E., and Hanke, A.R. 2010. Assessment of the Status, Threats and Recovery Potential of Cusk (*Brosme brosme*). DFO Can. Sci. Advis. Sec. Res. Doc. 2010/004.

Hurley, P.C.F., G.A.P. Black, G.A. Young, R.K. Mohn, and P.A. Comeau. 2009. Assessment of the status of Divisions 4X5Y haddock in 2005. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/024.

James, M.C., Ottensmeyer, C.A., Myers, R.A., 2005a. Identification of high-use habitat and threats to leatherback sea turtles in northern waters, new directions for conservation. *Ecol. Lett.* 8, 195–201.

Jensen, C.F., L.J. Natanson, H.L. Pratt, N.E. Kohler, and S. Campana. 2002. The reproductive biology of the porbeagle shark (*Lamna nasus*) in the western North Atlantic Ocean. *Fish. Bull.* 100:727-738.

Johnson, A., G. Salvador, J. Kenney, J. Robbins, S. Landry, and P. Clapham. 2005. Fishing gear involved in entanglements of right and humpback whales. *Marine Mammal Science* 21:635-645.

Johnson, A.J., S.D. Kraus, J.F. Kenney, and C.A. Mayo. 2007. The entangled lives of right whales and fisherman: can they coexist? In S. D. Kraus and R. M. Rolland (eds.). *The urban whale: North Atlantic right whales at the crossroads*, Harvard University Press, Cambridge, Massachusetts, USA.

Joyce, W.N., S.E. Campana, L.J. Natanson, N.E. Kohler, H.L. Pratt Jr., and C.F. Jensen. 2002. Analysis of stomach contents of the porbeagle shark (*Lamna nasus*) in the northwest Atlantic. *ICES J. Mar. Sci.* 59:1263-1269.

Kenchington, E., Lirette, C., Cogswell, A., Archambault, P., Archambault, P., Benoît, H., Bernier, D., Brodie, B., Fuller, S., Gilkinson, K., Lévesque, M., Power, D., Siferd, T., Treble, M., and Wareham, V. 2010. Coral and sponge concentrations in the biogeographic regions of the East Coast of Canada using spatial analyses. *DFO Can. Sci. Advis. Sec. Res. Doc.* 2010/041. Vi + 202 pp.

Klein-MacPhee, G. 2002. Haddock, *Melanogrammus aeglefinus* Linnaeus 1758. In: Collette, B.B., and G. Klein-MacPhee, eds. 2002. *Bigelow and Schroeder's Fishes of the Gulf of Maine*. 3rd Edition. Smithsonian Institute, Washington, DC, p.235-245.

Kulka, D., C. Hood and J. Huntington. 2007. Recovery Strategy for Northern Wolfish (*Anarhichas denticulatus*) and Spotted Wolfish (*Anarhichas minor*), and Management Plan for Atlantic Wolfish (*Anarhichas lupus*) in Canada. Fisheries and Oceans Canada: Newfoundland and Labrador Region. St. John's, NL. x + 103 pp.

Mandelman, J.W., Cicia, A.M., Ingram, G.W., Driggers, W.B. Coutreb, K.M. and Sulikowski, J.A. 2013. Short-term post-release mortality of skates (family Rajidae) discarded in a western North Atlantic commercial otter trawl fishery. *Fish. Res.*, 139: 76–84. doi:10.1016/j.fishres.2012.09.020.

McAllister, M. and Duplisea, D.E. 2011. Production model fitting and projection for Atlantic redfish (*Sebastes fasciatus* and *Sebastes mentella*) to assess recovery potential and allowable harm. *DFO Can. Sci. Advis. Sec. Res. Doc.* 2011/057 vi + 75 p.

Mohn, R.K. and J.E. Simon. 2002. Biological information relevant to the management of 4TVW haddock. *DFO Can. Sci. Advis. Sec. Res. Doc.* 2002/102.

Mohn, R.K., M.K. Trzcinski, G.A.P. Black, S. Armsworthy, G.A. Young, P.A. Comeau, and C.E. den Heyer. 2010. Assessment of the status of Division 4X5Y haddock in 2009. *DFO Can. Sci. Advis. Sec. Res. Doc.* 2010/085.

Morin, R., I. Forest, and H. Benoit. MS 2002. Status of NAFO Division 4T winter flounder, February 2002. *DFO Can. Sci. Advis. Sec. Res. Doc.*, No. 2002/033: 56 p.

Mug, M., Hall, M. & Vogel, N. (2008). Bycatch initiative: Eastern Pacific Programme: a vehicle towards sustainable fisheries. Progress Report of Fishing Experiments with Modified Gear (2004–2007). Rep. World Wildlife Fund, Inter-American Tropical Tuna Commission.

Natanson, L.J., J.J. Mello, and S.E. Campana. 2002. Validated age and growth of the porbeagle shark, *Lamna nasus*, in the western North Atlantic Ocean. *Fish. Bull.*, U.S. 100:266-278.

O'Boyle, R. 2001. Turtle By-catch in Canadian Atlantic Fisheries. *DFO Can. Sci. Advis. Sec. Proceed. Ser.* 2001/017.

Pezzack, D.S., C.M. Frail, A. Reeves, and M.J. Tremblay. 2011. Assessment of the LFA 41 Offshore Jonah Crab (*Cancer borealis*) (NAFO 4X and 5Zc). DFO Can. Sci. Advis. Sec

Rademeyer, R.A., and D.S. Butterworth. 2011. Technical Details Underlying the Management Strategy Evaluation Process Leading to Selection of a Management Procedure for Western Component (4Xopqrs5) Pollock. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/090: vi + 33 p.

Reeves, R.R., P.J. Clapham, R.L. Brownell Jr and G.K. Silber, 1998. Recovery Plan for the Blue Whale (*Balaenoptera musculus*). Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Silver Spring, Maryland, 39 p.

Rivard, D., L. C. Hendrickson and F. M. Serchuk. 1998. Yield estimates for short-finned squid (*Illex illecebrosus*) in SA 3-4 from research vessel survey relative biomass indices. NAFO SCR Doc. 98/75, Ser. No. N3068, 4 p.

Sears, R. and J. Calambokidis, 2002. COSEWIC Assessment and Update Status Report on the Blue Whale *Balaenoptera musculus*, Atlantic population and Pacific population, in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, 38 p.

Shester, G. and Micheli, F. 2011. Conservation challenges for small-scale fisheries: Bycatch and habitat impacts of traps and gillnets. *Biological Conservation* 144: 1673-1681.

Showell, M.A., Themelis, D., Mohn, R.K., and Comeau, P.A. 2013. Haddock on the Southern Scotian Shelf and Bay of Fundy in 2011 (NAFO Division 4X5Y). DFO Can. Sci. Advis. Sec. Res. Doc. 2013/101. v + 57 p.

Simon, J., and Cook, A. 2013. Pre-COSEWIC Review of White Hake (*Urophycis tenuis*) for the Maritimes Region. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/024. iv + 82 p.

Simon, J.E., Rowe, S., and Cook, A. 2011. Status of Smooth Skate (*Malacoraja senta*) and Thorny Skate (*Amblyraja radiata*) in the Maritimes Region. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/080. 110p.

Smith, P. C. 1989. Circulation and dispersion on Browns Bank. *Can. J. Fish. Aquat. Sci.* 46:539–559.

Stevens, M.M. 2004. Haddock *Melanogrammus aeglefinus*, U.S. Northeast Region. Seafood Watch Seafood Report, Monterey Bay Aquarium, 24p.

Stobo, W. T., G. M. Fowler, and S. J. Smith, S.J. MS 1997. Status of 4X winter flounder, yellowtail flounder, and American plaice. *Can. Stock Assess. Sec. Res. Doc.*, No. 97/105, 76 p.

Templeman, W. 1963. Distribution of sharks in the Canadian Atlantic (with special reference to Newfoundland waters). *Bull. Fish. Res. Board Can.* 140. 77 p.

TRAC. 2014. Eastern Georges Bank Cod. TRAC Status Report 2014/01 (Revised).

TRAC. 2014. Eastern Georges Bank Haddock. TRAC Status Report 2014/03.

TMGC. 2014. Eastern Georges Bank Cod, Haddock, Yellowtail Flounder [5Zjm]. Transboundary Management Guidance Committee Guidance Document 2014/01.

Tremblay, M.J., Pezzack, D.S., and Gaudette, J. 2012. Development of reference points for inshore lobster in the Maritimes Region (LFAs 27-38). DFO Can. Sci. Advis. Sec. Res.Doc. 2012/028.

Vanderlaan, A.S.M., R.K. Smedbol, and C.T. Taggart. 2011. Fishing-gear threat to right whales (*Eubalaena glacialis*) in Canadian waters and the risk of lethal entanglement. *Canadian Journal of Fisheries and Aquatic Sciences* 68:2174-2193.

Wang, Y., and L. O'Brien. 2012. Assessment of Eastern Georges Bank Cod for 2012. TRAC Ref. Doc. 2012/05, 83p.

Wang, Y., and Van Eeckhaute, L. 2012. Canadian Biomass Reference Points for Eastern Georges Bank (5Zjm) Haddock. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/029: ii + 7 p.

Waring GT, Josephson E, Maze-Foley K, Rosel, PE, editors. 2014. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2013. NOAA Tech Memo NMFS NE 228; 464 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

White, A.L., R.I. Perry, M.A. Koops, R.G. Randall, A. Bundy, P. Lawton, M. Koen-Alonso, D. Masson, P.S. Galbraith, M. Lebeuf, M. Lanteigne, and C. Hoover 2013. A National Synthesis of the Fisheries and Oceans Ecosystem Research Initiative. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/027. v + 31 p.

9.0. Appendices

Appendix 1. Performance Indicator Scores and Rationale

Principle 1

Units of Certification (UoC1= 4X5Y OT, UoC2=4X5Y LL, UoC3=4X5Y GN, UoC4=4X5Y HL)

Evaluation Table for PI 1.1.1

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Yes	Yes	Yes

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing			
	Justification	<p>A stratified random design bottom trawl RV survey of the Scotian Shelf and Bay of Fundy has been conducted every summer since 1970. Survey trends in both numbers and biomass show relatively high abundance in the early to mid 1980s, followed by a decline to relatively low levels over the period 1987-1994. Abundance increased in 1998-2001, but declined subsequently and has been relatively stable for the past eight years. The 2011 biomass index (47,874 t) was below the short (5 year: 50,470 t), medium (15 year: 51,434 t), and long-term (since 1970: 56,686 t) averages. However, it has been relatively stable over the past eight years.</p> <p>There are continuing strong retrospective patterns in the model, and poor model fit to survey indices. The strong retrospective patterns in F and SSB reflect a mismatch between the survey indices and catch information. Nevertheless, the model indicates that SSB has remained relatively stable over the past two decades and suggests an increase in SSB in the past few years, however, the strong retrospective pattern (tendency of the model to overestimate biomass and underestimate F) indicates that these recent values are likely overestimates.</p> <p>Since the 1970s – early 1980s period, SSB for most years has been between the B_{USR} and B_{lim} reference points, with some improvement in recent years. Despite uncertainties in the fit of the population model, the SSB of 4X5Y haddock is considered likely to be within the ‘cautious’ zone, that is, between the LRP and USR, and unlikely to be in the critical zone.</p> <p>A review of the assessment framework for this stock has started and is expected to be completed by early 2016. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review.</p> <p>Despite model uncertainties, SSB is well above the B_{lim} of 20,800 t and there is a high degree of certainty that the stock is above the point where recruitment would be impaired, thus justifying a score of 100 for issue a.</p>		
b	Guidepost		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Yes	No

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	
	Justification	<p>Since the 1970s – early 1980s period, SSB for most years has been between the B_{usr} and B_{lim} reference points, with some improvement in recent years. Despite uncertainties in the fit of the population model, the SSB of 4X5Y haddock is considered likely to be within the ‘cautious’ zone, that is, between the LRP and USR, and unlikely to be in the critical zone.</p> <p>The strong 2009 and 2010 year classes started entering the fishery in 2013 and 2014. The 2013 RV survey indicates increased SSB over 2012, although still well below averages. The survey abundance at length in 2010 and 2011 were above the long-term average for lengths less than 12 cm and these small fish were especially abundant in 2013. Prospects for strong recruitment for both the Bay of Fundy and Scotian Shelf stock components are very good.</p> <p>Despite model uncertainties, SSB appears to be in the cautious zone well above B_{lim} and increasing. A score of 80 for issue b is justified, however, it cannot be said with a high degree of certainty that SSB has been fluctuating around or has been above B_{usr} over recent years, thus a score of 100 for issue b cannot be justified.</p>	
References	DFO 2012a DFO 2014 DFO 2015 Showell et al. 2013		
Stock Status relative to Reference Points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Target reference point	SSB _{msy} (52,000 t) was estimated using a production model. $B_{usr} = 80\% SSB_{msy}$.	41,600 t	Model uncertainty, but SSB currently in cautious zone well above B_{lim} .
Limit reference point	$B_{lim} = 40\% SSB_{msy}$.	20,800 t	
OVERALL PERFORMANCE INDICATOR SCORE: A score of 100 is justified for issue a and 80 for issue b, giving a score of 90 for this PI.			90
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.1.2

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met?	Yes	Yes	
	Justification	<p>A Sissenwine-Shepard production model was run using the population estimates from the model. The analysis used the entire summer RV survey time series. The model estimated Maximum Sustainable Yield (MSY) at 14,700 t, SSB at MSY (SSB_{msy}) at 52,000 t, and F_{msy} at 0.43. Biological reference points of 40% (20,800 t) and 80% (41,600 t) of SSB_{msy} were suggested as the limit reference point (LRP) and upper stock reference (USR). A target removal reference of 0.25 ($F_{0.1}$) is suggested.</p> <p>The foregoing is consistent with DFO Precautionary Approach guidelines and justifies a score of 80 for issue a.</p>		
b	Guidepost		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		Yes	Yes
	Justification	<p>The B_{lim} is consistent with the DFO Precautionary Approach Framework guideline that requires $B_{lim} = 40\% B_{msy}$.</p> <p>A score of 100 can be justified for issue b.</p>		
c	Guidepost		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		Yes	Yes

PI 1.1.2		Limit and target reference points are appropriate for the stock	
	Justification	<p>Since the 1970s – early 1980s period, SSB for most years has been between the B_{usr} and B_{lim} reference points, with some improvement in recent years. Despite uncertainties in the fit of the population model, the SSB of 4X5Y haddock appears to be in the cautious zone well above B_{lim} and increasing. Model results indicate that fishing mortality has been near or below $F=0.25$ ($F_{0.1}$) over the past 20 years ($F_{msy}=0.43$). While SSB has been below the estimated MSY, it has been maintained at a sufficiently high level to generate strong year classes when conditions are favourable.</p> <p>A score of 100 for issue c is justified.</p>	
d	Guidepost		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.
	Met?		Not relevant
	Justification	This haddock stock is not considered to be a key lower trophic level stock.	
References	DFO 2012a		
OVERALL PERFORMANCE INDICATOR SCORE: A score of 80 is justified for issue a and 100 for issues b and c, giving a score of 100 for this PI.			100
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.1.3

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Where stocks are depleted rebuilding strategies, which have a reasonable expectation of success, are in place.		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe.
	Met?	Not Relevant		Not relevant
	Justification			
b	Guidepost	A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the depleted stock.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
c	Guidepost	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe.	There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	
	Met?	Not relevant	Not relevant	

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe	
	Justification		
References			
OVERALL PERFORMANCE INDICATOR SCORE:			N/A
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.1

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Yes	Yes	Yes

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	<p>TAC management was introduced to the fishery in 1970. Biological reference points were introduced in 2012 as a basis for a Precautionary Approach to management. The harvest strategy is to keep fishing mortality of 4X5Y haddock moderate by using the reference points and risk tolerances to determine harvest control rules (see PI 1.2.2 below).</p> <p>The TAC was 7,000 t from 2006 to 2009, but was lowered to 6,000 t for the 2010 and 2011 fishing years. However, catches have been lower than the TAC, averaging approximately 5,700 t since 2005. TAC in the 2011/12 fishing year remained at 6,000 t but was reduced by 15% to 5,100 t for the 2012/2013 and 2013/2014 fishing years. Model results indicate that fishing mortality has been near or below the $F=0.25$ ($F_{0.1}$) reference removal rate over the past 20 years ($F_{msy}=0.43$) and well below after 2004.</p> <p>There is significant uncertainty regarding the model used to assess stock status and a review of the assessment framework has started and is expected to be completed by early 2016. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review. Under the circumstances, management action has been consistent with Precautionary Approach principles (see PI 1.2.2 below).</p> <p>A score of 100 is justified for issue a.</p>		
b	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Yes	Yes	No
	Justification	<p>The TAC was 7,000 t from 2006 to 2009, but was lowered to 6,000 t for the 2010 and 2011 fishing years. However, catches have been lower than the TAC, averaging approximately 5,700 t since 2005. TAC in the 2011/12 fishing year remained at 6,000 t but was reduced by 15% to 5,100 t for the 2012/2013 and 2013/2014 fishing years. Model results indicate that fishing mortality has been near or below the $F=0.25$ ($F_{0.1}$) reference removal rate over the past 20 years ($F_{msy}=0.43$) and well below after 2004.</p> <p>Given the degree of uncertainty regarding the assessment model, it remains to be determined whether management action will be sufficient to increase SSB to the B_{usr} level over the short term.</p> <p>A score of 80 but not 100 is justified for issue b.</p>		
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Met?	Yes		
	Justification	<p>Monitoring of stock abundance is conducted annually by way of a RV survey. The majority of 4X5Y haddock landings are monitored at the dockside point of offloading by dockside monitors. These monitors verify the weight and the species of fish offloaded. Port sampling conducted by DFO captures detailed biological information on the catch. Data collected provide a sound basis for assessment of stock status (see PI 1.2.3 for details).</p> <p>A score of 60 is justified for issue c.</p>		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Yes
	Justification	<p>Stock status is usually assessed on a 2-year cycle and scientific advice provided for catch options in relation to the F_{ref} harvest rate. The Advisory Committee consultative process leads to a consensus recommendation for TAC. The TAC decision is communicated via a Conservation Harvesting Plan that provides fleet sector allocations as well as other management measures.</p> <p>Periodic performance review of management measures is a requirement of the IFMP. A scheduled evaluation will occur every four years with the next due in the 2016/17 planning year.</p> <p>A score of 100 for issue d is justified.</p>		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
References		DFO 2012a,b Showell et al. 2013		
OVERALL PERFORMANCE INDICATOR SCORE: A score of 100 is justified for issues a and d, 80 for issue b and 60 for issue c, giving a score of 95 for this PI.				95
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue	SG 60	SG 80	SG 100	

PI 1.2.2		There are well defined and effective harvest control rules in place		
a	Guidepost	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Yes	Yes	
	Justification	<p>TAC management was introduced to the 4X5Y haddock fishery in 1970. Biological reference points were introduced in 2012 as a basis for a Precautionary Approach to management. The harvest strategy is to keep fishing mortality of 4X5Y haddock moderate by using the reference points and risk tolerances to determine harvest control rules as follows:</p> <p>The TAC may be set with a neutral (50%) probability of exceeding the fishing mortality target reference (F_{ref}) when it is above the upper stock reference (USR). The TAC may be set with a low (less than 25%) probability of exceeding the fishing mortality limit reference ($F_{lim}=F_{0.1}$) when the SSB is above B_{msy}.</p> <p>The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A harvest strategy of F_{ref} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example.</p> <p>When the SSB is below the limit reference point (LRP), the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75%). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline.</p> <p>A score of 80 is justified for issue a.</p>		
b	Guidepost		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		Yes	No

PI 1.2.2		There are well defined and effective harvest control rules in place	
	Justification	<p>4X5Y haddock is harvested as part of a multi-species groundfish fishery. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Conservation Harvesting Plans indicate which species may be the target of a directed fishery and set out the measures that apply to non-target species (e.g. Cusk, White hake, Monkfish). All non-groundfish species must be returned to the water, with the exception of those species whose retention is specifically permitted within licence conditions.</p> <p>The best estimates of incidental catch are obtained using data collected by at-sea observers. However, given continuing low observer coverage for all fleets within the 4X5Y fishery, estimates are not precise. Low quotas for some species compared to the relatively high haddock quota may constrain the ability of industry to effectively harvest all haddock quota. This may lead to discarding fish at sea, an activity which is not permitted under the Regulations.</p> <p>About 50% of the haddock landings have come from Unit Area 4Xp in the last four years. Of these, a substantial proportion (15-20%) was caught very close to the 4X/5Z boundary. It is unknown whether this is a fishery effect or a change in haddock distribution. An unknown amount of Georges Bank (5Z) fish may be caught along this line and at present, there is no established method to estimate the degree to which this may be occurring. The influence on model projections or advice is unknown.</p> <p>The management system takes into account the main uncertainties associated with varying stock status in relation to reference points, however, it cannot be said to take into account a wide range of uncertainties.</p> <p>A score of 80 but not 100 can be justified for issue b.</p>	
c	Guidepost	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Yes	Yes
			Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.

PI 1.2.2		There are well defined and effective harvest control rules in place	
	Justification	<p>TAC management was introduced to the fishery in 1970. Biological reference points were introduced in 2012 as a basis for a Precautionary Approach to management. The harvest strategy is to keep fishing mortality of 4X5Y haddock moderate by using the reference points and risk tolerances to determine harvest control rules. The TAC was 7,000 t from 2006 to 2009, but was lowered to 6,000 t for the 2010 and 2011 fishing years. However, catches have been lower than the TAC, averaging approximately 5,700 t since 2005. This is largely because the haddock fishery is constrained by strict Cod by-catch limits. TAC in the 2011/12 fishing year remained at 6,000 t but was reduced by 15% to 5,100 t for the 2012/2013 and 2013/2014 fishing years. Model results indicate that fishing mortality has been near or below the $F=0.25$ ($F_{0.1}$) reference removal rate over the past 20 years ($F_{msy}=0.43$) and well below after 2004.</p> <p>There is significant uncertainty regarding the model used to assess stock status. A review of the assessment framework has started and is expected to be completed by October 2015. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review.</p> <p>However, despite model uncertainties, management action has been consistent with Precautionary Approach principles and effective in terms of maintaining exploitation at levels required by harvest control rules in place for the fishery.</p> <p>A score of 100 is justified for issue c.</p>	
References	DFO 2012a,b		
OVERALL PERFORMANCE INDICATOR SCORE: A score of 80 is justified for issues a and b and a score of 100 for issue c, thus giving a score of 90 for this PI.			90
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.3

PI 1.2.3	Relevant information is collected to support the harvest strategy		
Scoring Issue	SG 60	SG 80	SG 100

PI 1.2.3		Relevant information is collected to support the harvest strategy		
a	Guidepost	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Yes	Yes	No
	Justification	<p>Research studies over a protracted period have provided considerable knowledge of all aspects of haddock life history, population biology, ecology and stock structure throughout the Scotian Shelf, Bay of Fundy, Georges Bank region.</p> <p>Stock productivity and abundance are monitored by way of an annual RV survey which provides ongoing, fishery-independent indices of abundance and biomass at age as well detailed information on size, age and maturity composition.</p> <p>Detailed information on number and type of vessels in the fishery is collected through the licensing system. The temporal and spatial pattern of fishery, gear usage, etc are well known. Catch monitoring within the commercial groundfish fishery has many components. All vessels are required to hail-out to the Department (DFO) prior to departing on a fishing trip and are also required to hail-in from sea prior to returning to port. The hail-in is captured by a third-party, independent dockside monitoring company who records information on the vessel as well as the catch on board. A variety of information must also be reported to the Department in fishery monitoring documents completed by the captain for each trip. A majority of the commercial groundfish fleet is required to carry Vessel Monitoring Systems (VMS) on board when on a fishing trip. The VMS units transmit positional information to a communication service provider who, in turn, makes the information available to the Department.</p> <p>Observer coverage for all fleets within the 4X5Y fishery has been very low. This results in imprecise estimates of bycatch and discards. The majority of 4X5Y haddock landings are monitored at the dockside point of offloading by dockside monitors. These monitors verify the weight and the species of fish offloaded. DFO Science undertakes dockside sampling to characterize the age and size composition of the landings.</p> <p>In addition to the foregoing, the Scotian Shelf, one of several large ocean areas on Canada's east coast, has been the focus of extensive ecosystem research for many years.</p> <p>A score of 80 is justified for issue a, however, the low observer coverage in the fishery precludes a score of 100.</p>		

PI 1.2.3		Relevant information is collected to support the harvest strategy		
b	Guidepost	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Yes	Yes	No
	Justification	<p>An annual RV survey provides ongoing, fishery-independent indices of abundance and biomass at age as well as detailed information on size, age and maturity composition of the catch.</p> <p>Haddock is harvested as part of a mixed, multi-species fishery that includes other groundfish such as Cod, Halibut, Redfish, Pollock and flounders, making it difficult to define a 'haddock' fishing trip. Consequently, catch is reported for all groundfish trips for mobile and fixed gear. The majority of 4X5Y haddock landings are monitored at the dockside point of offloading by dockside monitors. These monitors verify the weight and the species of fish offloaded. DFO Science undertakes dockside sampling to characterize the age and size composition of the landings. However, the low level of observer coverage for all fleets within the 4X5Y fishery compromises verification of actual catches with landings.</p> <p>The fishery is dominated by the mobile gear sector (variable, but >80% of landings in some years). Fixed gear landings are primarily from longlines, with gillnets and handlines contributing a minor proportion of the total. Recent changes in the management of the fishery have had a significant impact on the timing of the fishery, which has led to changes in the distribution of catches.</p> <p>While possible sources of uncertainty in data from the fishery are known, it cannot be said there is a good understanding of the robustness of assessment and management to the uncertainty.</p> <p>A score of 80, but not 100, is justified for issue b.</p>		
c	Guidepost		There is good information on all other fishery removals from the stock.	
	Met?		Yes	

PI 1.2.3		Relevant information is collected to support the harvest strategy	
	Justification	<p>Haddock is harvested as part of a mixed, multi-species fishery that includes other groundfish such as Cod, Halibut, Redfish, Pollock and flounders, making it difficult to define a 'haddock' fishing trip. Consequently, catch is reported for all groundfish trips for mobile and fixed gear. The majority of 4X5Y haddock landings are monitored at the dockside point of offloading by dockside monitors. These monitors verify the weight and the species of fish offloaded, thereby quantifying total removals for each species by all fisheries.</p> <p>A score of 80 is justified for issue c.</p>	
References		DFO 2012a,b Showell et al. 2013	
OVERALL PERFORMANCE INDICATOR SCORE: A score of 80 is justified for issues a, b and c, giving an overall score of 80.			80
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Yes	Yes
	Justification	<p>The stock is modelled using a Sequential Population Analysis (SPA) model. Discarding and high-grading of haddock appear to be negligible, therefore, the catch at age is assumed to be well estimated. The catch is assumed to be known without error and the model is tuned to the summer RV survey and ITQ survey. The model has been widely used in Canadian east coast fisheries since the mid-1990s. It provides an estimate of stock status in relation to reference points established for the 4X5Y haddock stock and projections of catch options associated with the F_{ref} harvest rate.</p> <p>A score of 100 is justified for issue a.</p>		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	Yes		

PI 1.2.4		There is an adequate assessment of the stock status		
	Justification	<p>The assessment provides an estimate of stock status in relation to reference points established for the 4X5Y haddock stock.</p> <p>A score of 60 is justified for issue b.</p>		
c	Guidepost	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Yes	Yes	No
	Justification	<p>There are continuing strong retrospective patterns in the stock assessment model, and poor model fit to survey indices. The strong retrospective patterns in F and SSB reflect mismatch between the survey indices and catch information. Nevertheless, the model indicates that SSB has remained relatively stable over the past two decades and suggests an increase in SSB in the past few years. However, the strong retrospective pattern (tendency of the model to overestimate biomass and underestimate F) indicates that the recent values are likely overestimates.</p> <p>Armstrong and risk plots are used to estimate the impacts of harvest levels in terms of change in SSB and probability of exceeding F_{ref}.</p> <p>A review of the assessment framework for this stock has started and is expected to be completed by October 2015. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review.</p> <p>While the assessment takes much of the uncertainty into account and is evaluating stock status relative to reference points in a probabilistic way, there are important uncertainties regarding the assessment model that need to be resolved. Therefore, a score of 80, but not 100, is justified for issue c.</p>		
d	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			No
	Justification	<p>There is significant uncertainty regarding the model used to assess stock status. A review of the assessment framework has started and is expected to be completed by early 2016. An updated assessment of stock status with revised reference points and projections including risk analyses will follow shortly after the framework review. The assessment model has been/is being tested but cannot be shown to be robust at this time. Alternative approaches will undoubtedly be explored in the framework review, however, a score of 100 cannot be justified for issue d at this time.</p>		

PI 1.2.4		There is an adequate assessment of the stock status		
e	Guidepost		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Yes	Yes
	Justification	<p>Participation at the RAP (peer review) includes DFO scientists and fishery managers, representatives of industry and Aboriginal organizations. Peer review is provided by scientists from within the unit responsible for the assessment as well as scientists from other species assessment units within the Region. It is also common practice for species experts from other DFO Regions to participate in a reciprocal arrangement to provide a level of external peer review. Within the limits of budgetary constraints, special effort is made to arrange participation by experts from outside DFO to participate in periodic assessment framework reviews.</p> <p>A score of 100 is justified for issue e.</p>		
References	DFO 2012a Showell et al. 2013			
OVERALL PERFORMANCE INDICATOR SCORE: A score of 100 is justified for issues a and e but not d, 60 for b and 80 for c, giving a score of 90 for this PI.				90
CONDITION NUMBER (if relevant):				N/A

Units of Certification (UoC1= 5Zjm OT, UoC2=5Zjm LL,UoC3=5Zjm GN,UoC4=5Zjm HL)

Evaluation Table for PI 1.1.1

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Yes	Yes	Yes
	Justification	<p>Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch (including discards). The VPA is calibrated to trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Retrospective analyses are conducted to detect any tendency to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates. In the most recent assessment, retrospective analysis showed lower biomass, higher F and lower recruitment for several years of the analysis, however, differences were not considered sufficient to warrant a rho adjustment.</p> <p>Several large recruitment events since 1990, lower exploitation, and reduced capture of small fish in the fisheries allowed the adult population biomass (ages 3+) to increase from near a historical low of 10,300 t in 1993 to a historical high of 160,300 t (80% confidence interval: 123,500 t – 206,400 t) at the beginning of 2014.</p> <p>Given that B_{usr} for this stock is 40,000 t, there is a high degree of certainty that the stock is above the point where recruitment would be impaired, thus justifying a score of 100 for issue a.</p>		
b	Guidepost		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		Yes	Yes
	Justification	<p>The stock was at a historical high of 160,300 t (80% confidence interval: 123,500 t – 206,400 t) at the beginning of 2014.</p> <p>Given that B_{usr} is 40,000 t, there is a high degree of certainty that the stock has been well above its USR over recent years, thus justifying a score of 100 for issue b.</p>		
References		TRAC 2014		

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Stock Status relative to Reference Points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Target reference point	The age-disaggregated Sissenwine-Shepherd production model was used to derive $SSB_{msy} = 78,000$ t.	40,000 t The Upper Stock Reference was suggested on the basis of generally higher recruitment when SSB is above 40,000 t.	160,300 t
Limit reference point	The lowest historical SSB from which the stock was able to recover (Brecover).	10,340 t	
OVERALL PERFORMANCE INDICATOR SCORE: The requirements of scoring issues 100 a and b are satisfied, giving a score of for this PI.			100
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.1.2

PI 1.1.2	Limit and target reference points are appropriate for the stock		
Scoring Issue	SG 60	SG 80	SG 100
a	Guidepost	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.
Met?		Yes	Yes

PI 1.1.2		Limit and target reference points are appropriate for the stock	
	Justification	<p>The 5Zjm stock assessment is conducted using an age structured VPA. For consistency, the age-disaggregated Sissenwine-Shepherd production model was used for derivation of SSB_{msy}. SSB_{msy} is determined by using a stock recruitment curve to derive equilibrium levels of catch and SSB for a range of fishing mortality rates. The average PR for 1995-2010, average fishery weight at age for 1931-2010 and spawning stock weight at age from the DFO spring survey from 1986-2011 are used for the yield and spawner per recruit analysis. The extremely large 2003 and 2010 year classes are excluded as outliers from the analysis. For the SSB and recruitment relationship analysis, the traditional parametric Beverton-Holt (BH) and Ricker (RK) stock-recruit models were fit to recruitment and SSB. Both models fit the data poorly, with strong time-series patterns in the residuals. A non-parametric Lowess smoother was applied and used to calculate SSB_{msy}. A non-parametric bootstrapping approach results in a bias adjusted SSB_{msy} of 78,000 t with a 95% confidence interval of 60,000 t to 91,000 t. An appropriate B_{usr} was not suggested. The Canadian Precautionary Approach Framework guideline is $B_{usr}=80\%B_{msy}=62,400$ t. However, B_{usr} has been set at 40,000 t. See rationale for issue c for this PI below.</p> <p>A $B_{recover}$ of 10,340 t has been set as the B_{lim} for the 5Zjm haddock stock. $B_{recover}$ represents the lowest historical SSB from which the stock was able to recover. See rationale for issue b for this PI below.</p> <p>This justifies a score of 80 for issue a.</p>	
b	Guidepost	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?	Yes	Yes

PI 1.1.2		Limit and target reference points are appropriate for the stock	
	Justification	<p>A B_{recover} of 10,340 t has been set as the B_{lim} for the 5Zjm haddock stock. B_{recover} represents the lowest historical SSB from which the stock was able to recover. This B_{lim} is well below the MSC requirement for a $\text{LRP}=50\%B_{\text{msy}}$ as well as the Canadian Precautionary Approach guideline of $\text{LRP}=40\%B_{\text{msy}}$.</p> <p>At the reference point workshop for this stock, it was felt that a comparison amongst the five B_{lim} candidates (see 4.3.4 in Background section for details) provided insight into the certainty of advice. If the results were clustered into one region, some level of confidence might be attributed to the result. These methods were applied. $S_{b_{50/90}}$ was calculated as 11,000 t. 5Zjm haddock experienced a secure recovery from a low biomass of 10,340 t in 1993. This B_{recover} was recommended as the LRP. The LRP is defined as the biomass level below which serious harm is occurring and secure recovery cannot be achieved. From the biomass history, 5Zjm haddock has been exposed to full exploitation over an extended time series and has recovered twice from low stock levels, in 1974 and in 1993. Under the assumption of no productivity regime changes, B_{recover} reflects the stock biomass dynamics and its resilience under different fishing pressure. The $S_{b_{50/90}}$, which is very close to this value, provided insight into the reliability of this metric. A recommendation for this B_{recover} as a B_{lim} was accepted at the 2012 Maritimes Region Reference Point Regional Peer Review meeting.</p> <p>A score of 100 can be justified for issue b.</p>	
c	Guidepost		<p>The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.</p> <p>The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.</p>
	Met?		<p>Yes</p> <p>Yes</p>

PI 1.1.2		Limit and target reference points are appropriate for the stock		
	Justification	<p>The analytically derived $SSB_{msy} = 78,000$ t. The Canadian Precautionary Approach Framework guideline is $B_{usr} = 80\%B_{msy} = 62,400$ t. However, B_{usr} has been set at 40,000 t.</p> <p>5Zjm haddock is included in the Canada – US Transboundary Resources Sharing Understanding and TAC decision making is a collaborative process. As such, objectives, strategies and reference points contained in the IFMP apply explicitly to the management of the stock within Canada. They may also be used to guide Canadian members during negotiations at the Transboundary Management Guidance Committee. However, differing legislative frameworks may prevent the perfect implementation of the domestic strategies advanced by one country. To avoid complicating the process, DFO has avoided specifying explicit biomass reference points. Nevertheless, the TMGC has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality reference ($F_{ref} = 0.26 = F_{0.1}$). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. Implicit in a $F_{0.1}$ harvest strategy is a B_{usr} well above 40,000 t and likely near B_{msy}.</p> <p>Selection of the 40,000 t B_{usr} is based on examination of a long time series of SSB and recruitment estimates for the stock which indicate that recruitment, while highly variable, has generally been higher when adult biomass has been above 40,000 mt, which has been the case since 2001. Implicit in a $F_{0.1}$ harvest strategy, assuming average recruitment, is a target reference point near B_{msy}. $B_{usr} = 40,000$ t is also well above the $B_{recover}$ SSB level.</p> <p>A score of 100 can be justified for issue c.</p>		
		d	Guidepost	For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.
			Met?	Not relevant
	Justification	This haddock stock is not considered to be a key lower trophic level stock.		
References		DFO 2012a,b Wang and Van Eeckhaute 2012		
OVERALL PERFORMANCE INDICATOR SCORE: A score of 80 is justified for issue a and 100 for issues b and c, giving a score of 100 for this PI.			100	
CONDITION NUMBER (if relevant):			N/A	

Evaluation Table for PI 1.1.3

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Where stocks are depleted rebuilding strategies, which have a reasonable expectation of success, are in place.		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe.
	Met?	Not Relevant		Not relevant
	Justification			
b	Guidepost	A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the depleted stock.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
c	Guidepost	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe.	There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	
	Met?	Not relevant	Not relevant	

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe	
	Justification		
References			
OVERALL PERFORMANCE INDICATOR SCORE:			N/A
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.1

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Yes	Yes	Yes

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	<p>For the 5Zjm haddock stock, the Transboundary Management Guidance Committee (TMGC) has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality reference, $F_{ref} = 0.26$ ($F_{0.1}$). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.</p> <p>Keeping fishing mortality moderate is achieved by using the following references and risk tolerances:</p> <p>The TAC should be set with a neutral (50%) probability of exceeding the fishing mortality limit reference (F) when it is above the upper stock reference (USR).</p> <p>The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A low (25%) to neutral (50%) probability of exceeding F_{ref} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on the location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example.</p> <p>When the SSB is below the limit reference point (LRP), the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75%). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline.</p> <p>A score of 100 is justified for issue a.</p>		
b	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Yes	Yes	Yes

PI 1.2.1		There is a robust and precautionary harvest strategy in place	
	Justification	<p>Fishing mortality fluctuated between 0.27 and 0.47 during the 1980s, and increased in 1992 to 1994 to about 0.5, the highest observed. After 2002, the age at full recruitment to the fishery has been at age 5 (rather than age 4 previously) due to a decline in size at age of haddock. Fishing mortality was below $F_{ref} = 0.26$ during 1995 to 2003, fluctuated around 0.3 in 2004 to 2006, but has subsequently been below F_{ref} and was 0.16 in 2013.</p> <p>Several large recruitment events since 1990, lower exploitation, and reduced capture of small fish in the fisheries allowed the adult population biomass (ages 3+) to increase from near a historical low of 10,300 t in 1993 to a historical high of 160,300 t at the beginning of 2014. The more than doubling of the adult biomass after 2005 was due to the exceptionally strong 2003 year class. Strong 2011 and exceptionally strong 2010 and 2013 year classes provide good prospects for ongoing above-average recruitment.</p> <p>A score of 100 is justified for issue b.</p>	
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.	
	Met?	Yes	
	Justification	<p>Status of the stock is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch. The VPA is calibrated to trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. This monitoring is carried out annually (see PI 1.2.3 for details).</p> <p>A score of 60 is justified for issue c.</p>	
d	Guidepost		The harvest strategy is periodically reviewed and improved as necessary.
	Met?		Yes
	Justification	<p>The IFMP for 5Zjm haddock requires periodic performance review of management measures involving both the US and Canada. Stock assessment updates occur annually. A scheduled evaluation occurs every four years with the next due in the 2016/17 planning year (see section 4.3.5 of Target Species Background for details).</p> <p>A score of 100 for issue d is justified.</p>	

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
References		TRAC 2014 DFO 2012b		
OVERALL PERFORMANCE INDICATOR SCORE: Requirements are met for all scoring issues, giving a score of 100 for this PI.				100
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Yes	Yes	

PI 1.2.2		There are well defined and effective harvest control rules in place	
	Justification	<p>For the 5Zjm haddock stock, the Transboundary Management Guidance Committee (TMGC) has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality reference, $F_{ref} = 0.26$ ($F_{0.1}$). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.</p> <p>Keeping fishing mortality moderate is achieved by using the following references and risk tolerances:</p> <p>The TAC should be set with a neutral (50%) probability of exceeding the fishing mortality limit reference (F_{ref}) when it is above the upper stock reference (USR). The TAC should be set to mitigate declines and, when possible, promote positive change in spawning stock biomass (SSB) over a three-year period when it is below the upper stock reference (USR). A low (25%) to neutral (50%) probability of exceeding F_{ref} is acceptable when the stock is in the Cautious Zone, so long as the first criterion is met; however, it is required that fishing mortality will decline as the stock progresses lower into the Cautious Zone. The management response will vary depending on the location of the stock within the Cautious Zone, whether the stock is increasing or decreasing, whether the trajectory (growth or decline) is projected to continue, and indications of incoming recruitment to the SSB, for example.</p> <p>When the SSB is below the limit reference point (LRP), the harvest strategy is to be results-driven rather than based on a predetermined harvest rate. Rebuilding to a level above the LRP should be achieved in a reasonable timeframe (1.5 to 2 generations) with a high degree of probability (greater than 75%). The TAC (if appropriate) should be set with a very low (less than 5%) risk of preventable biomass decline.</p> <p>A score of 80 is justified for issue a.</p>	
b	Guidepost		<p>The selection of the harvest control rules takes into account the main uncertainties.</p> <p>The design of the harvest control rules takes into account a wide range of uncertainties.</p>
	Met?		<p>Yes</p> <p>No</p>

PI 1.2.2		There are well defined and effective harvest control rules in place		
	Justification	<p>Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Conservation Harvesting Plans indicate which species may be the target of a directed fishery and set out the measures that apply to non-target species (e.g. Cusk, White hake, Monkfish). All non-groundfish species must be returned to the water, with the exception of those species whose retention is specifically permitted within licence conditions.</p> <p>Under the Canada – US Transboundary Resources Understanding for groundfish stocks, both countries are responsible for accounting for all fishing mortality under the respective country quota. Canada now accounts for two sources of fishing mortality on 5Zjm haddock: landings from the directed groundfish fleet and estimated legal discards from the offshore scallop fleet, which catches these stocks as an incidental catch. The fleet is required to return haddock to the water, nevertheless, discards in this fishery represent significant removals. Information from observed scallop trips is used to estimate the quantity of haddock discarded throughout the entire season. This estimate is considered catch and counted against the bycatch reserve which comes from Canada’s allocation.</p> <p>Given the high haddock quotas available and the constraints of a low Cod quota, it is expected that groundfish fishers are illegally discarding Cod to be able to extend the season for haddock fishing. A process has been in place since 2006 to estimate the amount of Cod that is illegally discarded. This is in addition to the mandatory use of a separator panel when fishing with otter trawl.</p> <p>Harvest control rules take into account the main uncertainties, however, it cannot be said they take into account a wide range of uncertainties.</p> <p>A score of 80 but not 100 can be justified for issue b.</p>		
c	Guidepost	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Yes	Yes	Yes

PI 1.2.2		There are well defined and effective harvest control rules in place	
	Justification	<p>Fishing mortality fluctuated between 0.27 and 0.47 during the 1980s, and increased in 1992 to 1994 to about 0.5, the highest observed. After 2002, the age at full recruitment to the fishery has been at age 5 (rather than age 4 previously) due to a decline in size at age of haddock. Fishing mortality was below $F_{ref} = 0.26$ during 1995 to 2003, fluctuated around 0.3 in 2004 to 2006, but has subsequently been below F_{ref} and was 0.16 in 2013.</p> <p>A score of 100 is justified for issue c.</p>	
References		TRAC 2014 DFO 2012b	
OVERALL PERFORMANCE INDICATOR SCORE: A score of 80 is justified for issues a and b and 100 for issue c, giving a score of 90 for this PI.			90
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.3

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Yes	Yes	Yes

PI 1.2.3	Relevant information is collected to support the harvest strategy
Justification	<p>Research studies over a protracted period have provided considerable knowledge of all aspects of haddock life history, population biology, ecology and stock structure throughout the Scotian Shelf, Bay of Fundy, Georges Bank region.</p> <p>Stock productivity and abundance are monitored by way of three annual RV bottom trawl surveys (NMFS spring and fall and DFO Winter), which provide ongoing, fishery-independent indices of abundance and biomass at age as well as detailed information on size, age and maturity composition.</p> <p>Detailed information on number and type of vessels in the fishery is collected through each country's licensing system. The temporal and spatial patterns of the fishery, gear usage, etc are well known. Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Under the Canada – US Transboundary Resources Understanding for groundfish stocks, both countries are responsible for accounting for all fishing mortality under the respective country quota. All vessels are required to hail-out to the Department (DFO) prior to departing on a fishing trip and are also required to hail-in from sea prior to returning to port. The hail-in is captured by a third-party, independent dockside monitoring company who records information on the vessel as well as the catch on board. A variety of information must also be reported to the Department in fishery monitoring documents completed by the captain for each trip. When fishing on Georges Bank, all vessels in the commercial groundfish fleet are required to carry Vessel Monitoring Systems (VMS) on board when on a fishing trip. The VMS units transmit positional information to a communication service provider who, in turn, makes the information available to the Department. All landings are monitored at the dockside point of offloading. Monitors verify the weight and the species of fish offloaded.</p> <p>Observer coverage is high in this fishery, averaging 36% of the mobile gear catch and 13.5% of the fixed gear catch over the 2004-2013 period. Coverage of the scallop fishery, which catches haddock incidentally, is sufficiently high to estimate how much haddock is discarded by the fleet throughout the entire season.</p> <p>In addition to the foregoing, the whole Georges Bank-Gulf of Maine-Bay of Fundy-Southern Scotian Shelf region has been the focus of extensive ecosystem research for many years.</p> <p>A score of 100 is justified for issue a.</p>

PI 1.2.3		Relevant information is collected to support the harvest strategy		
b	Guidepost	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Yes	Yes	No
	Justification	<p>Stock abundance is monitored by way of three annual RV bottom trawl surveys (NMFS spring and fall and DFO Winter), which provide ongoing, fishery-independent indices of abundance and biomass at age as well as detailed information on size, age and maturity composition.</p> <p>Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Under the Canada – US Transboundary Resources Understanding for groundfish stocks, both countries are responsible for accounting for all fishing mortality under the respective country quota. All landings are monitored at the dockside point of offloading. Monitors verify the weight and the species of fish offloaded. A variety of information must also be reported to the Department in fishery monitoring documents completed by the captain for each trip.</p> <p>Observer coverage is high in this fishery, averaging 36% of the mobile gear catch and 13.5% of the fixed gear catch over the 2004-2013 period. Coverage of the scallop fishery, which catches haddock incidentally, is sufficiently high to estimate how much haddock is discarded by the fleet throughout the entire season.</p> <p>However, there is inherent uncertainty associated with haddock in 5Zjm being part of a transboundary stock on which there is a two-nation fishery. In addition, about 50% of haddock landings in the 4X5Y fishery have come from Unit Area 4Xp in the last four years. Of these, a substantial proportion (15-20%) was caught very close to the 4X/5Z boundary. It is unknown whether this is a fishery effect or a change in haddock distribution. An unknown amount of Georges Bank (5Z) fish may be caught along this line and at present, there is no established method to estimate the degree to which this may be occurring.</p> <p>While information monitoring is carried out with a high degree of certainty and there is a good understanding of inherent uncertainties, it cannot be said that there is good understanding of the robustness of assessment and management to the uncertainty.</p> <p>A score of 80, but not 100, is justified for issue b.</p>		

PI 1.2.3		Relevant information is collected to support the harvest strategy	
c	Guidepost		There is good information on all other fishery removals from the stock.
	Met?		Yes
	Justification	<p>Haddock is the key harvested species in the multi-species groundfish fishery on Eastern Georges Bank. Gears used to prosecute the fishery tend to capture a variety of groundfish species, whether they are the target of the fishery or not. Under the Canada – US Transboundary Resources Understanding for groundfish stocks, both countries are responsible for accounting for all fishing mortality under the respective country quota. Landings are monitored at the dockside point of offloading. Monitors verify the weight and the species of fish offloaded. A variety of information must also be reported to the Department in fishery monitoring documents completed by the captain for each trip.</p> <p>Observer coverage is high in this fishery, averaging 36% of the mobile gear catch and 13.5% of the fixed gear catch over the 2004-2013 period. Coverage of the scallop fishery, which catches haddock incidentally, is sufficiently high to estimate how much haddock is discarded by the fleet throughout the entire season.</p> <p>A score of 80 is justified for issue c.</p>	
References	TRAC 2014 DFO 2012b		
OVERALL PERFORMANCE INDICATOR SCORE: A score of 100 can be justified for issue a and a score of 80 is justified for issues b and c, giving an overall score of 90 for this PI.			90
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Yes	Yes
	Justification	<p>Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch (including discards). The VPA is calibrated to trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Robustness testing includes model fit diagnostics and retrospective analyses are conducted to detect any tendency to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates. In the most recent assessment, retrospective analysis showed lower biomass, higher F and lower recruitment for several years of the analysis, however, differences were not considered sufficient to warrant a rho adjustment.</p> <p>A score of 100 is justified for issue a.</p>		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	Yes		
	Justification	<p>The assessment provides an estimate of stock status in relation to reference points established for the 5Zjm haddock stock.</p> <p>A score of 60 is justified for issue b.</p>		
c	Guidepost	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Yes	Yes	Yes

PI 1.2.4		There is an adequate assessment of the stock status		
	Justification	<p>Evaluation of stock status is based on results from an age structured analytical assessment (Virtual Population Analysis, VPA) that uses fishery catch statistics and sampling for size and age composition of the catch (including discards). The VPA is calibrated to trends in abundance from three bottom trawl survey series: NMFS spring, NMFS fall and DFO Winter. Robustness testing includes model fit diagnostics and retrospective analyses are conducted to detect any tendency to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates.</p> <p>Model projections provide a basis for determining probability of exceeding F_{ref} for a range of catch options.</p> <p>A score of 100 is justified for issue c.</p>		
d	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Yes
	Justification	<p>The model used to assess status of 5Zjm haddock is subject to ongoing rigorous review and evaluation. Adjustments are made as necessary to correct for any bias or other uncertainty that is detected.</p> <p>A score of 100 is justified for issue d.</p>		
e	Guidepost		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Yes	Yes
	Justification	<p>Science advice is provided annually through the Transboundary Resources Assessment Committee (TRAC), the forum for joint science advice on Canada-US transboundary fish stocks. Both DFO and NMFS conduct internal reviews and occasionally a framework review/assessment is carried out that is subject to review by external experts.</p> <p>A score of 100 is justified for issue e.</p>		
References	TRAC 2014 DFO 2012b			
OVERALL PERFORMANCE INDICATOR SCORE: A score of 60 is justified for issue b and 100 for issues a, c, d and e. This gives an overall score of 100 for this PI.				100
CONDITION NUMBER (if relevant):				N/A

Principle 2

Evaluation Table for PI 2.1.1

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Met?	<p>4X5Y OT (UoC 1) Cod: N go to issue c Pollock Y Redfish Y Winter Flounder: N go to issue c</p> <p>4X5Y LL (UoC2) Cod: N go to issue c Cusk Y Halibut Y White hake Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm OT (UoC5) Cod: go to issue c Pollock Y Yellowtail Flounder Y</p> <p>5Zjm LL (UoC6) Cod: N go to issue c Cusk Y</p> <p>5Zjm GN (UoC7) Y</p> <p>5Zjm HL (UoC8) Y</p>	<p>4X5Y OT (UoC 1) Cod: N go to issue c Pollock Y Redfish Y Winter Flounder: N go to issue c</p> <p>4X5Y LL (UoC2) Cod: N go to issue c Cusk Y Halibut Y White hake Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm OT (UoC5) Cod: go to issue c Pollock Y Yellowtail Flounder Y</p> <p>5Zjm LL (UoC6) Cod : N go to issue c Cusk Y</p> <p>5Zjm GN (UoC7) Y</p> <p>5Zjm HL (UoC8) Y</p>	<p>4X5Y OT (UoC 1) Cod N Pollock Y Redfish Y Winter Flounder N</p> <p>Minor Species American plaice Cusk Y Pollock Y Halibut Y Sculpin N Monkfish N Witch flounder N White hake Y</p> <p>4X5Y LL (UoC2) Cod N Cusk N Halibut N White hake N</p> <p>Minor Species Redfish Y Pollock Y Monkfish N Cusk Y Halibut, Y Sculpin N</p> <p>4X5Y GN (UoC3) N</p> <p>4X5Y HL (UoC4) N</p> <p>5Zjm OT (UoC5) Cod N Pollock Y</p>

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
			Yellowtail Y Minor species Halibut Y Monkfish Y Redfish Y White hake Y Winter flounder N 5Zjm LL (UoC6) Cod N Cusk N Minor Species Halibut Y Monkfish Y Pollock Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y
	Justification	<p>For the majority of the main retained species, their status they are highly likely to be within biologically based limits.</p> <p>According to MSC V1.3, species that comprise >5% of the total catch (by weight) can be considered for subsequent analysis. All groundfish except for dogfish, skates and sculpin must be landed, and recorded through logbooks, dockside monitoring and risk-based independent observer coverage. Below is a summary of the current status of these stocks (all 4X5Y, 5Zjm unless otherwise indicated).</p> <p>4X5Y Otter Trawl UoC1</p>	

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>Cod: Average retained catch of Cod by otter trawlers targeting haddock in 4X5Y for 2011 to 2013 was 522.4 mt. Despite the low landings in recent years, the biomass survey indices estimates for the 4X5Y Cod have been continuously declining. The stock is deemed to have declined by 59-64% in the past generations, and was designated as “Endangered” by COSEWIC in 2010 (COSEWIC, 2010). The survey biomass index estimate for 2013 (2,058 mt) is the lowest from the time-series (1970-2013), representing a 37% reduction in relation to the previous year. This value is well below short-term average 2007-2011 (6,413 mt), medium-term average 1997-2011 (11,202 mt) and long-term average (20,963 mt) (DFO, 2014a). Fishing mortality (F) remains above the reference level (0.2), and was estimated at 0.3 in 2008 (DFO, 2011). Recent, information on F is not available.</p> <p>The Stock biomass and abundance has been stable at lower levels. Major sources of mortality for the stock are natural mortality (including seal predation), fishing above F_{ref}, discards, and bycatch . Stock is experiencing lower recruitment. Although fishing mortality has experienced a considerable drop in the mid-90s, it has remained above the reference level ($F=0.2$) since 1948. Projections suggest a possible increase in SSB, if fishing mortality drops to at least the reference F, but uncertainty is high (DFO, 2011).</p> <p>Management options for 4X5Y Cod remain implemented through a precautionary TAC (1,650 mt) which is calculated to promote recovery (Clark et al, 2011). Recently the TAC has been effectively halved as a result of the 2014 interim advice – TAC is now 1650mt over 2 year (TRAC 2014).</p> <p>The most recent stock status update (2014) indicates that Cod has not experienced the rebuilding previously predicted and expected with the 2011 reduction of TAC in 4X5Y from 3,000 mt to 1,650 mt. Previous projections estimated that Cod would reach the LRP by 2036 with moderate fishing, but it appears that this is not likely to be achieved based on current biomass projections. Major sources of mortality for the stock include fishing above F_{REF}, discards and bycatch, as well as natural mortality. DFO Cod surveys for 2013 and 2014 show record low numbers. The assessment suggests that “Atlantic Cod from all fisheries should be reduced to the lowest possible level.” It did not meet 60a. Thus for management measures please see Section C.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>Pollock: The annual average retained catch of Pollock by trawlers targeting haddock in 4X5Y for the period of 2011 to 2013 it was 2,433 mt. Spawning stock biomass declined from 66,000 mt in 1984 to 7,500 mt in 2000. Biomass has shown signs to be rebuilding since 2000, peaking in 2007 with 29,000 mt. However it declined the following year to 27,000 mt in 2008. Since 2006, Fishing mortality have been below the F_{REF} of 0.2 for size classes 6-9. This could be attributed to reduced harvest rates and quotas as well as increasing population biomass. There have been several stock assessments with contrasting results. For example, the 2008 assessment indicated that age 4+ population biomass was at 27,000 mt (Stone et al. 2009) while the 2010 assessment update indicated 4+ population biomass was either 23,000 mt or 17,000 mt, depending on whether the very low 2010 DFO Research Vessel (RV) survey indices were excluded or included from the analysis (Stone 2011). Data from surveys show that In 4X East the 2011 biomass estimate was the highest in the survey series and the biomass estimate in 4X West was similar to 2010 and was the lowest observed since 1983. However it was well below short, medium and long-term averages. Reference points were recently presented for the Eastern Component, 4VWX Pollock. These are based on a proxy for B_{MSY}. The proxy was developed using data from the DFO summer RV survey time series 1970 to 2011. A management evaluation strategy approach has been applied to manage the Western Component of the stock (NAFO div. 4X5). Reference points based on the precautionary approach were discussed at a recent RPA (DFO 2012) based on the geometric mean of the survey biomass years 1984 to 1994. Pollock stocks are well above the average survey index (DFO 2012b). SG100a score is met.</p> <p>Redfish: The annual average retained catch of Redfish by trawlers targeting haddock in 4X5Y for the period of 2011 to 2013 it was 4,741 mt. Default reference points based on the Precautionary Approach are used because a stock-recruit limit cannot be estimated. These reference points are $0.40B_{MSY}$ and $0.80B_{MSY}$ for the critical-cautious boundary (Limit Reference Point) and cautious-healthy boundary (Upper Stock Reference Point). Results from the recent stock assessment concluded that <i>S. fasciatus</i> in Unit 3 are above $0.80B_{MSY}$ (99% CI) (McAllister and Duplisea, 2011). Biological reference points have not been fully adopted but are in discussion (DFO 2012b). Units 3 (Scotian Shelf) are all above the long term mean (DFO 2012). SG100a score is met.</p> <p>Winter Flounder: The annual average retained catch of Winter Flounder by trawlers targeting haddock in 4X5Y for the period of 2011 to 2013 it was 1,032.8 mt. RV survey biomass indices (tonnes) for Winter flounder in 2014 was below than averages for long-term (1970-2013), but above than the medium-term 15 year (1999-2013), and short-term 5 year (2009-2013) time periods. Until 2013 management of Winter flounder has been based on TACS for the flatfish complex. There have not been no specific LRPs for this species. It did not meet 60a. Thus, please refer to Section C.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>Minor Species</p> <p>American plaice: RV survey biomass indices (tonnes) for American plaice in 2014 was below than averages for long-term (1970-2013), the medium-term 15 year (1999-2013), and short-term 5 year (2009-2013) time periods.</p> <p>Management of American plaice has been based on TACs for the flatfish complex. There have not been specific LRPs for this species. It does not meet 100a</p> <p>Cusk: Cusk is considered by COSEWIC to be “threatened.” The annual average retained catch of Cusk by trawlers targeting haddock in 4X5Y for the period 2002 to 2008 was 24 mt and for the period of 2011 to 2013 it was 15.6 mt. Cusk population abundance levels were first determined in the 1970s; and have continued to decline since the late 1990s. The mature portion of the population has declined by approximately 85% over three generations. There is also strong evidence that its area of occupancy has declined considerably. Average fish size has also declined, consistent with a decline in abundance. Limited management efforts have not been effective in halting the decline.” The reference points for Cusk under the DFO Precautionary Framework were set at an Upper Stock Reference (USR) of 26.6 kg/1000 hooks and a Limit Reference Point (LRP) of 13.3 kg/1000 hooks in the Halibut Industry Survey - 80% and 40%, respectively, of the average commercial CPUE from the 1986-1992 period. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP (Harris et al. 2012). The mean Cusk CPUE from the Halibut Industry Survey has been at or above LRP for the last 7 years. The 3-year geometric mean (2011-2013) of the Cusk CPUE is 17.9 kg/1000 hooks, which suggests that the stock is in the cautious zone. A high level of uncertainty is indicated by the wide confidence interval (Figure 3, DFO 2014a). The Upper Stock Reference Point of 26.6 kg/1000 hooks in the Halibut Industry Survey is the proposed population recovery target.</p> <p>A score of 80 is justified for issue a.</p> <p>Halibut 3NOPs4VWX: Average retained catch of Atlantic Halibut by otter trawl targeting haddock in 4X5Y for the period 2002 to 2008 was 47 mt and for 2011-2013 it was 59 mt. In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase, and it was concluded that there was little risk in harming the productivity of the stock at harvest levels < 4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that <i>F</i> has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and <i>F</i> are also consistent with model projections (DFO 2012, DFO 2014).</p> <p>Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years.</p> <p>A score of 100 is justified for issue a.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>Sculpin: The annual average retained catch of Sculpin by trawlers targeting haddock in 4X5Y for the period 2011-2013 was 123 mt. RV survey biomass indices (mt) for Long Sculpin in 2014 was below the averages for long-term (1970-2013), medium-term 15 year (1999-2013), and short-term 5 year (2009-2013) time periods. There have not been specific LRPs for this species. It does not meet 100a</p> <p>Monkfish: The annual average retained catch of Monkfish by trawlers targeting haddock in 4X5Y for the period 2004 to 2008 was 581 mt and for 2011-2013 it was 82 mt. RV survey biomass indices (mt) for Monkfish in 2014 was below the averages for long-term (1970-2013), but above the medium-term 15 year (1999-2013), and short-term 5 year (2009-2013) time periods. Management of Monkfish has been based on TAC quotas. There have not been specific LRPs for this species. It does not meet 100a</p> <p>Witch flounder: The annual average retained catch of Witch flounder by trawlers targeting haddock in 4X5Y for the period 2011 to 2013 was 75.6 mt. RV survey biomass indices (mt) for Witch Flounder in 2014 was below the averages for long-term (1970-2013), medium-term 15 year (1999-2013), and short-term 5 year (2009-2013) time periods. Management of American plaice has been based on TACS for the flatfish complex. There have not been specific LRPs for this species. It does not meet 100a</p> <p>White Hake: The annual average retained catch of White hake by trawlers targeting haddock in 4X5Y for the period 2002 to 2008 was 391 mt and for 2011 to 2013 it was 421 mt. In the Maritimes region, catches of White hake were highest in 1986 and 1987 (around 8,000 mt), and remained relatively high (around 5,000 mt) into the mid-1990's. Catch restrictions were introduced in the mid-late 1990's, and since then catches have been at or below 2,100 mt annually. Abundance has been in decline since the early 1990s despite efforts in reducing fishing mortality in all areas since the introduction of catch limits in 1996. The reason for the high total mortality on the Scotian Shelf is unknown. Biomass index from research survey for White Hake in 4X has been below the long-term survey average (1982-2011), the medium-term 15 year average (1997-2011), and the short-term 5 year average (2007-2011). Spawning biomass index in 2014 was in the cautious zone. A score of 80 is justified for issue a.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>4X5Y Longline (UoC2) Cod: Average retained catch of Atlantic Cod by bottom long liners targeting haddock in 4X5Y for the period 2011 to 2013 was 614 mt. For stock status, please see above. It did not meet 60a. Thus, please refer to Section C.</p> <p>Halibut 3NOPs4VWX: Average retained catch of Atlantic Halibut by bottom long liners targeting haddock in 4X5Y for 2011-2013 was 378.144 mt. For stock status, please see above. A score of 100 is justified for issue a.</p> <p>Cusk: Cusk is considered by COSEWIC to be “threatened.” The annual average retained catch of Cusk by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 277.059 mt. For stock status, please see above. A score of 80 is justified for issue a.</p> <p>White Hake: The annual average retained catch of White hake by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 360.86 mt. For stock status, please see above. A score of 80 is justified for issue a.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>Minor Species</p> <p>Redfish: Average retained catch of Redfish by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 10 mt. For stock status, please see above. It meets 100a.</p> <p>Pollock: Average retained catch of Atlantic Pollock by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 47.13 mt. For stock status, please see above. It meets 100a.</p> <p>Monkfish: Average retained catch of Monkfish by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 14.3mt. No LRP has been developed for his species. For stock status, please see above. It does not meet 100a.</p> <p>Cusk: Average retained catch of Cusk by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 277 mt. Status currently in the cautious zone. For more details on stock status, please see above. It does not meet 100a.</p> <p>Halibut: Average retained catch of Atlantic Cod by bottom long liners targeting haddock in 4X5Y for 2011 to 2013 was 378 mt. For stock status, please see above. It meets 100a.</p> <p>4X5Y Gillnet (UoC3). Data on retained species from the gillnet fisheries were not provided to the assessment team due to confidentiality issues, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets 80a.</p> <p>4X5Y Handline (UoC4). Data on retained species from the handline fisheries were not provided to the assessment team due to confidentiality issues, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets 80a.</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>5Zjm Otter Trawl (UoC5)</p> <p>Cod: Annual average retained catch of Cod by otter trawl targeting haddock in 5Zjm for 2011-2013 was 194 mt. Stock status evaluations for 5Zjm (VPA) indicate a substantial decline in adult population numbers and biomass in the mid 1990s, after which the stock has remained consistently at a low level. The abundance of Cod in Div. 5Zjm remains below pre-1994. Mature biomass at the beginning of 2010 was estimated at 9,260 mt (3.4 million individuals). Natural mortality of Div. 5Zjm Cod aged 6 years and older(6+) is also elevated (0.5 for 1994 to 2008, VPA). Total mortality for Cod in 5Zjm shows little or no decline over the last three decades. Recruitment for 5Zjm Cod has been poor since the early 1990s (≤ 5 million fish). Recruitment has generally been higher when ages 3+ biomass exceeded 30,000 mt and the number of recruits per spawner has not increased in recent years when the biomass has been low. While management measures have resulted in a decreased exploitation rate since 1995, total mortality has remained high and adult biomass has fluctuated at a low level. The adult population biomass at the beginning of 2013 was estimated at 11,160 mt, which was about 20% of the adult biomass in 1978. Recruitment at age 1 has been low in recent years. Lower weights at age in the population in recent years and poor recruitment have contributed to the lack of rebuilding. Considering $F_{REF}=0.18$ is not consistent with the assessment VPA “M 0.8” model, it is inappropriate for the catch advice. TRAC recommends basing catch advice on an $F=0.11$. Current biomass is below $LRP = 21,000$ mt. It did not meet 60a. Thus, please refer to Section C.</p> <p>Pollock: The annual average retained catch of Pollock by otter trawlers targeting haddock in 5Zjm for 2011 to 2013 it was 947.632 mt. See above for stock status. A score of 100 is justified for issue a.</p> <p>Yellowtail Flounder: The combined data from USA and Canada catches for 2013 was the lowest value in the time series beginning in 1935. All three bottom trawl surveys declined from already low values and catch curve analyses indicate high total mortality rates ($Z > 1$). Recent catch is low relative to the biomass estimated from the surveys. The declining trend in survey biomass in recent years to low levels, despite reductions in catch to low amounts, indicates a poor state of the resource. It did not meet 60a. Thus, please refer to Section C.</p>

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
		<p>Minor Species</p> <p>Halibut: The annual average retained catch of Halibut by otter trawl targeting haddock in 5Zjm for the period 2002 to 2008 was 15 mt and for 2011-2013 it was 22 mt. See above for stock status. A score of 100 is justified for issue a.</p> <p>Winter Flounder: The annual average retained catch of Winter Flounder by trawlers targeting haddock in 5Zjm for the period of 2011 to 2013 it was 47.6 mt.</p> <p>Despite considerable interannual variability, the relative abundance trends in the Canadian spring surveys showed an increasing trend during the 1990s and abundance peaked in the early 2000s, followed by a declining trend during later years. After that, the Canadian spring indices remained stable at some of the lowest levels in the time series during 2008-2014. There is no TACs for 5Zjm Winter Flounder. There have not been no specific LRP for this species.</p> <p>It does not meet 100a.</p>	
		<p>5Zjm Longline (UoC6)</p> <p>Cod: Annual average retained catch of Cod by bottom long liners targeting haddock in 5Zjm for 2011-2013 was 270 mt. For stock status, please see above . It did not meet 60a. Thus, please refer to Section C.</p> <p>Cusk: The annual average retained catch of Cusk by bottom long liners targeting haddock in 5Zjm for 2011-2013 was 75.9 mt. See above for stock status. A score of 80 is justified for issue a.</p> <p>Minor Species</p> <p>Halibut: The annual average retained catch of Halibut by bottom long liners targeting haddock in 5Zjm for 2011-2013 was 22 mt. See above for stock status. A score of 100 is justified for issue a.</p> <p>Monkfish: The annual average retained catch of Monkfish by bottom long liners targeting haddock for 2011-2013 was 1.12 mt. There are no biological reference points for this species. Management is based on TAC. A score of 80 is justified for issue a.</p> <p>White Hake: The annual average retained catch of White hake by bottom long liners targeting haddock in 5Zjm for 2011-2013 was 42 mt. Stock status is in the caution zone. A score of 80 is justified for issue a.</p> <p>4X5Y & 5Z Gillnet & Hand line (UoCs 3,4,7,8). Data on retained species from the gillnet handline fisheries were not provided to the assessment team due to confidentiality issues, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets 80a.</p>	
b	Guidepost		Target reference points are defined for retained species.

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
	Met?		<p>4X5Y OT (UoC1) Major Species Cod Y Pollock Y Redfish Y Winter Flounder N Minor Species American plaice N Cusk Y Halibut Y Sculpin N Monkfish N Witch flounder N</p> <p>4X5Y LL (UoC2) Major Species Cod Y Cusk Y Halibut Y White hake Y Minor Species Redfish Y Pollock Y Monkfish N</p> <p>4X5Y GN (UoC3) N</p> <p>4X5Y HL(UoC4) N</p> <p>5Zjm OT (UoC5) Cod Y Pollock Y Minor Species Halibut Y Monkfish N Redfish Y White hake Y Winter flounder N</p> <p>5Zjm Longline (UoC6) Major Species Cod Y Cusk Y Minor Species Halibut Y</p>

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
			Monkfish N Pollock Y

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
Justification	<p>Target reference points are defined for the majority of retained species</p> <p>Main Species</p> <p>4X5Y Atlantic Cod: An LRP and limit RR for 4X5Y Atlantic Cod were presented for information only. A USR was proposed. The LRP (24,000 mt) was based on a Beverton-Holt stock-recruitment model using the full time series. The limit RR (0.2) was calculated as F0.1 in the 1990s. The USR (48,000 mt) is double the LRP. A score of 100 is justified for issue b.</p> <p>Cusk: The proposed LRP (13.3 kg/1000 hooks) and USR (26.6 kg/1000 hooks) were calculated as 40% and 80% of the MSY proxy (commercial longline catch per unit effort from period of high catches, 1986-1992). A score of 100 is justified for issue b.</p> <p>White Hake: The White hake reference points are based on the RV survey data. Biomass for MSY is estimated to be 13,867 mt (B_{MSY} proxy). B_{MSY} proxy for the stock is estimated based on the productive period from the RV survey (1983 to 1992) and includes White hake that are 42+ cm. The LRP, based on B_{MSY} proxy is 5,447 mt or 0.40 B_{MSY}. The USR is 0.80 B_{MSY} or 11,093 mt. If the biomass is estimated to be above the USR the stock is said to be in the healthy zone. If between the LRP and USR, the stock is said to be in the cautious zone and below the LRP in the critical zone. Depending on where the stock falls on this scale and what the trajectory is different harvest control rules will be applied. A score of 100 is justified for issue b.</p> <p>Redfish: reference points for Unit 3 Redfish were adopted based on a proxy for B_{MSY} from DFO's summer RV survey mean (1970-2011). Forty percent of the B_{MSY} proxy was adopted as the LRP (29,000 mt), and 80% of the B_{MSY} proxy was adopted as the USR (58,000 mt). A target RR (0.068) was adopted based on the maximum relative fishing mortality rate (F) that would not result in a reduction in population biomass. A score of 100 is justified for issue b.</p> <p>4X Winter Flounder: Does not score 100b There are no established reference points for Winter Flounder .</p> <p>GB Yellowtail Flounder: Updated biological reference points (BRPs) for the stock are: $F_{MSY} = 0.44$ $SSB_{MSY} = 8,100$ mt $MSY = 3,200$ mt A score of 100 is justified for issue b.</p> <p>5Zjm Cod: The LRP (21,000 mt) was based on a Beverton-Holt stock-recruitment model using the full time series. A score of 100 is justified for issue b.</p> <p>5Zjm Cusk: The proposed LRP (13.3 kg/1000 hooks) and USR (26.6 kg/1000 hooks) were calculated as 40% and 80% of the MSY proxy (commercial longline catch per unit effort from period of high catches, 1986-1992). A score of 100 is justified for issue b.</p>

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
		<p>Western Component (4Xopqrs5) Pollock: A Management Strategy Evaluation (MSE) approach has been applied to manage western component (4Xopqrs5) Pollock. The LRP could be defined as the Survey Index Ratio (Jy)=0.2, i.e., when the 3-year geometric mean survey biomass index falls to 20% of the geometric mean survey biomass index for 1984-1994. The HCR with updated monitoring data for 2014 generated a catch limit of 2,781 mt for FY 2015-2016, down 9% from 3,072 mt for FY 2014- 2015. The RV survey biomass index decreased from 28.45 kg/tow in 2013 to 8.53 kg/tow in 2014. A score of 100b is justified.</p> <p>Eastern Component (4VWXmn) Pollock: An LRP and USR for eastern component (4VWXmn) Pollock were presented for review, based on a proxy for B_{MSY} based on data for 1984-1993, a period of high biomass for this stock. The proposed LRP (40% B_{MSY} proxy) was calculated to be 20,100 mt, and the proposed USR (80% B_{MSY} proxy) was calculated to be 40,100 mt. A score of 100b is justified.</p> <p>3NOPs4VWX+5 Atlantic Halibut: PA reference points for 3NOPs4VWX+5 Atlantic Halibut were developed, based on a modified Sissenwine- Shepard production model using the full time series. Forty percent of spawning stock biomass at maximum sustainable yield (SSB_{MSY}) was presented as the LRP (1,960 mt), and 80% of SSB_{MSY} was presented as the USR (3,920 mt). Fishing mortality at MSY ($F_{MSY}=0.36$) was presented as a limit RR. A target RR of 0.2 has been proposed. A score of 100b is justified.</p>	
		<p>Minor Species</p> <p>Longhorn Sculpin: There are no biological reference points for this species. It does not meet 100b.</p> <p>Monkfish: There are no biological reference points for this species. It does not meet 100b.</p> <p>Witch flounder: There are no biological reference points for this species. It does not meet 100b.</p> <p>Winter flounder (5Zjm) There are no biological reference points for this species. It does not meet 100b.</p> <p>American plaice: There are no biological reference points for this species. It does not meet 100b.</p>	
c	Guidepost	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
	Met?	<p>4X5Y Otter Trawl (UoC1) Cod Y Winter Flounder Y Pollock Y Redfish Y</p> <p>4X5Y Longline (UoC2) Cod Y Cusk Y Halibut Y Hake Y</p> <p>4X5Y Gillnet (UoC3) 4X5Y Handline UoC4) 5Zjm Otter Trawl (UoC5) Cod Y Yellowtail Flounder Y Pollock Y 5Zjm Longline (UoC6) Cod Y 5zjm Gillnet(UoC7) Y 5Zjm Handline (UoC8) Y</p>	<p>4X5Y Otter Trawl (UoC1) Cod N Winter Flounder Y Pollock Y Redfish Y</p> <p>4X5Y Longline (UoC2) Cod N Cusk Y Halibut Y Hake Y</p> <p>5Zjm Otter Trawl (UoC5) Cod Y Yellowtail flounder Y Pollock Y</p> <p>5Zjm Longline (UoC6) Cod Y Cusk Y 5zjm Gillnet(UoC7) Y 5Zjm Handline (UoC8) Y</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
Justification	<p>If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>4X5Y Otter Trawl (UoC1) Cod: Management options for 4X5Y Cod consist of a recently adopted precautionary TAC (1,650 mt) for 2014/2015 and 2015/2016 which is calculated to promote recovery. The first scoring issue for SG60 is met, however whilst there is a partial strategy in place that might be expected to ensure that the fishery does not hinder recovery and rebuilding of Cod, it cannot yet be shown to be demonstrably effective and therefore SG80 is not met for scoring issue c.</p> <p>Winter flounder: Management units of Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St Lawrence (Morin et al. 2002; DFO 2005). Prior to 1994 on the Scotian Shelf (NAFO Divs. 4VWX), yellowtail flounder, Witch flounder and American plaice were managed as one stock complex because a large component of the catches was landed as “unspecified flounders”. During this period, Winter flounder in the area were excluded from management considerations (DFO 2002a). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western (NAFO Div. 4X) components; Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two regions based on catch histories (DFO 2002b). Management of the four species together under area TACs was an explicit recognition that it has been impossible to obtain reliable landings statistics for each individual species. There has been implemented a TAC species specific for Winter flounder (1,000 mt) since 2013. Recent surveys show an upward trend indicating the strategy is working in not hindering recovery. SG 80c is met.</p>
	<p>Pollock: Management is based on MSE. It has been shown that the stocks are above the LRP showing that the strategy is effective. It meets 80c.</p> <p>Redfish: Management is based on survey based reference points. It has been shown that the stocks are above the LRP showing that the strategy is effective. It meets 80c</p>

PI 2.1.1	<p>The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species</p>
	<p>4X5Y Bottom Long Line (UoC2)</p> <p>Cod: See above for stock status. Management options for 4X5Y Cod consist of a precautionary TAC (1,650 mt) which is calculated to promote recovery. The first scoring issue for SG60 is met; however whilst there is a partial strategy in place that might be expected to ensure that the fishery does not hinder recovery and rebuilding of Cod, it cannot yet be shown to be demonstrably effective and therefore SG80b is not met.</p> <p>Cusk Currently the stock is on the cautious zone showing that the strategy is not hindering recovery. It meets 80c</p> <p>Halibut See section a above for stock status. Currently the stock is on the healthy showing that the strategy is not hindering recovery. It meets 80c</p> <p>White Hake See section a above for stock status. Currently the stock move from critical to cautious showing the strategy is not hindering recovery. It meets 80c</p> <p>5Zjm Otter trawl (UoC5)</p> <p>Cod: Cod in the southwest area of 5Zjm (Georges Bank) is managed by fleet sector quotas; time, location and method of catch are chosen to minimize Cod bycatch. The TMGC has adopted a strategy to maintain a low to neutral risk of exceeding the Fishing limit reference; $F_{REF} = 0.18$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. This stock is under a rebuilding strategy and catch is allocated through EAs, ITQs and community quotas. To protect spawning Cod, seasonal closures are implemented on Georges and Browns Bank. The groundfish trawl fishery has imposed an additional measure in area 5Zjm of a separator panel to decrease Cod catches. Small fish protocols and gear restrictions are mandated by fleet sector CHPs. Conservation limit reference points have been calculated for Cod in 5Zjm using the Precautionary Approach. The B_{LIM} for Cod in this area is 21,000 mt. Recently a fishing mortality target has been recommended and implemented ($F=0.11$) Current F is below $F_{REF}=0.11$ Scoring issue c is met at SG80</p> <p>Yellowtail Flounder: The TMGC previously adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.25$ (established in 2002 by the TMGC. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. However this has been substituted with an empirical survey based stock assessment. Recently in 2014 TRAC adopted a $F=0.11$ policy. In the last 3 years the fishing mortality has been 0 ($F=0$) Therefore SG80c is met.</p>

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
		Pollock: the current TAC for the Eastern Component of Pollock is precautionary. The stock is considered to be below the Upper Stock Reference (USR) with few fish over five years old. Fishing effort on this stock is low in the East and landings are well below the TAC. It shows that the strategy is not hindering recovery of this species. It meets 80c	
		<p>5Zjm Bottom Long Line (UoC6)</p> <p>Cod: Cod in the southwest area of 5Zjm (Georges Bank) is managed by fleet sector quotas; time, location and method of catch are chosen to minimize Cod bycatch. The TMGC has adopted a strategy to maintain a low to neutral risk of exceeding the Fishing limit reference; $F_{REF} = 0.18$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. This stock is under a rebuilding strategy and catch is allocated through EAs, ITQs and community quotas. To protect spawning Cod, seasonal closures are implemented on Georges and Browns Bank. The groundfish trawl fishery has imposed an additional measure in area 5Zjm of a separator panel to decrease Cod catches. Small fish protocols and gear restrictions are mandated by fleet sector CHPs. Conservation limit reference points have been calculated for Cod in 5Zjm using the Precautionary Approach. The B_{LIM} for Cod in this area is 21,000 mt. Recently a fishing mortality target has been recommended and implemented $F=0.11$. Current F is below $F_{REF}=0.11$. Scoring issue c is met at SG80</p> <p>Cusk: The 3-year geometric mean (2011-2013) of the Cusk CPUE is 17.9 kg/1000 hooks, which suggests that the stock is in the cautious zone. The Upper Stock Reference Point of 26.6 kg/1000 hooks in the Halibut Industry Survey is the proposed population recovery target. The Halibut Industry Survey, which began after the decline in commercial catch per unit effort (CPUE) was observed, has fluctuated without trend since 1999. This suggests that the population abundance has stabilized. Therefore it seems that the partial strategy has been effective in not hindering recovery. It meets 80c</p>	
d	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.	
	Met?	4X5Y OT (UoC1) Cod Y Pollock Y Redfish Y Winter Flounder Y 4X5Y LL (UoC2) Cod Y Cusk Y Halibut Y White hake Y 4X5Y GN,LL (UoC 3,4)	

PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species																																																																																		
	Y 5Zjm OT (UoC5) Cod Y Pollock Y Yellowtail Flounder Y 5Zjm Longline(UoC6) Cod Y Cusk Y 5Zjm GN,LL (UoC 7,8) Y																																																																																		
Justification	<p>If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.</p> <p>Most of these stocks have received considerable attention in the assessment of their status. There is a partial strategy of management measures in place such that the fishery does not hinder the recovery and rebuilding of some of these species. For example in keeping with the Precautionary Approach, biomass and removal reference points have been defined for many retained and bycatch species. Thus all UoC score 60d.</p>																																																																																		
Summary of Scores	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">4X5YOT</th> <th style="width: 5%;"></th> <th style="width: 20%; text-align: center;">4X5YLL</th> </tr> </thead> <tbody> <tr> <td>Cod</td> <td style="text-align: center;">70</td> <td></td> <td>Cod 70</td> </tr> <tr> <td>Pollock</td> <td style="text-align: center;">100</td> <td></td> <td>Cusk 80</td> </tr> <tr> <td>Redfish</td> <td style="text-align: center;">100</td> <td></td> <td>Halibut 80</td> </tr> <tr> <td>Winter Flounder</td> <td style="text-align: center;">80</td> <td></td> <td>White hake 80</td> </tr> <tr> <td>American Plaice</td> <td style="text-align: center;">80</td> <td></td> <td>Pollock 100</td> </tr> <tr> <td>Cusk</td> <td style="text-align: center;">80</td> <td></td> <td>Redfish 100</td> </tr> <tr> <td>Monkfish</td> <td style="text-align: center;">80</td> <td></td> <td>Monkfish 80</td> </tr> <tr> <td>Witch flounder</td> <td style="text-align: center;">80</td> <td></td> <td></td> </tr> <tr> <td>Overall Score</td> <td style="text-align: center;">75</td> <td></td> <td>Overall Score 75</td> </tr> <tr> <td>5ZjmOT</td> <td></td> <td></td> <td>5ZjmLL</td> </tr> <tr> <td>Cod</td> <td style="text-align: center;">80</td> <td></td> <td>Cod 80</td> </tr> <tr> <td>Pollock</td> <td style="text-align: center;">100</td> <td></td> <td>Cusk 80</td> </tr> <tr> <td>Yellowtail Flounder</td> <td style="text-align: center;">80</td> <td></td> <td>Halibut 100</td> </tr> <tr> <td>Winter Flounder</td> <td style="text-align: center;">80</td> <td></td> <td>Monkfish 80</td> </tr> <tr> <td>Redfish</td> <td style="text-align: center;">100</td> <td></td> <td>Pollock 100</td> </tr> <tr> <td>Monkfish</td> <td style="text-align: center;">80</td> <td></td> <td></td> </tr> <tr> <td>Halibut</td> <td style="text-align: center;">100</td> <td></td> <td></td> </tr> <tr> <td>White hake</td> <td style="text-align: center;">80</td> <td></td> <td></td> </tr> <tr> <td>Overall Score</td> <td style="text-align: center;">85</td> <td></td> <td>Overall Score 85</td> </tr> </tbody> </table>				4X5YOT		4X5YLL	Cod	70		Cod 70	Pollock	100		Cusk 80	Redfish	100		Halibut 80	Winter Flounder	80		White hake 80	American Plaice	80		Pollock 100	Cusk	80		Redfish 100	Monkfish	80		Monkfish 80	Witch flounder	80			Overall Score	75		Overall Score 75	5ZjmOT			5ZjmLL	Cod	80		Cod 80	Pollock	100		Cusk 80	Yellowtail Flounder	80		Halibut 100	Winter Flounder	80		Monkfish 80	Redfish	100		Pollock 100	Monkfish	80			Halibut	100			White hake	80			Overall Score	85		Overall Score 85
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PI 2.1.1	The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species					
	<p>4X5Y Otter Trawl (UoC1). The score allocated to this UoC is dependent on the stock status of four main retained species – Cod, Pollock, Redfish and Winter flounder and 4 minor species . Accordingly, for this PI the UoC is awarded a score of 75. As this score is below 80, a condition to certification has been raised (Condition 1). Once this condition has been satisfied the score for this PI will increase to 80 or above.</p> <p>4X5Y Bottom Long Line (UoC2). The score allocated to this UoC is dependent on the stock status of five main retained species – in order of importance (by weight): Cod, Cusk, White Hake and Atlantic Halibut and 5 minor species. Accordingly, for this PI the UoC is awarded a score of 75. As this score is below 80, a condition to certification has been raised (Condition 1). Once this condition has been satisfied the score for this PI will increase to 80 or above.</p> <p>4X5Y Gillnet (UoC3). Data on retained species from the gillnet fisheries were not provided to the assessment team due to confidentiality issues, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets 80.</p> <p>4X5Y Hand line(UoC4). See (UoC3) 4X5Y GN. The UoC is allocated a score of 80 for this PI.</p> <p>5Zjm Otter Trawl(UoC5). The score allocated to this UoC is dependent on the stock status of three main retained species – in order of importance (by weight): Pollock, Cod and Yellowtail Flounder and 4 minor species. The UoC is allocated a score of 85 for this PI.</p> <p>5Zjm Bottom Long Line(UoC6). The score allocated to this UoC is dependent on the stock status of two main retained species – Cod and Cusk and 5 other minor species . The UoC is allocated a score of 85 for this PI.</p> <p>5Zjm Gillnet(UoC7). See 4X5Y GN. The UoC is allocated a score of 80 for this PI.</p> <p>5Zjm Hand line (UoC8). See 4X5Y GN. The UoC is allocated a score of 80 for this PI.</p>					
Scores	UoC	OT	BLL	GN	HL	
	4X5Y	75	75	80	80	
	5Zjm	85	85	80	80	
References	DFO, 2009a; Clark et al. 2008, DFO, 2009b; DFO, 1999; FRCC, 2004; DFO, 2003a; DFO, 2008; Campana et al., 2007; DFO, 2005b; DFO, 2004a; DFO, 2006a; DFO, 2009c., DFO 2010; DFO 2011; DFO 2012; DFO 2013; DFO 2014; DFO 2015					
CONDITION NUMBER (if relevant):	1					

Evaluation Table for PI 2.1.2

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	4X5Y OT (UoC1) Cod Y Pollock Y Redfish Y Winter Flounder Y 4X5Y LL (UoC2) Cod Y Cusk Y Halibut Y White hake Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT(UoC5) Cod Y Pollock Y Yellowtail Flounder Y 5Zjm LL (UoC6) Cod Y Cusk Y 5Zjm GN (UoC7) Y 5Zjm HL(UoC8) Y	4X5Y OT (UoC1) Cod N Pollock Y Redfish Y Winter Flounder Y 4X5Y LL (UoC2) Cod N Cusk Y Halibut Y White hake Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT(UoC5) Cod N Pollock Y Yellowtail Flounder Y 5Zjm LL (UoC6) Cod N Cusk Y 5Zjm GN (UoC7) Y 5Zjm HL(UoC8) Y	4X5Y OT (UoC1) Cod N Pollock Y Redfish Y Winter Flounder Y Minor Species American plaice Y Cusk Y Halibut Y Sculpin Y Monkfish Y Witch flounder Y 4X5Y LL (UoC2) Cod N Cusk Y Halibut Y White hake Y Minor Species Redfish Y Pollock Y Monkfish Y Cusk Y Halibut Y Sculpin Y 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5)

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species			
				<p>Cod N Pollock Y yellowtail flounder N</p> <p>Minor species Halibut Y Monkfish Y Redfish Y White hake Y Winter flounder N</p> <p>5Zjm LL (UoC6) Cod N Cusk Y</p> <p>Minor Species Halibut Y Monkfish Y Pollock Y</p> <p>5Zjm GN (UoC7) N</p> <p>5Zjm HL(UoC8) N</p>

Justification	<p>There is a strategy in place for managing retained species.</p> <p>The CHPs provide the measures for the different fleet sectors to complement the specific species strategies by stipulating the total bycatch of species that can be taken on each trip in percentage terms. If this limit is exceeded, observer coverage is increased and further action may be taken as necessary. Under the “small fish protocol” in the CHPs, fisheries can be closed if the number of fish reaches or exceeds 15% of the catch of Cod, Pollock, White hake, Atlantic Halibut and all flatfish or when incidental catches of a closed species reach or exceed the established level for the fleet.</p> <p>Regarding the specific stocks of interest to the various UoCs under consideration:</p> <p>4X5Y Otter Trawl (UoC1)</p> <p>Cod: This stock has a rebuilding strategy with TACs allocated through EAs, ITQs and community quotas. There are management approaches along with reference points that are reviewed with respect to consistency with DFO’s precautionary approach (PA) framework. However, it remains to be seen if the strategy is working effectively by not hindering the recovery of Cod.</p> <p>4X5Y Atlantic Cod:</p> <p>The LRP (24,000 mt) was based on a Beverton-Holt stock recruitment model using the full time series. The limit RR (0.2) was calculated as F0.1 in the 1990s. The USR (48,000 mt) is double the LRP. Recent studies show populations below LRP and overfishing occurring. It cannot be said that the strategy is effective. It meets the SG60a score.</p>
	<p>Pollock: The catch is allocated through ITQs and community quotas. In 2011, fisheries managers and the fishing industry decided to manage WC Pollock using a risk-management approach and embarked on a Management Strategy Evaluation (MSE). MSE is a technique to explicitly consider the uncertainty in stock assessment assumptions and models, and to compare the likely consequences to Management Objectives when a predetermined Management Procedure (MP) incorporating a Harvest Control Rule (HCR) is applied. The Pollock MP was selected on the basis of satisfying three medium-term objectives agreed upon for management of the resource which relate to sustainability, catch levels and the extent of annual catch changes. The MP model was built around an HCR, which either increased or decreased future catch limits based on results from ongoing monitoring from the annual DFO summer RV survey. The HCR with updated monitoring data for 2014 generated a catch limit of 2,781 mt for FY 2015-2016, down 9% from 3,072 mt for FY 2014-2015. The RV survey biomass index decreased from 28.45 kg/tow in 2013 to 8.53 kg/tow in 2014, but this decline did not trigger the exceptional circumstance provision of the RV survey biomass index being < 6 kg/tow for two consecutive years and the Survey Index Ratio being < 0.2. It meets the SG100a score.</p>

<p>PI 2.1.2</p>	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Redfish: Redfish is managed by assessing stock status with default reference points based on the Precautionary Approach. These reference points are 0.40 B_{MSY} and 0.80 B_{MSY} for the critical-cautious boundary (Limit Reference Point) and cautious-healthy boundary (Upper Stock Reference Point). Results from the recent stock assessment concluded that <i>S. fasciatus</i> in Unit 3 are above 0.80 B_{MSY} (99% CI) (McAllister and Duplisea, 2011). Unit 3 (Scotian Shelf) is above the long term mean (DFO 2012). Thus, there is a management system working effectively for redfish retained catch. It meets the SG100a score.</p> <p>Winter flounder: Management units of Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St Lawrence (Morin et al. 2002; DFO 2005). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western (NAFO Div. 4X) components; Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two regions based on catch histories (DFO 2002b). Since 2013 Winter flounder has its own TAC individually and current population trends are positive. Thus there is a management system working effectively for winter flounder retained catch. It meets the SG100a score.</p>

Minor Species

American plaice: Management of American Plaice on the Scotian Shelf includes overall TACs for four flatfish species combined based on catch histories (DFO 2002b). Management of the four species together under area TACs was an explicit recognition that it has been impossible to obtain reliable landings statistics for each individual species. However due to populations decline and uncertainty in the stock status with no LRP , it is difficult to say the strategy is working. It does not meet 100a score.

Cusk: Cusk is managed by assessing stock status with default reference points based on the Precautionary Approach .The USR and LRP for Cusk in NAFO Divisions 4VWX5Z are 26.6 kg/1000 hooks and 13.3 kg/1000 hooks, respectively (Harris et al. 2012). The mean CPUE from the Halibut Industry Survey has been at or above the proposed LRP for the last 3 years although a high level of uncertainty is indicated by the wide confidence interval. The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone . Thus there is a management system working effectively for cusk retained catch. It meets the SG100a score.

Atlantic Halibut (3NOPs4VWX): The updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, indicate that abundance of both pre-recruits and recruits continues to be high. Over the past few years theTAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt. The TAC is allocated through ITQs and community quotas. It meets the SG100a score.

Sculpin: This species is of low commercial value. Management is based on CHPs It meets the SG 100a.

Monkfish: Management is based on CHPs and TACs. It meets the SG 100a.

Witch flounder: Management of Witch Flounder on the Scotian Shelf uses overall TACs for four flatfish species combined based on catch histories (DFO 2002b). Management of the four species together under area TACs was an explicit recognition that it has been impossible to obtain reliable landings statistics for each individual species. It meets the SG100a score.

4X5Y Bottom Long Line (UoC2)

Cod: See (UoC1 4X5Y1)above. It meets the SG60a score.

Cusk: Cusk is managed by assessing stock status with default reference points based on the Precautionary Approach .The USR and LRP for Cusk in NAFO Divisions 4VWX5Z are 26.6 kg/1000 hooks and 13.3 kg/1000 hooks, respectively (Harris et al. 2012). The mean CPUE from the Halibut Industry Survey has been at or above the proposed LRP for the last 3 years although a high level of uncertainty is indicated by the wide confidence interval. The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone . It meets the SG100a score.

White Hake: Measures were established in recent years for the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. The stock is considered to be in the lower part of the cautious zone and so further reductions in harvest rate were implemented for the fishing year.

In 2013, the abundance of White hake in the Maritimes was reviewed. This update assessment showed that abundance has continued to remain low since 2005. Overall, abundance of immature individuals on the entire Scotian Shelf was estimated to have declined by 60% since the 1980's, although current estimates of abundance are similar to abundance estimates seen in the 1970s. Abundance of adult fish has decreased overall by 56% since 1970 and by 77% since the 1980's (Simon and Cook 2013). It meets the SG100a score.

Atlantic Halibut (3NOPs4VWX): The updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, indicate that abundance of both pre-recruits and recruits continues to be high. Over the past few years theTAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt. The TAC is allocated through ITQs and community quotas. It meets the SG100a score.

Minor Species

Pollock: See (UoC1 4X5Y)cabove. It meets the SG100a score.

Monkfish: Management is based by CPHs and is under area TACs. It meets the SG100a score.

Redfish: See (UoC1 4x5Y) above. It meets SG100a score.

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>5Zjm Otter Trawl (UoC5)</p> <p>Cod: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.11$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Cod in 5Zjm has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. Current F has been lower than $F_{ref}=0.11$ 5Zjm Atlantic Cod has an LRP (21,000 mt) based on a Beverton-Holt stock recruitment model using the full time series. It meets the SG80a score.</p> <p>Pollock: See UoC1(4x5Y) above. It meets the SG100a score.</p> <p>Yellowtail flounder: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.25$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Cod in Georges Bank has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. In 2014 DFO recommended a fishing mortality below $F=0.11$. The current fishing mortality is $F=0.02$.. No overfishing occurring as it is below the F_{ref}. It meets the SG80a score.</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Minor species Halibut: See above. It meets the SG100a score. Monkfish: See above. It meets the SG100a score. Redfish: See above. It meets the SG100a score. White hake: See above. It meets the SG100a score. Winter Flounder: Management units of Winter flounder in Eastern Georges Bank are shared with US Authorities. Combined data of US and Canadian Winter flounder are used by NMFS to develop models for stock status and catch advice. Canadian landings generally comprised a low percentage (1-2 %) of the total landings until 1994, at which time Canadian landings increased rapidly from 6 % of the total to a peak of 24 % in 2001 (529 mt). The increasing trend in Canadian landings occurred primarily during the second half of the year because since 1994 Canadian groundfish fisheries on Georges Bank have, for the most part, been closed during January-May (Van Eeckhaute and Brodziak 2005). After 2001, Canadian landings declined rapidly to 1.5% in 2007 (12 mt). During 2008-2010, Canadian landings were very low, comprising only 1-3% of the total landings. Since 1994, the Canadian groundfish fishery on Georges Bank has, for the most part, been subject to a seasonal closure during January 1-June 1. Since 2001-2003, mobile gear vessels without at-sea observers have been required to use separator panels to minimize the bycatch of cod when fishing haddock. This gear modification may also have reduce the bycatch of winter flounder in the haddock fishery because the lower panel has an open cod end to allow cod (and possibly flatfish) to escape, while the upper panel captures and retains haddock. There are no TACS or LRPs for this fishery in 5Zjm. It does not meet the 100a score.</p> <p>5Zjm Bottom Long Line (UoC6)</p> <p>Major Species Cod: See (UoC5) above. It meets the SG100a score. Cusk: See (UoC5) above. It meets the SG100a score.</p> <p>Minor species Halibut: See above. It meets the SG100a score. Pollock: See above. It meets the SG100a score. Monkfish: See above. It meets the SG100a score.</p> <p>4X5Y/5Zjm Gillnet (UoC3, UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG100a score.</p>

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
b	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 some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	4X5Y OT (UoC1) Cod Y Pollock Y Redfish Y Winter Flounder Y 4X5Y LL (UoC2) Cod Y Cusk Y Halibut Y White hake Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Cod Y Pollock Y Yellowtail Flounder Y 5Zjm LL (UoC6) Cod Y Cusk Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Cod N Pollock Y Redfish Y Winter Flounder Y 4X5Y LL (UoC2) Cod N Cusk Y Halibut Y White hake Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Cod N Pollock Y Yellowtail Flounder Y 5Zjm LL (UoC6) Cod N Cusk Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Cod N Pollock N Redfish N Winter Flounder N Minor Species American plaice N Cusk N Halibut N Sculpin N Monkfish N Witch flounder N 4X5Y LL (UoC2) Cod N Cusk N Halibut N White hake N Minor Species Redfish N Pollock N Monkfish N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Cod N Pollock N Yellowtail Flounder N Minor species Halibut N Monkfish N Redfish N White hake N Winter flounder N

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
			5Zjm LL (UoC6) Cod N Cusk N Minor Species Halibut N Monkfish N Pollock N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

<p>PI 2.1.2</p>	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Justification</p>	<p>There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There have been a set of management strategies to protect these stocks. For example, in keeping with the Precautionary Approach, biomass and removal reference points have been defined for these species / Furthermore TACs are set based on a risk analysis of various TAC options in relation to the probability of conforming to the biological reference points and ensuring stock sustainability . However there are mixed results regarding some objective basis for confidence that strategies will work, based on evidence from stock assessment results for some species and reduced catch of retained species.</p> <p>4X5Y Otter Trawl (UoC1)</p> <p>4Y5Y Atlantic Cod: Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery. These plans are responsive to DFO's annual RV surveys. In 2013, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y Cod strategy was applied resulting in the 2014/15 total catch being reduced. The stock status is considered to be in the critical zone and further reductions in harvest rate were implemented for the fishing year. Latest stock assessment shows populations are below LRP. Tus it is difficult to say that There is some objective basis for confidence that the partial strategy will work. It meets the SG60b score.</p> <p>Pollock: Populations are above the LRP and low fishing pressure occurring. There is some objective basis for confidence that the partial strategy will wort meets the SG80b score.</p> <p>Redfish: Populations are above the LRP. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.</p> <p>Winter flounder: Populations are assessed as flatfish complex. No indication that populations are declining. Management units for Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St Lawrence (Morin et al. 2002; DFO 2005).). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western (NAFO Div. 4X) components; Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two regions based on catch histories (DFO 2002b). Since 2013 4X Winter Flounderhas its individual TAC. The latest WF abundance indices show an upward trend. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Minor Species</p> <p>American plaice: Management of American Plaice on the Scotian Shelf use overall TACs for other four flatfish species combined based on catch histories (DFO 2002b). Management of the four species together under area TACs was an explicit recognition that it has been impossible to obtain reliable landings statistics for each individual species. Status of the stock is unknown as there are no LRPs. It meets the SG80b score.</p> <p>Cusk: is managed by assessing stock status with default reference points based on the Precautionary Approach. The USR and LRP for Cusk in NAFO Divisions 4VWX5Z are 26.6 kg/1000 hooks and 13.3 kg/1000 hooks, respectively (Harris et al. 2012). The mean CPUE from the Halibut Industry Survey has been at or above the proposed LRP for the last 3 years although a high level of uncertainty is indicated by the wide confidence interval. The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.</p> <p>Atlantic Halibut (3NOPs4VWX): Populations are above LRP. There is some objective basis for confidence that the partial strategy will work. It meets the SG 80b score.</p> <p>Sculpin: This species is of low commercial value. Management is based on CHPs. Status of the stock is unknown as there are no LRPs. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.</p> <p>Monkfish: Management is based on CHPs and TACs. Status of the stock is unknown as there are no LRPs. There is some objective basis for confidence that the partial strategy will work. It meets the SG 80b score.</p> <p>Witch flounder: Management of Witch Flounder on the Scotian Shelf use overall TACs for other four flatfish species combined based on catch histories (DFO 2002b). Management of the four species together under area TACs was an explicit recognition that it has been impossible to obtain reliable landings statistics for each individual species. Status of the stock is unknown as there are no LRPs. It meets the SG80b score.</p>

4X5Y Bottom Long Line (UoC2)

Cod: See above. It meets the SG60b score.

Cusk: The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone. It meets the SG80b score.

White Hake: Measures were established in recent years for the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. The stock status is considered to be in the cautious zones and further reductions in harvest rate were implemented for the fishing year. Therefore there is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.

Minor Species

Pollock: Populations are above the LRPs. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.

Monkfish: Management is based by CPHs and under area TACs. Status unknown as there are no LRPs. It meets the SG80b score.

Redfish: Populations are above LRPs. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.

5Zjm Otter Trawl (UoC5)

Cod: There is new strategy adopted by TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.11$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Cod in 5Zjm has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. Current F is well below $F_{REF}=0.11$. There is some objective basis for confidence that the partial strategy will work. It meets the SG80b score.

Pollock: See (4x5Y UoC1)above. It meets the SG80b score.

Yellowtail Flounder: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.18$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently YT flounder in Georges Bank has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. However populations are in the lowest level. For the last 3 years the fishing mortality was 0. There is some objective basis for confidence that the partial strategy will work. Thus it meets the SG80b score.

Minor species

Halibut: See item a above. It meets the SG80b score.

Monkfish: See item a above. It meets the SG80b score.

Redfish: See item a above. It meets the SG80b score.

White hake: See item a above. It meets the SG80b score.

Winter Flounder: See item a above. It meets the 80b score.

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species	
		<p>Halibut: Biomass are above LRP and no overfishing occurring . There is objective the strategy is working . It meets the SG80b score.</p> <p>Monkfish: See item a above. It meets the SG80b score.</p> <p>Redfish: Biomass are above LRP and no overfishing occurring . There is objective the strategy is working. It meets the SG80b score.</p> <p>White hake: Biomass are above LRP and no overfishing occurring . There is objective the strategy is working. It meets the SG80b score.</p> <p>Winter Flounder: See item a above. It meets the 80b score</p>	
		<p>5Zjm Bottom Long Line(UoC6)</p> <p>Cod: No overfishing occurring. There is objective evidence that the strategy is working . It meets the SG80b score</p> <p>Cusk: Biomass are above LRP and no overfishing occurring. There is objective evidence that the strategy is working . It meets the SG80b score.</p> <p>Minor species</p> <p>Halibut: Biomass are above LRP and no overfishing occurring. There is objective the strategy is working. It meets the SG80b score.</p> <p>Monkfish: See item a above. It meets the SG80b score.</p> <p>Pollock: Biomass are above LRP and no overfishing occurring. There is objective evidence that the strategy is working. It meets the SG80b score item a above.</p>	
		<p>4X5Y/5Zjm Gillnet (UoC3,UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG80b score.</p> <p>4X5Y (all gears) There is no evidence that the strategy have been tested for any of the species preventing the fishery from meeting the 100b score.</p> <p>5Zzm (all gears) There is no evidence that the strategy have been tested for any of the species preventing the fishery from meeting the SG100b score.</p>	
c	Guidepost		<p>There is some evidence that the partial strategy is being implemented successfully.</p> <p>There is clear evidence that the strategy is being implemented successfully.</p>
	Met?		<p>4X5Y OT (UoC 1) Cod N Pollock Y Redfish Y Winter Flounder Y</p> <p>4X5Y LL (UoC2) Cod N Cusk Y</p> <p>4X5Y OT (UoC1) Cod N Pollock Y Redfish Y Winter Flounder N</p> <p>Minor Species American plaice N Cusk N</p>

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
			<p>Halibut Y White hake Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT(UoC5) Cod N Pollock Y Yellowtail Flounder Y 5Zjm LL (UoC6) Cod N Cusk Y 5Zjm GN (UoC7) Y 5Zjm HL(UoC8) Y</p> <p>Halibut Y Sculpin N Monkfish N Witch flounder N 4X5Y LL (UoC2) Cod N Cusk N Halibut Y White hake N Minor Species Redfish Y Pollock N Monkfish N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Cod N Pollock N Minor species Halibut N Monkfish N Redfish N White hake N Winter flounder N 5Zjm LL (UoC6) Cod N Cusk N Minor Species Halibut N Monkfish N Pollock N 5Zjm GN (UoC7) N 5Zjm HL(UoC8) N</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
Justification	<p>There is some evidence that the partial strategy is being implemented successfully. There have been a set of management strategies to protect these stocks. For example, in keeping with the Precautionary Approach, biomass and removal reference points have been defined for these species. Furthermore TACs are set based on a risk analysis of various TAC options in relation to the probability of conforming to the biological reference points and ensuring stock sustainability. However there are contrasting results as to whether the partial strategy is being implemented successfully based on evidence from stock assessment results for some species.</p> <p>4X5Y Otter Trawl (UoC1)</p> <p>4X5Y Atlantic Cod: Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X Cod. These plans are responsive to DFO's annual RV surveys. In 2013, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y Cod strategy was applied resulting in the 2014/15 total catch being reduced. The stock status is considered to be in the critical zone and further reductions in harvest rate were implemented for the fishing year Therefore it is difficult to say that There is some evidence that the partial strategy is being implemented successfully . It meets the SG60c score.</p> <p>Pollock: Populations have been managed by MSE approach are above LRP. Thus there is clear evidence that the strategy is being implemented successfully t meets the SG100c score.</p> <p>Redfish: Populations have been manged by PA reference poins and are above LRP. Thus there is clear evidence that the strategy is being implemented successful. It meets the SG100c score.</p> <p>Winter flounder: here is some evidence that the partial strategy is being implemented successfully. No indication of populations on the decline. Management units of Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St Lawrence (Morin et al. 2002; DFO 2005).). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western (NAFO Div. 4X) components; Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two areas based on catch histories (DFO 2002b). Since 2013 Winter flounder has its own TAC. Abundance trends indicate populations have an increasing trend. It meets the SG80c score.</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Minor Species</p> <p>American plaice: See Section b. It meets the SG80c score.</p> <p>Cusk: there is clear evidence that the strategy is being implemented successfully populations are above LRP and overfishing not occurring . It meets the SG80c score.</p> <p>Atlantic Halibut (3NOPs4VWX): There is clear evidence that the strategy is being implemented successfully populations are above LRP and overfishing not occurring. It meets the SG100c score.</p> <p>Sculpin: See Section b. It meets the SG80c score.</p> <p>Monkfish: See Section b. It meets the SG80c score.</p> <p>Witch flounder: See Section b. It meets the SG 80c score</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>4X5Y Bottom Long Line (UoC2)</p> <p>Cod: Status overfished and overfishing occurring It is difficult to say that the strategy has been implemented successfully. It meets the SG60c score.</p> <p>Cusk: There is some evidence that the strategy has been implemented successfully. The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone. It meets the SG80c score.</p> <p>White Hake: There is some evidence that the strategy has been implemented successfully . Measures were established in recent years for the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. It meets the SG80c score.</p> <p>Atlantic Halibut (3NOPs4VWX): There is clear evidence that the strategy has been implemented successfully. The updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, indicate that abundance of both pre-recruits and recruits continue to be high. Over the past few years theTAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt.The TAC is allocated through ITQs and community quotas. Populations are in the healthy zone. It meets the SG100c score.</p> <p>Minor Species</p> <p>Pollock: there is clear evidence that the strategy has been implemented successfully.populations are above LRPs . It meets the SG100c score.</p> <p>Monkfish: Management is based by CPHs and are under area TACs. Status unknown as there are no LRPs. It meets the SG80c score.</p> <p>Redfish: There is clear evidence that the strategy has been implemented successfully. Populations arein the healthy zone. It meets the SG100c score.</p> <p>5Zjm Otter Trawl (UoC5)</p> <p>Cod: There is clear evidence that the strategy has been implemented successfully There is a new strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.11$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Cod in 5Zjm has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. Current F is below $F_{REF} = 0.11$. It meets the SG80c score.</p> <p>Pollock: There is clear evidence that the strategy has been implemented successfully.Populations are above LRPs and in the healthy zone. It meets the SG100c score.</p>

<p>PI 2.1.2</p>	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Yellowtail Flounder: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.25$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Yellowtail flounder in Georges Bank has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. The fishing mortality for the last 3 years was 0. It meets the SG80c score</p> <p>Minor species</p> <p>Halibut: there is clear evidence that the strategy has been implemented successfully. Populations are above LRPs and on the healthy status. It meets 100c See item a above. It meets the SG100c score.</p> <p>Monkfish: There is clear evidence that the strategy has been implemented successfu. Populations decline have been stopped and continues to be stable. It meets the SG80c score.</p> <p>Redfish: there is clear evidence that the strategy has been implemented successfully. Populations are above LRPs and on the healthy status See above. It meets the SG100c score.</p> <p>White hake: there is some evidence that the strategy has been implemented successfully. Populations have stabilized and are on the cautious zone. It meets the SG80c score.</p> <p>Winter Flounder: There is some evidence that the strategy has been implemented successfu. Populations decline have been stopped and continues to be stable. It meets the SG80c score.</p>
	<p>5Zjm Bottom Long Line (UoC6)</p> <p>Cod: There is some evidence that the strategy has been implemented successfully. Overfishing is not occurring($F < F_{ref}$). It meets the SG80c score.</p> <p>Cusk: Cusk population decline has been stabilized and continues to be in the cautious zone giving some evidence that the strategy has been implmented successfully. It meets the SG80c score.</p> <p>Minor species</p> <p>Halibut: there is clear evidence that the strategy has been implemented successfully. Populations are above LRPs and on the healthy status. It meets 100c</p> <p>Monkfish: There is some evidence that the strategy has been implemented successfully. Populations decline have been stabilized. It meets the SG80c score.</p> <p>Redfish: There is clear evidence that the strategy has been implemented successfully. Populations are above LRPs and on the healthy status See above. It meets the SG100c score.</p> <p>4X5Y/5Zjm Gillnet (UoC3, UoC7) & Hand line (UoC4, UoC8). Data is not available on bycatch, However it seems retained bycatch is minimal. It meets the SG 100c score.</p>

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			<p>4X5Y OT (UoC1) Cod N Pollock Y Redfish Y Winter Flounder Y Minor Species American plaice N Cusk N Halibut Y Sculpin N Monkfish N Witch flounder N</p> <p>4X5Y LL (UoC2) Cod N Cusk N Halibut Y White hake N Minor Species Redfish Y Pollock N Monkfish N</p> <p>4X5Y GN (UoC3) N</p> <p>4X5Y HL (UoC4) N</p> <p>5Zjm OT (UoC5) Cod N Pollock N Yellowtail flounder N</p> <p>Minor species Halibut N Monkfish N Redfish N White hake N Winter flounder N</p> <p>5Zjm LL (UoC6) Cod N Cusk N Minor Species</p>

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species			
				Halibut N Monkfish N Pollock N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
Justification	<p>There is some evidence that the strategy is achieving its overall objective. There has been a set of management strategies to protect these stocks. For example, in keeping with the Precautionary Approach, biomass and removal reference points have been defined for these species / Furthermore TACs are set based on a risk analysis of various TAC options in relation to the probability of conforming to the biological reference points and ensuring stock sustainability. However there are contrasting results regarding evidence on partial strategy is being implemented successfully based on evidence from stock assessment results for some species.</p> <p>4X5Y Otter Trawl (UoC1)</p> <p>4Y5Y Atlantic Cod: Measures were established in recent years for the bycatch species in the 4X5Y Cod fishery including 4X Cod. These plans are responsive to DFO's annual RV surveys. In 2013, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y Cod strategy was applied resulting in the 2014/15 total catch being reduced. The stock status is considered to be in the critical zone and further reductions in harvest rate were implemented for the fishing year. Latest stock assessment shows populations are below LRP and overfishing is occurring. There is not evidence that the strategy is achieving its overall objective. It does not meet the SG100d score.</p> <p>Pollock: Populations are above LRP and on the healthy zone . It meets the SG100d score.</p> <p>Redfish: Populations are above LRP and on the healthy zone. It meets the SG100d score.</p> <p>Winter flounder: Populations were assessed as flatfish complex previously. No indication of populations in decline. Management units of Winter flounder in Canadian waters are based upon geographic distribution patterns inferred from Canadian summer research vessel surveys on the Scotian Shelf (Stobo et al. 1997; DFO 1997) and in the Southern Gulf of St Lawrence (Morin et al. 2002; DFO 2005).). In 1994, the Scotian Shelf management area was divided into eastern (NAFO Div. 4VW) and western (NAFO Div. 4X) components; Winter flounder was included in these management components, and overall TACs (for the four flatfish species combined) were established for the two areas based on catch histories (DFO 2002b). Recently Winter flounder is managed individually by TACs. Populations recently have an increasing trend in abundance. It meets the SG100d score.</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>Minor Species</p> <p>American plaice: Population abundances are considered to be on decline and are on the lowest levels(DFO 2014) . It does not meet the SG100d score.</p> <p>Cusk: The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock decline has been stopped and their status is in the cautious zone. It meets the SG100d score.</p> <p>Atlantic Halibut (3NOPs4VWX): Populations are above LRP and are on the healthy zone. It meets the SG 100d score.</p> <p>Sculpin: S Population abundances are considered to be on decline and are on the lowest levels(DFO 2014) . It does not meet the SG100d score</p> <p>Monkfish: Population abundances are considered to be on decline and are on the lowest levels(DFO 2014) . It does not meet the SG100d score</p> <p>Witch flounder: Populations are considered to be on lowest levels. It does not meet the SG100d score</p>

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>
	<p>4X5Y Bottom Long Line (UoC2) Cod: (See UoC1)above. It does not meet the SG100d score.</p> <p>Cusk: The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock decline has been stopped and their current status is in the cautious zone. It meets the SG100d score.</p> <p>White Hake: Measures were established in recent years with respect to the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. It does not meet the SG100d score.</p> <p>Atlantic Halibut (3NOPs4VWX): Populations are above LRPs and on the healthy zone It meets the SG100d score.</p> <p>Minor Species Pollock: Populations are above LRPs and on the healthy zone . It meets the SG100d score. Monkfish: Populations abundance is on the lowest levels of the time series. It does not meet the SG100d score. Redfish: Populations are above LRPs and on healthy zone. It meets the SG100d score.</p> <p>5Zjm Otter Trawl (UoC5) Cod: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.18$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Cod in 5Zjm has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. However populations are in the critical zone. It does not meet the SG100d score.</p> <p>Pollock: Populations abundance are above LRPs and on the healthy zone . It meets the SG100d score.</p> <p>Yellowtail Flounder: There is a strategy adopted by the TMAG to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{REF} = 0.25$. If the stock status continues to be poor, F should be reduced more to promote rebuilding. Currently Yellowtail Flounder in Georges Bank has a rebuilding strategy with TAC allocated through EAs, ITQs and community quotas. However populations are at the lowest levels. It does not meet the SG 100d score.</p>

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
		<p>Minor Species</p> <p>Halibut: Populations are above LRP and on the healthy zone It meets the SG100d score.</p> <p>Monkfish: Populations are in the lowest levels of the time series . It does not meet the SG100d score.</p> <p>Redfish: Populations are above LRP and on the healthy zone It meets the SG100d score. It meets the SG100d score.</p> <p>White hake: Measures were established in recent years with respect to the bycatch species in the 4X5Y Haddock fishery including 4X White Hake. These plans are responsive to DFO's annual RV surveys. In March 2014, given lower RV Survey indices and following discussions by the SFGAC, the 4X5Y White Hake strategy was applied resulting in the 2014/15 total catch being reduced. Population abundance on the lowest levels of the time series. It does not meet SG100d score</p> <p>Winter Flounder: Populations are in the lowest levels of the time series . It does not meet the SG100d score</p>		
		<p>5Zjm Bottom Long Line (UoC6)</p> <p>Cod: Populations are in the lowest levels of the time series . It does not meet the SG100d score</p> <p>Cusk: Population decline has slowed down and it is stabilizing. Status on the cautious zone. it does not meet the SG100d score</p> <p>Minor Species</p> <p>Halibut: Populations are above LRP and on the healthy zone It meets the SG100d score.</p> <p>Monkfish: Populations are in the lowest levels of the time series . It does not meet the SG100d score.</p> <p>Pollock: Populations are above LRP and on the healthy zone. It meets the SG100d score.</p> <p>4X5Y/5Zjm Gillnet & Hand line(UoC3,UoC4,UoC7,Uo8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). Given the uncertainty on the status of species caught with these gears, it does not meet 100d.</p>		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant

PI 2.1.2	There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species				
		4X5Y OT		4X5Y LL	
		Cod 60 Pollock 90 Redfish 90 Winter Flounder 80 American Plaice 80 Cusk 80 Atlantic Halibut 90 Sculpin 80 Monkfish 80 Witch flounder 80 Overall Score 75	Cod 60 Cusk 80 Halibut 90 White hake 80 Pollock 90 Monkfish 80 Redfish 90 Overall Score 75		
		5Zjm OT		5Zjm LL	
		Cod 80 Pollock 90 Halibut 90 Redfish 90 White hake 80 Winter Flounder 80 Yellowtail Flounder 80 Overall Score 85	Cod 80 Cusk 80 Pollock 90 Monkfish 80 Halibut 90 Overall Score 85		

PI 2.1.2	<p>There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species</p>																			
	<p>4X5Y Otter Trawl. On that basis the score allocated is 75. A condition (2) is raised because the score is below 80.</p> <p>4X5Y Bottom Long Line. On that basis the score allocated is 75. A condition (2) is raised because the score is below 80.</p> <p>5Zjm Otter Trawl. Overall there is a partial strategy in place for managing main retained species (Cod, Pollock, Yellow Tail Flounder) as well as minor species. So the UoC meets all issues of SG80 and half of SG100. Accordingly, the UoC is allocated a score of 85 for this PI.</p> <p>5Zjm Bottom Long Line. Overall there is a partial strategy in place for managing main retained species (Cod, Cusk) as well as minor species. so the UoC meets all issues of SG80 and half of SG100. Accordingly, the UoC is allocated a score of 85 for this PI.</p> <p>4X5Y Gillnet. There is no information for retained catch for this UoC due to confidentiality issues. However the assessment team was informed that these fisheries are minimal to negligible due to the given nature, scale and intensity of this fishery, there is a high degree of certainty that these fisheries is not hindering n recovery for main retained species and accordingly the UoC is allocated a score of 80 for this PI.</p> <p>5Zjm Gillnet. See 4X5Y gillnet. The UoC is allocated a score of 80 for this PI.</p> <p>4X5Y Hand line. See 4X5Y gillnet. The UoC is allocated a score of 80 for this PI.</p> <p>5Zjm Hand line. See 4X5Y gillnet. The UoC is allocated a score of 80 for this PI.</p>																			
Summary of Scores	<table border="1" data-bbox="485 1543 1315 1686"> <tr> <td>Score:</td> <td>OT</td> <td>BLL</td> <td>GN</td> <td>HL</td> </tr> <tr> <td>4X5Y</td> <td>75</td> <td>75</td> <td>80</td> <td>80</td> </tr> <tr> <td>5Zjm</td> <td>85</td> <td>85</td> <td>80</td> <td>80</td> </tr> </table>					Score:	OT	BLL	GN	HL	4X5Y	75	75	80	80	5Zjm	85	85	80	80
Score:	OT	BLL	GN	HL																
4X5Y	75	75	80	80																
5Zjm	85	85	80	80																
References	<p>DFO, 2009a; Clark et al., 2008; DFO, 2009b; DFO, 1999; FRCC, 2004; DFO, 2003a; DFO, 2008; Campana et al., 2007; DFO, 2005b; DFO, 2004a; DFO, 2006a; DFO, 2009c.</p>																			
<p>OVERALL PERFORMANCE INDICATOR SCORE:</p>																				
<p>CONDITION NUMBER (if relevant):</p>					<p>2</p>															

Evaluation Table for PI 2.1.3

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Information is sufficient to provide accurate and quantifiable and verifiable estimates on the catch of all retained species and the consequences for the status of affected populations in both areas. There is information on the quantities of retained species from the Scotia-Fundy haddock fishery in both areas for the major gears (trawl, longline). The Assessment Team considers that sufficient data is collected to detect any increase in risk level. There is retained species status using age composition of landings, size and age composition of the population, and trends in relative abundance derived from survey biomass indices. All groundfish species must be landed and recorded in a logbook supported by dockside monitoring and independent observer coverage.</p> <p>However there is insufficient quantitative information on gillnets and handline fisheries for both areas. Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014).</p> <p>For both areas, all issues meet 100a for OT and LL gears; GN and HL meet the SG 80a level.</p>		
b	Guidepost	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN(UoC 3) Y 4X5Y HL (UoC4) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
		5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Information is sufficient to provide accurate and quantifiable and verifiable estimates on the catch of all retained species and the consequences for the status of affected populations in both areas. There is information on the quantities of retained species from the Scotia-Fundy haddock fishery in both areas for the major gears (trawl, longline). The Assessment Team considers that sufficient data is collected to detect any increase in risk level. There is retained species status using age composition of landings, size and age composition of the population, and trends in relative abundance derived from survey biomass indices. All groundfish species must be landed and recorded in a logbook supported by dockside monitoring and independent observer coverage.</p> <p>However there is insufficient quantitative information on gillnets and handline fisheries for both areas. Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014).</p> <p>For both areas, all issues meet 100a for OT and LL gears; GN and HL meet the SG 80a level.</p>		
c	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species	
	Justification	<p>Information is adequate to support a partial strategy to manage retained species, but not adequate to evaluate with a high degree of certainty whether a strategy is achieving its objective in both areas. The information as it is may help in developing a partial strategy to manage main retained species. However, there is low observer coverage for fisheries in 4X5Y to corroborate if the available information is sufficiently adequate to support a strategy to manage retained species and evaluate with a high degree of certainty whether the strategy is achieving its objective. Additionally, there is insufficient quantitative information on gillnets and handline fisheries for both areas.</p> <p>A score of SG80c is justified for 4X5Y(OT,LL,GN,HL) and 5ZjmGN and 5ZjmHL; a score of SG100c is justified for 5ZjmOT and 5ZjmLL.</p>	
d	Guidepost	Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>The Assessment Team considers that sufficient data is collected to detect any increase in risk level. There is retained species status using age composition of landings, size and age composition of the population, and trends in relative abundance derived from survey biomass indices. All groundfish species must be landed and recorded in a logbook supported by dockside monitoring and independent observer coverage. The only exceptions are dogfish, skates and sculpin.</p> <p>However, low observer coverage levels in 4X5Y (average 2004-2013: 5%) prevented adequate monitoring of retained species in sufficient detail to assess ongoing mortalities to all retained species. Additionally, there is insufficient quantitative information on gillnets and handline fisheries for both areas.</p> <p>A score of 80d is met for 4X5Y(OT,LL,GN,HL) and 5ZjmGN and 5ZjmHL, and 100d is met for 5ZjmOT and 5ZjmLL.</p>	

PI 2.1.3	Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species																	
Summary of Scores	<p>4X5Y Otter Trawl (UoC1). This UoC meets all the issues of SG100 except c and d. Observer coverage is relatively low in 4X5Y to monitor and provide sufficient information to assess ongoing mortalities of all retained species. However, the level of dockside monitoring and associated sales slips information about retained species are both accurate and verifiable, and may be used to quantitatively estimate outcome status and support a comprehensive strategy to manage retained species. The allocated score is 90.</p> <p>4X5Y Gillnet (UoC3). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). The allocated score is 80.</p> <p>4X5Y Bottom Long Line (UoC2). See (U4X5Y Otter Trawl UoC1). The allocated score is 90.</p> <p>4X5Y Hand line (UoC4). See S4X5Y Gillnet (UoC3). The allocated score is 80.</p> <p>5Zjm Otter Trawl (UoC5). This UoC meets all the issues of SG100. Observer coverage is relatively high to monitor and provide sufficient information to assess ongoing mortalities of all retained species. The allocated score is 100.</p> <p>5Zjm Bottom Long Line (UoC6). See above. The allocated score is 100.</p> <p>5Zjm Gillnet (UoC7). See S4X5Y Gillnet (UoC3) . The allocated score is 100</p> <p>5Zjm Handline (UoC8). See S4X5Y Gillnet (UoC3) The allocated score is 80.</p>																	
	<table border="1" data-bbox="497 1375 1326 1489"> <thead> <tr> <th>Score:</th> <th>OT</th> <th>BLL</th> <th>GN</th> <th>HL</th> </tr> </thead> <tbody> <tr> <td>4X5Y</td> <td>90</td> <td>90</td> <td>80</td> <td>80</td> </tr> <tr> <td>5Zjm</td> <td>100</td> <td>100</td> <td>80</td> <td>80</td> </tr> </tbody> </table>				Score:	OT	BLL	GN	HL	4X5Y	90	90	80	80	5Zjm	100	100	80
Score:	OT	BLL	GN	HL														
4X5Y	90	90	80	80														
5Zjm	100	100	80	80														
References	DFO, 2009a; Clark et al., 2008; DFO, 2009b; DFO, 1999; FRCC, 2004; DFO, 2003a; DFO, 2008; Campana et al., 2007; DFO, 2005b; DFO, 2004a; DFO, 2008; DFO, 2006a; DFO, 2009c.; DFO, 2010; DFO, 2011; DFO, 2012; DFO, 2013; DFO, 2014.																	
OVERALL PERFORMANCE INDICATOR SCORE:																		
CONDITION NUMBER (if relevant):			N/A															

Evaluation Table for PI 2.2.1

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	<p>4X5Y OT (UoC1) No Main Species Found Y</p> <p>4X5Y LL (UoC2) Skates Y Porbeagle Y Blue Shark Y Cusk Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm OT (UoC5) Skates Y Porbeagle Shark Y</p> <p>5Zjm LL (UoC6) Skates Y Blue Shark</p> <p>5Zjm GN (UoC7) Y</p> <p>5Zjm HL(UoC8) Y</p>	<p>4X5Y OT (UoC1) No Main Species Found Y</p> <p>4X5Y LL (UoC2) Skates N Porbeagle N (see issue b) Blue Shark Y Cusk Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm OT (UoC5) Skates N (see issue b.) Porbeagle Shark N (see issue b.)</p> <p>5Zjm LL (UoC6) Skates N (see issue b.) Blue Shark Y</p> <p>5Zjm GN (UoC7) Y</p> <p>5Zjm HL (UoC8) Y</p>	<p>4X5Y OT (UoC1) Main Species No Main Species Found Y Minor Species Spiny Dogfish Y Lobster Y</p> <p>4X5Y LL (UoC2) Main Species Skates N Porbeagle shark N Blue Shark Y Cusk Y</p> <p>Minor Species Spiny Dogfish Y Halibut Y</p> <p>4X5Y GN (UoC3) N</p> <p>4X5Y HL (UoC4) N</p> <p>5Zjm OT (UoC5) Major Species Skates N Porbeagle N</p> <p>Minor Species Spiny Dogfish Y</p> <p>5Zjm LL (UoC6) Major Species Skates N Blue Shark N</p> <p>Minor Species Spiny Dogfish Y</p> <p>5Zjm GN (UoC7) N</p> <p>5Zjm HL (UoC8) N</p>

PI 2.2.1	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
Justification	<p>Most mainy bycatch species are highly likely to be within biologically based limits except for thorny skates and Porbeagle. However it is expected that recent management startegies such as the skate conservation plan and the shark management plan would help in the recovery of these species</p> <p>Dogfish, Sculpin, skate, Atlantic Halibut (<81cm) in length, Northern wolffish and spotted wolffish, non-licensed groundfish and any non-groundfish species are the only groundfish species permitted to be discarded. Species that makes up for more than 5% of the total volume of the catch can be categorized as major species. However, according to MSC V 1.3, the Assessment Team considers skates, sharks and Cusk to be vulnerable species and therefore must take these species into consideration as major species..</p> <p>Estimates of discards based on observer data. 4X5Y Otter Trawl (UoC1) Major Species: No Major Species were found. There were no species that that matches the criteria above. It meets 100a</p>
	<p>Minor Species</p> <p>4X5Y Spiny Dogfish: The 2013 discarded catch estimated by the observer data of spiny dogfish by otter trawlers targeting haddock was 0.19 mt. (Estimates of discards in 2004 was 49.3 mt). Population estimates indicate a dramatic increase in Spiny Dogfish abundance during the 1980s, peaking about 1992, and then declining. The updated model demonstrates increased abundance since 2009, especially of juveniles, with a total population abundance of 789.2 million Spiny Dogfish for 2013. Adult females have remained at relatively high abundance since 2006. Abundance of adult females (SSN) and fishing mortality on adult females (F_{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN_{MSY} (32.8 million) is proposed as the USR and 65% of SSN_{MSY} (21.3 million) is proposed as the LRP. $FSSN_{MSY}$ is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG100a score.</p> <p>American Lobster: The annual discarded catch of lobster by otter trawlers targeting haddock in 2013 was 2.84 mt (Discards in 2004 were 6.67mt). A precautionary approach proposed for lobster in LFA 34 utilizes reference points for the abundance of legal sizes (landings, commercial catch rate) and the abundance of legal and sublegal sizes combined (ITQ survey). Landings-based reference points for the abundance of legal sizes are based on the median of the lobster landings from 1985-2009 as BMSY proxy (Tremblay et al, 2012). For the USR and LRP, the values of 80% and 40% were selected. For LFA 34, the USR is calculated to be 8,867 mt. The metric for assessing where the stock is relative to the reference points is the 3-year running average of landings. These indicators are above their USR, indicating that the lobster stock in LFA 34 is in the healthy zone. It meets the SG100a score.</p>

PI 2.2.1	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
	<p>4X5Y Bottom Long Line (UoC 2) Major Species</p> <p>Skates: The annual discarded catch of skates by longline targeting haddock in 2012 was 1.73 mt (discards in 2004 were 3.00mt). In 2013 DFO implemented a management plan for skates.</p> <p>Status</p> <p>Barndoor Skate: Trends in survey abundance and biomass indices for barndoor skate in shallow waters (< 200 fathoms) are well documented for Canada (Kulka 1999, Kulka et al, 2002). A decline in the survey indices occurred in the mid-1960s to early 1970s, likely caused by the high fishing effort of the distant water fleet on Georges Bank, followed by a period of low to zero catches. In 1985, consistent catches of barndoor skate began occurring and increases in survey indices were observed that have continued through thereafter (Dulvy, N.K. 2003).</p> <p>Winter Skate: Since 1994, discards of Winter skate were estimated to have been generally less than 100 mt (Simon et al. 2003), although it should be recognized that this estimate is highly uncertain. This species underwent a COSEWIC assessment in 2005 which determined that populations within the combined 4X5Y and 5Ze area to be of “special concern”, although stable (COSEWIC, 2005).</p> <p>Thorny Skate: Early in the 2000’s, bycatch of thorny skate was high relative to other species but has since declined. Thorny skate were widespread across the Scotian Shelf and Bay of Fundy with the highest concentration in Div. 4V and the Bay of Fundy prior to 1990. Since the 1990s, there has been a dramatic reduction in the distribution of thorny skate on the central Scotian Shelf and the concentrations in the east and west are much reduced.</p> <p>Little Skate:</p> <p>For 4X5Y Skate species, DFO’s 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and long-term (1970-2011) averages.</p> <p>Barndoor Skate is showing a declining trend in the most recent surveys but relative to a comparison of the short-term and long-term this species is above the average. Both Winter and Little Skate are up relative to the short-term. Only Thorny Skate is considered to be below the LRP proxy of 40% of the long-term mean. Refer to Section b for management efforts. It did not meet 60a.</p>

<p>PI 2.2.1</p>	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
	<p>Porbeagle: The annual discarded catch of Porbeagle by longline otter trawl targeting haddock in 2013 was 0.02 mt. In 2014, COSEWIC (COSEWIC, 2014) re-evaluated the conservation status of the northwest Atlantic population of Porbeagle Shark as endangered. The evaluation was based on the status of the population to 2009. At that time, the stock decline appears to have abated; abundance was estimated at about 10,000t, which still only corresponded to 22% to 27% of the virgin biomass when directed fishing began in 1961. It did not meet 60a. Please see Section b</p> <p>Blue Shark: The annual discarded catch of Blue shark by longline otter trawl targeting haddock in 2013 was 0.04 mt. In 2006, the conservation status of the Atlantic Blue Shark population was evaluated by COSEWIC as special concern. At that time the evaluation was based primarily on the indices of abundance in and near the Canadian waters showing variable trends from no decline to a 60% decline from the 1980s to early 2000s (COSEWIC, 2006). There is no fishery-independent data available for Blue Sharks in Canada. Fishery-dependent data may be biased based on limitations of the fisheries distribution. The north Atlantic population was assessed by ICCAT in 2008 and again in 2015 and stated Blue Shark are not overfished or overexploited. It meets 80a</p> <p>Cusk: The annual average discarded catch of dogfish by longline targeting haddock in 2004 - 2012 was 0.14 mt. Status - The 3-year geometric mean (2011-2013) of the CPUE is 18.1 kg/1000 hooks, which suggests that the stock is in the cautious zone . It meets 80a</p>

PI 2.2.1	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
	<p><u>Minor Species</u></p> <p>Spiny Dogfish: The annual discarded catch of dogfish by longline targeting haddock in 2012 was 0.02 mt (discards in 2004 were 1.57mt). Status is on the healthy zone . It meets the SG100a score.</p> <p>Atlantic Halibut (3NOPs4VWX): The annual discarded catch of Halibut by longline targeting haddock in 2012 was 0.28 mt (average discards in 2004 were 0.64 mt). Status on healthy zone . It meets the SG100a score.</p> <p>4X5Y Gillnet (UoC3): 4x5Y Handline (UoC4): While data on bycatch species from the gillnet and hand line fisheries were not available to the assessment team, previous MSC assessments concluded that annual landings at under 5 mt for both fisheries combined with their impact on other retained species populations were considered to be insignificant (MSC 2014, MSC 2013, MSC 2012). Currently in 5Zjm the data for gillnets is rolled into fixed gear because catches by this gear in the Georges Bank fishery are not significant. There are no handline catches (pers. comm Michael O’Connor GEAC). It meets 80a</p>

<p>PI 2.2.1</p>	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
	<p>5Zjm Otter Trawl (UoC5)</p> <p>Skates: The annual discarded catch of skates by otter trawl targeting haddock in 2013 was 17 mt (discards in 2004 were 29 mt). For an evaluation of longline gear in 5Zjm a similar approach was followed although current observer data is used because of the enhanced level of coverage in 5Zjm. DFO’s 2014 RV Winter survey abundance indices indicate a downward trend for Thorny Skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor Skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth Skate is a minor species in 5Z and is above the long-term average. Only Thorny Skate is considered to be below the LRP proxy of 40% of the long-term mean. It did not meet 60a. Please see Section b.</p> <p>Porbeagle: The annual discarded catch of Porbeagle by otter trawl targeting haddock in 2013 was 21.75 mt (discards in 2004 were 0.34 mt). The virgin porbeagle population in the NW Atlantic was fished intensively at catch levels of about 4,500 mt per year in the early 1960s before the fishery collapsed 6 years later. The population slowly recovered during the 1970s and 1980s when annual landings averaged 350 mt. Catches of 1,000-2,000 mt throughout the 1990s appear to have once again reduced population abundance, resulting in very low catch rates and disturbingly low numbers of mature females. Based on an extensive reconstruction of porbeagle shark abundance, all indicators of population size have declined substantially since 1961. Current population size is estimated to be 10-20% of that of the virgin 1961 population. All lines of evidence indicate that fishing mortality is largely or solely responsible for the decline in population abundance since 1961. It does not meet 80a Please see section b</p>
	<p>Minor Species</p> <p>Spiny dogfish: The annual average discarded catch of dogfish by otter trawl targeting haddock in 2013 was 2.66 mt (annual discards in 2004 was 0.34mt). Status – Biomass above LRP and on healthy zone. It meets the SG100a score.</p>

PI 2.2.1	The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
		<p>5Zjm Bottom Long Line:</p> <p>Skates: The annual discarded catch of Skates by longline targeting haddock in 2013 was 7 mt (annual discards in 2004 were 10.9 mt). DFO's 2014 RV Winter survey abundance indices indicate a downward trend for Thorny Skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor Skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth Skate is a minor species in 5Z and is above the long-term average. Only Thorny Skate is considered to be below the LRP proxy of 40% of the long-term mean. It did not meet 60a. Please see Section b.</p> <p>Blue shark: The annual discarded catch of Blue shark by longline targeting haddock in 2013 was 0.6mt. In 2006, the conservation status of the Atlantic Blue Shark population was evaluated by COSEWIC as special concern. At that time the evaluation was based primarily on the indices of abundance in and near the Canadian waters showing variable trends from no decline to a 60% decline from the 1980s to early 2000s (COSEWIC, 2006). There is no fishery-independent data available for Blue Sharks in Canada. Fishery-dependent data may be biased based on limitations of the fisheries distribution. The North Atlantic population was assessed by ICCAT in 2008 and again in 2015 and stated Blue Shark are not overfished nor overfishing is occurring. It meets 80a</p>	
		<p>Minor Species</p> <p>Spiny Dogfish: The annual discarded catch of spiny dogfish by longline targeting haddock in 2013 was 5.539 mt (average discards in 2004 was 1 mt). Populations in 5Zjm are in the healthy zone. It meets the SG100a score.</p>	
		<p>5Zjm Gillnet and Handline (UoC7,Uo8)</p> <p>Over the past 10 years (2005-2014), combined gillnet and handline landings of haddock from 5Zjm have been <2 mt (i.e. 0.88 mt in 2014), with most of these originating from gillnet. There are no observed trips from the handline sector because they essentially do not fish on Georges Bank (personal com. from GEAC and DFO Heath Stone). It meets 80a</p>	
b	Guidepost	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.

PI 2.2.1	The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups			
	Met?	4X5Y OT (UoC1) No Main Species Found Y 4X5Y LL (UoC2) Skates Y Porbeagle Shark Y Blue Shark Y Cusk Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Skates Y Porbeagle Shark Y Blue Shark Y 5Zjm LL (UoC6) Skates Y Sharks Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5YOT (UoC1) No Main Species Found Y 4X5Y LL (UoC2) Skates N Porbeagle Shark Y Blue Shark Y Cusk Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Skates N Porbeagle Shark Y Blue Shark Y 5Zjm LL (UoC6) Skates N Sharks Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	
		<p>Based on the current status of the skate stocks that are at their historical lowest abundance on a time series or some that are outside of their biological limits, it is difficult to say whether there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding for this fishery. There has been a set of management strategies to protect these stocks. For example, in keeping with the Precautionary Approach, biomass and removal reference points have been defined for some species. While there is now a conservation strategic plan for skates since September 2013, it has only been operationalized for 1 year making an evaluation of the plan's effectiveness and its impact on the recovery of some skate populations difficult to verify at this time.</p>		
		4X5Y Otter Trawl (UoC1) No Major Species Found		

PI 2.2.1	<p>The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups</p>
Justification	<p>4X5Y Bottom Long Line (UoC2)</p> <p>Skates: The Conservation Strategy and Management Measures for skate comprise a set of actions including informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move-away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5Zjm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer-based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p> <p>However, given the relatively recent implementation of the strategy and management measures, it is somewhat premature to determine the effectiveness of the plan. It meets the SG60b score.</p> <p>Sharks: Porbeagle, Blue shark</p> <p>Management</p> <p>The existing management of shark populations in Canadian waters is designed to maintain shark population numbers at healthy levels. Several restrictions make this possible:</p> <ul style="list-style-type: none"> •All recreational fishing for sharks is restricted to catch and live release, with the exception of authorized shark derbies where DFO Science staff are present to collect scientific data on the sharks. •Commercial fisheries for Porbeagle stopped in 2013. Bycatch limits for All shark fishing quotas are set at levels which maintain or increase population numbers at healthy levels, based on the best available scientific information. There are TACS for Porbeagle (184 mt) and Blue shark (250 mt). •Sharks caught accidentally in fisheries targeting other species are to be released alive, if they are not landed. •The mating ground of porbeagle sharks has been closed to commercial fishing to encourage population recovery. <p>In 2015 DFO revised its Shark conservation action plan. Management measures for this fishery include closed areas at certain times of the year to reduce fishing pressure on mature female sharks, 100% dockside monitoring of landings. completion of logbooks by all participants, prohibitions against finning etc.</p> <p>It meets the SG80b score.</p> <p>5Zjm Gillnet (UoC3)& 4X5Y 5Zjm (UoC4) Hand line. Data is not available on by catch; however it seems retained bycatch is minimal. It meets the SG80b score.</p>
	<p>5Zjm Otter Trawl (UoC5)</p> <p>Skates: See above. It meets the SG60b score.</p> <p>Sharks(Porbeagle): See above. It meets the SG80b score.</p>

PI 2.2.1	The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
		5Zjm Bottom Long Line (UoC6) Skates: See above. It meets the SG60b score. Sharks (Blue shark): See above. it meets the SG80b score. 5Zjm Gillnet (UoC7)& 4X5Y 5Zjm (UoC8) Hand line. Data are not available on by catch; however it seems bycatch is minimal. It meets the SG80b score.	
c	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.	
	Met?	4X5Y OT (UoC1) No Main Species Y 4X5Y LL (UoC2) Skates Y Porbeagle Shark Y Blue Shark Y Cusk Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Skates Y Porbeagle Shark Y 5Zjm LL (UoC6) Skates Y Blue Shark Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	
	Justification	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery. All of these main species are currently monitored for abundance trends in DFO summer and winter surveys. DFO also has recovery strategic plans in effect for Porbeagle, and cusk as well as management strategies for skates, sharks, dogfish, and other invertebrates. It meets the SG60c score for all UoCs.	

PI 2.2.1	The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups																																										
		<p>4X5YOT</p> <table border="1"> <tr><td>Dogfish</td><td>100</td></tr> <tr><td>Lobster</td><td>100</td></tr> <tr><td>Overall Score</td><td>100</td></tr> <tr><td>5ZjmOT</td><td></td></tr> <tr><td>Dogfish</td><td>100</td></tr> <tr><td>Skates</td><td>60</td></tr> <tr><td>Porbeagle</td><td>80</td></tr> <tr><td>Overall Score</td><td>75</td></tr> </table>	Dogfish	100	Lobster	100	Overall Score	100	5ZjmOT		Dogfish	100	Skates	60	Porbeagle	80	Overall Score	75	<p>4X5YLL</p> <table border="1"> <tr><td>Dogfish</td><td>100</td></tr> <tr><td>Skates</td><td>60</td></tr> <tr><td>Halibut</td><td>100</td></tr> <tr><td>Cusk</td><td>80</td></tr> <tr><td>Porbeagle</td><td>80</td></tr> <tr><td>Blue Shark</td><td>80</td></tr> <tr><td>Overall Score</td><td>75</td></tr> <tr><td>5ZjmLL</td><td></td></tr> <tr><td>Dogfish</td><td>100</td></tr> <tr><td>Skates</td><td>60</td></tr> <tr><td>Blue Shark</td><td>80</td></tr> <tr><td>Overall Score</td><td>75</td></tr> </table>	Dogfish	100	Skates	60	Halibut	100	Cusk	80	Porbeagle	80	Blue Shark	80	Overall Score	75	5ZjmLL		Dogfish	100	Skates	60	Blue Shark	80	Overall Score	75
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OVERALL PERFORMANCE INDICATOR SCORE:																																											
CONDITION NUMBER (if relevant):				3																																							

Evaluation Table for PI 2.2.2

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met	4X5Y OT (UoC1) No Main Species Found Y 4X5Y LL (UoC2) Skates Y Porbeagle Shark Y Blue Shark Y Cusk Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Skates Y Porbeagle Shark Y 5Zjm Longline (UoC6) Skates Y Blue Shark 5Zjm Gillnet (UoC7) Y 5Zjm Handline (UoC8) Y	4X5Y OT (UoC1) No Main Species Found Y 4X5Y LL (UoC2) Skates N Porbeagle Shark Y Blue Shark Y Cusk Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Skates N Porbeagle Shark Y 5Zjm Longline (UoC6) Skates N Blue Shark Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Main Species No Main Species Found Y Minor Species Spiny Dogfish Y Lobster Y 4X5Y LL (UoC2) Main Species Skates N Porbeagle Shark Y Blue Shark Y Cusk Y Minor Species Spiny Dogfish Y Halibut Y 4X5Y GN (UoC3) 4X5Y HL (UoC4) 5Zjm OT (UoC5) Major Species Skates N Porbeagle Shark N Minor Species Spiny Dogfish Y 5Zjm LL(UoC6) Major Species Skates N Blue Shark N Minor Species Spiny Dogfish Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
Justification	<p>For species other than skates, Cod, and sharks, there is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>Groundfish species permitted to be discarded are dogfish, Sculpin and skate. License conditions also require the release of all Atlantic Halibut less than 81 cm and all threatened species such as northern and spotted wolffish.</p> <p>4X5Y OT (UoC1) Major Species No Major Species Found. It meets score 100a.</p> <p>Minor Species</p> <p>Dogfish: Canadian catches of Spiny Dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. The TAC since 2004 has been set at 2,500 mt, but there has been no directed fishery since 2006. TACs have not been based on scientific advice, and there are no restrictions on discarding and bycatch in other fisheries. Abundance of adult females (SSN) and fishing mortality on adult females (F_{sn}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN_{MSY} (32.8 million) is proposed as the USR and 65% of SSN_{MSY} (21.3 million) is proposed as a LRP. F_{SSNMSY} is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG100a score.</p> <p>Atlantic lobster: Lobster can only be retained if they comply with a minimum legal size (MLS) designed to allow 50% of females to reach sexual maturity before being harvested. Modified biodegradable panels became mandatory in 2013 for all LFAs (DFO 2013a). With a full suite of progressive management strategies in place, populations are found to be healthy. 4X5Y OT (UoC1) it meets the SG100a score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>4X5Y LL (UoC2) Major Species</p> <p>Skates: Conservation Strategies and Management Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X White Hake and 4X5Y Skate species. The Conservation Strategy and Management Measures for skate includes a suite of actions such as informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p> <p>For 4X5Y skate species DFO's 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and longterm (1970-2011) averages. Barndoor skate is showing a declining trend in the most recent surveys but relative to a comparison of the short-term and long term this species is above the average. Both Winter and Little skate are up relative to the short-term. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean. DFO's 2014 RV Winter survey abundance indices indicate a downward trend for Thorny skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth skate is a minor species in 5Z and is above the long-term average. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean.</p> <p>Given that the skates strategy is almost new (implemented in 2013) , it remains to be seen if the implementation strategy is successful. It meets the SG60a score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Sharks, Blue Shark, Porbeagle: The existing management of shark populations in Canadian waters is designed to maintain shark population numbers at healthy levels. Several restrictions make this possible:</p> <ul style="list-style-type: none"> • All recreational fishing for sharks is restricted to catch and live release, with the exception of authorized shark derbies where DFO Science staff are present to collect scientific data on the sharks. • All commercial shark fishing quotas are set at levels which maintain or increase population numbers at healthy levels, based on the best available scientific information. • Sharks caught accidentally in fisheries targeting other species are to be released alive, if they are not landed. • The mating ground of porbeagle sharks has been closed to commercial fishing to encourage population recovery. <p>Fishery management strategy is as follows:</p> <ul style="list-style-type: none"> • Keep fishing mortality of sharks moderate by maintaining precautionary management measures that where possible are species specific. • Porbeagle shark by-catch quota (185 mt) • Catch limits for blue shark (250 mt) • Encouraged release of live sharks (longline) • Mandatory release of White tip and hammerhead sharks (all fleets) • Mandatory release of all sharks (harpoon, trolling) <p>It meets the SG80a score.</p> <p>Cusk: Commercial catch rates for Cusk have declined since the 1980s. Management measures (e.g., trip limits, overall caps, and bycatch percentages) may have contributed to this reduction in catch rates (and landings); however, it is thought the decline in catch per unit effort (CPUE) is also due to a decline in Cusk abundance. Proposed reference points for Cusk and other Maritimes Region stocks were reviewed at a DFO Regional Peer Review meeting in February 2012. The framework for these reference points followed the 2009 DFO policy document “A fishery decision-making framework incorporating the Precautionary Approach,” which explains in detail how the PA will be put into practice. To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a LRP that delimits the boundary between a critical and cautious zone, and a USR that delimits the boundary between a cautious and healthy zone on the stockstatus axis. The Halibut Industry Survey provides an ongoing time series to be used for monitoring Cusk stock status. The USR and LRP for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks respectively. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP. Cusk is currently in the cautious zone. It meets the SG80a score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Minor Species</p> <p>Dogfish: Canadian catches of Spiny Dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. The TAC since 2004 has been set at 2,500 mt, but there has been no directed fishery since 2006. TACs have not been based on scientific advice, and there are no restrictions on discarding and bycatch in other fisheries. Abundance of adult females (SSN) and fishing mortality on adult females (F_{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN_{MSY} (32.8 million) is proposed as the USR and 65% of SSN_{MSY} (21.3 million) is proposed as a LRP. F_{SSNMSY} is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG100a score.</p> <p>Atlantic Halibut 3NOPs4VWX: In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase, and it was concluded that there was little risk in harming the productivity of the stock at harvest levels < 4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that <i>F</i> has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and <i>F</i> are also consistent with model projections (DFO 2012, DFO 2014).</p> <p>Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years.</p> <p>A score of 100 is justified for issue a.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	<p>5Zjm OT (UoC5) Major Species Skates. Please see (UoC2:LL). It meets 60a. Porbeagle Shark. Please see (UoC2:LL). It meets 80a. Minor Species Spiny Dogfish. Please see (UoC2:LL). It meets 100a.</p> <p>5Zjm LL (UoC6) Major Species Skates. Please see (UoC2:LL). It meets 60a. Blue Shark. Please see (UoC2:LL). It meets 80a. Minor Species Spiny Dogfish. Please see (UoC2:LL). It meets 100a.</p> <p>4X5Y/5Zjm Gillnet (UoC3,UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG80a score.</p>		
b 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 some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
Met ?	<p>4X5Y OT (UoC1) No Main Species found Y</p> <p>4X5Y LL (UoC2) Skates Y Porbeagle Shark Y Blue Shark Y Cusk Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL(UoC4) Y</p> <p>5Zjm Otter Trawl (UoC5) Skates Y Porbeagle Shark Y</p> <p>5Zjm Longline (UoC6) Skates Y Blue Shark Y</p> <p>5Zjm Gillnet (UoC7)</p>	<p>4X5Y OT (UoC1) No Main Species found Y</p> <p>4X5Y Longline (UoC2) Skates N Porbeagle Shark Y Blue Shark Y Cusk Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm Otter Trawl (UoC5) Skates N Porbeagle Shark Y</p> <p>5Zjm Longline (UoC6) Skates N Blue Shark Y</p> <p>5Zjm GN (UoC7)</p>	<p>4X5Y OT (UoC1) No Main Species found Y</p> <p>Minor Species Spiny Dogfish Y Lobster Y</p> <p>4X5Y LL (UoC2) Main Species Skates N Porbeagle Shark N Blue Shark N Cusk N</p> <p>Minor Species Spiny Dogfish Y Halibut Y</p> <p>4X5Y GN (UoC3) N</p> <p>4X5Y HL (UoC4) N</p> <p>5Zjm OT (UoC5) Major Species</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	Y 5Zjm Handline (UoC8) Y	Y N5Zjm HL (UoC8) Y	Skates N Porbeagle Shark N Minor Species Spiny Dogfish Y 5Zjm LL (UoC6) Major Species Skates N Blue Shark N Minor Species Spiny Dogfish Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
Justification	For all species assessed except for skates, there is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There is a set of management strategies to protect these stocks. For example, in keeping with the Precautionary Approach, biomass and removal reference points have been defined for these species. Furthermore TACs are set based on a risk analysis of various TAC options in relation to the probability of conforming to the biological reference points and ensuring stock sustainability. However there are mixed results regarding some objective basis for confidence that the strategies will work, based on evidence from stock assessment results for some species. It is noteworthy that the Skate Conservation Strategy has only been in place since September 2013, and its effectiveness and impact cannot be fully determined at this time.		
	4X5Y OT (UoC1) Major Species No major species found. It meets 100b. Minor Species Atlantic lobster: Lobster can only be retained if they comply with a minimum legal size (MLS) designed to allow 50% of females to reach sexual maturity before being harvested. Modified biodegradable panels became mandatory in 2013 for all LFAs (DFO 2013a). With a full suite of progressive management strategies in place, populations are found to be healthy. It meets the SG80b score. Dogfish: Canadian catches of Spiny Dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. The TAC since 2004 has been set at 2,500 mt, but there has been no directed fishery since 2006. TACs have not been based on scientific advice, and there are no restrictions on discarding and bycatch in other fisheries. Abundance of adult females (SSN) and fishing mortality on adult females (F _{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN _{MSY} (32.8 million) is proposed as the USR and 65% of SSN _{MSY} (21.3 million) is proposed as a LRP. F _{SSNMSY} is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG80b score.		

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>4X5Y LL (UoC2) Major Species</p> <p>Skates: Conservation Strategies and Management Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X White Hake and 4X5Y Skate species. The Conservation Strategy and Management Measures for skate includes a suite of actions including informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p> <p>For 4X5Y skate species DFO’s 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and longterm (1970-2011) averages. Barndoor skate is showing a declining trend in the most recent surveys but relative to a comparison of the short-term and long-term this species is above the average. Both Winter and Little skate are up relative to the short-term. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean.</p> <p>DFO’s 2014 RV Winter survey abundance indices indicate a downward trend for Thorny skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth skate is a minor species in 5Z and is above the long-term average. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean. The skates strategy have been implemented for about a year. It is too early to know how successful it will be. There is no testing of the management strategy. It meets the SG60b score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Sharks: Porbeagle, Blue Shark</p> <p>The existing management of shark populations in Canadian waters is designed to maintain shark population numbers at healthy levels. Several restrictions make this possible:</p> <ul style="list-style-type: none"> •All recreational fishing for sharks is restricted to catch and live release, with the exception of authorized shark derbies where DFO Science staff are present to collect scientific data on the sharks. •All commercial shark fishing quotas are set at levels which maintain or increase population numbers at healthy levels, based on the best available scientific information. •Sharks caught accidentally in fisheries targeting other species are to be released alive, if they are not landed. •The mating ground of porbeagle sharks has been closed to commercial fishing to encourage population recovery. <p>There is a fishery-specific management strategy for the species. The TAC for Porbeagle is 185 mt, for Blue shark it is 100 mt.</p> <p>Porbeagle:</p> <p>The latest Canadian assessment of the Northwest Atlantic porbeagle stock (Campana 2012) indicated that recent fishing mortality is below FMSY and recent biomass appears to be increasing. Recent estimates of Porbeagle bycatch among OTB and BLL gear are very low according to the recent Porbeagle RPA (DFO 2015) and observer data. Estimates of discards in Scotia Fundy OTB and BL fisheries are well below the bycatch limits (187mt). The level of bycatch in the haddock fishery totals only 1.29t in 5Zjm where observer coverage is very high; the overall total is estimated at 2.6t for 5Zjm plus 4X5Y, which is less than 3% of the 100t limit determined by the Recovery Potential Assessment (RPA); the total bycatch in all other fisheries is estimated at only 28.4t (Mike O' Connor, GEAC personal communication). When post-release mortality is incorporated, this reduces mortality to only 23t, which is well within the limits established through the RPA. At 0.02%, the rate of bycatch is extremely low relative to the directed fishery. There is no testing of the management strategy. It meets the SG80b score.</p> <p>Blue Shark:</p> <p>There is no directed commercial fishery on Blue Shark and due to poor commercial value total landings have decreased to <0.5t in the last 4 years after a high of 1.1t in 2008 (DFO 2015). On the latest ICCAT stock assessment (2015) it was found that the North Atlantic Blue shark is not overfished nor is overfishing occurring. (ICCAT 2015)</p> <p>It meets 80b.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Cusk: Commercial catch rates for Cusk have declined since the 1980s. Management measures (e.g., trip limits, overall caps, and bycatch percentages) may have contributed to this reduction in catch rates (and landings); however, it is thought the decline in catch per unit effort (CPUE) is also due to a decline in Cusk abundance. Proposed reference points for Cusk and other Maritimes Region stocks were reviewed at a DFO Regional Peer Review meeting in February 2012.</p> <p>The framework for these reference points followed the 2009 DFO policy document “A fishery decision-making framework incorporating the Precautionary Approach,” which explains in detail how the PA will be put into practice. To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a LRP that delimits the boundary between a critical and cautious zone, and a USR that delimits the boundary between a cautious and healthy zone on the stock status axis. The Halibut Industry Survey provides an ongoing time series to be used for monitoring Cusk stock status. The USR and LRP for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks respectively. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP. Currently, Cusk is in the cautious zone. There is no testing of the management strategy. It meets the SG80b score.</p> <p>Minor Species</p> <p>Dogfish: Please see (4X5Y OTB UoC1). It meets 80b.</p> <p>Atlantic Halibut 3NOPs4VWX: In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase, and it was concluded that there was little risk in harming the productivity of the stock at harvest levels < 4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that <i>F</i> has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and <i>F</i> are also consistent with model projections (DFO 2012, DFO 2014).</p> <p>Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years. It meets 80b.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	<p>5Zjm OTB (UoC5) Skates: Please see (UoC2). It meets 80b Porbeagle: Please see (UoC2). It meets 80b Minor species Dogfish: Please see (UoC2). It meets 80b</p> <p>5Zjm BLL (UoC6) Skates: Please see (UoC2). It meets 80b Blue Shark: Please see (UoC2). It meets 80b</p> <p>Minor species Dogfish: Please see (UoC2). It meets 80b</p> <p>4X5Y/5Zjm Gillnet (UoC3,UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined, their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG80b score.</p> <p>4X5Y (all gears) There is no evidence that the strategy has been tested for any of the species preventing the fishery from meeting the 100b score.</p> <p>5Zjzm (all gears) There is no evidence that the strategy has been tested for any of the species preventing the fishery from meeting the 100b score.</p>		
c	Guidepost	There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met	<p>4X5Y Otter Trawl (UoC1) No Main Species found Y</p> <p>4X5Y Longline (UoC2) Skates N Porbeagle Shark Y Blue Shark Y Cusk Y</p> <p>4X5Y GN (UoC3) Y</p> <p>4X5Y HL (UoC4) Y</p> <p>5Zjm OT (UoC5) Skates N Porbeagle Shark Y</p> <p>5Zjm Longline (UoC6) Skates N</p>	<p>4X5Y Otter Trawl (UoC1) Main Species No Main Species found Y</p> <p>Minor Species Spiny Dogfish Y Lobster Y</p> <p>4X5Y LL (UoC2) Main Species Skates N Porbeagle Shark N Blue Shark N Cusk N</p> <p>Minor Species Halibut Y Spiny Dogfish Y</p> <p>4X5Y GN (UoC3)</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
		Blue Shark Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	N 4X5Y HL /(UoC4) N 5Zjm OT (UoC5) Major Species Skates N Porbeagle Shark N Minor Species Spiny Dogfish Y 5Zjm LL (UoC6) Major Species Skates N Blue Shark N Minor Species Spiny Dogfish Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
Justification	<p>For all species except for skates, there is some evidence that the partial strategy is being implemented successfully. There are management measures in place in which it is expected that the fishery does not hinder recovery and rebuilding for this fishery. There has been a set of management strategies to protect these stocks. For example, in keeping with the PA, biomass and removal reference points have been defined for these species. Furthermore TACs are set based on a risk analysis of various TAC options in relation to the probability of conforming to the biological reference points and ensuring stock sustainability. However there are mixed results regarding some objective basis for confidence that strategies will work, based on evidence from stock assessment results for some species. It is noteworthy that the Skate Conservation Strategy has only been in effect since September 2013, making it very difficult to determine whether its effectiveness and impacts are measurable at this time.</p>		

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>4X5Y OT (UoC1)</p> <p>Major Species No Major Species found. It meets score 100c</p> <p>Minor Species</p> <p>Dogfish: Canadian catches of Spiny Dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. The TAC since 2004 has been set at 2,500 mt, but there has been no directed fishery since 2006. TACs have not been based on scientific advice, and there are no restrictions on discarding and bycatch in other fisheries. Abundance of adult females (SSN) and fishing mortality on adult females (F_{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN_{MSY} (32.8 million) is proposed as the USR and 65% of SSN_{MSY} (21.3 million) is proposed as a LRP. F_{SSNMSY} is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG100c score.</p> <p>Atlantic lobster: Lobster can only be retained if they comply with a minimum legal size (MLS) designed to allow 50% of females to reach sexual maturity before being harvested. Modified biodegradable panels became mandatory in 2013 for all LFAs (DFO 2013a). With a full suite of progressive management strategies in place, populations are found to be healthy. It meets the SG100c score.</p> <p>4X5Y LL (UoC2)</p> <p>Major Species</p> <p>Skates: Conservation Strategies and Management Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X White Hake and 4X5Y Skate species. The Conservation Strategy and Management Measures for skate includes a suite of actions including informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Sharks: Porbeagle, , Blue Shark</p> <p>The existing management of shark populations in Canadian waters is designed to maintain shark population numbers at healthy levels. Several restrictions make this possible:</p> <ul style="list-style-type: none"> •All recreational fishing for sharks is restricted to catch and live release, with the exception of authorized shark derbies where DFO Science staff are present to collect scientific data on the sharks. •All commercial shark fishing quotas are set at levels which maintain or increase population numbers at healthy levels, based on the best available scientific information. •Sharks caught accidentally in fisheries targeting other species are to be released alive, if they are not landed. •The mating ground of porbeagle sharks has been closed to commercial fishing to encourage population recovery. <p>There is a fishery-specific management strategy for the species. The TAC for Porbeagle is 185 mt, for Blue shark it is 100 mt.</p> <p>There is some evidence that the strategy has been implemented successfully.</p> <p>Porbeagle</p> <p>The latest Canadian assessment of the Northwest Atlantic porbeagle stock (Campana 2012) indicated that recent fishing mortality is below FMSY and recent biomass appears to be increasing. Recent estimates of Porbeagle bycatch among OTB and BLL gear are very low according to the recent Porbeagle RPA (DFO 2015) and observer data. Estimates of discards in Scotia Fundy OTB and BL fisheries are well below the bycatch limits (187mt). The level of bycatch in the haddock fishery totals only 1.29t in 5Zjm where observer coverage is very high; the overall total is estimated at 2.6t for 5Zjm plus 4X5Y, which is less than 3% of the 100t limit determined by the Recovery Potential Assessment (RPA); the total bycatch in all other fisheries is estimated at only 28.4t(Mike O’ Connor, GEAC personal communication). When post-release mortality is incorporated, this reduces mortality to only 23t, which is well within the limits established through the RPA. At 0.02%, the rate of bycatch is extremely low relative to the directed fishery. It meets the SG80c score.</p> <p>Blue Shark:</p> <p>There is no directed commercial fishery on Blue Shark and due to poor commercial value total landings have decreased to <0.5t in the last 4 years after a high of 1.1t in 2008 (DFO 2015). On the latest stock ICCAT assessment (2015) it was found that the North Atlantic Blue shark is not overfished nor overfishing is occurring. (ICCAT 2015)</p> <p>It meets the 80c score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Cusk: Commercial catch rates for Cusk have declined since the 1980s. Management measures (e.g., trip limits, overall caps, and bycatch percentages) may have contributed to this reduction in catch rates (and landings); however, it is thought the decline in catch per unit effort (CPUE) is also due to a decline in Cusk abundance. Proposed reference points for Cusk and other Maritimes Region stocks were reviewed at a DFO Regional Peer Review meeting in February 2012.</p> <p>The framework for these reference points followed the 2009 DFO policy document “A fishery decision-making framework incorporating the Precautionary Approach,” which explains in detail how the PA will be put into practice. To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a LRP that delimits the boundary between a critical and cautious zone, and a USR that delimits the boundary between a cautious and healthy zone on the stock status axis. The Halibut Industry Survey provides an ongoing time series to be used for monitoring Cusk stock status. The USR and LRP for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks respectively. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP. Currently, Cusk is in the cautious zone. There is no testing of the management strategy. It meets the SG80c score.</p> <p>Minor Species</p> <p>Dogfish: Please see (4X5Y OTB UoC1). It meets 80c.</p> <p>Halibut 3NOPs4VWX: In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase, and it was concluded that there was little risk in harming the productivity of the stock at harvest levels < 4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that <i>F</i> has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and <i>F</i> are also consistent with model projections (DFO 2012, DFO 2014).</p> <p>Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years. It meets 80c</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
	<p>5Zjm OTB (UoC5) Skates: Please see (UoC2). It meets 80c. Porbeagle: Please see (UoC2). It meets 80c.</p> <p>Minor species Dogfish: Please see (UoC2). It meets 80c.</p> <p>5Zjm BLL (UoC6) Skates: Please see (UoC2). It meets 80c. Blue Shark: Please see (UoC2). It meets 80c.</p> <p>Minor species Dogfish: Please see (UoC2). It meets 80c</p> <p>4X5Y/5Zjm Gillnet (UoC3,UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG80c score.</p>		
d	Guidepost		There is some evidence that the strategy is achieving its overall objective.
	Met ?		
	There is some evidence that the strategy is achieving its overall objective. There is a partial strategy of management measures in place such that the haddock fishery does not hinder recovery and rebuilding for these stocks. There has been a set of management strategies to protect these stocks. For example, in keeping with the PA, biomass and removal reference points have been defined for some of these species. However there are mixed results regarding whether the partial strategy is being implemented successfully based on evidence from stock assessment results for some species.		

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>4X5Y OT (UoC1) Major Species: No Major Species found. It meets score 100d.</p> <p>Minor Species</p> <p>Dogfish: Canadian catches of Spiny Dogfish were unrestricted prior to 2002. Since 2002, a TAC based on past catches has been in place for the Maritimes Region. The TAC since 2004 has been set at 2,500 mt, but there has been no directed fishery since 2006. TACs have not been based on scientific advice, and there are no restrictions on discarding and bycatch in other fisheries. Abundance of adult females (SSN) and fishing mortality on adult females (F_{SSN}) are used to evaluate stock status. Given the low productivity and associated recovery time of Spiny Dogfish, SSN_{MSY} (32.8 million) is proposed as the USR and 65% of SSN_{MSY} (21.3 million) is proposed as a LRP. F_{SSNMSY} is 0.072. Spiny Dogfish is currently above the USR, i.e., is in the healthy zone. It meets the SG100d score.</p> <p>Atlantic lobster: Lobster can only be retained if they comply with a minimum legal size (MLS) designed to allow 50% of females to reach sexual maturity before being harvested. Modified biodegradable panels became mandatory in 2013 for all LFAs (DFO 2013a). With a full suite of progressive management strategies in place, populations are found to be healthy. It meets the SG100d score.</p> <p>4X5Y LL (UoC2) Major Species</p> <p>Skates: Conservation Strategies and Management Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X White Hake and 4X5Y Skate species. The Conservation Strategy and Management Measures for skate includes a suite of actions including informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p> <p>For 4X5Y skate species DFO's 2013 RV summer survey abundance indices indicate a downward trend for Smooth and Thorny skate relative to the short-term (2007-2011) and longterm (1970-2011) averages. Barndoor skate is showing a declining trend in the most recent surveys but relative to a comparison of the short-term and long-term this species is above the average. Both Winter and Little skate are up relative to the short-term. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean.</p> <p>DFO's 2014 RV Winter survey abundance indices indicate a downward trend for Thorny skate relative to the short-term (2009-2013) and long-term (1987-2013) averages. Barndoor skate is above the long-term average when compared to the short-term and about the same when the short-term average is compared to the most recent survey indices. Both Winter and little skate are up relative to the short-term. Smooth skate is a minor species in 5Z and is above the long-term average. Only Thorny skate is considered to be below the LRP proxy of 40% of the long-term mean. The skates strategy have been implemented for about a year. It is too early to know how successful it will be. It meets the SG60d score.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Sharks: Porbeagle, , Blue Shark</p> <p>The existing management of shark populations in Canadian waters is designed to maintain shark population numbers at healthy levels. Several restrictions make this possible:</p> <ul style="list-style-type: none"> •All recreational fishing for sharks is restricted to catch and live release, with the exception of authorized shark derbies where DFO Science staff are present to collect scientific data on the sharks. •All commercial shark fishing quotas are set at levels which maintain or increase population numbers at healthy levels, based on the best available scientific information. •Sharks caught accidentally in fisheries targeting other species are to be released alive, if they are not landed. •The mating ground of porbeagle sharks has been closed to commercial fishing to encourage population recovery. <p>There is a fishery-specific management strategy for the species. The TAC for Porbeagle is 185 mt, for Blue shark it is 100 mt.</p> <p>There is some evidence that the strategy has been implemented successfully</p> <p>Porbeagle</p> <p>The latest Canadian assessment of the Northwest Atlantic porbeagle stock (Campana 2012) indicated that recent fishing mortality is below FMSY and recent biomass appears to be increasing. Recent estimates of Porbeagle bycatch among OTB and BLL gear are very low according to the recent Porbeagle RPA (DFO 2015) and observer data. Estimates of discards in Scotia Fundy OTB and BL fisheries are well below the bycatch limits (187mt). The level of bycatch in the haddock fishery totals only 1.29t in 5Zjm where observer coverage is very high; the overall total is estimated at 2.6t for 5Zjm plus 4X5Y, which is less than 3% of the 100t limit determined by the Recovery Potential Assessment (RPA); the total bycatch in all other fisheries is estimated at only 28.4t (Mike O' Connor, GEAC personal communication). When post-release mortality is incorporated, this reduces mortality to only 23t, which is well within the limits established through the RPA. At 0.02%, the rate of bycatch is extremely low relative to the directed fishery. It meets the SG80d score.</p> <p>Blue Shark:</p> <p>There is no directed commercial fishery on Blue Shark and due to poor commercial value total landings have decreased to <0.5t in the last 4 years after a high of 1.1t in 2008 (DFO 2015). On the latest stock ICCAT assessment (2015) it was found that the North Atlantic Blue shark is not overfished nor overfishing is occurring. (ICCAT 2015)</p> <p>It meets 80d.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations
	<p>Cusk: Commercial catch rates for Cusk have declined since the 1980s. Management measures (e.g., trip limits, overall caps, and bycatch percentages) may have contributed to this reduction in catch rates (and landings); however, it is thought the decline in catch per unit effort (CPUE) is also due to a decline in Cusk abundance. Proposed reference points for Cusk and other Maritimes Region stocks were reviewed at a DFO Regional Peer Review meeting in February 2012.</p> <p>The framework for these reference points followed the 2009 DFO policy document “A fishery decision-making framework incorporating the Precautionary Approach,” which explains in detail how the PA will be put into practice. To be compliant with the PA, fishery management plans should include harvest strategies that incorporate a LRP that delimits the boundary between a critical and cautious zone, and a USR that delimits the boundary between a cautious and healthy zone on the stock status axis. The Halibut Industry Survey provides an ongoing time series to be used for monitoring Cusk stock status. The USR and LRP for Cusk were set at 26.6 kg/1000 hooks and 13.3 kg/1000 hooks respectively. The 3-year geometric mean was accepted as the metric for monitoring Cusk status relative to the USR and LRP. Currently, Cusk is in the cautious zone. There is no testing of the management strategy. It meets the SG80d score.</p> <p>Minor Species</p> <p>Dogfish: Please see (4X5Y OTB UoC1). It meets 80d.</p> <p>Halibut 3NOPs4VWX: In 2012, based on model projections, 3NOPs4VWX5Zc Atlantic Halibut was concluded to be in a productive period due to high recruitment (DFO 2012, DFO 2014). The SSB was expected to increase, and it was concluded that there was little risk in harming the productivity of the stock at harvest levels < 4,000 mt. Evidence from the updated 2012 and 2013 abundance indices, including the 4VWX RV survey, the Halibut survey and the commercial index standardized catch rates, shows that the abundance of both pre-recruits and recruits continues to be high. Furthermore fishing mortality estimated from the multiyear tagging study shows that <i>F</i> has been stable or slightly reduced between 2007 and 2012. The current abundance indices and trends in landings and <i>F</i> are also consistent with model projections (DFO 2012, DFO 2014).</p> <p>Over the past few years the TAC has increased, with the 2013 TAC at 2,447 mt, which is still well below 4,000 mt (DFO 2014). Despite slight increases in TAC the Atlantic Halibut stock abundance appears to be increasing. The 4VWX RV survey standardized catch rates remain well above the long term mean and suggests that the fishery will continue to benefit from high recruitment in the next couple of years. It meets 80d.</p>

PI 2.2.2	There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations																																																							
	<p>5Zjm OTB (UoC5) Skates: Please see (UoC2). It meets 80d. Porbeagle: Please see (UoC2). It meets 80d.</p> <p>Minor species Dogfish: Please see (UoC2). It meets 80d.</p> <p>5Zjm BLL (UoC6) Skates: Please see (UoC2). It meets 80d Blue Shark: Please see (UoC2). It meets 80d.</p> <p>Minor species Dogfish: Please see (UoC2). It meets 80d.</p> <p>4X5Y/5Zjm Gillnet (UoC3,UoC7) & Hand line (UoC4,UoC8). Data on retained species from the gillnet and hand line fisheries were not provided to the assessment team, but previous studies stating that with annual landings at under 5 mt for both fisheries combined their impact on other retained species populations is considered to be insignificant (MSC 2012, MSC 2013, MSC 2014). It meets the SG80d score.</p>																																																							
Summary of Scores	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:30%;"></th> <th style="width:15%; text-align: center;">4X5YOT</th> <th style="width:30%;"></th> <th style="width:15%; text-align: center;">4X5YLL</th> </tr> </thead> <tbody> <tr> <td>Dogfish</td> <td style="text-align: center;">100</td> <td>Dogfish</td> <td style="text-align: center;">100</td> </tr> <tr> <td>Lobster</td> <td style="text-align: center;">100</td> <td>Skates</td> <td style="text-align: center;">60</td> </tr> <tr> <td></td> <td></td> <td>Halibut</td> <td style="text-align: center;">100</td> </tr> <tr> <td></td> <td></td> <td>Cusk</td> <td style="text-align: center;">80</td> </tr> <tr> <td></td> <td></td> <td>Porbeagle</td> <td style="text-align: center;">80</td> </tr> <tr> <td></td> <td></td> <td>Blue Shark</td> <td style="text-align: center;">80</td> </tr> <tr> <td>Overall Score</td> <td style="text-align: center;">100</td> <td>Overall Score</td> <td style="text-align: center;">75</td> </tr> <tr> <td></td> <td style="text-align: center;">5ZjmOT</td> <td></td> <td style="text-align: center;">5ZjmLL</td> </tr> <tr> <td>Dogfish</td> <td style="text-align: center;">100</td> <td>Dogfish</td> <td style="text-align: center;">100</td> </tr> <tr> <td>Skates</td> <td style="text-align: center;">60</td> <td>Skates</td> <td style="text-align: center;">60</td> </tr> <tr> <td>Porbeagle Shark</td> <td style="text-align: center;">80</td> <td>Blue Shark</td> <td style="text-align: center;">80</td> </tr> <tr> <td>Overall Score</td> <td style="text-align: center;">75</td> <td>Overall Score</td> <td style="text-align: center;">75</td> </tr> </tbody> </table>					4X5YOT		4X5YLL	Dogfish	100	Dogfish	100	Lobster	100	Skates	60			Halibut	100			Cusk	80			Porbeagle	80			Blue Shark	80	Overall Score	100	Overall Score	75		5ZjmOT		5ZjmLL	Dogfish	100	Dogfish	100	Skates	60	Skates	60	Porbeagle Shark	80	Blue Shark	80	Overall Score	75	Overall Score	75
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CONDITION NUMBER (if relevant):				4																																																				

Evaluation Table for PI 2.2.3

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL(UoC2) Y 4X5Y GN(UoC3) Y 4X5Y HL(UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.</p> <p>Only a limited number of species are permitted to be discarded (dogfish, skates and Sculpin). There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59%. A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. There is scarce bycatch information on GN and HL in 4X5Y and for GN and HL in 5Zjm (MSC 2011) .</p> <p>Therefore the score meets the SG80a in both areas for all gears. However due to the high coverage levels 5Zjm OT and LL score 100a</p>		
b	Guidepost	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N

PI 2.2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch			
		4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7)Y 5Zjm HL (UoC8) Y	4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>Only a limited number of species are permitted to be discarded (dogfish, skates and Sculpin). There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59% . A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. Nevertheless, There have been enough information to develop limit reference points. There is no information on HL and GN gears due to confidentiality issues. But the assessment team has been informed their impact is negligible.</p> <p>Therefore the score meets SG80b in both areas for all gears.. However due to the high coverage levels of 5Zjm OT and LL gears these UoAs scored 100b</p>		
c	Guidepost	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN(UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC 3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL(UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN(UoC3) N 4X5Y HL (UoC 4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
	Justification	<p>Information is adequate to support a partial strategy to manage main bycatch species.</p> <p>Only a limited number of species are permitted to be discarded (dogfish, skates and Sculpin). There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10 % to 23.59%. A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y.</p> <p>Therefore the 5Zjm OTB and LL meets the SG80c and the 4X5Y OTB and LL meets the SG60c. Information on HL and GN gear types for both areas is scarce. However the impact is considered negligible according to DFO; these UoCs meet the SG80c score.</p>	
d	Guidepost		<p>Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p> <p>Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.</p>
	Met?		<p>4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8)Y</p> <p>4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N</p>

PI 2.2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch	
	Justification	<p>Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p> <p>Only a limited number of species are permitted to be discarded (dogfish, skates and Sculpin). There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59%. However it cannot be said that monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.</p> <p>A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. Therefore the 5Zjm OTB and LL meets the SG80c and 4X5Y OTB and LL meets the SG60d. Information on HL and GN gear types for both areas is scarce. However the impact is considered negligible due to accounts from DFO, these UoCs meet the SG80d score</p>

PI 2.2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch					
	<p>4X5Y Otter Trawl (UoC1). The UoC meets the first two issues of SG 80, as there is qualitative and quantitative information available on the main by-catch species that is sufficient to estimate outcome status and support a partial management strategy for discard species. However, due to low observer coverage and no routine recording of discards, the UoC does not meet the third and fourth issue of SG80. Accordingly a score of 70 is allocated. As this score is below 80, a condition to certification has been raised (Condition 5). Once this condition has been satisfied the score for this PI will increase to 80 or above.</p> <p>4X5Y Bottom Long Line (UoC2). As above. A score of 70 is allocated. As this score is below 80, a condition to certification has been raised (Condition 5). Once this condition has been satisfied the score for this PI will increase to 80 or above.</p> <p>4X5Y Gillnet (UoC3). There is little quantitative information on this UoC. However, the impact is considered negligible due to accounts from DFO. A score of SG80 is allocated.</p> <p>4X5Y Handline (UoC4). There is little quantitative information on this UoC. However, the impact is considered negligible due to accounts from DFO. A score of SG80 is allocated.</p> <p>5Zjm Otter Trawl (UoC5). The UoC meets all four issues of SG80 and the first two issues of SG100. There are both qualitative and some quantitative information on the amount of main bycatch species affected by the fishery through the observer program, although coverage is low. This information is adequate to broadly understand the outcome with respect to biologically-based limits and support a partial strategy to manage main bycatch species. Information continues to be collected to detect any changes in risk. Accordingly a score of SG90 is allocated.</p> <p>5Zjm Bottom Long Line (UoC6). The UoC meets all four issues of SG80 and the first two issues of SG100, as there is qualitative and quantitative information available on the main bycatch species that is sufficient to estimate outcome status and support a partial management strategy for discard species and sufficient data continue to be collected to detect any increase in risk to main bycatch species. A score of 90 is allocated.</p> <p>5Zjm Gillnet (UoC7). There is little quantitative information on this UoC. However, the impact is considered negligible due to accounts from DFO. A score of SG80 is allocated.</p> <p>5Zjm Handline (UoC8). There is little quantitative information on this UoC. However, the impact is considered negligible due to accounts from DFO A score of SG80 is allocated.</p>					
	Score:	Area	OT	BLL	GN	HL
		4X5Y	70	70	80	80
		5Zjm	90	90	80	80

PI 2.2.3	Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch	
References	Kulka 1999; Kulka et al., 2002; Dulvy, N.K. 2003; COSEWIC, 2005; DFO, 2007; DFO, 2008; Simon et al., 2003	
OVERALL PERFORMANCE INDICATOR SCORE:		
CONDITION NUMBER (if relevant):		5

Evaluation Table for PI 2.3.1

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species		
		The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

<p>PI 2.3.1</p>	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>
<p>Justification</p>	<p>The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.</p> <p>Wolffishes:</p> <p>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> <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.</p> <p>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 the SG80a score for both areas and all gear types.</p>

<p>PI 2.3.1</p>	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>
	<p>Leatherback turtle: It is currently listed as ‘endangered’ under SARA. Incidental entanglement in fishing gear such as pelagic longlines, lines associated with pot gear and gillnets, buoys and anchor lines, and other ropes and cables pose a risk of entanglement to Leatherback Sea Turtles. Entangled turtles are at risk of serious injury, infection, necrosis or death. Entanglement can limit the Leatherback Turtle’s ability to feed, dive, breathe or perform other essential behaviours. Until recently, there has been relatively little study of the interaction between Canadian East Coast fisheries and Leatherback Turtles. Based on discussions by a group of experts at a workshop, O’Boyle (2001) rated the relative potential impact of a wide range of gear types used on Canada’s East Coast. Overall, it was considered that gears such as dredges (Scallop and Clams), trawls (groundfish and Shrimp), purse seine and weirs (Herring) were a low threat. Gears which were moored to the bottom, including longline (groundfish and large pelagic), gillnets (groundfish and Herring), traps (Lobster) and pots (Snow Crab) represented a higher risk, somewhat mitigated by the spatial and seasonal distribution of the gear. Since then, a number of studies have been conducted that provide further understanding of the interaction between fishing gear and Leatherback Turtles.</p> <p>One of the most important sources of information on Leatherback – fisheries interactions is the observer program conducted by DFO in each region (Newfoundland, Gulf, Quebec and Maritimes) and SARA logbooks. The most observed encounters with Leatherback Turtles have been reported by the Maritimes observer program including Scotia Fundy /Eastern Georges Bank. During 2001-2010, a total of 143 Leatherbacks were reported as being encountered (Table 5). Of these, 138 were reported from the large pelagic longline fishery.</p> <p>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.</p> <p>It meets the SG80a score for both areas and all gear types.</p>

<p>PI 2.3.1</p>	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>
	<p>North Atlantic Right Whale: The two major sources of human-induced mortality throughout the range of right whales are vessel strikes and entanglement in fixed fishing gear. These two threats account for all of the known human-induced mortality. For the period from 1970 to October 2006, 73 known mortalities have been documented. Of these mortalities, eight were caused by entanglement in fishing gear, 27 were due to vessel strikes, 21 were of undetermined causes, and 17 mortalities were of calves where the cause of death could not be linked to entanglement or vessel strikes. In addition, from 1986 to 2005 there were 61 confirmed reports of entanglements, including the known entanglement mortalities listed above. In addition to direct mortality, it is possible that whales surviving vessel strike and entanglement episodes may suffer negative effects such as reduced fertility. Seventy-five percent of all living right whales have scars consistent with entanglement or vessel strike, and scarring rates may have increased during the 1990s.</p> <p>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.</p> <p>It meets the SG80a for both areas and all gear types.</p>

PI 2.3.1	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>			
		<p>Fin Whale: Use of fixed gear and gillnets in fisheries constitutes a potential cause of mortality or injury for fin whales. Entanglement in fishing nets and lines can lead to injury, infection and even death through anoxia (absence of oxygen) of fin whales. In some cases, whales entangled in fishing gear experience difficulty moving about and feeding, to the point where reproduction and survival may be compromised (Reeves et al., 1998; Clapham et al., 1999). It is, however, difficult to assess the scope of the threat of entanglements because many probably go unreported or unnoticed. Photo-identification studies have revealed cases of injury and entanglement in fishing gear (Agler et al., 1990). Two fin whales found dead in the Jacques Cartier Strait in 2009 presented signs of entanglement (Banville, 2010).</p> <p>Entanglements have been reported in the St. Lawrence Estuary. Between 1979 and 2008, 11 fin whales entangled off Newfoundland and Labrador have been reported (Benjamins et al., in press). Fin whales could be large enough to extricate themselves from gear when they do become entangled unlike smaller whales such as the Minke whale (<i>B. acutorostrata</i>). Fishing gear can however stay entangled on the whale for extended periods of time, resulting in wounds prone to infections. It meets the SG80a score for both areas and all gear types.</p> <p>Blue Whale: The presence of certain types of fishing gear could present a threat to blue whales since the gear can kill animals by anoxia if they become entangled. Even when blue whales manage to escape fishing gear, they can be injured and tow parts of the gear (e.g., cables, buoys) over a long time. In 1987, a Blue whale was observed north of Cape Cod trailing a fishing cable and buoy that appeared to be from the lobster fishery (Reeves, <i>et al.</i>, 1998). In some cases, entangled whales could have difficulty moving and feeding, to the point that their reproductive activities and survival are compromised (Reeves, <i>et al.</i>, 1998; Clapham, <i>et al.</i>, 1999). Blue whales are powerful animals that rarely become entrapped in fishing nets. Despite this, three Blue whales caught in gillnets have died in the St. Lawrence since 1979 (Sears and Calambokidis, 2002). It is estimated that nearly 10% of Blue whales occurring in the St. Lawrence have scars caused by contacts with fishing gear . It meets the SG80a score for both areas and all gear types.</p>		
b	Guidepost	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N

PI 2.3.1	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>		
	5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Direct effects are highly unlikely to create unacceptable impacts to ETP species</p> <p>Wolffish:</p> <p>4x5Y OT 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.</p> <p>4x5Y LL Very low (<1.5 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.</p> <p>5Zjm OT 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.</p> <p>5Zjm LL 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.</p> <p>There is no information available for the HL and GN gear types in both areas. It meets the SG80b score.</p> <p>Turtles: Although sea turtle interactions with trawl 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 GOM and Georges Bank (GB) regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with trawl gear in these regions and therefore, produce a bycatch estimate for these regions (NEFMC 2015). Given the small number of observed interactions between sea turtles and trawl gear in the GOM and GB, it is highly unlikely that the large mesh OT fishery is causing unacceptable direct or indirect impacts on sea turtles.</p> <p>There have been few observations of longline gillnet interactions with turtles for 4X5Y and 5Zjm. No information was found in regard to handlines. It meets the SG80b score.</p>	

<p>PI 2.3.1</p>	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>
	<p>Marine mammals: Five species of large whales occur in the GOM and GB that potentially might interact with large mesh OTs. These species include: North Atlantic right whale (<i>Eubalaena glacialis</i>), humpback whale (<i>Megaptera novaeangliae</i>), fin whale (<i>Balaenoptera physalus</i>), and sei whale (<i>Balaenoptera borealis</i>) all of which are also listed as Endangered under the ESA (NEFMC 2015). None of these have been recorded interacting with the GOM/GB large mesh otter trawl fishery (Waring et al. 2014).</p>

<p>PI 2.3.1</p>	<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>
	<p>North Atlantic Right Whale:</p> <p>The two major sources of human-induced mortality throughout the range to right whales are vessel strikes and entanglement in fixed fishing gear. These two threats account for all of the known human-induced mortality. For the period from 1970 to October 2006, 73 known mortalities have been documented. Of these mortalities, eight were caused by entanglement in fishing gear, 27 were due to vessel strikes, 21 were of undetermined causes, and 17 mortalities were of calves where the cause of death could not be linked to entanglement or vessel strike. In addition, from 1986 to 2005 there were 61 confirmed reports of entanglements, including the known entanglement mortalities listed above. In addition to direct mortality, it is possible that whales surviving vessel strike and entanglement episodes may suffer negative effects such as reduced fertility. Seventy-five percent of all living right whales have scars consistent with entanglement or vessel strike, and scarring rates may have increased during the 1990s.</p> <p>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.</p> <p>It meets the SG80b score for both areas and all gear types.</p> <p>Fin Whale:</p> <p>Use of fixed gear and gillnets in fisheries constitutes a potential cause of mortality or injury for fin whales. Entanglement in fishing nets and lines can lead to injury, infection and even death through anoxia (absence of oxygen) of fin whales. In some cases, whales entangled in fishing gear experience difficulty moving about and feeding, to the point where reproduction and survival may be compromised (Reeves et al., 1998; Clapham et al., 1999). It is, however, difficult to assess the scope of the threat of entanglements because many probably go unreported or unnoticed. Photo-identification studies have revealed cases of injury and entanglement in fishing gear (Agler et al., 1990). Two fin whales found dead in the Jacques Cartier Strait in 2009 presented signs of entanglement (Banville, 2010).</p> <p>Entanglements have been reported in the St. Lawrence Estuary. Between 1979 and 2008, 11 fin whales entangled off Newfoundland and Labrador have been reported (Benjamins et al., in press). Fin whales could be large enough to extricate themselves from gear when they do become entangled unlike smaller whales such as the Minke whale (<i>B. acutorostrata</i>). Fishing gear can however stay entangled on the whale for extended periods of time, resulting in wounds prone to infections.</p> <p>It meets the SG80a score for both areas and all gear types.</p>

PI 2.3.1		<p>The fishery meets national and international requirements for the protection of ETP species</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species</p>		
		<p>Blue Whale:</p> <p>The presence of certain types of fishing gear could present a threat to blue whales since the gear can kill animals by anoxia if they become entangled. Even when blue whales manage to escape fishing gear, they can be injured and tow parts of the gear (e.g., cables, buoys) over a long time. In 1987, a Blue whale was observed north of Cape Cod trailing a fishing cable and buoy that appeared to be from the lobster fishery (Reeves, <i>et al.</i>, 1998). In some cases, entangled whales could have difficulty moving and feeding, to the point that their reproductive activities and survival are compromised (Reeves, <i>et al.</i>, 1998; Clapham, <i>et al.</i>, 1999). Blue whales are powerful animals that rarely become entrapped in fishing nets. Despite this, three Blue whales caught in gillnets have died in the St. Lawrence since 1979 (Sears and Calambokidis, 2002). It is estimated that nearly 10% of Blue whales occurring in the St. Lawrence have scars caused by contacts with fishing gear. It meets the SG80a score for both areas and all gear types.</p>		
c	Guidepost		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.3.1	The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species																		
Justification	<p>Indirect effects have been considered on affecting ETP species recovery by indirect effects from habitat destruction to trophic changes in the ecosystems. 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.</p> <p>Anthropogenic factors could have an effect on krill availability for whales. Firstly, an increase in pelagic fish that feed on capelin (<i>Mallotus villosus</i>) and Atlantic herring (<i>Clupea harengus</i>) could limit the availability of this resource for Blue whales (i.e., interspecific competition). In recent decade the abundance and distribution of pelagic fish has changed considerably in Scotian Shelf/Georges Bank following the decline of their predators, Atlantic Cod (<i>Gadus morhua</i>) and Redfish (<i>Sebastes</i> spp.), caused in part by the groundfish commercial fishery. Cetaceans and seals have gradually replaced them as principal predators for pelagic fish. Nevertheless with the scarce information available it is difficult to say that there is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species preventing granting a score approaching 100. It meets the SG80c score.</p>																		
	<table border="1" data-bbox="497 1084 1326 1196"> <thead> <tr> <th>Score:</th> <th>OT</th> <th>BLL</th> <th>GN</th> <th>HL</th> </tr> </thead> <tbody> <tr> <td>4X5Y</td> <td>80</td> <td>80</td> <td>80</td> <td>80</td> </tr> <tr> <td>5Zjm</td> <td>80</td> <td>80</td> <td>80</td> <td>80</td> </tr> </tbody> </table>					Score:	OT	BLL	GN	HL	4X5Y	80	80	80	80	5Zjm	80	80	80
Score:	OT	BLL	GN	HL															
4X5Y	80	80	80	80															
5Zjm	80	80	80	80															
References	SARA registry (accessed July 2015); Kulka et al. 2004; Kulka et al. 2007																		
OVERALL PERFORMANCE INDICATOR SCORE:																			
CONDITION NUMBER (if relevant):					N/A														

Evaluation Table for PI 2.3.2

PI 2.3.2		The fishery has in place precautionary management strategies designed to: <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place that minimise 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 fishery’s impact on ETP species, including measures to minimise 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 fishery’s impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.3.2	<p>The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 			
	Justification	<p>In Canada the primary management strategies for the protection of ETP species are provided by SARA. Once protected under SARA, ETP species are subject to recovery strategies and management plan.</p> <p>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. 4X5Y observer coverage is low <4% compared to 5Zjm (20%-35%). Information on gillnets and handline is very scarce. Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment.</p> <p>Therefore, the Assessment Team considers it difficult to say that there is a <u>comprehensive</u> strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species. However there is a strategy in place for managing the fishery'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. It meets the SG80a score.</p>		
b	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 strategy will work, based on information directly about the fishery and/or the species involved.	The 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?	4X5Y OTrawl (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.3.2	<p>The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 		
	Justification	<p>There is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved.</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. 4X5Y observer coverage is low <4% compared to 5Zjm (20%-35%). Information on gillnets and handline is very scarce. Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment.</p> <p>However there is existing information that interactions are low for all gears within each area . 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. Refer to Table at Section 3.3.1 for further information. It meets the SG80b score.</p>	
c	Guidepost		<p>There is evidence that the strategy is being implemented successfully.</p> <p>There is clear evidence that the strategy is being implemented successfully.</p>
	Met?		<p>4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y</p> <p>4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N</p>

PI 2.3.2	<p>The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 					
	Justification	<p>There is evidence that the strategy is being implemented successfully. 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 wolffish 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. 4X5Y observer coverage is low <4% compared to 5Zjm (20%-35%). Information on gillnets and handline is very scarce. Recovery strategies are either proposed or implemented but not explicitly in the fishery under assessment.</p> <p>There is existing information that interactions are low for all gears within each area is low. However, it is difficult to say that there is clear evidence that the strategy is being implemented successfully thereby preventing a SG score of 100. Refer to the Table at Sections 3.3.1. It meets the SG80c score.</p>				
d	Guidepost			There is evidence that the strategy is achieving its objective.		
	Met?			4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN(UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N		
	Justification	<p>There is some evidence but very scarce that the strategy is achieving its objective. From 2004 to 2013, there is data on bycatch of Atlantic wolffish but not for other species. Observer coverage is not adequate for the fisheries in 4X5Y. While the frequency and intensity of interactions between the fishery and ETP species is very low, they are still not well documented in all UoCs thus preventing a score of SG100.</p>				
	Score:	Area	OT	BLL	GN	HL
		4X5Y	80	80	80	80
		5Zjm	80	80	80	80

PI 2.3.2	<p>The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species.
References	DFO, 2002; DFO, 2004b; DFO, 2004b; SARA registry (accessed July 2009); SARA, 2006; Kulka et al. 2004; Kulka et al. 2007; Templeman 1984; O'Boyle 2001; Johnson et al. 2005; WWF/DFO 2000; Benjamins et al. 2008.
OVERALL PERFORMANCE INDICATOR SCORE:	
CONDITION NUMBER (if relevant):	N/A

Evaluation Table for PI 2.3.3

PI 2.3.3		Relevant information is collected to support the management of fishery 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	Guidepost	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL(UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.</p> <p>A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59%. A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0 % coverage in 2013. The fisheries have SARA logbooks however, in some areas and vessel fleets given the low observer coverage levels, it is difficult to conclude that information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty. Therefore, the score meets the SG80a in both areas.</p>		
Yes	No	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT(UoC5) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N

PI 2.3.3	<p>Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 			
		5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.</p> <p>A summary analysis of the data shows that the percentage of "observed" haddock catches from mobile gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the fixed gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59%. A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0 % coverage in 2013. The fisheries have SARA logbooks however given the low observer coverage levels in some areas and vessels fleets, it is difficult to conclude that accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species. Therefore, the score meets the SG80b in both areas.</p>		
c	Guidepost	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full 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?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.3.3	<p>Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 					
Justification	<p>Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.</p> <p>A summary analysis of the data shows that the percentage of "observed" haddock catches from mobile gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the fixed gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59%. A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0 % coverage in 2013. The fisheries have SARA logbooks however given the low observer coverage levels in some areas and vessel fleets, it is difficult to conclude that 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 Therefore, the score meets the SG80c in both areas.</p>					
		Score:	Area	OT	BLL	GN
			4X5Y	80	80	80
			5Zjm	80	80	80
References						
OVERALL PERFORMANCE INDICATOR SCORE:						
CONDITION NUMBER (if relevant):						N/A

Evaluation Table for PI 2.4.1

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.4.1	<p>The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</p>
Justification	<p>The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p> <p>Otter trawl fisheries (UoC1,5). Mobile bottom-contact fishing gears do have impacts on benthic populations, communities, and habitats. The effects are not uniform, but depend on at least (i) the specific features of the seafloor habitats, including the natural disturbance regime, (ii) the species present, (iii) the type of gear used, the methods and timing of deployment of the gear, and the frequency with which a site is impacted by specific gears, and (iv) the history of human activities, especially past fishing, in the area of concern.</p> <p>On February 2015, the CAB received from the Client the 2015 edition of “The Footprint of the Scotia-Fundy Haddock Fishery”. This edition is current to December 31st, 2013.</p> <p>Highlights of the Scotia-Fundy 4X5Y5Z haddock footprint analysis, as averaged for the period 2009-13, is summarized below:</p> <ul style="list-style-type: none"> • According to the underlying surficial geology, the 4X5Y5Z quota area is composed of 64 % sand-gravel, 17 % drift, 12% clay and 8 % silt. • The average figures for the 5-year period suggest that, on average, 82 % of the fishing effort occurred on sand or sand and gravel habitats, which are known to be high energy environments and resilient. • During the 5-year period, the equivalent of 6,394 hours of fishing activity, or 4% of the total fishing hours, have occurred in the vicinity of areas of significant sponge concentrations. Only 4.8% of this effort was inside the boundary of the delineated sponge polygons, where the probability of encountering sponges is the highest. The other 95.2% of the overlapping effort was in the periphery of the delineated sponge polygons, where the probability of encountering sponges nears zero. • Six of the nine sponge polygons have very little overlapping effort, ranging from zero hours in S8 to 112.8 hours in S14. 86% of the overlapping effort took place in sponge polygons S1 and S2, which are on Georges Bank, where observer coverage is at its highest. No sponge catches were reported by observers in any of the nine sponge areas. • There are no identified areas of significant coral concentrations in the 4X5Y5Z area. • Estimates of swept area, based on average figures for the 2009 to 2013 time period, suggest that less than 6% of the 26,423 nm² area was swept. • Estimates of swept area also suggest that, on average, the 69 % of the effective swept area originated from the Bottom 3rd of the fishery, where the effective swept area is only 34% of the sea area of those corresponding grid cells. <p>A partial score of 90 is granted.</p>

PI 2.4.1	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function																							
		<p>Bottom-set longlines (UoC2,6). This gear interacts with the bottom habitat through the terminal anchors. Otherwise it has limited or only momentary contact with the bottom habitats. As such it has little physical impact during controlled fishing. However, hooks and complete snoods (i.e. branch lines) may be lost or deliberately discarded, especially when gear is damaged or tangled during fishing. However there is no specific evidence derived from habitat specific studies in relation to the longline fishery that support the statement of SG100. This will allow SG60 and SG80 both to score. As the evidence is not specific to the area of the fishery, a partial score of 90 is granted.</p> <p>Gillnets (UoC 3,7). There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. DFO (2010b) and Dufour and Quillet (2007) provide some evidence that the fall gillnet fishery is having limited impact on the marine habitat. However there is no specific evidence derived from habitat specific studies in relation to the gillnet fishery that support the statement of SG100. This will allow SG60 and SG80 both to score. As the evidence is not specific to the area of the fishery, a score of SG90a is granted.</p> <p>Hand lines (UoC4,UoC8). The low levels of effort involved, combined with the minimal impact on the benthic and pelagic environments, means that this gear type has negligible impacts on the marine habitats. A score of SG90a is granted.</p>																						
	Summary of Scores	<table border="1" data-bbox="416 1167 1412 1279"> <thead> <tr> <th data-bbox="416 1167 576 1205">Score:</th> <th data-bbox="576 1167 735 1205">Area</th> <th data-bbox="735 1167 895 1205">OT</th> <th data-bbox="895 1167 1054 1205">BLL</th> <th data-bbox="1054 1167 1214 1205">GN</th> <th data-bbox="1214 1167 1412 1205">HL</th> </tr> </thead> <tbody> <tr> <td data-bbox="416 1205 576 1243"></td> <td data-bbox="576 1205 735 1243">4X5Y</td> <td data-bbox="735 1205 895 1243">90</td> <td data-bbox="895 1205 1054 1243">90</td> <td data-bbox="1054 1205 1214 1243">90</td> <td data-bbox="1214 1205 1412 1243">90</td> </tr> <tr> <td data-bbox="416 1243 576 1279"></td> <td data-bbox="576 1243 735 1279">5Zjm</td> <td data-bbox="735 1243 895 1279">90</td> <td data-bbox="895 1243 1054 1279">90</td> <td data-bbox="1054 1243 1214 1279">90</td> <td data-bbox="1214 1243 1412 1279">90</td> </tr> </tbody> </table>					Score:	Area	OT	BLL	GN	HL		4X5Y	90	90	90	90		5Zjm	90	90	90	90
Score:	Area	OT	BLL	GN	HL																			
	4X5Y	90	90	90	90																			
	5Zjm	90	90	90	90																			
References	DFO, 2006; Gavaris and Black, 2004; Macfadyen et al. 2009; Chopin et al., 1995.																							
OVERALL PERFORMANCE INDICATOR SCORE:																								
CONDITION NUMBER (if relevant):						N/A																		

Evaluation Table for PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of the fishery on habitat types.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL(UoC2) Y 4X5Y GN(UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
		<p>There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>In June 2013, amendments to the <i>Fisheries Act</i> were adopted. The Fisheries Protection Program and its Policy Statements (November 2013) support changes made to the <i>Fisheries Act</i>. The Fisheries Protection Policy Statement (FPPS) focuses on the management of impacts to fish resulting from habitats degradation or loss and alterations to fish passage and flow.</p> <p>Through the FPPS, DFO objectives are to provide consistent guidance through regulations, standards and directives, and to make regulatory decisions in a timely manner. In this way, proponents will have the necessary information and direction to avoid, mitigate and offset harmful impacts to fish and fish habitat so that they will meet the goal of this policy, and thereby comply with the fisheries protection provisions of the Act. The prohibition against serious harm to fish applies to fish and fish habitat that are part of or support commercial, recreational or Aboriginal fisheries. Section 35 of the Act prohibits serious harm to fish which is defined in the Act as “the death of fish or any permanent alteration to, or destruction of, fish habitat”.</p> <p>In 2009, DFO published the Policy for Managing the Impact of Fishing on Sensitive Benthic Areas under the auspices of the Sustainable Fisheries Framework in response to the 2006 United Nations Resolution 61/105. The purpose policy is to help DFO manages fisheries to mitigate impacts of fishing on sensitive benthic habitats or avoid impacts of fishing that are likely to cause serious or irreversible harm to sensitive marine habitat, communities and species.</p>		

PI 2.4.2	<p>There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types</p>
Justification	<p>A policy and process exists for ‘managing the impacts of fishing on sensitive benthic areas’, but it has yet to be fully implemented. This will utilise an ‘ecological risk analysis framework’ to assess the risk that fishing activities are likely to cause harm to the benthic habitat, communities and species, and particularly if such harm is likely to be serious or irreversible. Based on this, necessary management measures will be determined and implemented. Monitoring and evaluation systems for developing the approach will also be put in place. Two pilot projects have been initiated to test this approach – one on Georges Bank and the second in coastal areas of 4X - and the results are expected later in 2009. These will then be used to fine-tune the approach for the wider roll-out of the strategy. Protected areas have been developed to protect the Gully (a 2,364 square kilometre area protecting the large canyon feature and associated habitats of the Gully, near Sable Island) as well as coral (the Northeast Channel Coral Conservation Area: a 424 km² area protecting deep water coral concentrations adjacent to Georges Bank.</p> <p>A follow-up by the client states that “The ERAF policy was introduced in April 2013 as part of the Sustainable Fisheries Framework and is not likely the final edition. It is to be considered where a fisheries footprint overlaps with significant benthic areas. There are significant documentation and communication phases in the policy and it is led by Regional Fisheries Managers. If there are areas in the Scotia Fundy haddock fishery that require the "risk assessment process" as information becomes available on significant benthic areas, the process will likely take a few years to unfold. Of note in the DFO Policy the implementation of the Policy through the ERAF will take a phased-in approach for Canadian fisheries, depending on regional priorities. Clearly it is in the early stages of implementation”.</p> <p>The mapping of Ecologically and Biologically Significant Areas (EBSA) by DFO is an ongoing process requiring further research and information. They are subject to further refinement. There are currently 18 areas identified in the Scotia Fundy region. There are four EBSA proposed exclusive to 4X5Y and one to 5Zjm. In 4X5Y the majority of the otter trawl fishing effort relative to the Haddock fishery occurs outside these areas. More importantly the characteristics that are selected to categorize an area as an EBSA and define the area such as seabird guilds and phytoplankton biomass, do not preclude an ongoing bottom gear fishery for haddock. For instance on Brown's Bank there are moraine features that may be an important refuge for groundfish. These areas have yet to be delineated and are not likely fished with otter trawl because the bottom is too rough. On Roseway Basin the principal concern in identifying this area as an EBSA is for right whales habitat. For the Canadian portion of Georges Bank further research is required to delineate tube worm habitat.</p>

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
		<p>There has been progress within DFO on the implementation of EBSA/protected areas. The following is a list of protected areas in the Scotia-Fundy Region where GEAC and its members have worked with DFO and others in the industry to define and select areas for protection:</p> <ul style="list-style-type: none"> • Northeastern Channel Coral Closure; • Stone Fence Lophelia Pertusa Reef Closure; • Vazella Pourtalesi (Russian Hat) Closures; • Sable Island Gully MPA; • St Ann's Bank Area of Interest. <p>Since the habitat outcome was scored at SG80, a similar score is justified here.</p>		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT(UoC1) Y 4X5Y LL(UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

<p>PI 2.4.2</p>	<p>There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Justification</p>	<p>There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.</p> <p>A policy and process exists for ‘managing the impacts of fishing on sensitive benthic areas’, but it has yet to be fully implemented. This will utilise an ‘ecological risk analysis framework’ to assess the risk that fishing activities are likely to cause harm to the benthic habitat, communities and species, and particularly if such harm is likely to be serious or irreversible. Based on this, necessary management measures will be determined and implemented. Monitoring and evaluation systems for developing the approach will also be put in place. Two pilot projects have been initiated to test this approach – one on Georges Bank and the second in coastal areas of 4X - and the results are expected later in 2009. These will then be used to fine-tune the approach for the wider roll-out of the strategy. Protected areas have been developed to protect the Gully (a 2,364 square kilometre area protecting the large canyon feature and associated habitats of the Gully, near Sable Island) as well as coral (the Northeast Channel Coral Conservation Area: a 424 km² area protecting deep water coral concentrations adjacent to Georges Bank</p> <p>The mapping of Ecologically and Biologically Significant Areas (EBSA) by DFO is an ongoing process requiring further research and information. They are subject to further refinement. There are currently 18 areas identified in the Scotia Fundy region. There are four EBSA proposed exclusive to 4X5Y and one to 5Zjm. In 4X5Y the majority of the otter trawl fishing effort relative to the Haddock fishery occurs outside these areas. More importantly the characteristics that are selected to categorize an area as an EBSA and define the area such as seabird guilds and phytoplankton biomass, do not preclude an ongoing bottom gear fishery for haddock. For instance on Brown's Bank there are moraine features that may be an important refuge for groundfish. These areas have yet to be delineated and are not likely fished with otter trawl because the bottom is too rough. On Roseway Basin the principal concern in identifying this area as an EBSA is for right whales habitat. Fishermen have a Code of conduct on what to do in the event of whales are in the fishing area. For the Canadian portion of Georges Bank further research is required to delineate tube worm habitat.</p> <p>Regarding GEAC and its' client licence holders' efforts to work to implement EBSA/protected areas, the following is a list of protected areas in the Scotia-Fundy Region where GEAC and its members have worked with DFO and others in the industry to define and select areas for protection:</p> <ul style="list-style-type: none"> • Northeastern Channel Coral Closure; • Stone Fence Lophelia Pertusa Reef Closure; • Vazella Pourtalesi (Russian Hat) Closures; • Sable Island Gully MPA; • St Ann's Bank Area of Interest.

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
		<p>When more precision is known by DFO and the industry about sensitive areas relative to the haddock otter trawl fishery, GEAC will, as demonstrated, continue to participate and lead where protection of sensitive habitat is required. The Assessment Team had determined that there was some evidence to conclude that the EBSA/protected area strategy was on track to be implemented successfully for units 4X5Y OT and 5Zjm OT of the haddock fishery; however, further integration work (such as inclusion in the IFMPs for the fishery) and additional information on how the EBSA/protected area strategy and management measures have been implemented successfully relative to the haddock fishery will be required if the SG 80 level or higher is to be achieved.</p> <p>There has been no direct testing by way of before-and-after-fishing comparison of the fishing grounds, preventing the fishery from meeting the SG100b level. Thus it meets 80b</p>		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN(UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.4.2	<p>There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types</p>
	<p>Justification</p> <p>There is some evidence that the partial strategy is being implemented successfully.</p> <p>A policy and process exists for ‘managing the impacts of fishing on sensitive benthic areas’, but it has yet to be fully implemented. This will utilise an ‘ecological risk analysis framework’ to assess the risk that fishing activities are likely to cause harm to the benthic habitat, communities and species, and particularly if such harm is likely to be serious or irreversible. Based on this, necessary management measures will be determined and implemented. Monitoring and evaluation systems for developing the approach will also be put in place. Two pilot projects have been initiated to test this approach – one on Georges Bank and the second in coastal areas of 4X - and the results are expected later in 2009. These will then be used to fine-tune the approach for the wider roll-out of the strategy. Protected areas have been developed to protect the Gully (a 2,364 square kilometre area protecting the large canyon feature and associated habitats of the Gully, near Sable Island) as well as coral (the Northeast Channel Coral Conservation Area: a 424 km² area protecting deep water coral concentrations adjacent to Georges Bank</p> <p>The mapping of Ecologically and Biologically Significant Areas (EBSA) by DFO is an ongoing process requiring further research and information. They are subject to further refinement. There are currently 18 areas identified in the Scotia Fundy region. There are four EBSA proposed exclusive to 4X5Y and one to 5Zjm. In 4X5Y the majority of the otter trawl fishing effort relative to the Haddock fishery occurs outside these areas. More importantly the characteristics that are selected to categorize an area as an EBSA and define the area such as seabird guilds and phytoplankton biomass, do not preclude an ongoing bottom gear fishery for haddock. For instance on Brown's Bank there are moraine features that may be an important refuge for groundfish. These areas have yet to be delineated and are not likely fished with otter trawl because the bottom is too rough. On Roseway Basin the principal concern in identifying this area as an EBSA is for right whales habitat. Fishermen have a Code of conduct on what to do in the event of whales are in the fishing area. For the Canadian portion of Georges Bank further research is required to delineate tube worm habitat.</p> <p>Regarding GEAC and its' client licence holders' efforts to work to implement EBSA/protected areas the following is a list of protected areas in the Scotia Fundy Region where GEAC and its members have worked with DFO and others in the industry to define and select areas for protection:</p> <ul style="list-style-type: none"> • Northeastern Channel Coral Closure; • Stone Fence Lophelia Pertusa Reef Closure; • Vazella Pourtalesi (Russian Hat) Closures; • Sable Island Gully MPA; • St Ann's Bank Area of Interest.

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types	
		<p>When more precision is known by DFO and the industry about sensitive areas relative to the haddock otter trawl fishery, GEAC will, as demonstrated, continue to participate and lead where protection of sensitive habitat is required. With respect to whether the client's evidence is sufficient to close the Condition in relation to PI 2.4.2, the Assessment Team Team had determined that there was some evidence to conclude that the EBSA/protected area strategy was on track to be implemented successfully for units 4X5Y OT and 5Zjm OT of the haddock fishery; however, further integration work (such as inclusion in the IFMPs for the fishery) and additional information on how the EBSA/protected area strategy and management measures have been implemented successfully relative to the haddock fishery will be required if the SG 80 level or higher is to be achieved.</p> <p>Several policies have been implemented to support habitat protection and to mitigate impacts of fishing on sensitive benthic habitats or avoid impacts of fishing that are likely to cause serious or irreversible harm to sensitive marine habitat, communities and species.</p> <p>As part of its EAM, DFO identified EBSAs which require special management measures from anthropogenic disturbances that can have significant impact on the benthic habitat. These EBSAs contained are numerous strategic measures (e.g. closed areas and MPAs) that can be employed to limit impacts. But there is no evidence that a full strategy have been implemented successfully. This allows scoring at the SG80c level.</p>	
d	Guidepost		There is some evidence that the strategy is achieving its objective.
	Met?		4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Evidence is lacking that the strategy is achieving its objective.</p> <p>As part of its EAM, DFO identified EBSAs which require special management measures from anthropogenic disturbances that can have significant impact on the benthic habitat. While these EBSAs contain numerous strategic measures (e.g. closed areas and MPAs) that can be employed to limit impacts, there is no evidence/program evaluation information that the full strategy is achieving its objective. SG100d is not met.</p>	

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types					
	Summary of Scores	Score:	Area	OT	BLL	GN	HL
			4X5Y	80	80	80	80
			5Zjm	80	80	80	80
References		DFO, 2006b					
OVERALL PERFORMANCE INDICATOR SCORE:							
CONDITION NUMBER (if relevant):							N/A

Evaluation Table for PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT(UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC 3) Y 4X5Y HL (UoC 4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y
	Justification	<p>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>Vulnerability of the benthic environment: A study in 2001 developed a new approach for sea floor habitat mapping based on an integrated analysis of multi-beam bathymetric data, geo-scientific information and benthos data from Browns Bank on the SW Scotian Shelf. Each of the habitats is distinguished on the basis of substrate, habitat complexity, relative current strength & water depth. Based on sea floor sediment maps and statistical analysis of mega-benthos determined from photographs, six habitats and corresponding associations of benthos were derived and mapped. A Browns Bank benthic habitat map was developed as a conceptual model summarizing the understanding of the bank ecology, and commonness of species are used as additional guidelines for identification of habitat zones.</p> <p>An evaluation of the habitat structure and function of the 4X5YZ Haddock fishery has been completed by multi-layer mapping with the principal forms of surficial geology, fisheries effort and catch weight from 2008-2013 for the main fishing gears, location of sponges and key sensitive areas. Information on habitat types related to and sensitive areas have been documented.</p> <p>A score of SG100a is justified.</p>		

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
b	Guidepost	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC 4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.</p> <p>The impacts of trawls, longline, gillnets and hook and line on habitats have been widely studied. The distribution of the haddock resource and habitats are well known on the Scotian Shelf. Distribution of fishing effort has been investigated by DFO.</p> <p>However, whilst sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear, justifying a Yes for 80b, there has been no direct testing by way of before-and-after-fishing comparison of the fishing grounds, preventing the fishery from meeting 100b.</p> <p>A score of SG80b is warranted.</p>		
c	Guidepost		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types				
	Met?		4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y		4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N	
	Justification	<p>Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p> <p>SG80c requires the on-going collection of data sufficient to detect any increase in risk to the habitat. There is new documented evidence on the limited impact on habitat by longline and trawls on the Scotian Shelf and eastern Georges Bank habitats and the limited likely impact of pelagic gillnet and handline gear on the habitats. It meets the SG80c score. There is no monitoring of temporal changes in the habitat. It does not meet 100c.</p>				
Summary of scores		Area	OT	BLL	GN	HL
		4X5Y	85	85	85	85
		5Zjm	85	85	85	85
References		Kostylev, et al. 2001; DFO, 2006b.				
OVERALL PERFORMANCE INDICATOR SCORE:						
CONDITION NUMBER (if relevant):						N/A

Evaluation Table for PI 2.5.1

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N

PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
	5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N
	Justification	<p>The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</p> <p>There have been many changes to the Scotian Shelf ecosystem over the past 30 years. Some of the changes include:</p> <ul style="list-style-type: none"> • a major cooling of bottom waters occurred in the mid-1980s; • the index of zooplankton abundance was low in the 1990s when phytoplankton levels were high and the opposite pattern during the 1960s and early 1970s; • major structural changes in the fish community – a number of groundfish species have declined while small pelagic species and commercially exploited invertebrate species have increased; • reductions in the average body size of groundfish, with unexpectedly low improvements in condition and growth; and • steadily increasing abundance of grey seals up to around 300,000, triple the number in the early 1990s. <p>The current recovery of the haddock stock indicates that the ecosystem may be able to move back towards its original state, although the continued slow pace of Cod stock rebuilding remains a major concern. Given the precautionary management of Cod stocks in the region, it is considered that the haddock-directed fishery is unlikely to disrupt the key issues underlying the ecosystem structure to the point where there would be serious or irreversible harm.</p> <p>The Assessment Team could not find any evidence to indicate that the fishery causes any disruption to the key elements underlying ecosystem structure and function. The main impact of the fishery on target, bycatch and ETP species, and habitat are identified and there is no indication that the fishery causes disruption to the ecosystem’s main structure and function. There is a comprehensive assessment of the target species, and information is available to show the negligible impact on retained, bycatch and ETP species. There is no indication that the fishery causes serious or irreversible harm to habitats.</p> <p>However, a partial score was assigned to 90 as gaps in information on retained species bycatch, interactions with ETP species like whales and observer coverage fishing effort have been identified for 4X5Y and 5Jzm trawl and longline fisheries. The gillnet and hand line fisheries for 4X5Y and 5Jzm were given a score of SG80 due to their lower impact on retained species, bycatch and habitats but also because of data scarcity.</p>	

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function				
	Summary of Scores	Area	OT	BLL	GN	HL
		4X5Y	90	90	80	80
		5Zjm	90	90	80	80
References		Bundy, 2005; Peer, 1970; Mills et al. 1984; Wildish et al. 1989; Wildish et al. 1992; Desrosiers et al. 2000; Breeze et al. 2002 ; DFO, 2003b.				
OVERALL PERFORMANCE INDICATOR SCORE:						
CONDITION NUMBER (if relevant):						N/A

Evaluation Table for PI 2.5.2.

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Yes	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

	Justification	<p>There is a partial strategy in place, if necessary to document and address ecosystem impacts associated with fishing activities in Canadian waters.</p> <p>Under the <i>Oceans Act</i> and the Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada, DFO is committed to the development of large-scale and local integrated management plans for all of Canada's oceans. This includes implementation by DFO of an Ecosystem Approach to management in all activities for which it has management responsibility. The governance, regulation and management of activities are shared between a wide variety of government departments and agencies involved in, or with an interest in, the use and management of resources within its coastal, estuarine and marine environments. The process is intended to involve all stakeholders. There is a strategy in place that is being implemented and will continue to develop under new national policies.</p> <p>Canada has developed a Sustainable Fisheries Framework (SFF) which builds on existing fisheries management practices to form a foundation for implementing an ecosystem approach in the management of its fisheries to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the SFF is to ensure that Canada's fisheries are environmentally sustainable, while supporting economic prosperity. It is designed to foster a more rigorous, consistent, and transparent approach to decision making across all key fisheries in Canada. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada. DFO and Park Canada have a number of MPAs designated under the <i>Ocean Act</i> (1996), including several areas of interest that are at various stages of progress towards designation.</p> <p>The <i>Oceans Act</i> does not have mechanisms to assess the status of the ocean's ecosystems. Nevertheless, DFO has developed three 'conceptual' objectives related to conserving diversity, productivity and habitat as part of the Groundfish Management Plan (2002-2007). A number of these are implicit in harvest strategies, bycatch reduction and developing MPAs. These conceptual objectives include</p> <ul style="list-style-type: none"> • to conserve enough components (communities, species, populations etc) so as to maintain the natural resilience of the ecosystem, • to conserve each component of the ecosystem so that it can play its historic role in the food web; • to conserve the physical and chemical properties of the ecosystem. <p>While DFO has embedded these ecosystem objectives as part of the Groundfish Management Plan (2002-2007), it cannot be said that there is a strategy that consists of a plan in place.</p> <p>Therefore, a score of SG80 is met for trawl and longline, handline and gillnet in both areas.</p>
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b	Guidepost	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

	Justification	<p>The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.</p> <p>Under the <i>Oceans Act</i> and the Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada, DFO is committed to the development of large-scale and local integrated management plans for all of Canada's oceans. This includes implementation by DFO of an Ecosystem Approach to management in all activities for which it has management responsibility. The governance, regulation and management of activities within and surrounding the Gulf are shared between a wide variety of government departments and agencies involved in, or with an interest in, the use and management of resources within its coastal, estuarine and marine environments. The process is intended to involve all stakeholders. There is a strategy in place that is being implemented and will continue to develop under new national policies.</p> <p>Canada has developed a Sustainable Fisheries Framework (SFF) which builds on existing fisheries management practices to form a foundation for implementing an ecosystem approach in the management of its fisheries to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the SFF is to ensure that Canada's fisheries are environmentally sustainable, while supporting economic prosperity. It is designed to foster a more rigorous, consistent, and transparent approach to decision making across all key fisheries in Canada. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.</p> <p>The original policies under the SFF include: (i) A Fishery Decision-Making Framework Incorporating the Precautionary Approach (PA Framework); (ii) Policy on bycatch, (iii) Managing Impacts of Fishing on Sensitive Benthic Areas; and, (iv) a Policy on New Fisheries for Forage Species. Integrated Fisheries Management Plans (IFMPs) and self-diagnostic tools are among the planning and monitoring tools developed to help implement sustainable use policies.</p> <p><u>Policy on Bycatch</u> The goals of the policy are to promote conservation and improve accounting of bycatch and discards while minimizing the risk that bycatch and discard species could be seriously or irreparably harmed by fishing activities.</p> <p><u>Precautionary Approach Framework.</u> The Framework requires rebuilding plans to be established when a stock has reached the 'Critical Zone', a state of high risk. A new tool – Rebuilding Plan Guidelines – will help fisheries managers develop plans for growing stocks out of a depleted state.</p>
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		<p><u>Managing Impacts of Fishing on Sensitive Benthic Areas</u></p> <p>Building upon the Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas, introduced by DFO in 2009, the Department has developed an Ecological Risk Analysis Framework (ERAF) that assists in identifying and measuring the ecological risks and impacts of fishing on sensitive benthic areas. This tool and the policy on which it is based have been developed in recognition of the importance of sensitive benthic areas to overall aquatic ecosystem health. Its implementation will support healthy and productive oceans and better ensure fishing is conducted sustainably.</p> <p>DFO and Park Canada have a number of MPAs designated under the <i>Ocean Act</i> (1996), including several areas of interest that are at various stages of progress towards designation.</p> <p>However, it cannot be said that there is a strategy that consists of a plan in place. Therefore a score of SG80b is met for trawl and longline, handline and gillnet in both areas.</p>		
c	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.
	Met?	Yes	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

Justification	<p>The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).</p> <p>In theory It could be said that measures are considered likely to work based on plausible argument and information from the fishery/ecosystem involved. Despite an ongoing focus on ecological research as part of Canada’s efforts to implement an ecosystem approach to management, the Assessment Team could not find any concern indicating that the fishery causes any disruption of the key elements underlying ecosystem structure and function. The main impact of the fishery on target, retained, bycatch and ETP species, and habitat are identified and there is no indication that the fishery causes disruption to the ecosystem main structure and function. There is a comprehensive assessment of the target species, bycatch and ETP species. There is no indication that the fishery causes serious or irreversible harm to habitats.</p> <p>Furthermore, Canada has developed a Sustainable Fisheries Framework (SFF) which builds on existing fisheries management practices to form a foundation for implementing an ecosystem approach in the management of its fisheries to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the SFF is to ensure that Canada’s fisheries are environmentally sustainable, while supporting economic prosperity. It is designed to foster a more rigorous, consistent, and transparent approach to decision making across all key fisheries in Canada. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.</p> <p>The original policies under the SFF include: (i) A Fishery Decision-Making Framework Incorporating the Precautionary Approach (PA Framework); (ii) a Policy on bycatch, (iii) Managing Impacts of Fishing on Sensitive Benthic Areas; and, (iv) a Policy on New Fisheries for Forage Species. Integrated Fisheries Management Plans (IFMPs) and self-diagnostic tools are among the planning and monitoring tools developed to help implement sustainable use policies.</p> <p><u>Policy on Bycatch</u></p> <p>The goals of the policy are to promote conservation and improve accounting of bycatch and discards while minimizing the risk that bycatch and discard species could be seriously or irreparably harmed by fishing activities.</p> <p><u>Precautionary Approach Framework.</u></p> <p>The Framework requires rebuilding plans to be established when a stock has reached the ‘Critical Zone’, a state of high risk. A new tool – Rebuilding Plan Guidelines – will help fisheries managers develop plans for growing stocks out of a depleted state.</p> <p><u>Managing Impacts of Fishing on Sensitive Benthic Areas</u></p> <p>Building upon the Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas, introduced by DFO in 2009, the Department has developed an Ecological Risk Analysis Framework (ERAF) that assists in identifying and measuring the ecological risks and impacts of fishing on sensitive benthic areas. This tool and the policy on which it is based have been developed in recognition of the importance of sensitive benthic areas to overall aquatic ecosystem health. Its implementation will support healthy and productive oceans and better ensure fishing is conducted sustainably.</p>
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		DFO and Park Canada have a number of MPAs designated under the <i>Ocean Act</i> (1996), including several areas of interest that are at various stages of progress towards designation. However, it is difficult to say whether the strategy's measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved where a plan is in place. There are still some gaps in observer coverage and knowledge of ecosystem function in both areas and some of DFO's policies have not been fully implemented as yet . A score of SG80 is met for all UoCs.		
d	Guidepost		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

Justification	<p>There is some evidence that the measures comprising the partial strategy are being implemented successfully.</p> <p>Despite an ongoing focus on ecological research as part of Canada’s efforts to implement an ecosystem approach to management, The Assessment Team could not find any concern indicating that the fishery causes any disruption of the key elements underlying ecosystem structure and function. The main impact of the fishery on target, retained, bycatch and ETP species, and habitat are identified and there is no indication that the fishery causes disruption to the ecosystem main structure and function. There is a comprehensive assessment of the target species, bycatch and ETP species. There is no indication that the fishery causes serious or irreversible harm to habitats.</p> <p>Furthermore, Canada has developed a Sustainable Fisheries Framework (SFF) which builds on existing fisheries management practices to form a foundation for implementing an ecosystem approach in the management of its fisheries to ensure continued health and productivity while protecting biodiversity and fisheries habitat. The primary goal of the SFF is to ensure that Canada’s fisheries are environmentally sustainable, while supporting economic prosperity. It is designed to foster a more rigorous, consistent, and transparent approach to decision making across all key fisheries in Canada. Overall, the SFF provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada.</p> <p>The original policies under the SFF include: (i) A Fishery Decision-Making Framework Incorporating the Precautionary Approach (PA Framework); (ii) a Policy on bycatch, (iii) Managing Impacts of Fishing on Sensitive Benthic Areas; and, (iv) a Policy on New Fisheries for Forage Species. Integrated Fisheries Management Plans (IFMPs) and self-diagnostic tools are among the planning and monitoring tools developed to help implement sustainable use policies.</p> <p><u>Policy bycatch</u></p> <p>The goals of the policy are to promote conservation and improve accounting of bycatch and discards while minimizing the risk that bycatch and discard species could be seriously or irreparably harmed by fishing activities.</p> <p><u>Precautionary Approach Framework.</u> The Framework requires rebuilding plans to be established when a stock has reached the ‘Critical Zone’, a state of high risk. A new tool – Rebuilding Plan Guidelines – will help fisheries managers develop plans for growing stocks out of a depleted state.</p> <p><u>Managing Impacts of Fishing on Sensitive Benthic Areas</u></p> <p>Building upon the Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas, introduced by DFO in 2009, the Department has developed an Ecological Risk Analysis Framework (ERAF) that assists in identifying and measuring the ecological risks and impacts of fishing on sensitive benthic areas. This tool and the policy on which it is based have been developed in recognition of the importance of sensitive benthic areas to overall aquatic ecosystem health. Its implementation will support healthy and productive oceans and better ensure fishing is conducted sustainably.</p> <p>Conservation Strategies and Management Measures were established in recent years for the bycatch species in the 4X5Y haddock fishery including 4X White Hake and 4X5Y</p>
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	<p>Skate species.</p> <p>The Conservation Strategy and Management Measures for skate includes a suite of actions including informing fishermen of the best practices for live release of skate, how to identify skate species, the recording of quantities released by species, a move away protocol when encountering high bycatch of Thorny Skate, and the mandatory live release of Thorny Skate caught in 4X5Y and 5jm. Specific measures for monitoring and evaluating the skate species in 4X5Y and 5Zjm include: monitoring the RV abundance indices, utilizing observer based bycatch extrapolated to the full catch, and estimating bycatch percentages and discard survivability.</p> <p>DFO and Park Canada have a number of MPAs designated under the <i>Ocean Act</i> (1996), including several areas of interest that are at various stages of progress towards designation. For example the following is a list of protected areas in the Scotia Fundy Region where GEAC and its members have worked with DFO and others in the industry to define and select areas for protection:</p> <ul style="list-style-type: none"> • Northeastern Channel Coral Closure; • Stone Fence Lophelia Pertusa Reef Closure; • Vazella Pourtalesi (Russian Hat) Closures; • Sable Island Gully MPA; • St Ann's Bank Area of Interest <p>However, there are still policies that have yet to be implemented such as the Bycatch policy, and the management of benthic sensitive areas. There are still some gaps in observer coverage. Therefore a score of SG80 is met for trawl and longline, handline and gillnet in both areas.</p>				
Summary of scores	Area	OT	BLL	GN	HL
	4X5Y	80	80	80	80
	5Zjm	80	80	80	80
References	Peer, 1970; Mills et al. 1984; Wildish et al. 1989; Wildish et al. 1992; Desrosiers et al. 2000; Breeze et al. 2002 ; DFO, 2003b.				
OVERALL PERFORMANCE INDICATOR SCORE:					
CONDITION NUMBER (if relevant):					N/A

Evaluation Table for PI 2.5.3

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem			
Scoring Issue		SG 60	SG 80	SG 100	
a	Guidepost	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.		
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y		

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
		5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	
	Justification	<p>Information is adequate to broadly understand the key elements of the ecosystem.</p> <p>Marine ecosystem dynamics of the Scotian Shelf and Bay of Fundy area have been well studied, specifically groundfish population dynamics (Peer, 1970, Mills et al. 1984; Wildish et al. 1989; Wildish et al. 1992; Desrosiers et al. 2000 and Breeze et al. 2002). Furthermore, information is generally adequate to broadly understand the key issues of the ecosystem.</p> <p>Main impacts of fishing gear under assessment can be inferred from existing information, like target and incidental catch removals (through individual stock assessments, especially for key groundfish species), trawl effects on habitat structure (DFO, 2006b, GEAC 2015) and any structural changes to key commercial fish populations. However, the extent and impact of ghost fishing and the impact of fish removals on the trophic structure of the Bay of Fundy and Scotian Shelf is not very well understood.</p> <p>Sufficient information is available on the impacts of the fishery on the target and incidental retained bycatch, discards, ETP species and habitats to allow the main consequences of the eight fisheries on the ecosystem to be inferred. Information is sufficient to support the development of strategies to manage ecosystem impacts. These were present in the Groundfish Management Plan (2002-2007) and are expected to be considerably more advanced in the successor to the plan. All UoCs meet the SG80a score.</p>		
b	Guidepost	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) N 5Zjm LL (UoC6) N 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem	
	Justification	<p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.</p> <p>Information sufficient to document the impacts of the fishery on target, bycatch, retained and ETP species are identified as are the main functions of these Components. Catch of retained and bycatch species have considerable impact with trawls and longlines but negligible with gillnets and hook and line by area. There are few ETP species catch reported in mandatory SARA logbooks or independent observer reports. Fishery is carried out where almost no contact is made with the seabed and the percentage of area impacted is very low. However, the level of bycatch monitoring in place are not comprehensive enough and there has been no direct impacts on habitats testing by way of before-and-after-fishing comparison of the fishing grounds. Therefore, main interactions between the fishery and ecosystem elements have not been fully investigated, preventing the fishery from meeting the SG100b for all UoCs. Thus all UoCs score SG80b.</p>	
c	Guidepost	The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem	
	Justification	<p>Knowledge of main functions of the components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem varies by area and by gear. There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59% .</p> <p>A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. There is scarce information for GN and HL gear for both areas.</p> <p>Catch of retained and bycatch species have considerable impact with trawls and longlines but negligible with gillnets and hook and line. There are few ETP species catch reported in mandatory logbooks or independent observer reports. The fishery is carried out where almost no contact is made with the seabed and the percentage of area impacted is very low.</p> <p>Therefore, the 5Zjm OT and LL score meets SG100c.</p>	
d	Guidepost	Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2) N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem	
	Justification	<p>Information to document the impacts of the fishery on the components and elements to allow the main consequences for the ecosystem to be inferred and to support the development of strategies to manage ecosystem impacts varies by area and by gear. There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59% .</p> <p>A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. There is scarce information for GN and HL gear for both areas.</p> <p>Catch of retained and bycatch species have considerable impact with trawls and longlines but negligible for gillnets and hook and line by area. There are few ETP species catch reported in mandatory logbooks or independent observer reports. The fishery is carried out where almost no contact is made with the seabed and the percentage of area impacted is very low.</p> <p>Therefore, the 5Zjm OT and LL warrants the SG100d score.</p>	
e	Guidepost	Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?	4X5Y OT (UoC1) Y 4X5Y LL (UoC2) Y 4X5Y GN (UoC3) Y 4X5Y HL (UoC4) Y 5Zjm OT (UoC5) Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) Y 5Zjm HL (UoC8) Y	4X5Y OT (UoC1) N 4X5Y LL (UoC2)N 4X5Y GN (UoC3) N 4X5Y HL (UoC4) N 5Zjm OT (UoC5)Y 5Zjm LL (UoC6) Y 5Zjm GN (UoC7) N 5Zjm HL (UoC8) N

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem					
Justification	<p>Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures). Availability of Information to support the development of strategies to manage ecosystem impacts varies by area and gear. There is no direct recording of discards in logbooks. They are only recorded by independent observer coverage. A summary analysis of the data shows that the percentage of "observed" haddock catches from OT gear vessels in 5Zjm improved steadily from 16.49% in 2010 to 64.14% in 2013. For the BLL gear vessels, the percentage of "observed" haddock catches increased from 10.10% to 23.59% .</p> <p>A different at-sea observer deployment strategy occurred in the 4X5Y Haddock fishery. For the mobile gear sector, the percentage of "observed" catches declined in 3 of the 4 years between 2010 and 2013 when it stood at 3.00%. A similar downward trend occurred in "observed" catches by the fixed gear fleet with lower coverage levels, including 0% coverage in 2013. The client noted that the observer company charged with providing at-sea observers has faced challenges in providing a sufficient number of personnel to improve bycatch and discard data collection on vessels operating in 4X5Y. There is scarce information on GN and HL gear for both areas.</p> <p>Catch of retained and bycatch species have considerable impact with trawls and longlines but negligible for gillnets and hook and line by area. There are few ETP species catch reported in mandatory logbooks or independent observer reports. The fishery is carried out where almost no contact is made with the seabed and the percentage of area impacted is very low.</p> <p>Therefore, the 5Zjm OT and LL score meets SG100e.</p>						
	Summary of Scores		Area	OT	BLL	GN	HL
			4X5Y	80	80	80	80
			5Zjm	90	90	80	80
References		Peer, 1970; Mills et al. 1984; Wildish et al. 1989; Wildish et al. 1992; Desrosiers et al. 2000; Breeze et al. 2002 ; DFO, 2003b; DFO, 2006b.					
OVERALL PERFORMANCE INDICATOR SCORE:							
CONDITION NUMBER (if relevant):						N/A	

Principle 3

Evaluation Table for PI 3.1.1

PI 3.1.1		<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and <u>organised and effective cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Yes	Yes	No

<p>PI 3.1.1</p>	<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Justification</p>	<p>The Canadian and US fisheries legal systems consist of a comprehensive and contemporary system of national statutes and supporting regulations and policy frameworks that are capable of delivering sustainable fisheries and management outcomes in accordance with MSC Principle 1 and 2. The Canadian legislation (cited in the main report) empowers the federal minister to manage both fisheries and oceans, implement a precautionary approach, and protect both ETP species, habitats, and ecosystems within a comprehensive and integrated management framework.</p> <p>The Canadian legal system and supporting instruments are effective and highly structured to foster and achieve effective cooperation with other levels of government (including with the US for transboundary stocks), industry stakeholders, NGOs, and the general public. Considerable evidence exists to demonstrate that the planning and delivery of fisheries management and scientific research activities for stocks in both the 4X5Y and 5Zjm areas are particularly well served to deliver outcomes consistent with MSC Principles 1 and 2 through established formal networks, partnerships, and other cooperative arrangements (cited in main report).</p> <p>Under international law, as set out in the UN Convention on the Law of the Sea and related instruments, the relevant coastal States in the case of shared stocks, straddling stocks, and highly migratory species, are required to cooperate to ensure effective conservation and management of the resources. The MSC considers UNFSA Article 10 and the UNCLOS requirements as a basis for MSC requirements relating to cooperation for fisheries that are subject to international cooperation for management of the stock. The relevant instruments that set out these requirements are:</p> <ul style="list-style-type: none"> ▪ United Nations Convention on the Law of the Sea, 1982 (UNCLOS); ▪ United Nations Agreement for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995 (UNFSA); and, ▪ FAO Code of Conduct for Responsible Fisheries, 1995 (including the FAO Compliance Agreement of 1993). <p>The Assessment Team found no evidence to demonstrate that the nature and scope of the required cooperation between Canada and the US and within Canada was subject to binding procedural arrangements as required by SG100a.</p>

PI 3.1.1		<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework. 		
b	Guidepost	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery.	The management system incorporates or subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective.
	Met?	Yes	Yes	Yes
	Justification	<p>The Canadian management system includes proactive measures that serve to avoid or minimize fisheries disputes such as through the formal Scotia-Fundy Groundfish Advisory Committee.</p> <p>The system also provides for the resolution of legal disputes based on the Canadian judicial system at the provincial, territorial and federal levels. The judicial system is acknowledged to be impartial and transparent, and where, at a minimum, the rules of administrative fairness can be applied. Parties may also seek a judicial review of a departmental decision at the federal level in accordance with the provisions of the Canadian Criminal Code.</p> <p>While recourse to the judicial system is available and has been used, this is not the same as the fishery management system itself incorporating an internal legal dispute settlement mechanism that can be used to challenge fishery-specific decisions that are of a legal nature.</p> <p>As a general rule, the policy upon which a disputed decision has been made cannot be appealed. However, in some instances, such as when a commercial licence holder is dissatisfied with a DFO licensing policy decision, the individual can seek to have the decision re-assessed by an independent Appeal Board which may recommend a different course of action to the Minister.</p> <p>The management system is not continually facing court challenges but rather has been influenced by occasional landmark court decisions that have significantly impacted fisheries policies and programs (eg. native treaty rights) and to which it has responded in accordance with the court's determinations.</p> <p>In recognition thereof, the SI warrants a score of 100.</p>		

PI 3.1.1		<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework. 		
d	Guidepost	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Yes	Yes	No
	Justification	<p>In Canada, the nature and scope of the legal rights created explicitly or established by custom of (aboriginal) people dependent on fishing for food, social and ceremonial (FSC) purposes were formally interpreted and defined by the Supreme Court in 1990 (eg. Sparrow Decision). The Court found that the Mi'kmaq of PEI (and others elsewhere) had a treaty right to fish as noted subject to valid conservation objectives, and that access took precedence over other uses of the resource.</p> <p>In response, DFO negotiated FSC fishing access agreements with First Nations and other aboriginal organizations which provided allocations for various fisheries subject to agreed upon management measures. FSC licences are issued annually and conditions are enforceable under the <i>Aboriginal Communal Fishing Licences Regulations</i>. Where agreements are not in effect or renewed, DFO still issues FSC licences but these may contain fewer conditions than were otherwise agreed to by negotiation.</p> <p>DFO's Aboriginal Fisheries Strategy (1992) provides: (i) the framework for the management of FSC fishing, (ii) Aboriginal groups with an opportunity to participate in the management of fisheries, (iii) contributes to the economic self-sufficiency of Aboriginal communities, (iv) provides a foundation for the development of self-government agreements and treaties, and (v) improves the fisheries management skills and capacity of Aboriginal groups.</p> <p>While the management system generally respects and observes the legal rights, it does not formally commit to such rights until they have been legally proven or established. The exception to this practice is when fishing rights have been worked out or formalized in the context of treaties and land claims agreements.</p> <p>The Assessment Team concludes that this SI merits a score of 80.</p>		

PI 3.1.1	<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and • Incorporates an appropriate dispute resolution framework. 	
References	<p>Canadian Fisheries Acts and Regulations: http://www.dfo-mpo.gc.ca/acts-lois/index-eng.htm</p> <p>Aboriginal Fisheries Strategy: http://www.dfo-mpo.gc.ca/fm-gp/aboriginal-autochtones/afs-srapa-eng.htm</p> <p>Aboriginal Communal Fishing Licences Regulations: http://laws-lois.justice.gc.ca/eng/regulations/SOR-93-332/index.html</p> <p>Atlantic Fisheries Licence Appeal Process: http://www.dfo-mpo.gc.ca/fm-gp/policies-politiques/licences-permis/aflap-pappa/index-eng.htm</p>	
OVERALL PERFORMANCE INDICATOR SCORE		90
CONDITION NUMBER (if relevant):		N/A

Evaluation Table for PI 3.1.2

PI 3.1.2		<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</p>		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
		Met?	Yes	Yes

PI 3.1.2		<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</p>		
	Justification	<p>All affected parties and individuals involved in the consultation processes for the 4X5Y and 5Zjm haddock fishery are identified. These include representatives of harvesters, processors, Aboriginal communities, government agencies, and, in many cases, environmental NGOs. The processes are open to the general public. The principal formal consultation fora include: the Scotia-Fundy Groundfish Advisory Committee, the Gulf of Maine Advisory Council, and the various committees and working groups associated with the transboundary fisheries management regime for Georges Bank (membership and participants' roles and responsibilities are set out in the Terms of Reference); the Science-based Regional Assessment Process (CSAS-posted participation guidelines, participants' roles and obligations defined); and the industry-directed fleet sector advisory committees.</p> <p>The vast majority of industry stakeholders who participate in these management and science processes are knowledgeable and experienced representatives who have attended as committee members for many years, and therefore understand well their key roles and responsibilities for all areas of responsibility.</p> <p>DFO Maritimes Region has in place a Fisheries Sectoral Roundtable which meets twice yearly and which examines a broad range of existing and emerging strategic policies and issues affecting both fisheries and oceans activities. The region has recently established a Marine Environmental NGO Dialogue Forum to pursue discussions on sustainable development and conservation of marine resources. Both fora are well represented across the spectrum of activities, is well managed, and serves to inform comprehensive planning and policy development at a strategic level.</p> <p>In view of the evidence, this SI is awarded a score of 100.</p>		
b	Guidepost	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.
	Met?	Yes	Yes	Partial

PI 3.1.2		<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</p>	
	Justification	<p>For both 4X5Y and 5Zjm, the aforementioned principal consultation fora all regularly seek, accept and consider relevant information from the main affected parties, including local and aboriginal knowledge. Moreover, according to comments from stakeholders at the November 2014 site visits and an examination of meeting minutes by the Reassessment Team, it is evident that the management system demonstrates consideration of the information obtained. This is largely acquired by the direct participation of the parties in the consultation processes but extends to written briefs, reports and emails that are provided during or following consultations. DFO personnel also interact throughout the year with industry stakeholders which further provides the parties opportunities to inform the management system.</p> <p>DFO also consults the parties on other management system issues such as species-at-risk listings and recovery plans, regulatory and policy development and amendments, and changes to service delivery levels. DFO seeks, accepts and considers relevant information that it receives. The recent decision by DFO to include environmental NGOs as members of the Scotia-Fundy Groundfish Advisory Committee is viewed by the Assessment Team as progressive and positive.</p> <p>The Assessment Team is satisfied that DFO provides explanations to the main affected parties regarding how the information it receives is used. Meeting minutes, published reports, and daily interactions support this conclusion. However, the team could not ascertain the extent to which DFO provided explanations to the parties about information it received that was not used.</p> <p>Therefore, a score of SG90 is awarded.</p>	
c	Guidepost		<p>The consultation process provides opportunity for all interested and affected parties to be involved.</p> <p>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</p>
	Met?		<p>Yes</p> <p>Yes</p>
	Justification	<p>Information provided to the Reassessment Team by DFO confirmed that all interested and affected parties are provided the opportunity and encouragement to contribute to the discussions relative to the management system for the fishery. The administrative rules which oversee the work undertaken by the consultative fora both support and facilitate effective engagement by the parties.</p> <p>The evidence presented is sufficient to award this SI a score of 100.</p>	
References		<p>DFO and client commentary provided to the Reassessment Team during the November 2014 site visit.</p> <p>Examination of the Terms of Reference of various committees (cited in the main report), reporting minutes of the transboundary committees (available online), and those of the domestic advisory committees (provided by DFO and the client).</p>	

PI 3.1.2	The management system has effective consultation processes that are open to interested and affected parties.	
	The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER (if relevant):		NA

Evaluation Table for PI 3.1.3

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Yes	Yes	Partial
	Justification	<p>DFO nationally has developed a suite of explicit statements (vision, mission) and management policy frameworks with operational guidelines that define clear long-term fishery management objectives and how they can be implemented in a manner that is consistent with MSC Principles and Criteria and the precautionary approach. Policy frameworks have been developed for DFO's Fisheries Management, Science, Ecosystem, and Oceans sectors and all are posted on the department's website. Science-based frameworks have been peer-reviewed where required. In several instances, guidance and planning and monitoring tools have been developed to ensure associated decision-making within management policy meets the long-term objectives.</p> <p>DFO's Sustainability Fisheries Framework and supporting policy guidance best reflects the requirements of MSC Principles and Criteria. It lays the foundation for an ecosystem-based and precautionary approach to fisheries management in Canada while committing to the principles of sustainable development.</p> <p>Internationally, Canada is a signatory to the United Nations Fish Stock Agreement (UNFA) which requires countries to use the precautionary approach in the management of fisheries.</p> <p>While there is clear and demonstrable evidence that the requirements of SG80 have been met for the 4X5Y and 5Zjm management areas, there is only partial evidence that the long-term objectives which guide decision-making consistent with MSC Principles and Criteria and the precautionary approach are explicit within and required by management policy.</p> <p>For this reason, the Assessment Team concludes that a score of 90 is warranted for this SI.</p>		

PI 3.1.3	<p>The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach</p>
References	<p>Science</p> <ol style="list-style-type: none"> 1. A Framework for the Application of Precaution in Science-based Decision-Making about Risk http://www.pco.bcp.gc.ca/index.asp?lang=eng&page=information&sub=publications&doc=precaution/precaution_e.htm 2. DFO's Oceans Management Approach http://www.dfo-mpo.gc.ca/oceans/management-gestion/index-eng.htm 3. A New Ecosystem Science Framework in Support of Integrated Management http://www.dfo-mpo.gc.ca/science/Publications/Ecosystem/index-eng.htm <p>Ecosystem Management</p> <ol style="list-style-type: none"> 1. Ecosystem Considerations in Fisheries Management http://www.dfo-mpo.gc.ca/fgc-cgp/documents/parsons_e.pdf 2. Guidelines on Evaluating Ecosystem Overviews and Assessments http://www.dfo-mpo.gc.ca/csas/Csas/status/2005/SAR-AS2005_026_e.pdf 3. Policy for Managing the Impact of Fishing on Sensitive Benthic Areas http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthi-back-fiche-eng.htm <p>Oceans</p> <ol style="list-style-type: none"> 1. Canada's Ocean Strategy – Policy and Operational Framework http://www.dfo-mpo.gc.ca/oceans/publications/cosframework-cadresoc/pdf/im-gi-eng.pdf <p>Fisheries Management</p> <ol style="list-style-type: none"> 1. Sustainable Fisheries Framework http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm 2. A Fishery Decision-Making Framework Incorporating the Precautionary Approach http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm 3. Policy on Managing Bycatch http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/bycatch-policy-prise-access-eng.htm 4. Application of the Sustainable Fisheries Framework through the Integrated Fisheries Management Planning Process

PI 3.1.3	The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach	
	http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/ifmp-pgip-back-fiche-eng.htm	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		N/A

Evaluation Table for PI 3.1.4

PI 3.1.4	The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing		
Scoring Issue	SG 60	SG 80	SG 100
a	Guidepost The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
Met?			

PI 3.1.4	The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing		
	Justification	<p>The management system for both the 4X5Y and 5Zjm haddock fisheries provides for a range of incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2. Moreover, the system explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.</p> <p>The fishery-specific management system and policies for the 4X5Y and 5Zjm haddock fisheries is informed by three conservation and two social, cultural and economic long-term objectives (Section 4 of IFMPs).</p> <p>The Reassessment Team noted that a considerable number of incentives have been adopted and are in use to ensure both the sustainability of the fishery and the prevention of perverse incentives from arising. The management system's longstanding catch sharing programs (ITQs and EAs) provide economic and social incentives that support sustainable fisheries while discouraging overcapitalization and underutilization of available quotas. The programs also change the incentives structure from one of maximizing catch to maximizing value from a fixed quota allocation.</p> <p>The team acknowledges that while several of the incentives listed in the main report fall within the category of management measures and are supported by enforceable regulations and licence conditions, many of them were put in place at the request of the groundfish harvesting sector which represents a clear indication of its' commitment to sustainable fishing practices, and the protection of groundfish habitats and ecosystems. There is evidence to indicate that DFO's management system explicitly considers the effectiveness of the incentives on a regular basis such as at SFGAC meetings and annual updates to DFO's Fishery Sustainability Checklist.</p> <p>No apparent capital or operating subsidies are known to be offered by governments to the harvesting sector that would give rise to outcomes that are inconsistent with these principles.</p> <p>The Assessment Team concludes that a score of 100 is warranted for this SI.</p>	
References	Refer to the main report for a description of the incentives in place for the fishery based on documentation provided to the Reassessment Team by DFO and the Client following the November 2014 site visit.		
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 3.2.1

PI 3.2.1	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue	SG 60	SG 80	SG 100

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
a	Guidepost	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
	Met?	Yes	Yes	No
	Justification	<p>Sections 4.1 of the IFMPs for the 4X5Y and 5Zjm haddock fisheries identify 3 specific conservation objectives and 2 social, cultural and economic objectives. They are: productivity, biodiversity, habitat, culture and sustenance, and prosperity. These objectives are broadly consistent with achieving the outcomes expressed by the MSC's Principles 1 and 2 and are implicit within the fishery's management system.</p> <p>The fishery-specific objectives are further informed by a suite of supporting strategies and tactics (Sections 4.2 of the IFMPs); the objectives, however, are not categorized as short or long-term. The Reassessment Team understands that the 5 objectives are both short and long-term through to 2016 at which time the components of the plans themselves are to be formally re-evaluated.</p> <p>An examination of the official meeting reports from the 2012-2014 DFO-Industry consultation committees (SFGAC, GOMAC), reported proceedings from the various Canada-US transboundary committee meetings, and subsequent adjustments by DFO to CHPs and licence conditions are indications that the strategies and tactics for both fisheries are adjusted as required to remain compliant with the outcomes expressed by MSC Principles 1 and 2.</p> <p>However, the Assessment Team cannot conclude that all of the fishery-specific objectives (and their associated metrics) for both fisheries and management areas are sufficiently well-defined and measurable such that it can be demonstrably shown that they consistently contribute to the MSC Principles' stated outcomes.</p> <p>Therefore, a score of 80 is warranted for this SI.</p>		
References		Refer to the main report for a description of the Plans' objectives, strategies and tactics for the fishery as provided to the Reassessment Team following the November 2014 site visit.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 3.2.2

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Yes	Yes	
	Justification	<p>The management system for the 4X5Y and 5Zjm haddock fisheries is supported by federal statutes and regulations that are designed to achieve positive conservation outcomes for the target stock and associated habitat and marine ecosystems. The legislation is further supported by management policies and implementation guidelines and tools which support the objectives for the fishery (as well as the management system).</p> <p>There are established DFO decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives. While the authority for most decisions rendered rests with senior DFO officials, the DFO Minister is responsible for fisheries decisions that are international, interregional or interprovincial in scope. The associated decision-making processes for both the 4X5Y and 5Zjm management areas are illustrated in the main report. While not explicitly defined, they are nonetheless long-standing in regards to their application and the administrative rules which govern their use. They are considered by DFO, key stakeholders and the Reassessment Team as supportive of measures and strategies that achieve the fishery-specific objectives of the management system for the haddock fisheries.</p> <p>In recognition thereof, a score of 80 is awarded to this SI.</p>		
b	Guidepost	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Yes	Yes	No

PI 3.2.2	<p>The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.</p>			
	Justification	<p>It is important to note that there has been a general absence of serious issues that would compromise the objectives established for the 4X5Y and 5Zjm haddock fisheries for which the DFO has jurisdictional responsibility and authority.</p> <p>That said, the decision-making processes for both the 4X5Y and 5Zjm haddock fisheries are conditioned to operate effectively, transparently, and in a timely manner in the event that serious and other issues arise that would affect the management system and fishery-specific objectives. The processes operate on a continuous cycle of internal post-season review, stakeholder input, in-season scientific research, and compliance monitoring. As described in the main report, there are a number of scientific partnerships and networks in place through which organizations conduct a wide-range of studies of specific application to the various groundfish stocks, their habitat and ecosystem. This applies equally to the transboundary stocks on Georges Bank where the management systems of Canada and the US operate in tandem and in a complementary fashion. Occasionally, the decision-making processes are informed by observations raised through independent, external reviews.</p> <p>Specifically, the fisheries management and science processes are supported by well-established and functioning industry consultation and engagement activities, both formal and informal, which contribute to promoting decision-making that is effective and responsive to any potential serious and other important issues. During the November 2014 site visit, the client indicated that the decision-making processes were well known to and understood by the industry and the parties did their due diligence to ensure the processes were responsive and timely. The Reassessment Team was told that potential disputes were frequently avoided because the underlying issues had been examined proactively through the integrated network of fisheries consultative committees, thus removing potential misunderstandings.</p> <p>While the decision-making processes which inform the management system and those which are specific to the haddock fisheries of 4X5Y and 5Zjm have been shown to be generally effective, transparent and timely, they are not necessarily structured to be responsive to all issues that arise, particularly in terms of timeliness. This is especially true of integrated ocean use issues which, by their nature, are complex, require extensive scientific research and monitoring, involve multiple stakeholders with competing interests, and a mix of government agencies and perhaps jurisdictions.</p> <p>The evidence warrants a score of 80 for this SI.</p>		
c	Guidepost		<p>Decision-making processes use the precautionary approach and are based on best available information.</p>	
	Met?		<p>Yes</p>	

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.	
	Justification	<p>Canada's precautionary approach for fisheries management is defined in a number of DFO national policy and operational frameworks including in the IFMPs for the haddock fisheries of 4X5Y and 5Zjm. The approach is tethered by the requirement to be cautious when scientific knowledge is uncertain, and to not use the absence of adequate scientific information as a reason to postpone action or failure to take action to avoid serious harm to fish stocks or their ecosystem.</p> <p>The precautionary approach model that was developed for both haddock fisheries has been peer-reviewed, discussed with industry, and incorporated in both IFMPs. Reference points have been developed based on best available science and harvest control rules are in effect. As new scientific research information is made available, the components of the precautionary approach model for the fisheries are reviewed against the existing reference points and harvest control rules to ensure they reflect the new information and continue to support the fishery-specific objectives as defined.</p> <p>The Reassessment Team's observations are based on examinations of various domestic and Canada-US consultation committee reports for the 4X5Y and 5Zjm fisheries. Accordingly, a score of 80 is awarded for this SI.</p>	
d	Guidepost	Some information on fishery performance and management action is generally available on request to stakeholders.	Information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Yes	Yes
			Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
			Yes

PI 3.2.2	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.		
	Justification	<p>Stakeholders are able to access a range of information on the performance of the fishery and management actions through a variety of means, such as by attending advisory committee meetings and subject-matter workshops; accessing published reports, news services, and government-industry-corporate websites.</p> <p>Information initiated and formally provided by DFO includes stock status and research priorities and outcomes, economic analyses of conditions and trends affecting the fishery and industry, enforcement and compliance priorities and outcomes, fisheries management policy changes, regulatory amendments, species at risk assessments and recovery plans, environmental findings etc. Independent fisheries reviews are also available electronically and via media outlets.</p> <p>DFO personnel routinely provide explanations at meetings for any actions or lack of action associated with various findings and relevant recommendations. This extends to industry organizations who make the information available to their membership.</p> <p>Federal Access to Information requests offer another means of obtaining information and analyses generated by governments.</p> <p>In view of the evidence, a score of 100 is justified for this SI.</p>	
e	Guidepost	<p>Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.</p>	<p>The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.</p>
Met?	Yes	Yes	Yes
	Justification	<p>The management authority or the fishery is not subjected to continuing court challenges, and respects court decisions that are handed down. On occasion, DFO will consider appealing a provincial or federal lower court decision if, for example, it has been determined that a serious error has arisen or if the decision has the potential to seriously limit the Minister's discretionary powers pursuant to the federal <i>Fisheries Act</i>.</p> <p>The management system or fishery does comply in a timely fashion with judicial decisions arising from any legal challenges (this usually includes while awaiting the disposition of a decision under appeal).</p> <p>In the majority of cases, the management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges. DFO's formal and informal consultation and engagement processes have been effective in minimizing potential legal disputes involving other levels of government, industry stakeholders and the general public. Of note, Fishery Officers have the authority to intervene to resolve conflicts between fishers outside of the legal system.</p> <p>In view of the evidence, a score of 100 is awarded for this SI.</p>	

PI 3.2.2	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.	
References	<p>Maritime Regions Regional Advisory Process: http://www2.mar.dfo-mpo.gc.ca/science/rap/internet/Home.htm</p> <p>DFO Science Advisory Framework: http://www.dfo-mpo.gc.ca/csas-sccs/process-processus/ssrp-psrs-eng.htm</p> <p>Sustainable Fisheries Framework (SFF): http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/overview-cadre-eng.htm</p> <p>Application of the SFF through the Integrated Fisheries Management Planning Process: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/ifmp-pgip-back-fiche-eng.htm</p> <p>Fishery Decision-Making Framework Incorporating the Precautionary Approach: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precaution-eng.htm</p> <p>Policy for Managing the Impacts of Fishing on Sensitive benthic Areas: http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/benthi-eng.htm</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER (if relevant):		N/A

Evaluation Table for PI 3.2.3

PI 3.2.3	Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
Scoring Issue	SG 60	SG 80	SG 100
a	Guidepost Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
Met?			

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
	Justification	<p>The MCS system for the 4X5Y and 5Zjm haddock fisheries is considered multi-faceted and comprehensive, consisting principally of dockside and at-sea vessel and harvester inspections, vessel monitoring system, aerial and sea surveillance, covert operations, and a toll-free number where individuals can report suspected illegal activities. These operational components are supplemented by effective stakeholder engagement activities, public awareness and educational initiatives, as well as a proactive approach to investigating complaints and tips from industry and the general public.</p> <p>MCS mechanisms for the haddock fisheries include detailed licence conditions that are specific to participating fleets sectors and gear types. Licence conditions reflect the current management measures that have been approved for the fishery. For example, the documentation outlines the reporting and monitoring requirements for the fishery, lists prohibited species, defines closures (time and areas), specifies gear configurations, and protects species-at-risk.</p> <p>The C&P program at the national level is informed by a compliance and enforcement strategy for all major commercial fisheries. The program's performance in relation to commercial and aboriginal fisheries was formally audited in 2012 and found to be performing well at the operational level; however, the audit determined that shortcomings existed in relation to management's approach to program planning and formal performance evaluation. An Action Plan has been formulated which outlines what measures will be implemented to address the issues and is scheduled to be finalized by March 2015.</p> <p>The Assessment Team examined various MCS enforcement outcomes by DFO's Maritimes Region for the 2011-2014 period (as reported for this and previous MSC assessments/audits) and is generally satisfied that the operational components of the C&P program have demonstrated a consistent ability to effectively enforce relevant management measures, strategies and/or rules associated with the haddock fisheries in 4X5Y and 5Zjm.</p> <p>Accordingly, a score of 100 is awarded for this SI.</p>		
b	Guidepost	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Yes	Yes	No

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
	Justification	<p>The management system for both fisheries consists of a range of legal and administrative sanctions, including licence suspension, catch and equipment seizures and forfeitures, monetary fines, and incarceration for the most serious offences. Federal prosecutors are experienced in prosecuting fisheries charges, and magistrates have a good understanding of fisheries law. For the most part, court-imposed sanctions have been levied on a consistent basis and are thought by DFO and the client to provide effective deterrence. Media coverage of fisheries prosecutions and DFO's practice of reporting out on legal proceedings on its national website also serve to reinforce deterrence.</p> <p>While C&P data suggest that the overall MCS system for the fisheries are likely effective and client feedback tends to support this conclusion, the Reassessment Team is concerned that (i) in many respects, important C&P operational data are not collected, reported and analyzed specifically in relation to the target haddock fisheries, (ii) the C&P program lacks performance indicators to measure the effectiveness of its activities, including whether sanctions demonstrably provide effective deterrence, and (iii) non-compliance risks have not been formally defined nor an accompanying mitigation strategy developed that would facilitate the strategic deployment of resources to potential areas of high risks/threats of non-compliance.</p> <p>Given the above, a score of 80 is justified for this SI.</p>		
c	Guidepost	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Yes	Yes	Partial

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with	
	Justification	<p>During the November 2014 site visit, fish harvester representatives opined that the vast majority of licence holders complied with the management system for the fishery, and were diligent in their reporting of information of importance for the effective management of the fishery. They noted that the requirements to hail-out and hail-in on fishing trips, coupled with the mandatory requirement to operate and maintain a functioning VMS system on most vessels, and for independent dockside verifications of catch were instrumental both in deterring unauthorized activities such as fishing in closed areas/times and misreporting catches, and ensuring that information for quota monitoring and stock assessments was credible and reliable.</p> <p>Similarly, harvester organizations routinely provide information of importance to the effective management of the fishery through their participation in a variety of formal and informal advisory and assessment processes, as well as through their ongoing participation with DFO in various initiatives associated with stock research, species-at-risk, sensitive marine habitats, gear selectivity studies, and bycatch and discard reduction efforts</p> <p>The Assessment Team was not able to factually determine through analysis whether the degree of compliance by fishers with the management system for the haddock fisheries was high as required by SG 100c. The team's rationale is described in SG100b. A score of 90 is justified for this SI.</p>	
d	Guidepost		There is no evidence of systematic non-compliance.
	Met?		Yes
	Justification	<p>Based on information and program data provided by C&P staff and comments from industry representatives, the Reassessment Team considers the level of recidivism in the fishery to be extremely low. Moreover, there was no evidence to indicate the presence of systematic non-compliance in the fishery.</p> <p>The Assessment Team has concluded that a score of 80 is warranted.</p>	
References		<p>Feedback provided to the Assessment Team by Industry stakeholders during the November 2014 site visit.</p> <p>Statistical information and analyses presented in the main report.</p> <p>DFO Report on Plans and Priorities 2014-2015 (Compliance and Enforcement): http://www.dfo-mpo.gc.ca/rpp/2014-15/SO2/so-rs-2.1-eng.html</p> <p>Charges and Convictions - Maritimes Region: http://www.dfo-mpo.gc.ca/media/charges-inculpations/mar-eng.htm</p> <p>Report a Fisheries Violation: http://www.dfo-mpo.gc.ca/fm-gp/enf-loi/report-signaler-eng.htm</p>	
OVERALL PERFORMANCE INDICATOR SCORE:			85
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 3.2.4

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Yes	Yes	No
	Justification	<p>DFO's national science and oceans research programs are typically defined by multi-year strategic plans and/or frameworks with appropriate planning tool and implementation guidance. Examples include:</p> <ol style="list-style-type: none"> 1. Science Framework for the Future: http://www.dfo-mpo.gc.ca/science/publications/framework-cadre/index-eng.htm 2. New Ecosystem Science Framework in Support of Integrated Management: http://www.dfo-mpo.gc.ca/science/publications/ecosystem/index-eng.htm 3. Framework for Developing Science Advice on Recovery Targets for Aquatic Species in the context of the Species at Risk Act: http://www.dfo-mpo.gc.ca/csas/Csas/status/2005/SAR-AS2005_054_e.pdf 4. Fisheries and Oceans Canada Five-Year Research Plan (2008-2013): http://www.dfo-mpo.gc.ca/science/publications/fiveyear-plan-quinquennial/index-eng.html <p>There are numerous documented past and current/ongoing project-specific research initiatives which support the needs of the 4X5Y and 5Zjm haddock resource, habitat and ecosystem and contribute to the objectives consistent with MSC's Principles 1 and 2. Descriptions of the initiatives are provided in the main report for all three Principles. These initiatives vary in their scope, complexity, duration, objectives and outcomes. Collectively, they provide the management system with ongoing, reliable advice that informs the development of measures and policies consistent with the requirements of the MSC's principles.</p> <p>The Assessment Team was provided with details of various science multi-year work plans undertaken by staff at the St. Andrews Biological Station and the Bedford Institute of Oceanography. The associated work and projects provide the management system with a strategic approach to research and reliable and timely information that are felt to be sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. The details of the work plans are presented in the main report.</p> <p>In contrast, the Assessment Team did not find documented evidence of the existence of a comprehensive research plan that provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. In view of the evidence, a score of 80 is justified for this SI.</p>		

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
b	Guidepost	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Yes	Yes	Partial
	Justification	<p>While DFO-based research work plans are not widely published or disseminated to interested parties, plan components are discussed with key stakeholders through DFO's established consultation fora. In contrast, research results are widely and publicly available on the CSAS website and in scientific journals and take the form of peer-reviewed advice, research documents, proceedings, special science responses and presentations. The results are also explained to, and discussed with, industry stakeholders and others at formal and informal venues. Related research generated by other government departments, academia, and NGOs is also disseminated on various websites and scientific journals.</p> <p>The Assessment Team has concluded that a score of 90 is warranted for this SI.</p>		
References		Refer to the main report for a listing and descriptions of applicable research initiatives and projects of importance to the management system.		
OVERALL PERFORMANCE INDICATOR SCORE:				85
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 3.2.5

PI 3.2.5		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives		
		There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Yes	Yes	Yes

PI 3.2.5		<p>There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives</p> <p>There is effective and timely review of the fishery-specific management system</p>		
	Justification	<p>Section 6 of the IFMPs for the 4X5Y and 5Zjm haddock fisheries outline the mechanisms in place to monitor and evaluate the effectiveness of the management measures for the fisheries.</p> <p>4X5Y Periodic reviews are undertaken jointly by DFO and Industry stakeholders via the Science-based RAP process and the Fisheries Management-led Scotia-Fundy Groundfish Advisory Committee (SFGAC), including the various fleet sector advisory committees. A more in-depth and comprehensive evaluation takes place every four years. The RAP process evaluates the performance and effectiveness of the strategies and tactics associated with the productivity, biodiversity and habitat objectives for the fishery. The process also provides a retrospective analysis of the fishery's performance and proposals for future changes. Performance monitoring and evaluation undertaken by the SFGAC and fleet sector committees is focused on the elements of the CHPs and associated catch monitoring tools.</p> <p>5Zjm Periodic reviews are conducted jointly by Canadian and US fisheries managers and Industry representatives through two principal mechanisms: (i) the umbrella Canada-US Transboundary Resources Sharing Understanding (which includes the TRAC and TMGC), and (ii) the GOMAC. The former processes monitor and evaluate stock productivity related strategies and tactics listed in the IFMP and is informed by standardized annual research vessel surveys and stock assessment updates. Framework/benchmark assessments which evaluate the stock assessment model for the fishery are undertaken as required (underway in 2015). The GOMAC process, supported by the aforementioned fleet sector committees, focuses on the fishery's strategies and tactics relating to the biodiversity, habitat and prosperity objectives. The same process also evaluates the components of the fishery's CHPs and related catch monitoring tools. A more in-depth and comprehensive evaluation takes place every four years (scheduled for 2016-2017). The Assessment Team reviewed the official minutes of these committees for the 2012-2014 period and found numerous references to discussions of the performance evaluation of key components of the management system of both fisheries. Adjustments to management measures are incorporated in the CHPs and licence conditions. Apart from the aforementioned committee-based processes, the Reassessment Team noted that DFO Maritimes Regions carries out a number of collaborative reviews which also serve to monitor the performance of the fisheries. They include:</p> <ol style="list-style-type: none"> 1. Precautionary Approach: DFO sustainability checklist (annually) 2. Economics: DFO Cost-Earnings analyses (as required) 3. Licensing Policy: DFO regional committee and industry engagement (annually) <p>The evidence justifies a score of 100 for this SI.</p>		
b	Guidepost	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Yes	Yes	Partial

PI 3.2.5		<p>There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives</p> <p>There is effective and timely review of the fishery-specific management system</p>
	Justification	<p>The fishery-specific management system is subject to regular internal and occasional external review. The internal review mechanisms (defined here as DFO, NMFS, Industry and other interested stakeholders) are described in the previous section as well as in the main report. The external review mechanisms that have been triggered occasionally are listed in the main report.</p> <p>The Assessment Team has concluded that a score of 90 is warranted for this SI.</p>
	References	<p>Documentation cited includes: (i) the 4X5Y and 5Zjm IFMPs, (ii) minutes of the SFGAC and GOMAC advisory committees as provided by the client, and (iii) minutes of the Canada-US bilateral committees as posted on the NMFS and DFO websites.</p>
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER (if relevant):		N/A

Appendix 1.2. Risk-Based Framework (RBF) Outputs

The RBF has not been used to score any PIs.

Appendix 1.3. Conditions and Client Action Plan

Following are the stated conditions and recommendations as provided in the Draft Client Report dated October 2015.

In addition to the general requirements, the Client Group (client) must also agree in a written contract with SAI Global to meet the specific conditions as described below within the timelines that will be agreed in the 'Action Plan for Meeting the Condition for Continued Certification' that is to be approved by SAI Global.

Upon consultation with DFO, the client submitted a ratified Final Client Action Plan to SAI Global on November, 2015.

There are 5 conditions relating to performance indicators 2.1.1, 2.1.2, 2.2.1, 2.2.2, and 2.2.3

Condition number	Condition	Performance Indicator	Related to previously raised condition? (Y,N,N/A)
1, 2	(UoC1- 4X5Y OT, UoC2-4X5Y LL) The client must provide evidence that there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of retained species (4X5Y Cod)	2.1.1, 2.1.2	Y
3, 4	(UoC 1-4X5Y OT, UoC2-4X5Y LL, (UoC 5-5Zjm OT, UoC6-5Zjm LL) The client must provide evidence there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding of bycatch species (Thorny Skates)	2.2.1, 2.2.2	Y
5	(UoC1-4X5Y OT, UoC2-4X5Y LL) The client must provide evidence that qualitative information and some adequate quantitative information are available on the amount of main bycatch species affected by the fishery.	2.2.3	Y

Table B1.3: Condition 1,2

Performance Indicator	PI 2.1.1 Retained Species Outcome PI 2.1.2 Retained Species Management
Score	75
Rationale	UOC1, UOC2: Area 4X5Y OT, LL Given the most recent RV Survey data and the latest information on the 2015 stock assessment update and the reexamination of strategies to reduce 4X5Y Cod bycatch, there is no clear evidence at this time that mitigation measures are demonstrably effective in promoting recovery and rebuilding of 4X5Y Cod, given the downward trends in the population indices. In April 2015 decisions were made (1) to reduce the TAC by 50%, and (2) to manage the current TAC over 2 years, allocating 50% of the 2-year TAC for the 2015/16 fishing season with a

	<p>provision that uncaught quota can be carried forward to the second year. It is expected this measure would continue to reduce relative fishing mortality from 0.59 in 2013/14 to 0.32 by 2015/16 (see Chart 1 Annex A). It was noted that natural mortality has been estimated to have averaged at 0.76 in ages 4+ in recent history (1996-2008) and that recruitment has remained low. Additional data and analysis are required before determining whether the more recent strategy and management measures have achieved the desired outcomes.</p>
Condition	<p>The client must provide evidence that the partial strategy that has been adopted for 4X5Y Cod is demonstrably effective i.e. it does not hinder the recovery and rebuilding of 4X5Y Cod.</p>
Milestones	<p><u>By Year 2:</u> The Assessment Team shall be provided with evidence that a partial strategy to reduce 4X5Y Cod mortality by retained catch of the Scotia-Fundy Haddock fisheries (OTB,LL) has been reviewed and corrective adjustments (if any) have been taken.</p> <p><u>By Year 4:</u> The Assessment Team shall be provided with evidence that the relative fishing mortality for 4X5Y Cod has been maintained at levels that would enable a positive recovery trajectory.</p> <p>Where a species is below the level at which recruitment could be impaired, the client shall provide “evidence of recovery” or a “demonstrably effective strategy” as being in place such that the fishery does not hinder recovery of the species using any or a combination of the following as rationale:</p> <ul style="list-style-type: none"> • Evaluation of a recovery of a species below the limit reference point is actually happening on a stock level, as evidenced by a demonstrably increasing trend in biomass. • Proxy approaches may be used, including reference to fishing mortality levels and the use of simulation studies for other cod stocks, in which expert opinion is acceptable. In a very general sense, if fishing mortality for the entire stock is less than FMSY (the fishing mortality that would deliver maximum sustainable yield) the recovery of the stock can reasonably be expected to not be hindered. • Simulation studies which combine information on recent and expected F levels, stock size and recruitment etc. may also be used to confirm that the stock is expected to recover, and thus that the strategy can be regarded as ‘demonstrably effective’.
Client action plan	<p><u>Action Plan</u></p> <p>Action required: To implement management measures to maintain relative fishing mortality at levels that would enable a positive recovery trajectory. This will be achieved by the following:</p> <p><u>By Year 2:</u> The Assessment Team shall be provided with evidence that a partial strategy to reduce 4X5Y Cod mortality by retained catch of the Scotia-Fundy Haddock fisheries (OTB,LL) has been reviewed and corrective adjustments (if any) have been taken.</p> <p><u>By Year 4:</u> The Assessment Team shall be provided with evidence that the relative fishing mortality for 4X5Y Cod has been maintained at levels that would enable a positive recovery trajectory.</p> <p>Where a species is below the level at which recruitment could be impaired, the client shall provide “evidence of recovery” or a “demonstrably effective strategy” as being in place such that the fishery does not hinder recovery of the species using any or a combination of the following as rationale:</p> <ul style="list-style-type: none"> • Evaluation of a recovery of a species below the limit reference point is actually happening on a stock level, as evidenced by a demonstrably increasing trend in biomass.

	<ul style="list-style-type: none"> Proxy approaches may be used, including reference to fishing mortality levels and the use of simulation studies for other cod stocks, in which expert opinion is acceptable. In a very general sense, if fishing mortality for the entire stock is less than FMSY (the fishing mortality that would deliver maximum sustainable yield) the recovery of the stock can reasonably be expected to not be hindered. Simulation studies which combine information on recent and expected F levels, stock size and recruitment etc. may also be used to confirm that the stock is expected to recover, and thus that the strategy can be regarded as ‘demonstrably effective’. <p><u>Responsible parties</u> Client in consultation with DFO</p> <p><u>Timeframe for Milestones</u> Timescale: The outcome above should be achieved within 4 years of certification</p>
Consultation on condition	GEAC in collaboration with DFO and other industry organizations.

Table B1.3: Condition 3,4

Performance Indicator	PI 2.2.1 Bycatch Outcome PI 2.2.2 Bycatch Management
Score	75
Rationale	<p>UoC1- 4X5Y OT; UoC2 - 4X5Y LL Given the most recent RV Survey data and the very recent implementation of the strategy (within a year of this reassessment), there is no clear evidence at this time that mitigation measures are demonstrably effective in promoting recovery and rebuilding of Thorny Skate in 4X5Y, given the downward trends in the population indices. Additional data and analysis are required before determining whether the strategy and management measures have achieved the desired outcomes. Evidence provided to the Reassessment Team indicates that the abundance of 4X5Y Thorny Skate is below the limit reference point.</p> <p>UoC5 - 5Zjm OT; UoC6 - 5Zjm LL Given the most recent RV Survey data and the very recent implementation of the strategy (within a year of this reassessment), there is no clear evidence at this time that mitigation measures are demonstrably effective in promoting recovery and rebuilding of Thorny Skate in 5Zjm, given the downward trends in the population indices. Additional data and analysis are required before determining whether the strategy and management measures have achieved the desired outcomes. Evidence provided to the Reassessment Team indicates that the abundance of 5Zjm Thorny Skate is below the limit reference point.</p>
Condition	<p>UoC1- 4X5Y OT; UoC2 - 4X5Y LL The client must provide evidence that a partial strategy of demonstrably effective management measures is in place such that the Canadian Scotia-Fundy Haddock Fishery does not hinder the recovery and rebuilding of 4X5Y Thorny Skate.</p> <p>UoC5 - 5Zjm OT; UoC6 - 5Zjm LL The client must provide evidence that a partial strategy of demonstrably effective management measures is in place such that the Canadian Scotia-</p>

	Fundy Haddock Fishery does not hinder the recovery and rebuilding of 5Zjm Thorny Skate.
Milestones	<p>UoC1 - 4X5Y OT; UoC2 – 4X5Y LL</p> <p><u>By Year 1:</u> Area 4X5Y (OTB) & (LL) and 5Zjm (LL). In the first year following grant of recertification, GEAC will work actively with DFO to monitor compliance and implementation of the adopted Skate Conservation Strategy, and other (new) measures as may be appropriate, with the aim of being able to demonstrate that this Strategy is resulting in sufficiently low fishing mortality such that the fishery does not hinder recovery and rebuilding. Information required for this purpose shall include the following:</p> <ul style="list-style-type: none"> • Examination of the status of Thorny Skate relative to its' Limit Reference Point (LRP) proxy ; • For each gear type, fleet sector and management area, (i) data on Thorny Skate bycatch from the pre-assessment averages reported in the initial 2010 fishery assessment to March 2015, in regards to annual quantities caught/retained and discarded, and associated percentages of haddock catch, and (ii) haddock trip catch and effort; • Quantified estimates of discard mortality in relation to the summer and winter RV biomass index for the pre-assessment period and recent years; and • Examination of observer reports relative to the management measures applicable to Thorny Skate ie. handling, live release, move-away protocol etc. <p><u>By Year 2:</u> The Reassessment Team shall be provided with evidence that the partial strategy to mitigate 4X5Y thorny skate bycatch has been reviewed and corrective adjustments (if any) have been taken.</p> <p><u>By Year 4:</u> The Assessment Team shall be provided with evidence that the abundance of Thorny Skate is on a positive recovery trajectory, or an assessment that the estimated fishing mortality is not hindering recovery .</p> <p>Where a species is below the level at which recruitment could be impaired, the client shall provide “evidence of recovery” or a “demonstrably effective strategy” as being in place such that the fishery does not hinder recovery and rebuilding of the species using any or a combination of the following as rationale:</p> <ul style="list-style-type: none"> •Evaluation of a recovery of a species below the limit reference point is actually happening on a stock level, as evidenced by a demonstrably increasing trend in biomass. • Proxy approaches may be used, including reference to fishing mortality levels and the use of simulation studies for other skate species, in which expert opinion is acceptable. In a very general sense, if fishing mortality for the entire stock is less than FMSY (the fishing mortality that would deliver maximum sustainable yield) the recovery of the stock can reasonably be expected to not be hindered. •Simulation studies which combine information on recent and expected F levels, stock size and recruitment etc. may also be used to confirm that the stock is expected to recover, and thus that the strategy can be regarded as ‘demonstrably effective’.
Client action plan	<p><u>Action Plan</u> Action required: Continue with the implementation of the Thorny Skate bycatch strategy and monitoring of the resource by means of the DFO RV surveys</p>

	<p>This will be achieved by the following:</p> <p><u>By Year 1:</u> Area 4X5Y (OTB) & (LL) and 5Zjm (LL). In the first year following recertification, GEAC will work actively with DFO to monitor compliance and implementation of the adopted Skate Conservation Strategy, and other (new) measures as may be appropriate, with the aim of being able to demonstrate that this Strategy is resulting in low fishing mortality. Information required for this purpose shall include the following:</p> <ul style="list-style-type: none"> • Examination of the status of Thorny Skate relative to its' Limit Reference Point (LRP) proxy ; • For each gear type, fleet sector and management area, (i) data on Thorny Skate bycatch from the pre-assessment averages reported in the initial 2010 fishery assessment to March 2015, in regards to annual quantities caught/retained and discarded, and associated percentages of haddock catch, and (ii) haddock catch and effort; • Quantified estimates of discard mortality in relation to the summer and winter RV biomass index for the pre-assessment period and recent years; and • Examination of observer reports relative to the management measures applicable to Thorny Skate ie. handling, live release, move-away protocol etc. <p><u>By Year 2:</u> The Assessment Team shall be provided with evidence that the partial strategy to mitigate 4X5Y thorny skate bycatch has been reviewed and corrective adjustments (if any) have been taken.</p> <p><u>By Year 4:</u> The Assessment Team shall be provided with evidence that the abundance of Thorny Skate is on a positive recovery trajectory, or an assessment that the estimated fishing mortality is not hindering recovery.</p> <p>Where a species is below the level at which recruitment could be impaired, the client shall provide "evidence of recovery" or a "demonstrably effective strategy" as being in place such that the fishery does not hinder recovery and rebuilding of the species using any or a combination of the following as rationale:</p> <ul style="list-style-type: none"> • Evaluation of a recovery of a species below the limit reference point is actually happening on a stock level, as evidenced by a demonstrably increasing trend in biomass. • Proxy approaches may be used, including reference to fishing mortality levels and the use of simulation studies for other skate stocks, in which expert opinion is acceptable. In a very general sense, if fishing mortality for the entire stock is less than FMSY (the fishing mortality that would deliver maximum sustainable yield) the recovery of the stock can reasonably be expected to not be hindered. • Simulation studies which combine information on recent and expected F levels, stock size and recruitment etc. may also be used to confirm that the stock is expected to recover, and thus that the strategy can be regarded as 'demonstrably effective'. <p>Relevant Scoring Indicator: 2.2.1, 2.2.2</p> <p><u>Responsible parties</u> <u>Client in consultation with DFO</u> <u>Timeframe for Milestones</u> Timescale: The outcome above should be achieved within 4 years of certification</p>
Consultation on condition	GEAC in collaboration with DFO and other industry organizations.

Table B1.3: Condition 5

Performance Indicator	PI 2.2.3 Bycatch Monitoring Information
Score	70
Rationale	Having reviewed and considered the evidence provided in relation to what is needed to comply with the requirement at the SG 80 level, the opinion of the Reassessment Team is that insufficient progress was made since the 4th Surveillance Audit and during reassessment to close the condition. At-sea observer coverage in 4X5Y remains at a low level, thus depriving the fishery of important, additional data on the fishery. Accordingly, the score for this PI remains at 70.
Condition	UoC1 - 4X5Y OT; UoC2 - 4X5Y LL The client is required to ensure that sufficient data is collected to enable evaluation of the level and impact of bycatch species in the haddock fishery.
Milestones	<u>By Year 1:</u> Area 4X5Y (OTB) & LL): In the first year following grant of recertification, GEAC will work actively with DFO and the third party Observer program service provider to complete a review of recent and appropriate future levels of observer coverage for both fleets operating in the area such that, beginning in 2016, better data are available on the bycatch of species in the haddock fishery. <u>By Year 2:</u> Improved data collection and estimations of discards by OT and LL in 4X5Y will be adopted. <u>By Year 4:</u> There will be documented evidence that the adopted data collection and discard estimation mechanisms have been implemented.
Client action plan	Action Plan Action required: Working cooperatively with SFGAC and DFO, to improve at-sea observer coverage levels in 4X5Y where appropriate to address identified information gaps, including the organization of observer deployment by fleet, fishing area and season. This will be achieved by the following: <u>By Year 1:</u> Area 4X5Y (OTB) & LL): In the first year following grant of recertification, GEAC will work actively with DFO and the third party Observer program service provider to complete a review of recent and appropriate future levels of observer coverage for both fleets operating in the area such that, beginning in 2016, better data are available on the bycatch of species in the haddock fishery. <u>By Year 2:</u> Improved data collection and estimations of discards by OT and LL in 4X5Y will be adopted. <u>By Year 4:</u> There will be documented evidence that the adopted data collection and discard estimation mechanisms have been implemented. Relevant Scoring Indicators: 2.2.3 <u>Responsible parties</u> Client in consultation with DFO

	<p><u>Timeframe for Milestones</u> The outcome above should be achieved within 4 years of certification</p>
<p>Consultation on condition</p>	<p>GEAC in collaboration with DFO and other industry organizations.</p>

Accompanying Recommendations

(a) Administrative/Governance

During the course of its work, the Assessment Team was presented with many relevant documents which allowed for opinions to be formed about their usefulness. In other situations, important documents of relevance to any MSC fishery assessment were either outdated on the DFO website or not available except upon request during or following a client site visit. Among several examples, one in particular stands out – the fishery’s IFMP or CHP. The former is labelled as an “evergreen” document while the latter is intended to reflect annual changes to the management measures for the fishery. Some DFO regions publish both documents on their regional website, others much less so.

The Assessment Team provides the following recommendations to DFO’s Maritimes Region. The first recommendation could assist in better addressing the situation as described above; the others deal with general improvements to the region’s current practices.

1. DFO should make full use of the “*Fisheries Decisions*” and “*Notice to Fish Harvesters*” sections of the website to communicate current information about the management changes to the fishery (as opposed to only sending email notifications to industry stakeholders).
2. DFO should grant membership status to regionally-based Environmental NGOs in respect of the GOMAC committee and appropriate sub-committees on the same basis as currently provided in respect of the SFGAC.
3. DFO and the relevant industry sector should update the Community Management Board Operational Guidelines (December 1998).
4. DFO should augment its existing Monitoring and Surveillance (C&P) data for the 4X5Y and 5Zjm Haddock fisheries by incorporating data currently captured by the third party at-sea and dockside

monitoring services providers. This would add value to the evaluation of some MCS P3 Performance Indicators.

(b) Fishery specific - 4X5Y and 5Zjm

General

1. The Assessment Team recommends that DFO assemble scientific consensus or expert opinion about the potential influence of trophic structure and/or various environmental/ecological conditions in the Southern Scotian Shelf and Northeast Georges Bank in relation to species/stocks that appear to remain at low abundance, despite low-to-moderate fishing mortality rates.

4X5Y and 5Zjm Cod

2. DFO and GEAC are encouraged to maintain fishing mortality at low levels until the limit reference point is achieved.

Porbeagle 4X5Y (OTB, LL) and 5Zjm (OTB, LL)

3. The Assessment Team found inconsistencies with the Porbeagle discards estimates in the 4X5Y OTB fishery provided by the client and the information included on Table 1 (DFO 2015) of the RPA for the OTB haddock fishery. The team recommends that DFO re-examine and explain the basis for both sets of estimates, ideally in advance of the first surveillance audit of the Scotia-Fundy Haddock Fishery.

4. The post-release mortality of un-injured Porbeagle has been investigated but that of injured Porbeagle is largely unknown. The team recommends that DFO investigate post-release mortality of injured Porbeagle in order to reduce uncertainty in their estimates.

5. There is no accepted limit reference point (LRP) for Porbeagle. An Upper Stock Reference Point of 80% of female spawning stock numbers (SSN) at MSY, SSN80%, is proposed in the 2015 RPA as the population recovery target. The team recommends that DFO work toward establishing a limit reference point for Porbeagle.

Appendix 2. Peer Review Reports

Peer Reviewer 1

Overall Opinion

<i>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</i>	Yes	Conformity Assessment Body Response
<p><u>Justification:</u></p> <p>The assessment team conducted a comprehensive review of the literature on the basic biology and population dynamics of the haddock stock occurring within the 4X5Y and 5Zjm statistical areas. The material presented was thorough and well-presented and reasonably concise. The largest issues I had with the section (PI 1) is the lack of sensitivity explorations in the basic stock assessment that could have added additional confidence in the results.</p> <p>P1. This peer reviewer notes that some information relative to the uncertainty in the stock assessment was not included; specifically graphical presentations of retrospective analyses. Though these would have contributed to the completeness of the stock assessment section, alone the lack of this information does not alter the evaluation results.</p> <p>P2 Ecosystem The presentation and analyses were exhaustive, intense and extremely comprehensive and presented in a fashion easy to follow even in light of the enormous amount of information. /the assessment team is to be commended for the full suite of considerations taken on in regards to characterizing the ecosystem qualities of the haddock fisheries.</p> <p>P3 Management Very well presented; I would like to see use of a few more schematics characterizing the linkages in and between all of the various management components (domestic, international). The following refers to both 4X5Y and 5Zjm.</p> <p>Specifically take much of the text from 4.5.1.1 and 4.5.1.2, 4.5.1.3, 4.5.1.4 and summarize with a schematic- then add to it all the various groups within/between that are used to provide guidance (TMGC, GMIC, GOMAC,SFGAC, various roundtable groups, various boards, etc.).. There is an extensive amount of information here that could be better presented schematically, keeping the text as background but visually presented as well. This could significantly improve understanding and add transparency to public viewing the material.</p>		<p>P1 – In the most recent stock assessment, a base model only was used. However, for the previous assessment three additional models had been developed to explore alternative assumptions. Although a major review of the assessment framework for this stock is underway, mention of the earlier exploratory modeling, along with reference citation, will be included in the background section of the final draft of the report. Similarly, where retrospective analyses are mentioned in the background section, a reference citation will also be provided.</p> <p>P2- No response is required.</p> <p>P3 - Presenting the domestic and international information for Canada and the US in an integrated schematic format was considered desirable at the time the approach to P3 was being mapped out. The team’s research was able to source and use schematics illustrating both the US and Canadian processes; however, not in an integrated format. For this reason, the team opted to provide a more detailed narrative of the management components than would otherwise be necessary.</p>

<p>Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?</p>	<p>Yes</p>	<p>Conformity Assessment Body Response</p>
<p><u>Justification:</u> Yes, the assessment team’s conditions are clearly stated as to the issues concerning the conditions for each PI sub issues for each fleet/gear, and also the suggested milestones.</p> <p>However, additional rationale on how simulation studies could support closing out the various conditions is warranted (sensitivity analyses as well) and background on why a rigorous statistical analysis of the observer data collection system is needed to determine optimal required sample sizes particularly from the aspects of information gained and costs.</p>		<p>The Assessment Team has discussed these observations and is of the view that further analyses are not required at this time. However, the team considers these matters worthy of follow-up as a matter of course during the annual surveillance audits.</p>

If included:

<p>Do you think the client action plan is sufficient to close the conditions raised?</p>	<p>Partial</p>	<p>Conformity Assessment Body Response</p>
<p><u>Justification:</u></p> <p>Condition 2.1.1, 2.1.2 Client should be requested to provide by year 1 some objective basis on which to assess if the planned strategies are on track (i.e., provide at the 1st surveillance audit information to show progress and the basis of the ‘strategy’).</p> <p>Condition 2.1.1, 2.1.2 (Retained Species Management) and 2.2.1 and 2.2.3 (Bycatch Management) under Milestones. I would also include “sensitivity analysis” evaluations in addition to simulation studies as possible options.</p> <p>Condition 2.2.1 and 2.2.2 (Bycatch management). The potential for use of advanced sampling techniques should be considered as part of the ‘strategies’ options in the data gathering phase of closing out the conditions. Specifically, discussions should take place with such experts to identify the potential for use of onboard cameras to use in quantifying and improving information available on retained species and bycatch including condition and size (where possible) of releases.</p> <p>Regarding condition 2.2.3 (Bycatch monitoring) and specifically as regards milestone:</p> <p>By year 1:</p> <p>a. Regarding Porbeagle discards:</p>		<p>A Client Action Plan has been developed by the Assessment Team and discussed with the Client and by extension with DFO Maritimes Region. For example, the issues with Porbeagle and the low level of at-sea observer coverage has been raised and are the subject of the Action Plan or a recommendation.</p> <p>Appropriate consideration has been given in the development of milestones and specific actions for all of the conditions as identified by the team and agreed to by the Client. The considerations are sufficient to meet the SG 80 level if the required actions are successfully implemented.</p> <p>Therefore, the team is not supportive of taking further action as proposed by the reviewer at this time. However, further consideration of the suggested actions could be made during the mandatory annual surveillance audit process.</p>

Provide a review of the incongruence in discard estimates (as noted in SAI general recommendations) for 4X5Y and 55Zjn B, BLL fleets. By 1st surveillance audit

- b. The review of the recent/appropriate future levels of observer coverage should be done such that a product is a statistical determination of the optimal level of required observer coverage by fleet.**
- c. In addition, by year 1- the client should provide at least a draft characterization of the future data collection design that will result in achieving the MSC Principles 1 and 2 regarding bycatch and discards.**

General recommendation:

- 1. Where reference points do not exist or have not been adopted for any of the retained species, the Client should work with the management agency entities (DFO, TRAC) to initiate action towards a review of appropriate reference points and if available but not implemented/adopted provide an objective basis to understand the issues of adoption including any strategies in place or underdevelopment to adopt such reference points.**
- 2. The management agency entities are encouraged to conduct rigorous examination of the research vessel survey, survey design with regards to how representative it is currently of the fishery populations in space, time and biological characteristics.**

For reports using the Risk-Based Framework please follow [the link](#).

For reports assessing enhanced fisheries please follow [the link](#).

General Comments on the Assessment Report (optional)

The assessment team conducted a thorough and comprehensive, objective review of the available information for the fisheries under review. The team presented a voluminous amount of information on biological characteristics of the populations, fishery statistics, stock assessment status including future projections, relevant background on all primary retained species within the fishery, as well as bycatch and incidentally caught species. They are to be commended for the quality and thoroughness of the review and the objectivity with which it was presented. Taken in total, in addition to management information presented on the fishery, this assessment and the information provided provides sufficient and adequate information with which to evaluate it against the MSC Principles 1, 2, and 3.

Thank you for the opportunity to have reviewed the Canada/Scotia-Fundy haddock assessment.

Performance Indicator Review Completed for 4X5Y

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1 4X5Y	Yes	For most issues	NA	<p>1.1.1a: SG 90 is supported. Results of the SPA stock assessment suggest a good outlook for 4X5Y haddock however strong retrospective patterns in the model results precludes a score of SG 100 for 1.1.1a. It can not be supported from the assessment that it is 'highly likely' that the stock is currently at a level that will maintain high productivity. Model estimated SSB (age 4+) shows significant fluctuations from the mid 1980's – present time and further shows a significant decline in SSB (age 4+) from 2006-2007, with some recent improvement in SSB. In addition there is incongruence in the research survey and ItQ survey indices that the model was not able to explain. These translate into further uncertainty in the model estimated exploitation, recruitment and SSB patterns. 1.1.1a-score is SG 90.</p> <p>1.1.1b-SG 90 is supported given the uncertainty in the assessment and the lack of sensitivity analyses conducted to address model uncertainty and the large retrospective patterns in model estimates.</p>	<p>SIa – Reference to SG 90 is in error. Two figures that had been included in the original P1 Background section of the report were omitted from the version sent to peer reviewers by mistake. These illustrate that there is a 50% probability that $F_{0.1}$ will be exceeded at harvest levels above 3,800 t (TACs for 2012/13 and 2013/14 set at 5,100 t, down from 6,000 t in the previous fishing year) and although catch at this level will result in some decline in SSB, it will nevertheless remain considerably above B_{lim}. These figures will be reinserted in the final draft. The assessment concluded that, despite uncertainties in the fit of the population model, the SSB of 4X5Y haddock is considered likely to be within the 'cautious zone', that is between the LRP and USR, and unlikely to be in the critical zone. Increases in the RV survey biomass index in 2013 and 2014 (to just slightly below the 2009-2013 average) strongly support this conclusion.</p> <p>The reviewer's comment seems to suggest that requirements of SG 80 are exceeded, the CAB feels its evaluation of SIa at SG 100 is justified.</p> <p>SIb – Again, reference to SG 90 is in error. The CAB evaluates this SI at SG 80.</p> <p>The reviewer appears to be satisfied with the CAB's overall score of 90 for this PI.</p>
1.1.2 4X5Y	Yes	Yes	NA	<p>1.1.2 Overall score. SG 80 is supported based on the production model analyses that were conducted using the base SPA model.</p>	<p>This comment seems to suggest that an overall score of only 80 for this PI is supported. The CAB feels that its evaluation (overall score of 100) is well supported by the rationales provided.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.3 4X5Y	Not Relevant	Not Relevant	NA	NA	
1.2.1 4X5Y	Yes	For some issues only	NA	<p>1.2.1a. SG 90- is supported; the current harvest strategy has high quantitative support (based on recent stock assessments) that it is achieving management goals and is effective in maintaining exploitation below the precautionary management goals (below F_{ref}). However, there is uncertainty in the stock assessments and sensitivity analyses are recommended to address these uncertainties, results support that exploitation levels have been maintained below the reference level for some 20+ years.</p> <p>However, given the pattern in retrospective analyses- estimate of F's in recent years are more uncertain (see DFO SPA results) thus the exact magnitude of exploitation on the haddock stock in 4X5Y in current years remains uncertain precluding SG 100 score.</p> <p>1.2.1.b. SG80 is supported given the uncertainty in the model (retrospective patterns, lack of sensitivity analyse, uncertainty to data inputs- potential for higher levels of discards not accounted for in the model), model tuning inconsistencies in indices from research vessel and the ITQ surveys.</p> <p>1.2.1.c. SG 60 supported. Sampling (monitoring) of directed fishery removals is in place. The need for enhanced sampling of discards is recommended and possible use of video cameras to reduce uncertainty in discarding.</p>	<p>SIa – Reference to SG 90 is in error. The reviewer's comment seems to suggest that requirements of SG 80 are exceeded, but the CAB feels its evaluation of this SI at SG 100 is supported by the rationale provided despite the uncertainty associated with the stock assessment.</p> <p>SIb – The CAB evaluates this SI at SG 80. No further response is required.</p> <p>SIc – The CAB evaluates this SI at SG 60. No further response necessary.</p>
1.2.1 continued	Yes	For some issues	NA	<p>1.2.1.d. SG 100 supported based on the frequency and method of status review and the protocols in place for consensus management.</p> <p>1.2.1e Not relevant</p>	<p>SI d – The CAB evaluates this SI at SG 100. No further response is required.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.2 4X5Y	Yes	Yes	NA	SG 90 is supported overall based on the following: well understood HCRs are in place and quantitatively are supported, the HCRs work towards precautionary management objectives. There are mechanisms in place within the HCR framework for adjustments as needed (response based). However, as the team noted the HCRs do not address primary uncertainties in stock determination – the latter which could impact stock status and thus the effectiveness of the HCRs. All of the individual component scores of the team are supported and well documented in the text.	Although reference to SG 90 is in error, the reviewer's comment indicates that the CAB's overall score of 90 for this PI is supported.
1.2.3 4X5Y	Yes	Yes	NA	<p>SG 80 supported overall. The team noted that stock status is determined using the RV survey; as well the ITQ survey provides important information on abundance however the two surveys are not in complete agreement in recent years. There is a need to review the two surveys methodology and standardization procedures to identify possible sources for the disparity.</p> <p>In addition the team noted low observer coverage currently exists and was presented in tabular form in Appendix tables); this information is of primary importance to the overall evaluation and should be presented in the main report.</p> <p>Consideration of advanced sampling methods/tools is needed to address uncertainty in discards.</p>	The CAB evaluates all three SIs at SG 80. No further response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.4 4X5Y	Yes	Yes	NA	<p>SG 100 is supported for 1.2.4a SG 60 is supported for 1.2.4b. SG 80 is supported for 1.2.4c.</p> <p>The model is appropriate however sensitivity analyses were not conducted to address primary uncertainties (retrospectives, effects of error in catch (discard) thus the model was not used to its fullest extent. The auxiliary production model aided in evaluating future stock status through projections. As well the assessment provides reference points. The team has done a thorough job in addressing the deficiencies of the assessment (retrospective patterns, full consideration of uncertainties, no sensitivity runs, mismatch to indices, need for increased observer coverage to quantify discards with confidence).</p> <p>SG 100 is not supported as indicated by the team. SG 100 supported for 1.2.4e. The SA has a history of excellent system of peer review, examination of all inputs and model structure and data inputs are reviewed in an fashion.</p>	The reviewer agrees with the CAB's evaluation of all SIs and the overall score of 90 for this PI. No further response is required.
For scoring of PI 1 for 5Zjm- scroll below after final P3 scores. I have created scores separately for 5Zjm for PI 1.	See below	See below	See below	See below	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1 4X5Yand 5Zjm	Yes	Yes	Yes	<p>All of the overall scores (by fishery and gear) for each of the PI 2.1.1 issues are well supported from the information provided by the team. This PI was evaluated by this peer reviewer for both 4X5Y and 5Zjm as one unit.</p> <p>The assessment did an excellent job describing an extensive amount of information on retained catch, stock status, abundance for the retained and bycatch species in the Canada/Scoita Bay of Fundy Haddock fisheries. They are to be commended for the compilation, organization, and presentation of the material. Detailed tables identify pass/fail by issue according to the team and justification by each fishery/species/issue was a great aid in evaluating the PI 2 Indicators.</p> <p>Sufficient information was provided to evaluate whether the 'fishery' poses a serious risk or irreversible harm to the retained and/or bycatch species and for species depleted if the fishery hinders recovery.</p> <p>Evidence was provided showing that management options, for species comprising >5% by weight of the total catch, currently are implemented through the PA approach and as developed through robust consensus building and assessment framework are considered suitable and appropriate to promote recovery where deemed needed.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
				<p>However, for some species such as Cod rebuilding under the prescribed management plan has not occurred as expected. Thus, mortality of this species should be further reduced from all sources.</p> <p>As well, the team noted that for several species (biological reference points either did not exist or were not fully adopted adding to the difficulty of status (redfish, Winter Flounder, Sculpin, Monkfish, Witch Flounder) determination issues for many species.</p> <p>The assessment team provided sufficient background to address and evaluate if the fishery does not hinder recovery of species that are outside limits and that there are measures in place to ensure the strategy is effective. As an example, although Cod are managed through a recently adopted PA TAC- considered towards aiming to promote recovery, however although in place, it has not been shown to be demonstrably effective in not hindering recovery. Again the team provided sufficient background information pertaining to management issues/concerns pertaining to spatiality of the Winter flounder stock to suggest considerable uncertainty in stock units (and catch data used in such assessments) to warrant additional concern on the impact of the fishery on these stocks.</p> <p>Ample data exist to also support that if status is poorly known, that practices are in place that are expected to result in the fishery not causing the retained species to be outside the limits</p>	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.2 4X5Y and 5Zjm	Yes	Yes	Yes	<p>All scores (by fishery and gear) are supported through the assessment team text, tables, figures and score justification.</p> <p>Conservation Harvesting Plans provide a primary vehicle in addition to individual species management harvest strategies by which caps are implemented with regards to total bycatch and also per trip level harvest of said species. As well, restrictions are in place whereby fisheries may be closed when ceilings for 'small fish' numbers are reached for a number of species within the fishery if their catch exceeds >15% of the catch. This yields additional protection to Cod, Pollock White Hake, Atlantic Halibut and all flat fish, in addition to incidental catches of a closed species at the time their catches reach/exceed established limits.</p> <p>For individual species other management measures are followed also including: stock status determinations with respect to reference points, evaluation of CPUE trends, ITQs and community quotas, trends in catch, trends in survey and commercial indices of abundance.</p> <p>The team provided adequate information to evaluate whether if there was a strategy/process in place for managing retained species – that is designed to ensure the fishery does not pose a harm or irreversible harm – if the system/process is effective in its objectives. Although there are systems in place and measures exist, that the effectiveness/success of the systems and outcome is mixed across the species retained and individual fleet components. In some cases where reference points exist, and harvest strategies have been implemented – stocks are still</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.2. Continued				below the target reference points indicating success is questionable (Cod). For other stocks such as redfish, Witer Flouder the strategies seem to be working at least in part	
2.1.3 4X5Y and 5Xjm	Yes	Yes		<p>All scores are supported (by fishery and gear). Sufficient details were provided to evaluate the nature and qualitative value of information available on the main retained speies. There is a need for review of data collection procedures/protocols for the gilnet and handline fleets across the entire fishery. Although qualitative inforation suggests the level of retained speices is not high for these fleets- the exact amounts are uncertain. There is probalby sufficient data to qualitatively assess biological status for most species for most fleets but not for gillnets and handlines. As well observer coverage is considered low particulary in 4X5Y. Although the team noted that other auxillary data exists with which to monitor status (e.g., survey indices, siae and catch samples) that absence of adquate observer coverage minimizes the confidence in the ability to monitor retained species with confidence.</p> <p>An overarching observation noted by the team was that the large variability in ability to detect /qualitatively the status of retained species across fleets and areas due to the large multi-species/multi-fleet characteristics of the fishery.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.1 4X5Y and 5Zjm	Yes	Yes	Yes	<p>All scores are supported (by fishery and gear). Sufficient information was presented to evaluate if the fishery poses harm or hinders recovery of bycatch species and to quantify status with respect to reference points (where they exist). There were specific identified issues where recently implemented management strategies would like provide additional knowledge needed to more fully address this question (e.g., flr throny skates, Porbeagle).</p> <p>As well as prescribed by MSC V1.3- the team provided background on speices considered vulnerale (skates, sharks, cusk). The team emphasized the uncertainty in ability to determine for by catch species outside their limtis, if the strategy in place could be said to demonstrably show positive migigation against any harmful impacts on these main bycatch species.</p> <p>Finally, there was adeqate background priveded as to for those bycatch species which status was poorly know, if there were monitoring stragegies in place such that would aid in preventing the bycatch species to e outside their biologicl based limits or hinder recovery.</p>	No response is required.
2.2.2 4X5Y and 5Zjm	Yes	Yes	Yes	<p>All scores are supported (by fishery and gear) The team provided sufficient evaluate this PI topic; in general there is at least a partial strategy in place to maintaitn by catch within their biological limits. Examples include small fish caps, licence conditions (Atlantic Halibut), minimum sizes (lobster), gear restrictions (biodegradable panels), best practices for releases. In addition there seems to be some reasonable level of objective information with which to evaluate if these measrues are working and/or effective towards the aim of maintaing these species within their biological limits.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.3 4X5Y and 5 Zjm	Yes	Yes	Yes	<p>All scores are supported (by fishery and gear) The team provided good description of the information available by fleet and areas for the by catch species. It was particularly emphasized that in 5Zjm observer coverage improved between 2010 and 2013 for both Otter trawl and bottom longlines. Observer coverage is extremely scarce for gillnet and handline fleets in this area.</p> <p>In 4X5Y- observer coverage has been very poor and remains low for all fleets. Observer coverage was 0% in 2013.</p> <p>Although some information is available to quantify status with respect to biological limits- in general the quantity and quality of information is not sufficient to determine status with a high level of certainty.</p> <p>Although some information is being collected due to low observer coverage (and declining coverage) and absence of direct discard monitoring increased uncertainty exists on the ability to assess a partial strategy to control bycatch or to quantify ongoing mortalities of bycatch species.</p>	No response is required.
2.3.1 4X5Y and 5Zjm	Yes	Yes		<p>ETP species include Wolfishes, leather back turtle, North Atlantic right whales, and fin whales. The team provided sufficient information regarding interaction with ETP species and incidental catches to evaluate if there is sufficient information to address the fishery's impact as to harm and recovery hindrance for ETP species. All of the scores by gear/fleet are supported.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.2 4X5Y and 5Zjm	Yes	Yes	NA	SG is 80 is supported overall for all components. Strategies are in place within the fishery for managing impacts on ETP species however strategies are not comprehensive in scope as relates all the aspects of ETP biology and population dynamics. Although logbooks are in place for monitoring statistics on encounters/interactions and training modules implemented regarding release protocols, the functional aspects of determining overall effectiveness is not able to be quantified. There is an objective basis to determine if the strategies in place are working and some of them appear to be but it is not comprehensive.	No response is required.
2.3.3 4X5Y and 5Zjm Relevant info. Collect suitable data for ETP	Yes	Yes	NA	The overall scores by fleet of SG80 are supported based on the information provided. Information is being collected in the fishery that allows determination of plausible levels of impacts and mortalities to the bycatch however the information is not at the quantitative/qualitative level to allow exact metrics to be made with confidence. Reasons include low observer coverage and lack of directed fishery observations.	No response is required.
2.4.1 4X5Y and 5Zjm	Yes	Yes	NA	<p>All scores are supported (by fishery and gear). Information exists and was evaluated by the team, sufficient to assist the fishery's risk to the habitat. It is difficult to reconcile the overall scoring by fleet from the team- firstly the information is of such nature that it is quite qualitative and without discussing physical loads to the habitat- it is difficult to quantify potential risk.</p> <p>At best without additional information, the scores by fleet are supported at the SG 80 level for each fleet.</p> <p>The industry could work with physical oceanographers and evaluate methods to better quantify and characterize potential harm to the habitat structure.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.2 4X5Y and 5Zjm	Yes	Yes	NA	SG 80 is supported for both areas and across fisheries through the evidence discussed by team and identification of strategies in place. As well, the team did a good job presenting the evolution of the strategies and work that is yet to be done which when completed should work to provide more assurance of protection to the habitat. The and/or ongoing/future work includes: Fisheries protection Act, mapping of Ecologically and Biologically Significant Areas, various closure areas (see 2.4.2a). As well the Client is involved in the process and this is a positive measure and one indicating interest in ensuring the actions/strategies are effective towards the objectives.	No response is required.
2.4.3 4X5Y and 5Zjm	Yes	Yes	NA	SG scores by fleet are supported in both areas. As noted by the team, some information exists and continues to be collected to quantify risk to habitat and there is a basic understanding of the vulnerability processes throughout the habitat types based on 2001 research. Although impacts of various gears on the bottom habitats has been extensively documented there are not quantifiably determined metrics for the fishery grounds. As well, ongoing monitoring is not occurring which is required to assess the levels of increase in habitat risks by the fishery.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.1 4X5Y and 5Zjm	Yes	Yes	NA	SG 80 is fully supported by fishery and area. Based on the comprehensive review of fishery impacts on the habitats, retained species and bycatch-there is sufficient informatin to support that the fishery is not functioning to produce impacts on the overall ecosystem that would produce an overall disruption to the struncture however due to a variety of information gaps discussed above in each component this cannot be quantiied with a high level of certainty. Additional information on discarding= collected through direct or indirect (video camera) in additonal to continuing the high level research activiteis to quantify possible harm to the habitats in addition to identification of critical habitats as needed wll improve this score.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.2 4X5Y and 5Zjm Measures in place	Yes	Yes		<p>SG 80 score is supported.</p> <p>Partial measures exist that could aid in ensuring the fishery ecosystem structure is not harmed. These include the Ecosystem approach to fisheries of the Oceans Act, the SFF framework- to foster environmentally sustainable fisheries at the same time allowing economic prospertiy. There are plans within the Oceans Act that foster conserving diversity, productivity and habitats- the later which are incorporated in various fisheries management act frameworks through the harvest strategy, bycatch and incidental cacth levels and development of marine prtected ares.</p> <p>Althogh there exists mechanisms that foster preservation of the exosystem structure it caannot be said that there is strategy in place .</p> <p>The team presented sufficient informatiion that suggests that there is no quantifiable data to suggest the fishery is impacting the ecosystem in a way that the structrue and function would be altered. However, although there are plans developed and that there is evidence that at least the partial strategies in place (through the fisheries management system) are working positively to ensure the integrity of the ecosystem, formal adoption of the plans in additon to continued research on critical topics will improve the ability to evaluate this issue more quantitatively.</p> <p>SG 80 for each fleet is supported.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.3 4X5Y and 5Zjm	Yes	Not all		<p>SG 80 is supported for 2.5.3a and b. by fishery.</p> <p>There is sufficient information available to generally understand the primary components of the ecosystem that includes habitat impacts from gear interactions species interactions from gear encounters (target and incidental) and also some general information on expected changes in trophic structure of important fish groups. However- there exists gaps in knowledge on other important areas (habitat impacts from lost gear- temporally especially). Though the general impacts on the ecosystem can be described and quantified to some level the exact level of impacts particularly on bycatch and incidental species cannot be quantified currently with confidence due to lack of monitoring.</p> <p>For issue 2.5.3c and d SG scores = 90 is supported due to lack of direct monitoring and low observer coverage.</p>	<p>Not sure of the observation of Peer reviewer 1.</p> <p>Scores on 2.53c, 2.53d, and 2.53e were higher compared to 2.53a and 2.53b because the observer coverage levels for OT and LL are by far highest in 5Zjm than in 4X5Y.</p>
3.1.1 4X5Y and 5Zjm	Yes	For some issues	NA	<p>3.1.1 only has issues a, b and d- c is missing</p> <p>SG 3.1.a 80 is supported for both fishery areas only due to lack of binding agreement.</p> <p>SG3.1.b 90 is supported for both fishery areas due to lack of transparent arbitration system.</p> <p>SGf 3.1.d- score 90 is supported for both fishery areas.</p>	<p>3.1.1. has issues a, b, and c. There is no issue d on this performance indicator.</p> <p>This typo has been corrected .</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.1.2 4X5Y and 5Zjm	Yes	For some issues	NA	<p>The following refers to both 4X5Y and 5Zjm.</p> <p>SG 3.1.2a 100 supported through well documented and describe management system consultation process. The system and process is comprehensive in scope and functions are well described.</p> <p>3.1.2b score 90 is supported as it is felt that the overall process could be improved by additional follow through of DFO to provide more details, transparent and explanation of material/information considered but not used. This type of material could be provided/included through special reports.</p> <p>3.1.2c 100 well supported.</p>	We disagree with peer reviewer 1 comments. By means of meeting minutes, published reports, and daily interactions DFO can provide explanations to parties regarding the sort of information obtained. However, the team is not sure to what extent the information obtained by DFO is used or not used to address the parties interested. Thus Sg 3.1.2b scored 90.
3.1.3 4X5Y and 5Zjm	Yes	Yes	NA	<p>The following refers to both 4X5Y and 5Zjm.</p> <p>SG Score 90 fully supported. Goals are explicit and defined with respect to long term however within the fishery management policy it is not clear the goals are required. The foundations on which to fully provide for this in management exist through several frameworks that exist (e.g, SFF, Bycatch Policy, PAA).</p>	No response is required.
3.1.4 4X5Y and 5Zjm	Yes	Yes	NA	<p>The following refers to both 4X5Y and 5Zjm.</p> <p>SG 100 supported through various information inputs including that DFO management system has explicit considerations within the framework that promote incentives (ITQ, EAs), that are aligned with achieving MSC principles 1 and 2, and that the considerations are reviewed periodically.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.2.1 4X5Y and 5Zjm	Yes	Yes	NA	The following refers to both 4X5Y and 5Zjm. SG 80 is supported. While the overall 4X5Y and 5Zjm fishery management plans have goals that are generally supportive of achieving MSC principles 1 and 2, and are implicit within the management system, the fishery specific plans are not further qualified by short-long term objectives explicitly. Implicitly, the objectives are to be applied through 2016 and will be evaluated again.	No response is required.
3.2.2 4X5Y and 5Zjm	Yes	Yes	NA	The following refers to both 4X5Y and 5Zjm. SG 895 is supported The management system for the fishery works from the basis on federal statutes and regulations developed through consensus building and consideration of robust science, and is one designed to achieve good conservation outcomes for the target stock, associated habitat and ecosystem. The decision making process is well established.	No response is required.
3.2.3 4X5Y and 5Zjm	Yes	Yes	NA	The following refers to both 4X5Y and 5Zjm. SG 80 supported Systems are in place regarding monitoring, access control, and surveillance that work to ensure the management system's measures are being complied with. The MCS system is complex and multi-faceted, consisting mainly of docksie, at – sea, vessel inspections, use of VMS, aerial and sea surveillance and a telephone system through which infractions may be reported. It was identified that the process by which to ensure consistent application of sanctions with regard to non-compliance was being followed. However, based on the information supplied it was difficult to ascertain the exact level of fishery compliance and at what level of confidence this was at (issue 3.2.3c)	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.2.4 4X5Y and 5Zjm	Yes	Yes	NA	The following refers to both 4X5Y and 5Zjm. SG 85 supported. There is additional research needed to ensure a management system is in place that aims to achieve the MSC principles with a reliable and consistent approach and with transparency to all interested constituents.	No response is required.
3.2.5 4X5Y and 5Zjm	Yes	Yes	NA	The following refers to both 4X5Y and 5Zjm. SG 95 supported. Mechanisms are in place to periodically review the management system, the fishery itself and the objectives of the system. There are some options for internal and some external review.	No response is required.

5Zjm P1 Indicator Component 1 Scoring Fishery

Performance Indicator Review Completed separately for 5Zjm

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1 5Zjm	Yes	For some issues	NA	<p>SG 100 not supported for 1.1.1a for 5Zjm fishery; SG 90 is supported. Due to uncertainty in the stock assessment, lack of sensitivity analyses and model estimates mismatch to indices- it cannot be said that there is a 'high level' of certainty regarding current stock status. The retrospective analysis results were not presented in the assessment report. Although the pattern of recent biomass is shown to be increasing and exploitation on fully recruited ages to have declined significantly since the mid 1990s the uncertainty present in the stock assessment precludes the determination of the exact level of increase in SSB and decrease in Full F. Recruitment has exhibited several aberrant spikes since the mid 1970s continuing through 2011. Additional research is needed to corroborate the recent increases in recruitment, declining F's on the age 3 and 4 component, and recent recruitment increases, to add confidence in estimated recent SSBs.</p> <p>SG 90 is supported for 1.1.1b as the uncertainty in the SA and the retrospective patterns does not fully support that there is a 'high degree of certainty' regarding recent stock sizes being well above the target reference point.</p>	<p>Sl_a and Sl_b– Reference to SG 90 in both cases is in error. The reviewer's comments seem to suggest that the requirements of SG 80 are exceeded for both Sl_s. Despite the uncertainties, the CAB feels that the assessment results provided in the evaluation table (SSB currently at 160,300 t, B_{usr} = 40,000 t and B_{recover} = 10, 340 t) strongly support its evaluation of both Sl_a (i.e. SSB above point where recruitment would be impaired; also note reviewer's comment re 1.1.2 Sl_s b and c) and Sl_b (i.e. SSB fluctuating around or above target) at SG 100.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1 continued	Yes	For some issues		1.1.1b continued. Although the team notes that model generated recent SSB's have been above the TRP- it is the recent estimates that are most uncertain and most affected by the retrospective patterns. Model estimates of SSB prior to 2010 are below the TRP.	Reference to the retrospective analysis in the P1 Background section mentions that in the latest assessment differences in estimates were not considered sufficient to warrant a rho adjustment to reduce the degree of bias associated with the retrospective pattern. A citation for the assessment document will be added to the text where this is mentioned.
1.1.2 5Zjm	Yes	For some issues	NA	SG 80 is supported for 1.1.2a as the team determined primarily as a formal determination of Busr reference point has not been adopted by management. SG 100 is supported for 1.1.2b and c limited target reference point issues based on the evaluation of the historical biomass trajectories from the model in addition to evaluation against multiple (5) consensus derived Blim possible choices. The results provide sufficient information to show that the stock is well above the level that would impair reproductive capacity of the stock as relates the PA issues. Issue 1.1.2d Not relevant	The reviewer agrees with the CAB's evaluation of each of the three SIs and its overall score of 100 for this PI. No further response necessary.
1.1.3 5Zjm	NA	NA	NA	1.1.3a – c Not relevant	

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.1 5Zjm Harvest Strategy in place	Yes	Yes	NA	<p>SG 100 is supported for 1.2.1a. A harvest strategy is in place that appears to be functioning responsively to alterations in the stock status and has a formal basis for working towards the goal of PA management goals and to be carried out/implemented on concert with official reference limit and target reference points.</p> <p>SG 90 is supported for 1.2.1b. Although evidence exists to indicate that the harvest strategy has aided in reducing exploitation on younger age classes (thus contributing to survival of younger fish) and maintaining F's below F_{prey} - there remains some uncertainty in model estimates due to uncertainties precluding SG 100.</p> <p>SG 60 and SG 100 are supported for 1.2.1c and 1.2.1d respectively as indicated through the team input for these issues. In particular, management has an excellent history/process of evaluating the stock, the harvest strategy and expected outcome on future stock thus supporting the SG 100 for 1.2.1d.</p> <p>Issue 1.2.1 is Not Relevant</p>	<p>The reviewer agrees with the CAB's evaluation of SIs a, c and d.</p> <p>With respect to SIb, reference to SG 90 is in error. The reviewer seems to suggest that requirements of SG 80 are exceeded. The CAB feels the assessment has demonstrated that the harvest strategy has been successful in maintaining F at a low level and, with recent/current very high SSB projected to continue, its evaluation of this SI at SG 100 is well supported and its overall score of 100 for this PI is justified.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.2 5Zjm HCRs	Yes	For some issues	NA	<p>SG 80 is justified for 1.2.2a and b through the information provided by the team regarding the harvest strategy in place and adopted by TRAC regarding strategy to maintain the stock above the limit and target reference points for exploitation, recruitment and SSB in keeping with defined levels of accepted risk.</p> <p>SG 80 is only supported for 1.2.2b mainly due to the lack of uncertainties introduced into the stock assessment as relates catch inputs and uncertainties relating to discards and spatial units. There were no sensitivity analyses performed on the stock assessment that incorporated uncertainties in these basic data inputs.</p> <p>SG 90 is supported only for 1.2.2c as although from the SA some evidence exist that exploitation rates are 'under control' particularly on younger ages but also some older (age 8+) age groups- there is not a 'great preponderance' of results to support a score of 100, particularly given retrospective patterns. Although the estimated F's are reduced for recent years and are below F_{ref} – retrospective patterns were quite large and without sensitivity analyses how reliable the current estimates are is unknown.</p>	<p>The reviewer agrees with the CAB's evaluation of SIs a and b.</p> <p>With respect to SIc, reference to SG 90 is in error. The reviewer seems to suggest that the requirements of SG 80 are exceeded. The comment regarding retrospective patterns is addressed in the CAB's response to 1.1.1 SIb. The CAB feels that its evaluation of SIc at SG 100 is well supported by the rationale provided and that its overall score of 90 for this PI is justified.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.3 5Zjm	Yes	For most some issu	NA	<p>SG 95 is supported for 1.2.3a; additional inputs regarding discarding is needed to strengthen the knowledge regarding the stock.</p> <p>SG 90 is supported for 1.3b- a primary uncertainty in information being collected relates to the spatial aspects of this stock. Additional information is needed to increase the certainty in landings of this stock in/on the 4X/5Y boundary area. This could have impact on the stock status.</p> <p>SG 90 is supported for 1.2.3c regarding knowledge of other removals. In general the level of information collected is reasonably high although strengthening observer coverage. The table of percentage landings by gear indicates about 33% of the total landings are from fixed gear; observer coverage is ~ 13% and should be increased to provide more confidence around discarding and/or other types of sampling considered (e.g., cameras).</p>	<p>SIa – Reference to SG 95 is in error. The reviewer seems to suggest that requirements of SG 80 are exceeded. The CAB feels that its evaluation of this SI at SG 100 is well supported by the rationale provided.</p> <p>SIb – Reference to SG 90 is in error. The CAB evaluates this SI at SG 80.</p> <p>SIc – Reference to SG 90 is in error. The CAB evaluates this SI at SG 80.</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.4 5Zjm	Yes	Yes	NA	<p>SG 100 is supported for 1.2.4a.</p> <p>SG 60 is supported for 1.2.4b</p> <p>SG 90 is supported for 1.2.4c as the SA did not consider sensitivity analyses nor address other basic data input uncertainties (catch, discarding) retrospective patterns.</p> <p>SG 100 is supported for 1.2.4d as the SA considered traditional and accepted methods of evaluating future stock status through well accepted analytical procedures.</p> <p>SG 100 is accepted for 1.2.4e also as management has in place a comprehensive process to review the adequacy of the assessment although this review recommends some additional consideration on uncertainty.</p>	<p>The reviewer agrees with the CAB's evaluation of SIs a, b, d and e.</p> <p>Slc – Reference to SG 90 is in error. The reviewer seems to suggest that the requirements of SG 80 are exceeded. Despite some ongoing uncertainties, the assessment clearly takes uncertainty into account to the extent possible and Figure 19 in the P1 Background section clearly shows that stock status relative to reference points is evaluated in a probabilistic way, thus supporting the CAB's evaluation of this SI at SG 100.</p>

Any Other Comments

Comments	Conformity Assessment Body Response

For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1				
2.1.1				
2.2.1				
2.4.1				
2.5.1				

Peer Reviewer 2

Overall Opinion

<i>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</i>	Yes	Conformity Assessment Body Response
<i>Justification:</i> Overall the assessment team was thorough and documented each of the issues unique to each of the units of certification (4X5Y Otter Trawl, Long Line, Gillnet, Handline and 5Zjm Otter Trawl, Long Line, Gillnet, Handline). My response below will document my general and specific comments to each of the performance indicators. The assessment team provided a rigorous and sufficiently critical analysis of each of the eight units of certification. I was especially impressed with the depth of investigation for each of the three overarching performance indicators – Mateo et al. had a keen attention to detail and their knowledge of the dynamics of the stock, the ecosystem ramifications, and the management setting were clear and well communicated. Given the information provided to me in the report the appropriate conclusion has been reached.		No response is required.

<i>Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?</i>	Yes	Conformity Assessment Body Response
<p><u>Justification:</u> The conditions are sufficient to be achieve SG80. However, each of these conditions has been averred previously by other assessment teams – and it will be necessary for the assessment group to ensure compliance by the client on each of the five conditions. The selectivity of otter trawl and longline gears, deployed in areas where both Cod, Thorny Skate, and Haddock reside, are similar and thus each are susceptible to the gear. This presents major challenge for the client. Less challenging however is the condition that the client will better assess the amount of bycatch from the fishery.</p>		No response is required.

If included:

<i>Do you think the client action plan is sufficient to close the conditions raised?</i>	Yes/No	Conformity Assessment Body Response
<p><u>Justification:</u> In general I agree that the clients action plan is sufficient. There is a stated desire by the client to work with the management agency to ameliorate the declines of Cod and Thorny Skate.</p>		No response is required.

For reports using the Risk-Based Framework please follow [the link](#).

For reports assessing enhanced fisheries please follow [the link](#).

General Comments on the Assessment Report (optional)

I would like to commend Drs. Mateo and Ennis and Mr. Alain for their thorough review and clear presentation of the eight units of certification presented in this work. Their attention to detail and clarity of presentation made the review of the client report a much easier task.

Performance Indicator Review

Please complete the table below for each Performance Indicator which are listed in the Conformity Assessment Body's Public Certification Draft Report.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	Yes	Yes	NA	<p>That the assessment model exhibits strong retrospective patterns is troubling – it is generally grounds for dismissing its value for the determination of stock status and for eliminating its utility for management advice. It may be true that this is the case here, and it is recommended that other modeling approaches be used to determine stock status and indeed, this is being performed by the management agency responsible for the assessment of the stock. It is imperative that the source(s) of the retrospective pattern be identified if there is a desire by the assessment agency to continue to employ the same assessment model – perhaps it is possible that the episodic (chaotic) nature of the stock-recruitment time series of Haddock may be at fault. Regardless, the client may want to work with the management agency to ensure that rigorous assessment results are achieved even if it results in the reduction of model complexity (SSB is now estimated using a production model). That the estimated SSB is well above B_{lim} and that the stock has experienced strong year classes in recent years supports the contention that, even in the face of considerable uncertainty, the stock is at or fluctuating around target.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.2	Yes	Yes	NA	The limit and target reference points are based on the precautionary approach guidelines of the management agency responsible for the assessment and management of this stock. The reference points are set such that reproductive capacity is not likely to be impaired - the recruitment history of the stock indicates that to a certain extent, recruitment may be primarily driven by environmental drivers. The limit reference points are sufficiently precautionary. The assessment team is correct to state that because the stock SSB is between the limit and upper stock reference point, and below Bmsy, the stock is still demonstrably capable of producing strong year classes.	No response is required.
1.1.3	Yes	Yes	NA	Performance measure P 1.1.3 is concerned with evaluation and analysis of stocks that have SSB magnitudes substantially low, such that a rebuilding plan is necessary. This is not relevant to the Scotian-Fundy Haddock stock. Although it is at level of $SSB < SSB_{MSY}$, no rebuilding plan is necessary or justified.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.1	Yes	Yes	NA	To the extent that the fishery reference points derived in the assessment model are valid, there is a robust and precautionary harvest strategy in place. A TAC was implemented in 1970 and fishing mortality, in recent years, is lower than the reference removal rate. The magnitude of the TAC in recent years may have been too high (SSB is low, relative to B_{MSY}) but the TAC has not been met in recent years and there is evidence that, at its current level, will not imperil the stock. Such a conclusion is based on the information that the stock SSB is between the limit and upper stock reference points. The management agency's implemented monitoring, assessment, and management are complementary. Monitoring is performed using fishery-independent tools, the harvest strategy is justified with statistical assessment models. That these models exhibit some fitting problems is true and promotes much uncertainty in the magnitude of the reference points. The score of 80 for the performance measure is justified – previous experiences by the stakeholders with the stock indicates that the harvest strategy does not imperil the long-term sustainability of the resource.	No response is required.
1.2.2	Yes	Yes	NA	The problems with the assessment model in the observed severe retrospective pattern promote uncertainty in reference point formulation. The assessment team reported that these issues will be addressed in the fall and thus may already be ongoing. To the extent possible, the harvest strategy and management actions follow precautionary guidelines. It is expected that more robust and complex models (age-structured, synthetic analysis) could be used.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.2.3	Yes	Yes	NA	A primary deficiency in this aspect, and a major determinant of the harvest level, is the interaction and harvest of non-targeted species. The quantification of the level of removal, discard mortality, and age- and size-composition of incidentally harvested Thorny Skate and Atlantic Cod is necessary and needs to be expanded, as the assessment team has noted. The biostatistical data collected from the fishery to support the assessment is detailed and includes fishery independent assessment of age and length composition. Given the observed changes in the demographic characteristics of the stock (nearly monotonic reduction in weight-at-age), an age-structured approach using these collected data would be informative.	No response is required.
1.2.4	Yes	Yes	NA	The problems with the assessment model have been noted by this reviewer and well documented by the assessment team. These problems with the SPA model indicate that it is not robust and thus the reference points exhibit considerable uncertainty. However, to the extent possible, I agree with the assessment team that this uncertainty is recognized when determining the stock status, but not done so in a quantitative way. A more rigorous approach is needed. The reviewers mention that this work is already ongoing. The stock assessment, though problematic, has undergone peer review of scientists and stakeholders. This peer review is scientifically rigorous.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1	Yes	Yes	Yes	<p>Scotian-Fundy Haddock are part of the multi-species groundfish assemblage in the area and the gears used to prosecute the fishery target Haddock as well as a number of other associated groundfish. Of primary importance, because of their depleted status and commercial importance are Cod in both areas (4X5Y and 5Zjm) and to a lesser extent Winter Flounder. In each region I agree with the assessment team that Cod, Winter Flounder, and to a lesser extent Cusk, Halibut, and White Hake are a primary concern. Cod stocks in the region are near historic lows in SSB and continue to decline. Even under the adopted rebuilding plan the stock size is stagnant and the stock is at record low numbers of individuals. This is a major cause for concern and I agree with the assessment team that because of this issue, the performance indicator does not warrant a score greater or equal to 60. This is an issue for the longline and otter trawl sectors. The lack of species-specific limit reference points for Winter Flounder are an issue as is the observation of the fishery-independent indices of abundance for the stock exhibiting levels below long-term abundance.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.2	Yes	Yes	Yes	<p>I agree that for a majority of species there is a strategy in place for retained species in the Fundy-Scotian Haddock fishery to minimize irreversible harm at some level. The outstanding need, and the justified low scores on the performance indicator assigned by the reviewers are for Cod in the long line and otter trawl sectors in each of the two regions. There are measures in place to ensure that the Fundy-Scotian Haddock fishery does not hinder recovery of Cod but it is not possible to determine if such measures are yet to be effective and given the value of the limit reference point the strategy is not effective. This will likely be a chronic problem for the Haddock-Cod species complex in the region. With respect to Cod, the strategy of TACs do seem to be working adequately in some regions' (4X5Y) sectors gillnet and handlines, but not in others (otter trawl and longline) in both regions. The critical status of the Cod stock remains a challenge in the prosecution of the Haddock fishery.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.3	Yes	Yes	NA	<p>It is through the collection of high resolution (temporal and spatial data) of age composition of the retained species and an understanding of the magnitude of harvest that there is sufficient information (at the SG80 level) for all stocks to ascertain the risk posed by the fishery. The age and length composition of retained species are well documented as are the indices of abundance, which are determined from fishery-independent monitoring programs. I agree with the assessment team's conclusion that although information was not provided to them about the gillnet and handline sectors, the estimated low annual landings are not likely to be significant. The information presented is sufficient to provide accurate estimates of retained catch using fishery-independent and dependent (sampling catch length- and age-composition) and this information is adequate to support a management strategy. There is an outstanding need to improve observer coverage and collect biostatistical information in some sectors (handline and gillnet). Based on the assessment, this is a challenge because of the size of the boats (small) and the nature of the fishery.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.1	Yes	Yes	Yes	<p>Skates and Porbeagle sharks are the problematic bycatch taxa with respect to understanding whether the fishery poses serious harm to their recovery. Porbeagle sharks have been depleted and are listed by COSEWIC as endangered and are at these levels because they were historically the target of an intense directed fishery. Each of the four skate species that make up the skate complex show temporal reductions in estimated biomass. The nature of the gear used to prosecute the haddock make Skates prone to incidental catch. The seriousness of the decline and low abundance for Porbeagle and Skate vary for each of the sectors and regions and are most pronounced (for the Skate complex) in the otter trawl and bottome longline sectors in region 5Zjm. The strategy in place to ameliorate the continued declines of Skates are reasonable but have not been in place long enough to determine whether the actions (live release, move away, outreach efforts, others) will be effective.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.2	Yes	Yes	Yes	<p>With the exception of Skates in the 4X5Y longline, 5Zjm otter trawl and longline there are partial strategies in place to meet SG 80 for the performance indicator. The strategies will take time and monitoring and assessment will be needed in order to ensure that the goals of the bycatch reduction strategy are successful. It is premature to evaluate the success of this performance measure and I agree with the reviewers that the variation in the indices of abundance of the different taxa in the short term and the historical lows of some taxa necessitate caution and a low (SG 60) score on the performance indicator is justified. The management strategies for the other elasmobranch species are rigorous and the reduction of the commercial and recreational catch of these taxa may be adequate. The evidence from the recent assessment that overfishing is not occurring and that the abundance is increasing indicate that the management strategy for this stock is likely effective.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.2.3	Yes	No	Yes	<p>Although observer coverage is highly variable in some sectors and areas, it is zero in the gillnet and handline fisheries in both sectors and does not meet SG80 for the performance indicator. The allocation of observer coverage in each of the fishing sectors is necessarily skewed toward a greater amount of observer coverage on larger vessels – The SG80 score is warranted for the otter trawl sectors in both regions. Although 3% observer coverage is low and the reviewers estimate that it has been lower (0% for 4X5Y for 2013) it is not clear what level of coverage is adequate – it is possible that 3% is adequate if the diversity and size-composition among gears is uniform. An evaluation of the bycatch patterns and observer effort should be done to ensure that effort is allocated to the gears and areas where the abundance and diversity of incidentally caught species is greatest. It is not clear from the report how observer effort is allocated. More detail is needed to describe why observer coverage is so variable across years and areas for the mobile gears. Similarly, the assessment team noted that there was “scarce” bycatch information (and very little observer coverage) on the Gillnet and Handline sectors in each of the areas – scarce information implies that only qualitative information is available and this is consistent with a score of <80. The magnitude and size-composition of the discards need to be better and quantitatively characterized in order for a score of SG80 to be justified given the sparse observer coverage..</p>	<p>A condition was raised for 4X5Y OT and LL due to very low observer coverage levels. The assessment team officially requested information to DFO on GN and HL data . However the request was not granted given that this data is confidential and cannot be released. Nevertheless it has been documented on previous reports and confirmed by DFO officials that the GN and HL has very low impact on the fisheries resources (<5mt of total catches by these 2 gears).</p>

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.1	Yes	Yes	NA	The nature of the gears used in each of the regions, the few records of interaction, and the life history of the Blue Whales, Fin Whales, North Atlantic Right Whale, Leatherback Turtle indicate that the Haddock fisheries do not impair the population growth of these species. Thus, the fishery meets national and international requirements for protection of these species. Similarly, there is no indication that indirect effects of gear on the habitat or food web will have measurable impacts to these species. Because of these factors I agree with the assessment team that the fishery does not pose a serious threat to the recovery of these stocks. Wolfish species are directly and potentially indirectly effected by the gears employed in the Haddock fishery. Given that the stock has been driven to low numbers there is a concern that mobile gears that interact with the bottom may impact the species complex deleteriously.	No response is required.
2.3.2	Yes	Yes	NA	The primary taxa of interest in terms of precautionary management is the Wolfish stock because it, like Cod, are found in the same areas as Haddock and targeted by the same gear. To ameliorate the declines of Wolfishes and to ensure management of the ground fish fishery to incidental capture, the assessment team documents that the participants in the fishery are instructed to record incidental capture and are trained to in the procedures to release individuals such that mortality is minimized. The assessment team documents the decline in wolfish in the bycatch but also note (here and in other sections) that the observer coverage is sparse and "not adequate" in one area. I am satisfied that the fishery does not hinder the recovery of whales and turtles and that the management strategies for these taxa are sufficiently precautionary.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.3.3	Yes	Yes	NA	I agree with the assessment that the poor observer coverage does not allow quantitative assessment of how management is improving the population of endangered and threatened species. This is most relevant to gathering information about the fishery impacts on the two species of Wolfish encountered in the fishery. A larger or at least more comprehensive effort is needed to determine the magnitude of incidental catch of Wolfish and the age and length composition of this stock complex in order to assess fishery impacts. Because of the mandatory reporting in the SARA logbooks there is some information related to incidental impact but without systematic and quantitative collection it is likely that the data collected will not provide sufficient detail to make a rigorous assessment of impacts. This is a major deficiency in assessing "impacts" of the fishery and one that needs to be addressed.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.1	Yes	Yes	NA	<p>Each of the mobile gears has a variable impact on the topography and function of the benthic habitats that it interacts with, but I agree with the reviewers that the harm is not irreversible and the "footprint" of the impact in the recent past (5-year period) is well documented. Based on the study results presented, much of the 4X5Y5Z area that is fished with otter trawl is composed of loosely aggregated silt, mud, sand, and gravel and did not infringe, to a large extent, on habitats occupied by sponges, nor were sponges reported as by-catch in regions of large sponge coverage. The rating of GS80 is justified. The nature of the longline, gillnet, and handline gears makes it highly unlikely that these gears will seriously and irreversibly harm the regional habitat. The impacts are small and likely to be minimal for these gears. To the extent that the bottom habitats are impacted there is a strategy in place under the auspices of the national management and enforcement body, DFO. The assessment team summarizes that the legislation will serve to mitigate damage to sensitive habitats and will include rigorous monitoring and observation.</p>	No response is required.
2.4.2	Yes	Yes	NA	<p>Two strategies are in place to ensure that the fishery minimizes the impact of the fishery. The first is to establish protected area in biologically-sensitive habitats and the second is the policy for managing benthic habitat impacts implemented by the DFO. The assessment team has documented the GEAC involvement in understanding the locations of sensitive areas (working collaboratively with the DFO) and industry's understanding of otter trawl impacts on the substrate. The SG80 scores are appropriate for this performance indicator.</p>	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.4.3	Yes	Yes	NA	The mapped distribution and quantification of habitat types in the fishing area is available at high resolution. Because this information is available, there is sufficient information to understand the potential impacts of the fishery. The assessment team is correct however, that no directed BACI (before-after-control-impact) study has been performed and that the impact of fishing on habitat has been "quantified fully". Given what is known about the habitat, fishing impacts, and the impacted organisms there is information that can be used to quantify the nature of the impacts – but ongoing monitoring is not occurring.	No response is required.
2.5.1	Yes	Yes	NA	The Scotian Shelf ecosystem is subject to a variety of large-scale biotic and abiotic drivers that include short- and long-term variations in temperature, salinity, and primary production. There is very little reason to believe that the fishery is effecting the ecosystem at this level of organization. However, bycatch removal and alteration of food webs may be altering ecosystem structure and function. The Scotian-Fundy Haddock fishery is not different from other fisheries in that it is very difficult to say, with certainty, what the effects of removal may be given the presence of many other potential drivers that are likely to be acting in the ecosystem. The score of SG80 on the performance indicator is justified but I would like to see the assessment team address the issue of changes in food web structure as a result of exploitation. There are a number of papers by Auster and others that may be relevant in this regard.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.5.2	Yes	Yes	NA	A major challenge for management systems in understanding the risks to ecosystem structure and function is to understand a wide variety of ecosystem-level measures of resilience. Often it is not clear how management can achieve and maintain "resilient ecosystems". The Canadian SFF framework is a step toward implementing ecosystem approaches to management however as the assessment team notes – the specifics of a strategy are not yet in place. The SFF, like many ecosystem-based fishery management and ecosystem-based management policies lacks a specific plan, but does have a number of management objectives. The strategy is concerned with ecosystem outcome metrics and I agree with the assessment team that SG80 is an appropriate score.	No response is required.
2.5.3	Yes	Yes	NA	A major deficiency in understanding the impacts of the fishery on the ecosystem is to understand the tractable impacts of the fishery on the incidentally-caught species encountered. The low observer coverage and inconsistent reporting has been discussed in other aspects of this report. However, the understanding of the fishery impacts, in an ecosystem context, would benefit from a better understanding of the species retained as bycatch. This is generally the only tractable ecosystem metric that can be determined from a fishery – the extent to which this knowledge can inform ecosystem management is another issue. That this information is lacking makes it difficult to perform quantitative assessment of changes in the community structure.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.1.1	Yes	Yes	NA	I agree with the assessment team, the management system is a contemporary, stake-holder engaged system that delivers, or attempts to deliver, sustainable fishery practices. Legal rights, by aboriginal groups for example, are explicitly established and have been codified. Although legal rights are observed they are not committed to in a formal way and may be superseded by conservation and other concerns. There are management bodies in place to adjudicate on disputes – relevant to the fishery under examination is the Scotia-Fundy Groundfish Advisory Committee.	No response is required.
3.1.2	Yes	Yes	NA	The management system of the Scotia-Fundy Haddock stock can be characterized as being inclusive, open, and knowledgeable and this promotes an effective consultation process.	No response is required.
3.1.3	Yes	Yes	NA	I agree that the management policy has well-defined long-term objectives that are consistent with precautionary approaches and sustainable targets and these follow from Department of Fisheries and Ocean's Sustainability Fisheries Framework.	No response is required.
3.1.4	Yes	Yes	NA	There is no evidence that social and economic incentives are being used that conflict with the goals of sustainability in the fishery. The ITQ system employed by the fishery makes it difficult for overcapitalization to occur and fixed allocation schemes promote the maximization of value over maximizing catch.	No response is required.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
3.2.1	Yes	Yes	NA	The fishery management plan for the Haddock Fishery specifies objectives for management that are consistent with MSC's principals 1 and 2. Though they are not presented as short and long-term they can be translated into this framework. An evaluation of these goals, by the fishery, and put in terms of achievable targets in the short and long-term would be adequate to satisfy this performance metric at a high level.	No response is required.
3.2.2	Yes	Yes	NA	The DFO's fishery management system has a responsive decision-making process – that is guided by engagement with stakeholders and understanding the objectives of management.	No response is required.
3.2.3	Yes	Yes	NA	The score of 85 for this performance measure is justified. Monitoring and control to ensure compliance is generally acceptable and enforcement measures are in place. The use of VMS and and hail-in, hail-out procedures provide de facto compliance measures in the fishery. The assessment team provided a variety of strategies that could be utilized to improve MCS system (p. 376).	No response is required.
3.2.4	Yes	Yes	NA	The fishery has organized and engaged in ad hoc research to address critical management and assessment needs but currently lacks a detailed and comprehensive research plan to achieve its short and long-term data needs. As with performance measure 3.2.1 these need to be determined.	No response is required.
3.2.5	Yes	Yes	NA	The comprehensive nature of the management system is appropriate to provide review and evaluation of performance.	No response is required.

Any Other Comments

Comments	Conformity Assessment Body Response

For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1				
2.1.1				
2.2.1				
2.4.1				
2.5.1				

For reports assessing enhanced fisheries:

Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	Yes/No	Conformity Assessment Body Response:
<u>Justification:</u>		

For reports assessing enhanced fisheries:

<i>Does the report clearly evaluate any additional impacts that might arise from enhancement activities?</i>	Yes/No	Conformity Assessment Body Response:
<u>Justification:</u>		

Appendix 3. Stakeholder submissions



Ecology Action Centre

2 February, 2015

Ivan Mateo
Lead Assessor
SAI Global Assurance Services

Dear Mr. Mateo,

Please accept this letter as input into the MSC re-assessment of the Canadian Scotia-Fundy haddock fishery. Scientific information has recently become available that is very relevant to this fishery, particularly regarding Atlantic Cod, other groundfish stocks caught in this fishery, as well as sharks and skates.

In addition, we wish to express our support for the findings of the 4th surveillance audit. Considering Conditions 4, 5 and 6 have been open since the fishery was first certified in 2010, we believe that the one year timeline for completion is necessary in order for meaningful on the water conservation measures to be achieved.

Atlantic Cod:

Since Scotia-Fundy haddock was first assessed in 2010¹, the status of Atlantic Cod has further declined. The most recent stock status update (2014)² indicates that Cod has not experienced the rebuilding previously predicted and expected with the 2011 reduction of TAC in 4X5Y from 3000 MT to 1650 MT. Previous projections estimated that Cod would reach the LRP by 2036 with moderate fishing, but it appears that this is not likely to be achieved based on current biomass projections. Major sources of mortality for the stock include fishing above F_{ref} , discards and bycatch, as well as natural mortality. DFO Cod surveys for 2013 and 2014 show record low numbers. The assessment suggests that *“Atlantic Cod from all fisheries should be reduced to the lowest possible level.”*³

While DFO and the fishing industry have started to discuss how to respond to the latest trends, we are concerned that slow decision making may further jeopardize the species, which was designated by COSEWIC as “endangered” in 2010 and is currently going through the government process of consultations on listing under SARA. We recommend that conditions be put in place to reduce the

¹ http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-west-atlantic/canadian_scotia_fundy_haddock/assessment-downloads-1/15.10.2010-scotia-fundy-haddock-pcr-V5.pdf

² Canadian Science Advisory Secretariat, 2014 4X5Y Atlantic Cod Stock Status Update, January 12, 2015.

³ 2014 4X5Y Atlantic Cod Stock Status Update, p.7

directed harvest of Cod, and that bycatch mitigation measures (such as bait and depth/soak time modification, move away provisions etc.) be put in place to reduce fishing related Cod mortality. It should also be explored whether spatial closures related to benthic habitat (condition 6) could potentially overlap with Cod spawning and nursery grounds.

Secondary Stocks:

Other retained and non-retained species in this fishery have also been assessed to be below the LRP and in the critical zone for this fishery⁴:

- 4VW White Hake
- 4X Monkfish
- 5Z Longhorn Sculpin
- 4X Thorny Skate

In addition, considering their critical status, we believe that conditions should be put in place to reduce bycatch levels, and implement bycatch mitigation measures, in order to ensure rebuilding of these stocks to acceptable levels.

Observer coverage/electronic monitoring:

A condition is already in place to address the fishery's ability to accurately assess bycatch (condition 5). We believe that fulfilment of this condition will be essential to accurately monitoring and assessing bycatch levels, as well as Cod harvest levels. We encourage the Scotia-Fundy haddock fishery to make use of new electronic monitoring technology, which was collaboratively developed in British Columbia by crab fishermen EcoTrust.⁵ This approach is now being piloted in the Gulf of Maine. We believe that a video monitoring program could potentially provide lower cost observer coverage to this fishery, as well as the tools required to adequately monitor stocks.

Sharks/Skates:

We wanted the assessment team to be aware that new data has been collected by scientists at Dalhousie University on shark and skate bycatch across fisheries. This data shows:

- Previous DFO estimates on shark/skate bycatch may be underestimating total mortality.
- New research shows that a high number of at-risk sharks and skates (COSEWIC assessed species-at-risk) are caught in the groundfish trawl fishery:
 - o 84% of thorny skate discards
 - o 39% of porbeagle shark discards
 - o 38% of shortfin mako sharks discards

⁴ See Canadian Science Advisory Secretariat, Draft SAR: Using Research Vessel Survey Data to Assess Secondary Groundfish Stocks in the Maritimes Region, December 15, 2014

⁵ For details, see: <http://ecotrust.ca/fisheries/electronic-monitoring>

We encourage the audit team to examine this issue, especially as the data also shows discard “hotspots” which could help the fishery identify both temporal and spatial measures that could help alleviate bycatch of at-risk shark and skate species. This data is part of a PhD. dissertation, and will be published in the coming year. The researcher is Aurelie Godin, and she can be reached at godina@dal.ca

Species at Risk:

DFO has recently released a “SARA Listing Policy and Directive for “Do Not List Advice” which outlines the conditions under which the department may recommend that a COSEWIC assessed species not be listed under the *Species at Risk Act*. In order to justify going against the listing advice of COSEWIC, DFO must provide:

- A regulatory impact statement, which explains how not listing the species will result in the greatest overall benefit; meets the regulatory objectives of SARA, and is proportionate to the degree and type of threat.
- A “Compelling Rationale”, which outlines the alternative approach for the species in the absence of listing; the expected outcome(s) for the species in the absence of listing; and the net benefits to Canadians of a “do not list” decision.
- If the alternative approach required activities incremental to the status quo, DFO must draft a 5 year workplan, which includes performance indicators.⁶

Many of the species implicated in the Scotia-Fundy haddock fishery are COSEWIC assessed, including

- Atlantic Cod, Southern population⁷
- White hake, Atlantic population⁸
- Cusk⁹
- Porbeagle shark¹⁰,
- Acadian Redfish, Atlantic population¹¹
- American plaice, Maritimes population¹²
- Thorny skate¹³
- Smooth skate, Laurentian-Scotian population¹⁴
- Winter skate, Eastern Scotian shelf population¹⁵

⁶ <http://www.dfo-mpo.gc.ca/species-especes/policy-politique-eng.htm>

⁷ For COSEWIC designation see details, see: <http://www.cosewic.gc.ca/eng>

⁸ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

⁹ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

¹⁰ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

¹¹ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

In order to be consistent with Canadian policy frameworks regarding species-at-risk, and to ensure implementation of these regulations, we believe it's appropriate to include conditions requiring evidence that the requirements of the "SARA Listing Policy and Directive for "Do Not List Advice" have been met for any COSEWIC assessed species. In this way, MSC can help ensure that species-at-risk are being managed appropriately in its certified fisheries and contribute meaningfully to ecosystem based fisheries management, stock rebuilding and conservation measures.

We hope our comments are considered during the re-assessment process. We are happy, at any time, to discuss this with you further. We are also eager to work collaboratively with the fishery to address the concerns we raise above and will be doing so through DFO fisheries management processes.

Sincerely,

(original signed by)

Catharine Grant
Marine Policy and Certification Coordinator
902-412-2902

¹² For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

¹³ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

¹⁴ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

¹⁵ For COSEWIC designation details, see: <http://www.cosewic.gc.ca/eng>

Response to EAC Submission



January 5, 2016

Ms. Catharine Grant
Marine Policy and Certification Coordinator
Ecology Action Centre
2705 Fern Lane
Halifax, Nova Scotia
B3K 4L3

Re: EAC Submission: Re-assessment of Canada Scotia-Fundy Haddock Fishery

Dear Ms. Grant,

Thank you for your detailed letter of February 2, 2015 on the subject. My colleagues and I have given the content of the letter much thought in undertaking the re-assessment of this fishery. As you know, the initial timelines were extended on two occasions in 2015 to allow for sufficient consideration of new, additional information and research, and to solicit commentary from the client and, if necessary, the Department of Fisheries and Oceans, Maritimes Region.

In your letter, you raised concerns in relation to the status of Atlantic Cod on the Scotian Shelf, the status of secondary stocks whether retained or non-retained, the low level of observer coverage and the absence of some form of electronic monitoring, the availability of new data and information on Sharks and Skates, and a new DFO policy under the Species at Risk Program entitled '*SARA Listing Policy and Directive for Do Not List Advice.*'

Please rest assured that the Assessment Team was particularly attentive to the EAC's concerns and recommendations. The team carried out extensive research and information gathering on the issues raised in your letter, and we returned to the client and to DFO on many occasions to seek their input and perspectives. As a result, we are confident that we have given these subjects appropriate consideration as required under the MSC's Standard.

I encourage you to carefully review the assessment report for the fishery when it is presented for public commentary in the coming weeks, and to re-connect with me if you have further information to share.

Once again, Ms. Grant, thank you for your letter and continuing interest in MSC fishery assessments.

Sincerely,

A handwritten signature in black ink that reads "Ivan Mateo". The signature is written in a cursive, flowing style.

Dr. Ivan Mateo
Lead Assessor and Team Leader

Cc: Dave Garforth, Dr. Gerry Ennis, R.J. (Bob) Allain

Appendix 4. Surveillance Frequency

Table A4: Fishery Surveillance Plan

The determination of the surveillance level is based on Table C3 and C4. The score was calculated by adding scores from sections 1-4 in Table C3.

Table C3: Determination of the Surveillance level

Default Assessment tree used?	
Yes	0
No	2
2. Number of conditions	
Zero conditions	0
Between 1-5 conditions	1
More than 5	2
3. Principle Level Scores	
≥85	0
<85	2
4. Conditions on outcome PIs?	
Yes	2
No	0

The surveillance score of 6 was used to identify the surveillance level appropriate to the fishery;

Table C4: Surveillance Level Years after certification

Surveillance score (from Table C3)	Surveillance level		Year 1	Year 2	Year 3	Year 4
2 or more	Normal Surveillance		On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit
1	Remote Surveillance	Option 1	Off-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit
		Option 2	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit	On-site surveillance audit
0	Reduced Surveillance		Review of new information	On-site surveillance audit	Review of new information	On-site surveillance audit

Appendix 5. Client Agreement

(REQUIRED FOR PCR)

Appendix 5.1 Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)