Vottunarstofan Tún ehf.

Sustainable Fisheries Scheme

Marine Stewardship Council Fisheries Assessment

ISF Iceland Saithe and Ling Fishery:

Expedited Assessment for Scope Extension:

Atlantic Wolffish and Plaice Fisheries

Public Comment Draft Report

Conformity Assessment Body: **Vottunarstofan Tún ehf.**

Client: **Iceland Sustainable Fisheries ehf.**

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Glossary

B_{lim}	Limit biomass reference point below which recruitment of stock is expected to be impaired
B_{loss}	A particular B_{lim} used by ICES based on the lowest past observed spawning stock biomass.
B_{MSY}	Biomass corresponding to the maximum sustainable yield (biological reference point); the peak value on a domed yield-per-recruit curve
$B_{trigger}$	The point when management intervention should be taken to avoid the stock falling below the limit reference point.
CAB	Conformity Assessment Body
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
COC	Chain of Custody
CPUE	Catch per unit of effort
CR	MSC Certification Requirements version 1.3
DF	Directorate of Fisheries
EEZ	Exclusive Economic Zone
ETP	Endangered, Threatened and Protected species
F	Fishing Mortality
F_{MSY}	Fishing Mortality corresponding to MSY
FAO	Food and Agriculture Organization of the United Nations
GADGET	Globally applicable Area Disaggregated General Ecosystem Toolbox
GCR	Guidance to the MSC Certification Requirements v1.3
GT	Gross Tonnage
HCR	Harvest Control Rule
ICES	International Council for the Exploration of the Seas
IPI stock	Inseparable or practically inseparable stocks
ITQ	Individual Transferable Quota
LRP	Limit Reference Point
LTL	LTL species: Low Trophic Level species
MII	Ministry of Industries and Innovation
MFRI	Marine and Freshwater Research Institute (Hafrannsóknastofnun – Rannsókna- og ráðgjafarstofnun hafs og vatna)
MRI	Marine Research Institute, merged into MFRI 1 July 2016
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NASBO	National Association of Small Boat Owners (Landsamband smábátaeigenda)

nm	Nautical miles
PCR	Public Certification Report
PI	Performance Indicator
PRI	Point of recruitment impairment (stock reference point)
SFS	Fisheries Iceland (Samtök fyrirtækja í sjávarútvegi)
SG	Scoring Guidepost
SI	Scoring Issue
t	tonnes
TAC	Total Allowable Catch
TRP	Target Reference Point
UoA	Unit of Assessment
UoC	Unit of Certification
VMS	Vessel monitoring system

1. Executive Summary

1.1 Scope of the Assessment

This report presents the results of an expedited assessment as a means to extending the ISF Iceland saithe and ling fishery certificate to include Atlantic wolffish (*Anarhichas lupus*) and plaice (*Pleuronectes platessa*) caught by bottom trawl, Danish seine, gillnet, handline, longline and *Nephrops* trawl within the Icelandic Exclusive Economic Zone (EEZ), North-east Atlantic, ICES division 5.a.2, against the Marine Stewardship Council's (MSC) Principles and Criteria for Sustainable Fishing.

The report provides an account of the process followed by the assessment team during the stages of information gathering and the scoring of the fisheries against the MSC Principles and Criteria for Sustainable Fishing. The report provides a qualitative description of the fisheries. The report is not intended to follow standard editing norm of scientific journals, but intends to address the needs of both fisheries specialists and other interested parties e.g. consumers and/or other stakeholders. The report contains all the sections of the *Full Assessment Reporting Template* v1.3 while following the process requirements of *MSC Fisheries Certification and Requirements (& Guidance) v2.0*.

1.2 Assessment Team Members and Coordinator

The assessment was conducted by a team of the following experts:

- Dr. Giuseppe Scarcella: Team leader and expert responsible for Principle 1 issues;
- Dr. Leyla Knittweis: Expert assessor responsible for Principle 2 issues;
- Dr. Ásgeir Daníelsson: Expert assessor responsible for Principle 3 issues;
- Lovísa Ó. Guðmundsdóttir MSc: Responsible for traceability issues and Assessment Secretary on behalf of Vottunarstofan Tún.

1.3 Outline of the Assessment

The full assessment of the ISF Iceland saithe fishery was initiated in April 2013 and resulted in the fishery being certified in September 2014. An expedited assessment as a means to extending the scope of the ISF Iceland saithe fishery certificate to include ling was initiated in April 2015 and was successfully completed in November 2015.

The expedited assessment of Atlantic wolffish and plaice to add the two fisheries to the ISF Iceland saithe and ling fishery certificate was initiated in September 2016. The assessment of Atlantic wolffish and plaice was undertaken in parallel with the expedited assessment of the ISF Iceland Golden redfish fishery certificate to include blue ling (*Molva dipterygia*) and tusk (*Brosme brosme*), since the gears, the management and the fishery operations are the same for both sets of extensions. Site visit and stakeholder consultations were conducted in November 2016. Data used in the assessment was gathered by reviewing publicly available reports and scientific journals, and from interviews with representatives of the Client and several stakeholders. The assessment team met to score the fishery against MSC principles. Six conditions were raised and put to the Client who subsequently submitted a plan of action to address those over the period of potential certification and beyond, in the event of re-certification.

Preliminary Draft Report was submitted for client review, followed by the issuing of Peer Review Draft Report submitted for the review of two external experts (see comments and replies in Appendix 2). Public Comment Draft Report was issued in early May.

Final Report

PCR

1.4 Main Strengths and Weaknesses of the Assessed Fisheries

Strengths:

- Exploitation is controlled through catch limits, which are well administered, with negligible discarding.
- Both fisheries are now managed through analytical stock assessments rather than as a data limited stock.
- The management system is well documented and transparent.

Weaknesses:

- The basis for setting the reference point for Atlantic wolffish has not been well justified.
- The harvest control rules for both stocks are not well defined.
- Although single species management is very good, the Icelandic system is less strong on wider ecosystem management; it was not possible to show that there are demonstrably effective mitigation measures to ensure that harbour seals, hooded seals and Atlantic puffins are not significantly affected by gillnet fishing operations.
- Monitoring of bycatch of marine mammals and seabirds in longline and gillnet fisheries needs to be improved.

1.5 Overall Conclusion

The Atlantic wolffish and plaice fisheries reach the minimum aggregate score of 80 for each of the three principles and the minimum of 60 for each Performance Indicator.

However, the Atlantic wolffish fishery failed to reach a score of 80 for two Performance Indicators in Principle 1 and the plaice fishery failed to reach a score of 80 for one Performance Indicator in the same principle, thus requiring three conditions. Both the Atlantic wolffish and plaice gillnet fisheries failed to reach a score of 80 for two Performance Indicators in Principle 2 resulting in two conditions, one of which includes provisions for three bycatch species (i.e. separate scoring elements) evaluated in the same Performance Indicator (PI 2.2.1). The Atlantic wolffish and plaice gillnet and longline fisheries failed to reach a score of 80 for one Performance Indicator in Principle two, resulting in one condition.

Table 1. Summary of Atlantic wolffish score.

Principle		***Score***
Principle 1 – Target Species		80.0
Principle 2 – Ecosystem	Bottom Trawl (TB)	87.0
	Danish Seine (SD)	87.0
	Gillnet (GN)	84.3
	Handline (LH)	89.0
	Longline (LL)	86.3
	Nephrops Trawl (TN)	87.3
Principle 3 – Management System		90.3

Several Performance Indicators failed to reach the minimum score of 80, resulting in six conditions:

- PI 1.1.2 – Stock rebuilding: Atlantic wolffish fishery. Score: 75
- PI 1.2.2 – Harvest control rules and tools: Atlantic wolffish fishery. Score: 75
- PI 1.2.2 – Harvest control rules and tools: Plaice fishery. Score: 75

- PI 2.2.1 –Bycatch species outcome: Atlantic wolffish and plaice gillnet fisheries; scoring elements harbour seal, hooded seal, Atlantic puffin. Score: 60
- PI 2.2.2 – Bycatch species management: Atlantic wolffish and plaice gillnet fisheries. Score: 75
- PI 2.2.3 – Secondary species information: Atlantic wolffish and plaice gillnet and longline fisheries. Score: 75

Table 2. Summary of plaice score.

Principle		***Score***
Principle 1 – Target Species		84.4
Principle 2 – Ecosystem	Bottom Trawl (TB)	87.0
	Danish Seine (SD)	87.0
	Gillnet (GN)	84.3
	Handline (LH)	89.0
	Longline (LL)	86.3
	Nephrops Trawl (TN)	87.3
Principle 3 – Management System		90.3

1.6 Draft Determination, Conditions and Recommendations

The assessment team recommends that the MSC-certified ISF Iceland saithe & ling fishery shall be extended to include the Atlantic wolffish and plaice fisheries within the Icelandic EEZ, and that they are granted certification against the MSC Fisheries Standard as well managed and sustainable fisheries. This draft determination is made, provided the following six conditions set are sufficiently addressed in a plan of action submitted by the Client (see also section 6 and Appendix 1.3).

Two conditions were set for Atlantic wolffish and one for plaice against Principle 1. The Atlantic wolfish and plaice gillnet fisheries have two conditions against Principle 2, and one condition is set for Atlantic wolffish and plaice gillnet and longline fisheries against Principle 2. One recommendation was set regarding the management of traceability, applying to both fisheries.

Atlantic wolffish fishery

Condition 1 (PI 1.1.2)

A limit reference point needs to be defined for Atlantic wolffish such that it is above the point where there is significant risk of impairing reproductive capacity. This might be achieved by providing scientific evidence that fishing at F_{MAX}, or an alternative reference point such as $F_{0.1}$, would not impair reproductive capacity and is sufficiently precautionary consistent with MSC requirements.

Condition 2 (PI 1.2.2)

A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock of Atlantic wolffish approaches the limit reference point. Evidence should be provided that the HCR is precautionary.

Plaice fishery

Condition 3 (PI 1.2.2)

A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock of plaice approaches the limit reference point. Evidence should be provided that the HCR is precautionary within 4 years.

Atlantic wolffish and plaice gillnet fisheries

Condition 4 (PI 2.2.1)

Harbour seal, hooded seal and Atlantic puffin must be shown highly likely to be within biologically based limits, or it must be demonstrated that there is a partial strategy of demonstrably effective mitigation measures in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding.

Condition 5 (PI 2.2.2)

A demonstrably effective partial strategy should be put in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding of vulnerable marine mammal and seabird species. This should include a regular review of the potential effectiveness and practicality of alternative measures to minimise gillnet fishery related mortality of unwanted catch of vulnerable species such as harbour seal, hooded seal and Atlantic puffin, and regular reviews to ensure that the relevant measures are implemented as appropriate.

Atlantic wolffish and plaice gillnet and longline fisheries

Condition 6 (PI 2.2.3)

By the second surveillance audit electronic logbook reporting for Atlantic wolffish and plaice gillnet and longline fisheries provides quantitative information on of seabird and marine bycatch for gillnets and longlines that is both available and adequate to detect any increase in risk to main bycatch species.

Atlantic wolfish and plaice fisheries – All gears

Recommendation 1 (Traceability)

The team recommends that the client issues a reminder to all of the client members, as well as auctions, to observe the following:

- to ensure full segregation of catch of each species by gear in the event more than one gear is applied during the same fishing trip;
- to ensure full segregation of catch of each species by management region, i.e. fish caught inside the Icelandic EEZ is kept separate, in the event a vessel catches the same species on the same trip inside and outside the Icelandic EEZ – and –
- to observe and implement appropriate measures of packing and labelling certified products prior to moving them to sub-contracting cooler or freezer storages upon landing, to ensure client members´ responsibility for product integrity prior to sale or further handling.

2. Authorship and Peer Reviewers

2.1 Team Members and Assessment Coordinator

Dr. Giuseppe Scarcella, team leader. Primarily responsible for Principle 1

Dr. Giuseppe Scarcella holds a laurea 110/110 in Biology (2001), PhD in Marine Biology and Ecology at the Università Politecnica delle Marche (2009) with Vincenzo Caputo. He served as contracted research scientist at the National Research Council (CNR), Institute of Marine Sciences (ISMAR) of Ancona since 2008. Following his degree he was offered a job as project scientist in several research programs about artificial reef and the impact of off-shore platform. During the years of employment at CNR-ISMAR he has gained experience in benthic ecology, fish assemblages of artificial structures, fisheries ecology and impacts of fishing activities, stock assessment, otholith analysis, population dynamic. During the same period, he attended courses of uni- and multivariate statistics and participated in field activity, both scuba diving and aboard fishing and research vessels.

His work as a researcher for the National Research Council (CNR), Institute of Marine Sciences (ISMAR) of Ancona, as well as him academic experience at the Polytechnic University of Marche, have given him considerable international field knowledge. He is currently participating in expert meetings and working groups which are organized under the auspices of the EC's Directorate General for Maritime Affairs (DGMARE), STECF, ICES, GFCM, and the FAO regional projects MedSudMed, Adriamed and Eastmed. In addition, He is collaborating with numerous scientific institutions in the horizontal framework project MAREA (scientific advice for the implementation of the Common Fisheries Policy in the Mediterranean Sea), in the framework of EMODNET-MedSea checkpoint (TENDER No. MARE/2012/11, Growth and innovation in ocean economy - Gaps and priorities in sea basin observation and data - LOT NO: 2 – THE MEDITERRANEAN) and other DGMARE tenders recently started.

As a scientist at CNR-ISMAR, Dr Scarcella is responsible for the sampling design and statistical analyses of numerous research activities. In particular, I have worked as a project scientist on several research programs about fishery activities in the Mediterranean and Black sea, artificial structures and their impact on the marine environment. In the framework of such activities I have gained experience in stock assessment, management plans, benthic ecology, fish assemblages of artificial structures, analysis of stomach contents, fisheries ecology and the impacts of fishing activities. Moreover, during his employment at ISMAR-CNR he worked as part of a team of scientists operating within different fields of marine biology, including population dynamics, taxonomy and fisheries as well as with physical oceanographers and fisheries technologists. The application of EAF principles to fisheries management have been at the core of these collaborations.

Since the beginning of 2010 Dr Scarcella has moved to Cyprus, where he is collaborating as consultant with the private sector (AP Marine Environmental Consultancy Ltd), working on DCF data collection, marine bio-invasions and the implementation of the Marine Strategy Framework Directive. This allowed him to extend his work experience on the eastern part of the Mediterranean and also to improve my skill in working in international/multicultural projects and environments. Dr. Scarcella has over five years' experience in the fisheries sector related to the tasks under his responsibility, and has passed MSC team leader training.

Dr. Leyla Knittweis, team member. Primarily responsible for Principle 2

Dr. Leyla Knittweis is a researcher based at the Department of Biology of the University of Malta. She holds a Bachelor of Science in Marine Biology (Swansea, UK), a Master in Science in Coastal Management (Newcastle upon Tyne, UK) and a PhD in Biology from Bremen University (Bremen, Germany). Her research interests include population dynamics, fisheries biology, and resource management.

Dr Knittweis has worked as scientific consultant for numerous clients including the Food and Agriculture Organisation (FAO) of the UN and the European Commission; as Fisheries Advisor for Government of Malta; as Post-doc Scientific Researcher at the Centre for Tropical Marine Ecology in Bremen (Germany). She has participated in numerous research projects, including more recently the projects CREAM (ecosystem approach to fisheries management), GAP II (bridging the gap between scientists and fisheries stakeholders), MESMA (marine spatial planning), MAREA-MEDISEH (Mediterranean Sensitive Habitats), LIFE BaĦAR for N2K (Benthic Habitat Research for Marine Natura 2000 Site Designation), and MANTIS (Marine protected areas: networks for enhancement of sustainable fisheries in EU Mediterranean waters).

Dr Knittweis has been a regular participant at the meetings of the European Commission's Scientific Technical and Economic Committee for Fisheries (STECF) since 2009, contributing to expert working groups addressing topics including fisheries data collection, Mediterranean stock assessments, review of scientific advice, the development of an ecosystem approach to fisheries, and the implementation of the landing obligation. She chairs the STECF expert working group assessing balance between fishing capacity and opportunities for the EU fishing fleet since 2014, and is a permanent STECF Committee member since April 2016. Dr. Knittweis has authored numerous scientific articles and scientific reports. She has over five years' experience in the fisheries sector related to the tasks under her responsibility, and has passed MSC team member training.

Dr. Ásgeir Daníelsson, team member. Primarily responsible for Principle 3

Dr. Ásgeir Daníelsson graduated in 1985 with Ph.D. in Economics from the University of Manchester. Dr. Daníelsson currently holds the position of head of research and forecasting in the Economics department of the Central Bank of Iceland. He has lectured on microeconomics, statistics, macroeconomics and fisheries economics at the University of Iceland and University of Akureyri. He has over 25 years´ experience of macroeconomic analysis of the Icelandic fisheries for the Central Bank of Iceland and previously the National Economic Institute. He has been involved in and advised numerous national and international task forces on the utilization of living marine resources and fisheries management. From 1993-1994 and 2001-2004 he was a member of a committee, set up by the Icelandic Minister of Fisheries, formulating a long term policy on exploitation of fish stocks. He has worked with the "Nairobi group" set up by the UN´s UNEP and UNSD, and was later commissioned by the FAO to provide a guide on the incorporation of environmental factors into national accounting with special regard to fisheries and the living marine environment.

Dr. Daníelsson has written and co-authored several peer-reviewed publications, as well as research reports on the utilization of fish stocks in Icelandic waters, ITQ efficiency and environmental- and economic accounting of fisheries. During the last three years, Dr. Daníelsson has served as Principle 3 expert for several MSC fishery assessments, including the Cod, Haddock, Saithe, Golden Redfish, Lumpfish and Herring fishery assessments. Dr. Daníelsson has over five years' experience in the fisheries sector related to the tasks under his responsibility, and has passed MSC team member training.

Lovísa Ólöf Guðmundsdóttir, M.Sc., team member. Assessment Coordinator and responsible for traceability.

Ms. Lovísa Ó. Guðmundsdóttir is a Project Manager for Vottunarstofan Tún in the area of fishery assessments. Ms Guðmundsdóttir completed a degree in biology from the University of Iceland, with fish biology as the core subject with particular emphasises on early stages of fish life history. She has participated in all of Tún's MSC assessments over the last two years, either as a team member, observer or as an assessment secretary, and has passed MSC team member training.

2.2 Peer Reviewers

The following two experts were nominated and then appointed to conduct external review of this assessment report:

John Henry Nichols, CBiol, FRSB

Mr John Nichols is a retired UK government fisheries biologist with 42 years´ research experience in plankton ecosystems in the North Atlantic specializing in the taxonomy of North Atlantic & NW European plankton including phytoplankton, micro and meso-plankton, ichythoplankton and young fish. He has been a member of ICES working groups on herring, mackerel, horse mackerel, sardine and anchovy assessments; and mackerel and horse mackerel egg surveys. He was also a member of ICES study groups on herring larval surveys and plankton sampling. In 1992, he set up the UK programme for monitoring phytoplankton in shellfish harvesting areas in compliance with a new EU Directive to protect the public from the potential ill effects of toxic algae entering the food chain through shellfish. Mr Nichols was scientist in charge of numerous research vessel surveys for fish stock assessment purposes and directly involved in the assessment of pelagic and western demersal fish stocks from 1994 to 2000. He has been involved in the publication of over fifty scientific papers and reports more than half of which have been in peer reviewed journals, and the publication of two fish egg and larvae identification keys.

Since retirement from his government post Mr Nichols has participated in a total of numerous MSC fisheries assessments as the Principle 1 expert, including surveillance and re-assessments. Those include the Thames estuary herring, PFA North Sea Herring, NEA mackerel and Atlanto-Scandian herring, Hastings Fleet Dover sole, the north –east coast of England bass fishery, the SW mackerel hand line fishery, Portuguese sardine, a Newfoundland herring fishery, Newfoundland cod, Canadian Pacific sablefish, various Norwegian and Swedish pelagic fisheries, Faroese and Norwegian saithe fisheries, Faroese, Russian and Norwegian Arctic cod and haddock fisheries, Faroese mackerel and Blue whiting fisheries, Scottish pelagic fisheries and a North Sea plaice and sole fishery. He has also been a peer reviewer for numerous MSC certification reports by various Certification bodies and has also carried out two MSC pre-assessments and numerous annual surveillance audits. In 2010, he delivered a lecture on *The Importance of a Fisheries Interaction with the Ecosystem in the MSC Certification Process'* at an international Safe Seas conference in Portugal.

Robert Blyth-Skyrme, Ph.D.

Dr. Robert Blyth-Skyrme started his professional career in finfish mariculture in 1996, before switching to a focus on the science, management and policy of wild fisheries. Following his PhD, which considered biological and socio-economic aspects of an inshore shellfish fishery, he worked as the Senior Environment Officer and then Deputy Chief Fishery Officer at the Eastern Sea Fisheries Joint Committee, the largest regional fisheries management organization in England. Rob then became Natural England's senior advisor to the UK Government on marine fisheries and environmental issues, leading a team dealing with fisheries policy, science and nationally significant fisheries casework. Since the end of 2008, Rob has run Ichthys Marine Ecological Consulting Ltd., a consultancy providing marine fisheries and environmental advice to a variety of governmental, NGO and industry clients.

Dr Blyth-Skyrme has undertaken all facets of MSC work as a Lead Assessor, expert team member and peer reviewer, across a wide variety of fisheries globally. He has completed the MSC training in CRv1.3 and CRv.2.0, and is a member of the MSC's Peer Review College.

3. Description of the Fishery

3.1 Units of Certification and scope of certification sought

3.1.1 UoA and Proposed Unit of Certifications (UoC)

The assessment applies to all Atlantic wolffish (*Anarhichas lupus*) and plaice (*Pleuronectes platessa*) caught by bottom trawl, *Nephrops* trawl, Danish Seine, gillnet, longline, and handline from the Icelandic stock (ICES Division 5.a) by vessels licenced to operate within the Icelandic EEZ. These fisheries operate within the same jurisdiction under the same management system and are subject to the same coherent controls and monitoring. Within the gear categories, the fisheries are homogeneous in operation and culture and supply to a common chain of custody, with all catches and landings in Iceland and abroad being monitored and recorded by the Directorate of Fisheries. Finally, the UoAs together form an almost complete set of commercial fisheries operating in the region so that cumulative impacts (e.g. combined impacts of MSC UoAs) need not be considered separately.

In the initial notification of this expedited assessment included a third UoA: Anglerfish (*Lophius piscatorius*) in ICES Division Va (Icelandic EEZ) fished with the same series of gears of the other two species. However, during the site visit the team observed that the gillnet used to target anglerfish, which also had the highest catches of anglerfish, was different from the gillnet originally certified for the ISF Iceland Saithe and ling fishery. The client subsequently decided to withdraw anglerfish from the expedited assessment.

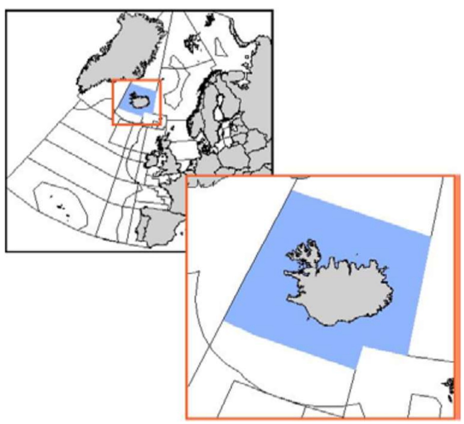
Table 3 summarises the main features of the unit of certification that is the subject of this assessment.

The Atlantic wolffish and plaice fisheries proposed scope extensions are within scope of the MSC standard. The CAB confirmed the following:

- The fisheries do not target amphibians, birds, reptiles, or mammals and do not use poisons or explosives.
- The fisheries are subject to Icelandic jurisdiction and are not conducted under a controversial unilateral exemption to an international agreement.
- No entity within the client group has been successfully prosecuted for violations against forced labour laws.
- There are mechanisms for resolving disputes through negotiation, the Directorate of Fisheries, the Ministry of Industries and Innovation, the Icelandic courts, and ultimately the Council of Europe court. Disputes are not common within the fisheries.
- The fisheries are neither enhanced nor introduced species based fisheries (ISBF).
- There are no inseparable or practically inseparable (IPI) species caught in the fisheries.
- The CAB reviewed the pre-assessment and other available information to determine the units of assessment required.
- The fisheries have not failed an assessment within the last two years.
- The fisheries have elements overlapping with other certified fisheries within the Icelandic EEZ. These fisheries are ISF cod, haddock, saithe & ling, and golden redfish fisheries, as well as the Icelandic lumpfish and herring fisheries. However, these issues pertain to Principles 2 and 3, which are partly covered in the ISF Iceland Saithe and Ling PCR.

The client is Iceland Sustainable Fisheries ehf. The purpose of this company is to obtain certification of fishing gear and fish stocks exploited around Iceland and to regulate their utilisation. The company's shareholders are Icelandic fishing, fish processing and trading/exporting companies. ISF has issued a statement outlining its policy on arrangements for certificate sharing.

Table 3. Units of Assessment and proposed Units of Certification.

<table>
<tr><td>Name of Fishery</td><td colspan="2">ISF Iceland saithe & ling</td></tr>
<tr><td>Target Species Common Name(s)</td><td colspan="2">Atlantic wolfish (Anarhichas lupus)
Plaice (Pleuronectes platessa)</td></tr>
<tr><td>Species Latin Name</td><td colspan="2">Anarhichas lupus
Pleuronectes platessa</td></tr>
<tr><td>Method of Catch</td><td colspan="2">Longline, bottom trawl, handline, gillnet, Nephrops trawl, Danish seine</td></tr>
<tr><td>Description of Stock</td><td colspan="2">Atlantic wolfish in Icelandic waters or Atlantic wolfish (Anarhichas lupus) in ICES Division Va (see http://www.hafro.is/Astand/2016/steinbitur_2016.pdf)
Plaice in Icelandic waters or Plaice (Pleuronectes platessa) in ICES Division Va (see http://www.hafro.is/Astand/2016/skarkoli_2016.pdf)</td></tr>
<tr><td rowspan="4">Location of Fishery</td><td colspan="2">Icelandic Exclusive Economic Zone</td></tr>
<tr><td colspan="2">North East Atlantic</td></tr>
<tr><td colspan="2">FAO statistical area 27</td></tr>
<tr><td colspan="2">ICES Division Va

Source:http://ices.dk/sites/pub/publication%20reports/advice/popular%20advice/linicel_popular.pdf</td></tr>
<tr><td>Fishing Season</td><td colspan="2">January to December</td></tr>
<tr><td colspan="3">Proposed extension of Atlantic wolfish and plaice to the ISF Iceland saithe & ling fishery within the Icelandic EEZ</td></tr>
<tr><td>Fishing gear</td><td>Units of Assessment</td><td>Other eligible fishers</td></tr>
<tr><td>UoA1: Longline</td><td>All registered Icelandic vessels operating longlines that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries</td><td>Any new entry to the group of registered Icelandic vessels operating longline targeting Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction</td></tr>
</table>

UoA2: Bottom trawl	All registered Icelandic vessels operating bottom trawl that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries.	Any new entry to the group of registered Icelandic vessels operating bottom trawl targeting Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction
UoA3: Gillnet	All registered Icelandic vessels operating gillnets that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries.	Any new entry to the group of registered Icelandic vessels operating gillnet targeting, Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction
UoA4: Handline	All registered Icelandic vessels operating handlines that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries.	Any new entry to the group of registered Icelandic vessels operating handline targeting Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction
UoA5: Danish seine	All registered Icelandic vessels operating Danish seine that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries.	Any new entry to the group of registered Icelandic vessels operating Danish seine targeting Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction
UoA6: *Nephrops* trawl	All registered Icelandic vessels operating *Nephrops* trawl that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries.	Any new entry to the group of registered Icelandic vessels operating *Nephrops* trawl targeting Atlantic wolfish or plaice stock and/or that are incidentally catching Atlantic wolfish or plaice in other MSC certified fisheries within Icelandic jurisdiction

Proposed extension of Atlantic wolfish and plaice to the ISF Iceland saithe & ling fishery within the Icelandic EEZ	
Fishing gear	**Units of certification**
UoA1: Longline	All registered Icelandic vessels operating **<u>longlines</u>** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **<u>Atlantic wolfish or plaice</u>** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.
UoA2: Bottom trawl	All registered Icelandic vessels operating **<u>bottom trawl</u>** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **<u>Atlantic wolfish or plaice</u>** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.
UoA3: Gillnet	All registered Icelandic vessels operating **<u>gillnets</u>** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **<u>Atlantic wolfish or plaice</u>** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.
UoA4: Handline	All registered Icelandic vessels operating **<u>handlines</u>** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **<u>Atlantic wolfish or plaice</u>** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.

UoA5: Danish seine	All registered Icelandic vessels operating **Danish seine** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **Atlantic wolfish or plaice** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.
UoA6: *Nephrops* trawl	All registered Icelandic vessels operating ***Nephrops* trawl** that carry valid permits for fishing within the Icelandic Exclusive Economic Zone issued by the Icelandic Directorate of Fisheries, and that fish, supply and/or sell **Atlantic wolfish or plaice** to Iceland Sustainable Fisheries ehf. and/or its authenticated certificate sharers.

3.1.2 Total Allowable Catch (TAC) and Catch Data

Table 4. TAC and Catch Data – Atlantic wolffish

TAC	**Year**	2016/17	**Amount**	8811 t
UoA share of TAC	**Year**	2016/17	**Amount**	8811 t
UoC share of total TAC	**Year**	2016/17	**Amount**	8811 t
Total green weight catch by UoC	**Year (most recent)**	2015/16	**Amount**	8954 t
	Year (second most recent)	2014/15	**Amount**	7855 t

Table 5. TAC and Catch Data – Plaice

TAC	**Year**	2016/17	**Amount**	7300 t
UoA share of TAC	**Year**	2016/17	**Amount**	7300 t
UoC share of total TAC	**Year**	2016/17	**Amount**	7300 t
Total green weight catch by UoC	**Year (most recent)**	2015/16	**Amount**	7615 t
	Year (second most recent)	2014/15	**Amount**	6240 t

3.2 Overview of the fishery

3.2.1 Atlantic Wolffish

Along with saithe and ling, Atlantic wolffish is one of the demersal fish species that has long been of commercial interest in Iceland. Most of the fisheries are conducted in March or April when the Atlantic wolffish is migrating back from the spawning grounds (*Figure 1*). These fisheries are mostly by longline. In other seasons of the year, the Atlantic wolffish is a prized bycatch in other longline, trawl or Danish seine fisheries (*Figure 2*). Data from the fisheries of Atlantic wolffish in the North Atlantic date back to the 1950s with landings averaging 20000 to 40000 t. In the year 2000, the catches averaged 40000 t within the whole North Atlantic, but since then it has been constantly decreasing, with catches dropping to 23000 t in 2008 (FAO, 2011). In Icelandic waters, annual landings averaged 19000 t from the 1950s to the 1960s, and subsequently declined to 11000 to 12000 t in the 1970s–1980s (*Figure 3*). In 1977, foreign ships stopped fishing in Icelandic grounds, which resulted in a slight decline in catches until 1985 (10000 t). From 1986 to 1992, the long-line effort increased again and the catches averaged 15000 t year. Since 1999, the catches have been steady and were on average 15500 t. However, during this period, increased catch efforts using bottom trawls at one of the main spawning locations (west of Iceland) have raised concern about the recruitment of Atlantic wolffish in Icelandic waters. In 2010, the area of this location, which was closed during spawning time (from 15 September to the end of April), was therefore increased from 500 to 1000 km^2. In the last period, the catch has been in the general range of 10000 to 15000 t annually for the last 30 years (*Figure 3*, *Table 6*). From the 2011/12 to 2014/15 fishing seasons, total catches of Atlantic wolffish were above the issued TAC. The main reasons for this excess catch were the transfer of quota shares from one year to the next and conversion of quotas from one species to another (*Table 6*). As of 2013/14, the national TAC has been set equal to MFRI advice (*Table 6*).

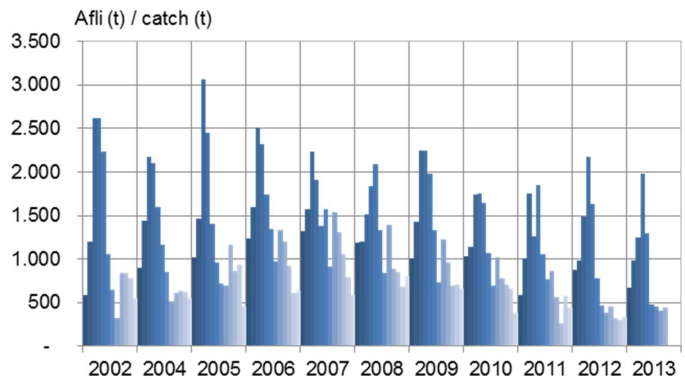


Figure 1. Monthly catch of Atlantic wolffish in Icelandic waters (Source: www.fisheries.is)

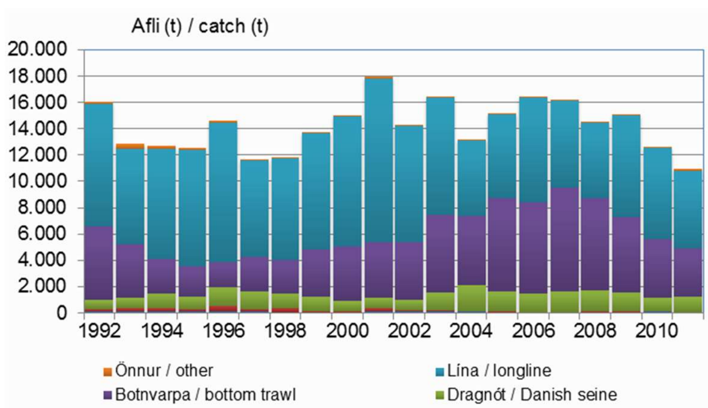


Figure 2. Annual catch by gear of Atlantic wolffish in Icelandic waters (Source: www.fisheries.is)

Table 6. TAC and landings (tonnes) of Atlantic wolffish in Icelandic waters (Source: www.fisheries.is)

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli *Catches*
2010/11	8500	12000	11650
2011/12	7500	10500	10654
2012/13	7500	8500	8937
2013/14	7500	7500	7758
2014/15	7500	7500	7874
2015/16	8200	8200	
2016/17	8811		

The fisheries are conducted all around Iceland, but the largest catches are off western and eastern Iceland (*Figure 4*).

The majority of the Iceland catch is either iced at sea and then processed and frozen in Icelandic factories or, in equal amounts each, exported fresh in containers or by air. Compared to many other species, a relatively large share also goes to local consumption. In Iceland, the Atlantic wolffish is considered one of the best fishes to wind-dry. The Atlantic wolffish is a popular food fish in Western Europe and is exported in roughly equal amounts to France, the United Kingdom, Germany or the Netherlands. The fillet is commonly eaten fried or battered in fish and chips (*Figure 5*).

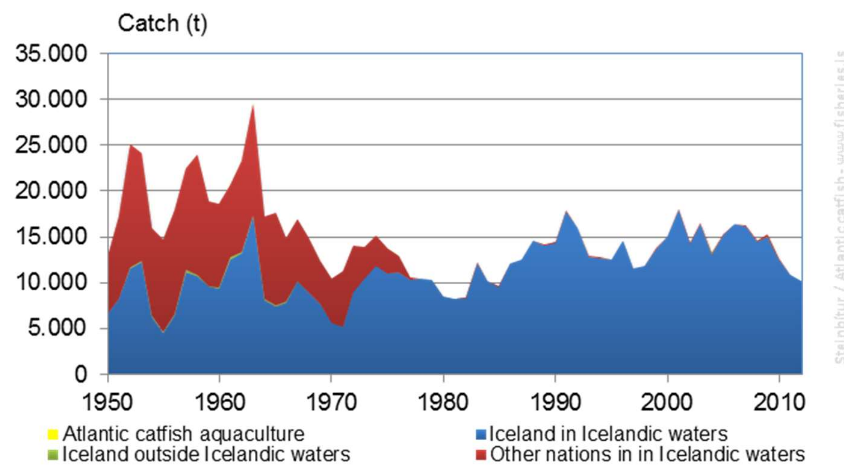


Figure 3. TAC and landings (tonnes) of Atlantic wolffish in Icelandic waters (Source: www.fisheries.is)

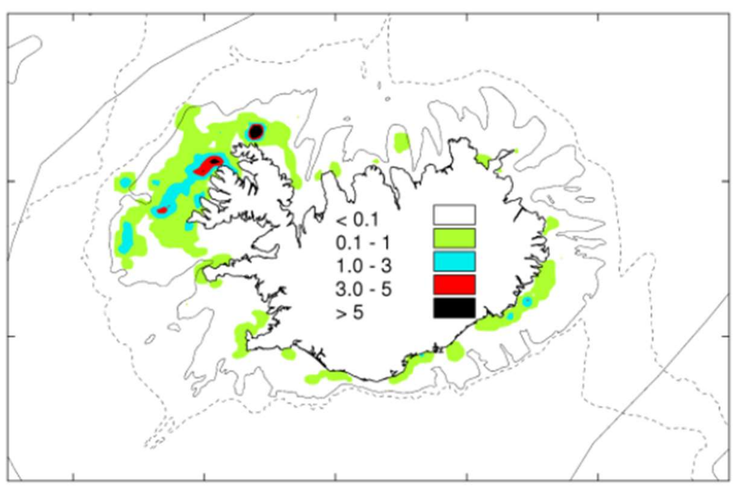


Figure 4. Main fishing grounds (tonnes/nmi2) of Atlantic wolffish in Icelandic waters in 2015 (Source: MFRI, 2016).

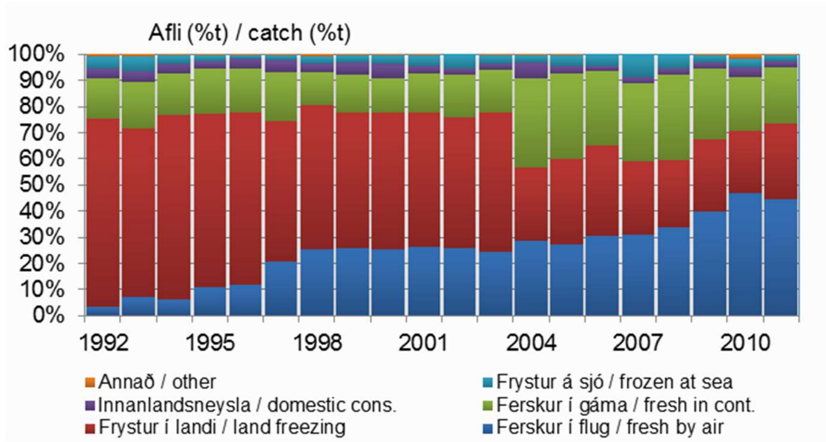


Figure 5. Annual catch of Atlantic wolffish by type of processing in Icelandic waters (Source: www.fisheries.is)

3.2.2 Plaice

Along with saithe and ling, plaice is one of the demersal fish species that has long been of commercial interest in Iceland. Most of the fisheries are conducted in summer-fall (*Figure 6*). Because of its good taste, abundance and shallow water distribution, plaice has sustained high catches in Icelandic waters since the beginning of the trawler age. Catches have usually been similar or higher than for all other flatfish species combined. Originally, the bulk of the catches were caught by British trawlers, but, in recent decades Icelandic boats (*Figure 7*) have caught all of it. Catches have been in the general range of 5000 to 10000 tons per year since the beginning of the 20th century. Most of the current catches are by Danish seine, but a considerable share is taken by bottom trawl. Catch by other fishing gear is negligible (*Figure 8*). The major fishing areas are off the south west and west coasts (*Figure 9*).

Since of 2010/11 fishing season the national TAC has been set equal to MFRI advice and the catches have been always lower than the national TAC (*Table 7*).

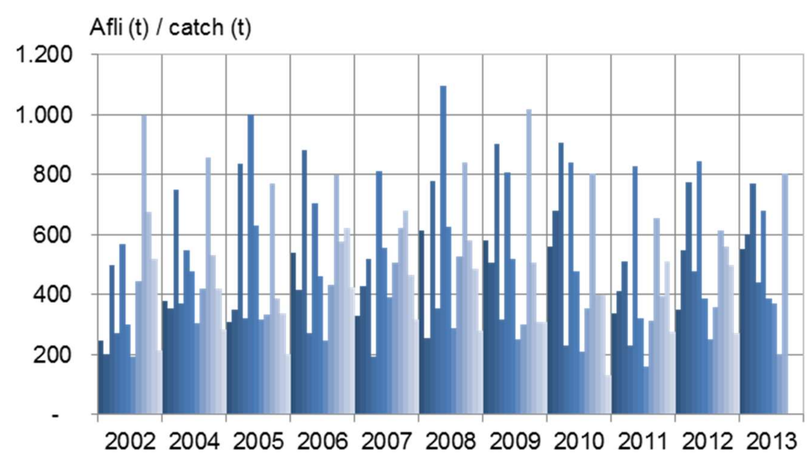


Figure 6. Monthly catch of plaice in Icelandic waters (Source: www.fisheries.is)

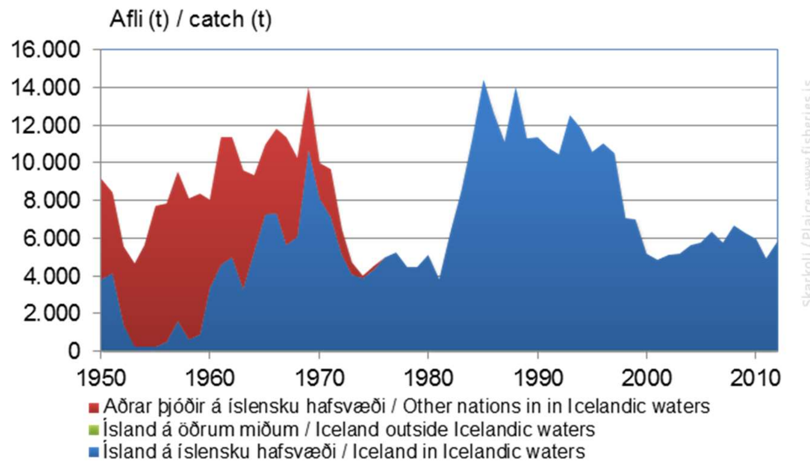


Figure 7. Annual catch of plaice in Icelandic waters (Source: www.fisheries.is)

Table 7. TAC and landings (tonnes) of plaice in Icelandic waters (Source: www.fisheries.is)

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli *Catches*
2010/11	6500	6500	4840
2011/12	6500	6500	5820
2012/13	6500	6500	5930
2013/14	6500	6500	6030
2014/15	7000	7000	6230
2015/16	6500	6500	
2016/17	7330		

The fisheries are conducted all around Iceland, but the largest catches are off western and eastern Iceland (*Figure 9*).

The majority of the Iceland catch is either iced at sea and then processed and frozen in Icelandic factories or in equal amounts exported fresh in containers. An increasing share is also exported fresh by air. Plaice is one of the most popular food fishes in Northern Europe, especially in the United Kingdom and Denmark. More than 95% of the Icelandic catch is exported to the United Kingdom, the fillet being commonly eaten fried or battered and deep-fried in fish and chips (*Figure 10*).

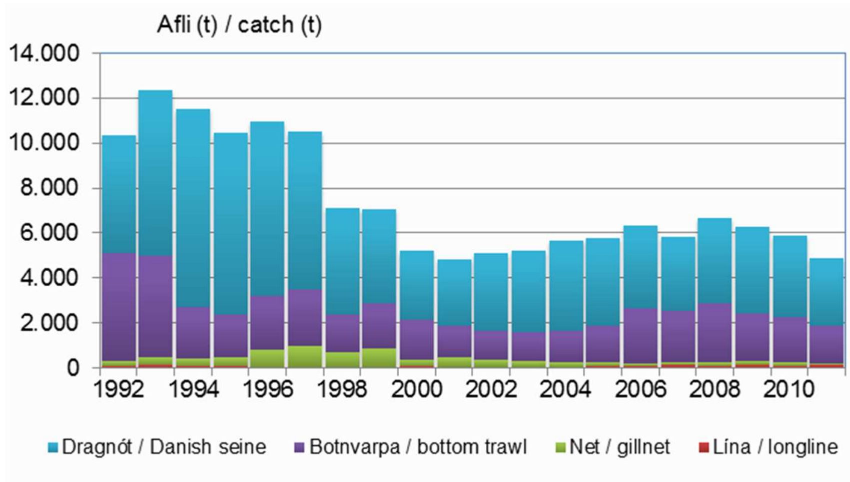


Figure 8. Annual catch by gear of plaice in Icelandic waters (Source: www.fisheries.is)

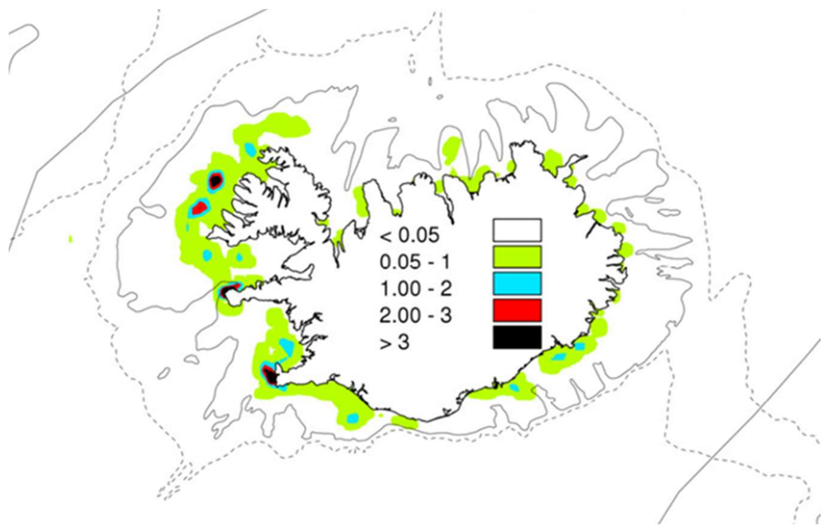


Figure 9. Main fishing grounds (tonnes/nmi2) of plaice in Icelandic waters in 2016 (Source: MFRI, 2016).

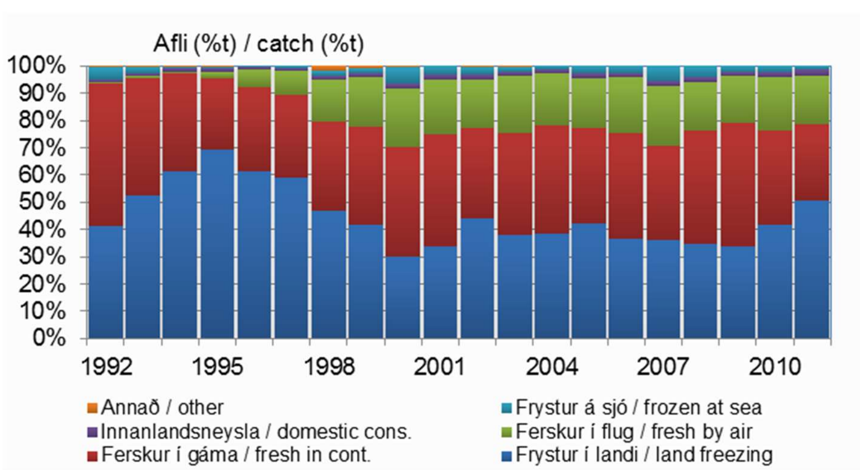


Figure 10. Annual catch of plaice by type of processing in Icelandic waters (Source: www.fisheries.is)

3.3 Principle One: Target Species Background

3.3.1 Atlantic wolffish

3.3.1.1 Stock biology

The Atlantic wolffish *Anarhichas lupus* (Linnaeus, 1758) is widely distributed across the North Atlantic and is an important commercial fish species. Like many other marine fishery resources, the abundance of the Atlantic wolffish has drastically declined over the last decades, especially in the Northwest Atlantic where it has been listed by the Canadian Species at Risk Act (SARA) as a species of "special concern" (McCusker et al., 2008). Habitat destruction by bottom trawl and recreational fishing activities have been mentioned as possible reasons for the decline in the species (Collie et al., 2000). Length and age at maturity as well as growth and fecundity have been studied in various environments (Nelson and Ross, 1992; Pavlov and Novikov, 1993; Liao and Lucas, 2000).

Available biological data suggest life-history trait (LHT) differences between Atlantic wolffish collected at the east and the west of Iceland (Gunnarsson, 2014; Gunnarsson et al., 2006). Fish collected in the west in warmer water tend to grow faster and to mature at an earlier age and at a smaller size, than fish collected in the cold water in the east (Gunnarsson et al., 2006; 2016). In addition, tagging experiments using anchor and alcathene tags have been performed from 1966 to 1975 to investigate the migration pattern of the species and showed that the Atlantic wolffish exhibits spawning-site fidelity and migration to feeding grounds of less than100 miles in Icelandic waters (Jonsson, 1982).

Although genetic structure has been intensively studied in several important commercial species, e.g. because of the drastic decline in their stock, there is an obvious lack of genetic structure studies in the Atlantic wolffish. A recent study based on microsatellite loci revealed a weak genetic structure of the Atlantic wolffish from Western Greenland and Iceland to the Barents Sea (McCusker and Bentzen, 2010a). The apparent lack of genetic structure within these geographical locations was explained by a possible recent recolonization of these waters after the last glacial maximum from a refugia area located in the Rockall Bank (McCusker and Bentzen, 2010b). The stock structure of the Atlantic wolffish was recently investigated at Icelandic fishing grounds, using 16 microsatellite loci by Pampoulie et al. (2012). Despite the potential of the Atlantic wolffish to exhibit genetic structure (lack of eggs/larval dispersal and adults are sedentary), none of the genetic tests applied in this study detected significant genetic differentiation among the contemporary samples as well as among the contemporary and archived samples. The results of this study therefore suggested a lack of genetic structure among the populations of Atlantic wolffish in Icelandic waters and temporal stability over a period of about 10 years.

Spawning takes place at 160-200 m depth off Vestfirdir peninsula in autumn and early winter, as opposed to most other fish that spawn in late winter and spring. Some spawning also occurs off the eastern part of Iceland. Unlike most other fish, the wolffish guards the eggs until they hatch; usually it seems to be the role of the males to do that. During this time they lose their teeth. After the eggs hatch, they migrate back to other areas around Iceland. Growth rate is slow but it can reach more than 20 years of age.

Fertilization is internal and takes place 8–15 h before spawning. The Atlantic wolffish is a determinate spawner and spawns all the eggs in single batch (Johannessen et al., 1993). The eggs are demersal and 4–7 mm in diameter. After spawning the female fish coils around the eggs and creates an egg cluster that will later be guarded by the male (Gunnarsson et al., 2006). The incubation period of the eggs is c. 800–1000 degree-days, depending on incubation temperature. The potential fecundity ranges from 400 to 16,000 eggs, for 25 and 83 cm of total lenght, respectively. The hatching time is around 2 months and the larvae will typically hatch at a size around 20 mm and almost exclusively stay around the nest area until the juveniles become bottom dwelling owing to their large size and negative buoyancy (Gunnarsson et al., 2006).

3.3.1.2 Status of the stock

The stock is considered in a good state, showing a fishing mortality that has been lower than F_{MSY} proxy in the last two years, and the harvestable biomass has increased from 2013. Juvenile index in 2016 is predicted to be above the average of 2008–2015. Therefore, catch levels are expected to be similar or increase slightly in coming years (*Figure 11*).

According to the evidences showed during the meeting by the personnel of the Directorate of Fisheries (DF), the sampling of commercial catches is conducted and considered to be good in relation to spatial and temporal distribution of landings.

Biomass indices for Atlantic wolffish is available from the Icelandic groundfish surveys carried out in March. The fishable biomass (fish >40cm) index gradually increased from 2004 to 2008 showing one of the highest level observed. Then the index fell sharply in 2011 to levels similar to those in the late 1990´s, and subsequently increased again after 2010 to the highest level recorded in 2013 (*Figure 12*). However, the recruitment index (fish <40cm) has decreased in recent years from the high values observed from 1995 to 2005 (*Figure 12*). The decreasing trend in recruitment could be due to various environmental factors, as it was evidenced during the meeting with MFRI, including decreased productivity of the spawning stock due to disturbances on the spawning grounds, increased predation of small fish and increased sea temperatures.

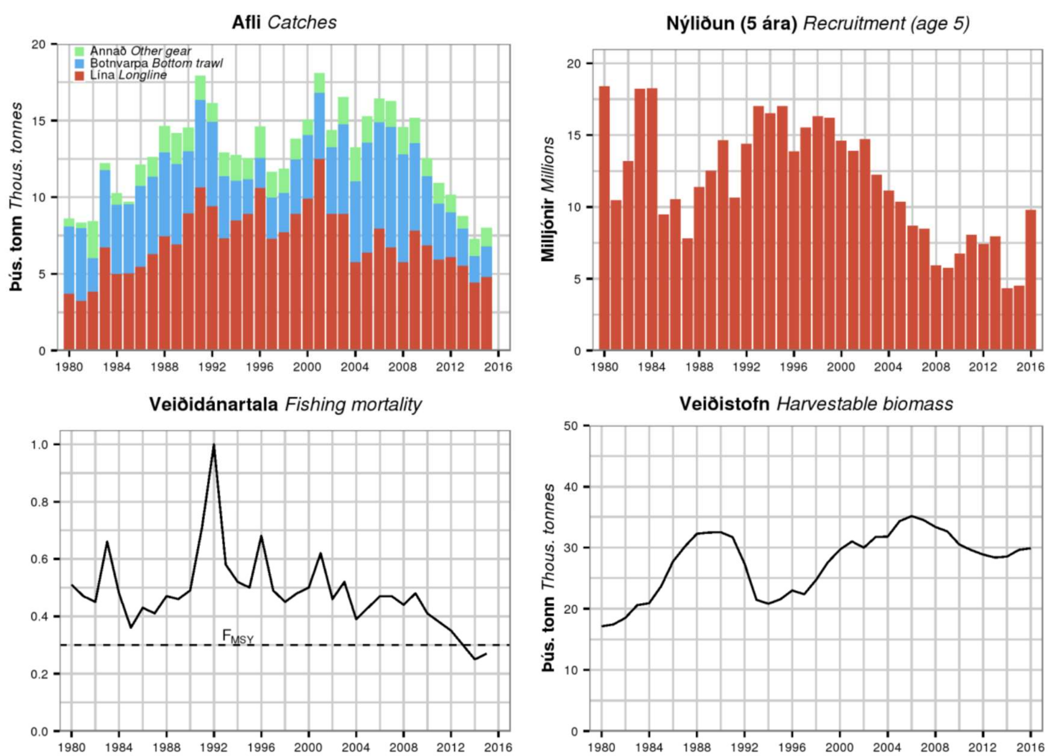


Figure 11. Atlantic wolffish. Catch by gear type, recruitment at age 5, fishing mortality, and harvestable biomass (MFRI, 2016).

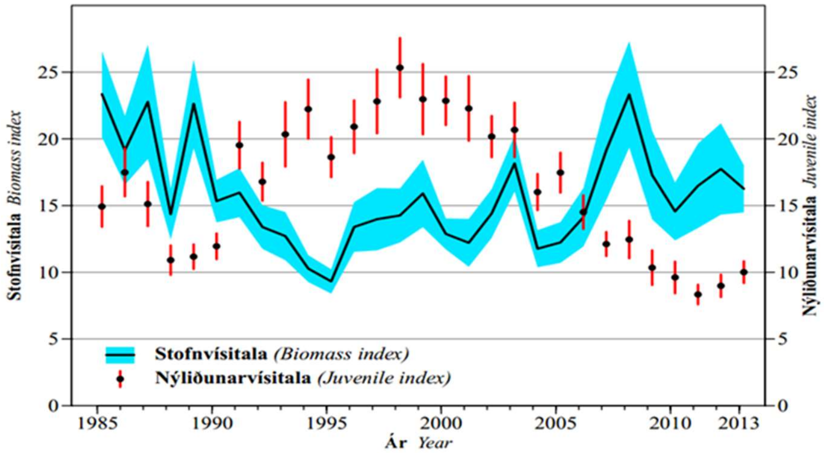


Figure 12. Atlantic wolffish stock index (biomass) and recruitment index (number of fish between 20 and 40 cm) in annual groundfish survey in March (MFRI, 2016).

Based on F_{MSY} proxy (F_{MAX} from a Yield per recruit reported in *Figure 13*), the MFRI recommends that the 2016/2017 should be no more than 8811 tonnes. MFRI recommends a continued closure of the spawning area off West Iceland during the spawning and incubation season in autumn and winter.

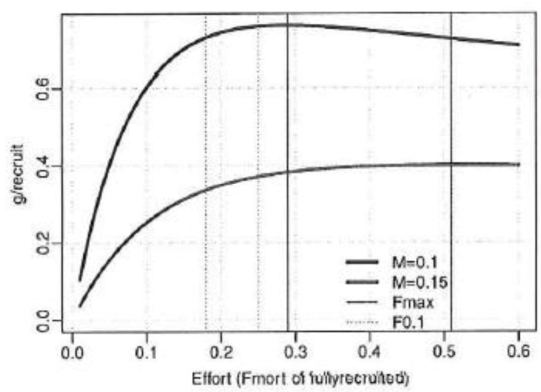


Figure 13. Estimated yield per recruit from model runs based on M = 1 and M = 0.15. F_{MAX} and $F_{0.1}$ are also shown (Figure provided by MFRI scientist during site visit).

A length-age based model of Atlantic wolffish in Iceland was developed in GADGET. No bootstrap procedure was used in the Atlantic wolffish assessment nor short and long-term stochastic projections. This stock has not gone through ICES, the assessment method has been discussed internally at the MFRI but no benchmark with external reviewers has been conducted. Fleets are lumped into one because length distributions from the main fleets (longline and trawls) are very similar.

The 2016 assessment estimates of recruitment and fishing mortality are in line with the assessments of 2013–2015. However, estimates of harvestable biomass have changed. NFT-ADAPT assessment estimates are similar to those obtained from the Gadget model (*Figure 14*).

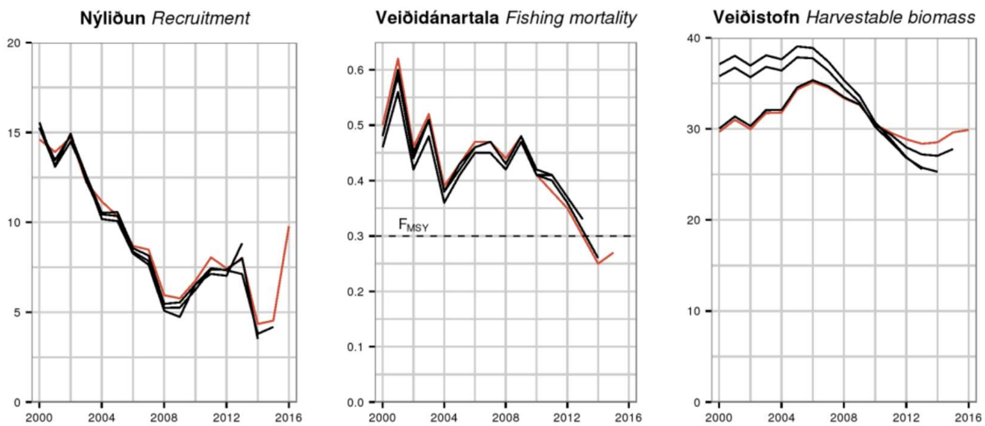


Figure 14. Atlantic wolffish historical assessment results 2013–2016 (red line: 2016 assessment (MFRI, 2016)).

3.3.1.3 History of the fishing and management

Landings have decreased considerably in the last years as Atlantic wolffish in 5.a is now part of the ITQ system. There is no management plan for this stock.

The recruitment index from the spring survey indicates very little recruitment to the stock since 2010, resulting in a truncated length distribution from both the survey and commercial catches. The MFRI recommends a continued closure of the spawning area off West Iceland during the spawning and incubation season in autumn and winter.

3.3.2 Plaice

3.3.2.1 Stock biology

Plaice is a medium sized flatfish. It has a smooth skin as opposed to, for example, dab and long rough dab. It is easily recognized by the red or orange spots on the otherwise dark back, the underside is white. The maximum recorded size in Icelandic waters is 85 cm, but the usual size in catches is from 30 to 50 cm. Plaice is common all around Iceland from the seashore to 200 m depth, on sandy or muddy bottoms. In European waters, it is found from the White Sea and the Barents Sea in the north down to the western part of the Mediterranean Sea in the south. It is not found in North American waters. Previously, flatfishes were considered rather sedentary. Tagging studies on plaice have, however, shown that this does not hold entirely true. Plaice undertake large scale feeding and spawning migrations in the waters around Iceland, fish tagged on one side of the country have been found at the other side.

Spawning mostly takes place in the warmer waters south and west of Iceland at 50 to 100 m depth. Eggs and larvae have also been found in colder northern waters, so at least some limited spawning also occurs there. In the southern waters, the peak spawning season is in March and April, but in May and June in northern waters. The juveniles settle onto shallow intertidal beaches and stay there for the first year of their life before migrating to deeper waters.

Plaice shows planktonic eggs (ca. 1.8mm) with a hatching time of around 3 weeks and larval hatch size of 2 mm (Solmundsson et al., 2005). Gunnarson et al (2010) determined hatch date distribution, larval phase and subsequent growth of juvenile plaice in different regions around Iceland using otolith microstructure analysis. The study provides evidence that the juvenile plaice population may in fact originate from multiple spawning sites located not only along the south and south-west coasts, but along the entire coast of Iceland. The findings are discussed in relation to currents and temperature in Icelandic waters.

Plaice are found on the continental shelf around Iceland, most abundantly in the warmer waters to the south and west of the country. The main spawning takes place on several distinct spawning grounds off the southwest and west coasts, begins in late February, peaks in March and April and is mostly finished by the middle of May (Solmundsson et al., 2003). Plaice also spawn off the north and east coasts, one to two months later than in the southwest (Bagenal, 1963). Mature plaice undertake annual migrations between spawning and feeding grounds, the main feeding occurring in early summer to late autumn in the south, west, and northwest (Sigurdsson, 1989).

Plaice is relatively fast growing and can reach a larger size than other flatfish species in Icelandic waters, with the exception of halibut and Greenland halibut. Females grow larger than males as is common with flatfishes. Growth is, however, quite variable and has been shown to depend on temperature, food abundance and stock size, among other things (Hjörleifsson and Pálsson, 2001). Plaice reaches 50% maturity at around the age of 5, maximum age being more than 20 years. Plaice feeds mainly on various benthic invertebrates, dominated by polychaetes and bivalves, but also, to some extent, on small fishes such as sandeels.

For assessment and management purposes the Icelandic plaice has been treated as a single stock. Little, however, is known of the population structure or the possibility of gene flow between distinct plaice grounds. Recent genetic research has revealed a relatively low genetic diversity in Icelandic plaice, which has been suggested to be caused by low population size, geographic position at the edge of the distributional range of plaice and possibly inbreeding (Hoarau et al., 2004). Therefore, knowledge of the spatial dynamics and population structure of Icelandic plaice is of fundamental importance.

A tagging study (Solmundsson et al., 2005) carried out on spawning and feeding grounds off Iceland revealed the migration pattern of mature plaice and to estimate fidelity rates to spawning and feeding grounds. The results of the study unveiled geographically distinct spawning locations maintained by site fidelity and connected by straying, indicating a complex structure in Icelandic plaice. As a precautionary approach, the study suggested that the management of the plaice fishery should aim to preserve all known subcomponents. Current knowledge on the substructure of the total stock is, however, not sufficient for fine - scale management, but could be extended by a combination of extensive tagging and genetic research.

3.3.2.2 Status of the stock

According to the evidences showed during the meeting by the personnel of the Directorate of Fisheries (DF), the sampling of commercial catches is conducted and considered to be good in relation to spatial and temporal distribution of landings.

Recruitment has been low but steady since 1994. Fishing mortality has declined since 1997 and is at an all-time low, while biomass has increased since 2000 (*Figure 15*). Sampling of commercial catches is conducted and considered to be good in relation to spatial and temporal distribution of landings.

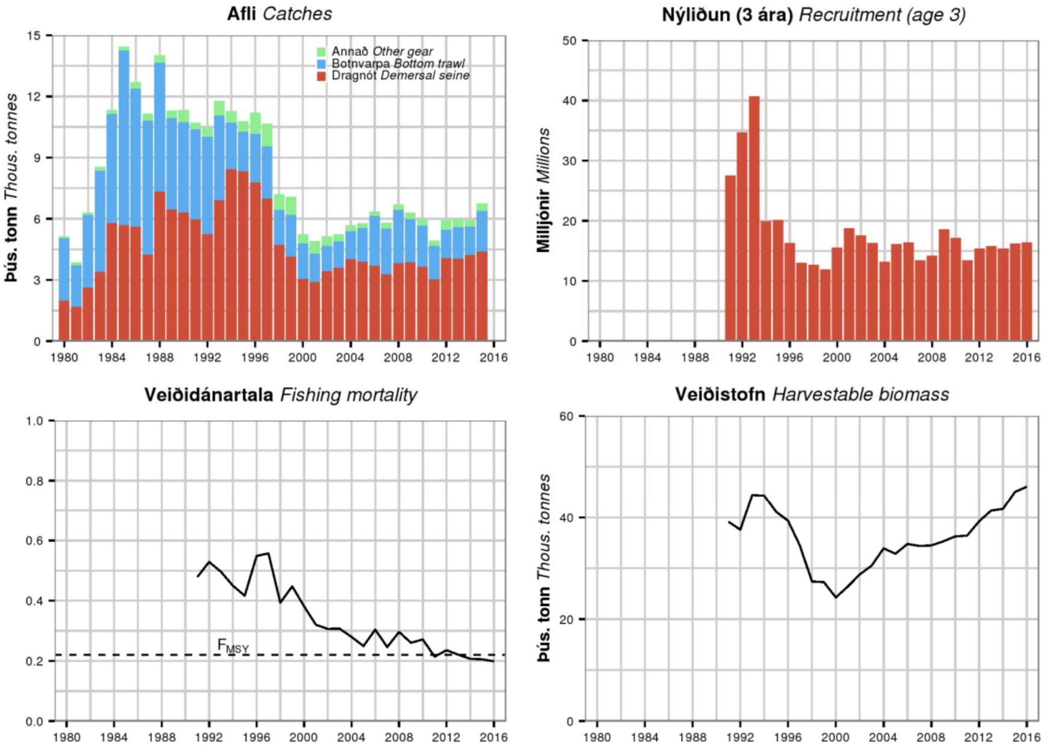


Figure 15. Plaice. Catch by gear type, recruitment at age 5, fishing mortality, and harvestable biomass (MFRI, 2016).

The stock size is likely to remain stable over the next years, but considerable uncertainty is present in the assessment due to a lack of recruitment data. A new statistical catch at age-based model was used in 2016, suggesting that fishing mortality was overestimated but harvestable biomass underestimated in the model used in 2013–2015. Considerable uncertainty is present in the assessment due to limited information on recruitment (*Figure 16*).

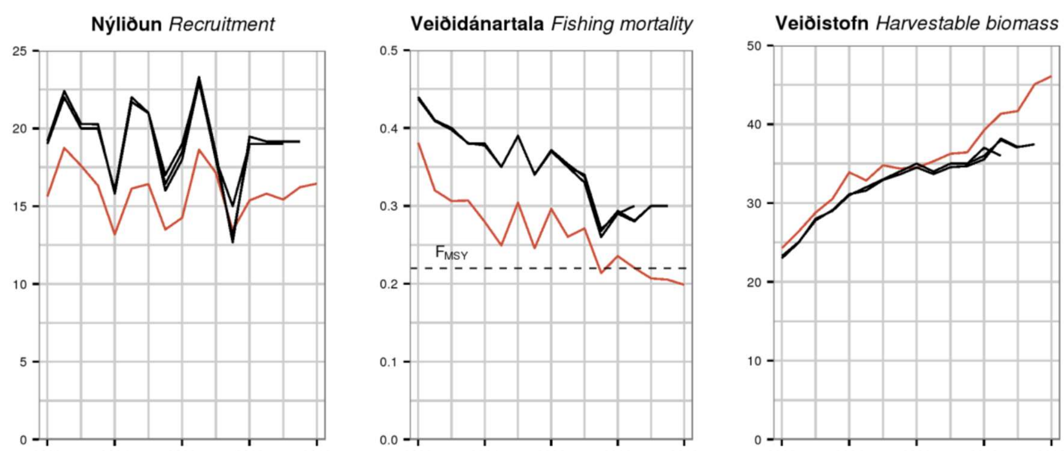


Figure 16. Plaice historical assessment results 2013–2016 (red line: 2016 assessment) (MFRI, 2016).

The natural mortality is set at 0.15 and in the model all age 1 fish is immature and 14.3% is mature at age 2. The spring survey shows an increasing trend of the plaice biomass (swept area) in the last decade (*Figure 17*).

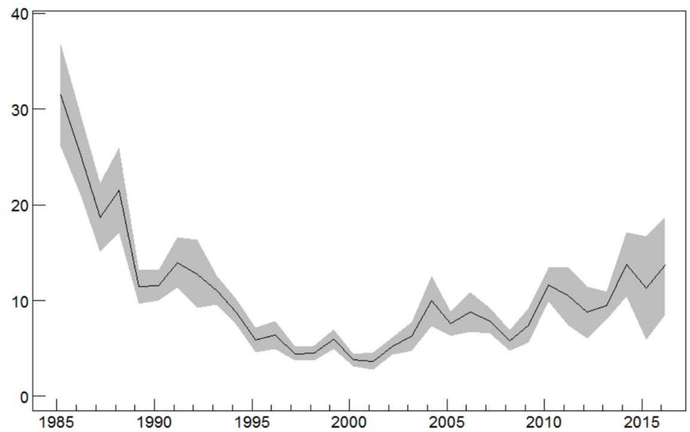
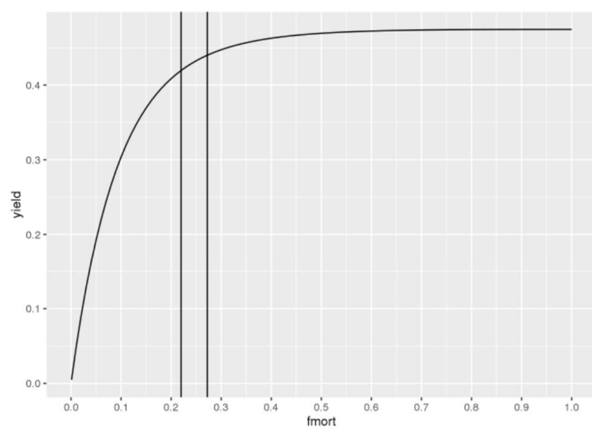


Figure 17. Plaice biomass index spring survey (kg/km2) (Figure provided by MFRI scientist during the site visit).

Based on F_{MSY} proxy ($F_{0.1}$ from a Yield per recruit reported in *Figure 18*), the MFRI recommends that the 2016/2017 should be no more than 7330 tonnes.



f01	fmax	fssb35	ssb35	maxy
0.22	0.97	0.27	1.6	0.47

Figure 18. Estimated yield per recruit of plaice (Figure provided by MFRI scientist during the site visit).

This stock has not gone through ICES, the new assessment method has been discussed internally at the MFRI but no benchmark with external reviewers has been conducted.

3.3.2.3 History of the fishing and management

Landings have decreased considerably in the last ten years as plaice is now part of the ITQ system. There is no management plan for this stock. However, the MFRI recommends that regulations regarding area closures on spawning grounds remain in effect.

3.4 Principle Two: Ecosystem Background

3.4.1 Ecosystem

Iceland is situated just south of the Arctic Circle in the central North Atlantic at the junction of the Mid-Atlantic Reykjanes Ridge, and the Greenland–Scotland Ridge. The island has maritime boundaries with Norway in the north, Greenland in the west and north-west, and the Faroe Islands in the south-east. The Icelandic EEZ encloses a sea area of 758,000 km², of which ca. 212,000 km² are less than 500 m deep.

Three major current systems influence Icelandic waters, including the warm and saline Irminger current, which is an offshoot from the Gulf Stream flowing from the south, the intermediate East Icelandic current from the north-east, and the very cold and less saline East Greenland current flowing from the north-west *(Figure 19)*. The East Icelandic current consists of merged cold Arctic waters and warmer Atlantic waters, whilst the East Greenland current consists of Arctic waters. The Irminger current flows around the western, north-western and northern parts of Iceland (Steingrímur Jónsson, n.d.). The precise locations of the cold and warm water fronts shift from year to year resulting in highly variable local conditions, in particular on the northern Icelandic Shelf. Nevertheless, as a result of the hydrographic and bathymetric conditions the Icelandic ecoregion is considered to be made up of four key areas which differ in terms of species composition (Gislason and Asthorsson, 2004):

i. Northern deep: Beyond the shelf break to the north and east of Iceland, where depths exceed 500 m and Artic water is dominant.
ii. Northern shelf: Continental shelf to the north and east of Iceland, where depths are generally less than 500 m, and a mixture of coastal, Atlantic and Arctic water is found.
iii. Southern deep: Beyond the shelf break to the south and west of Iceland, where depths exceed 500 m and Atlantic water is dominant.
iv. Southern shelf: Continental shelf to the south and west of Iceland, where depths are generally less than 500 m, and a mixture of coastal and Atlantic water is found.

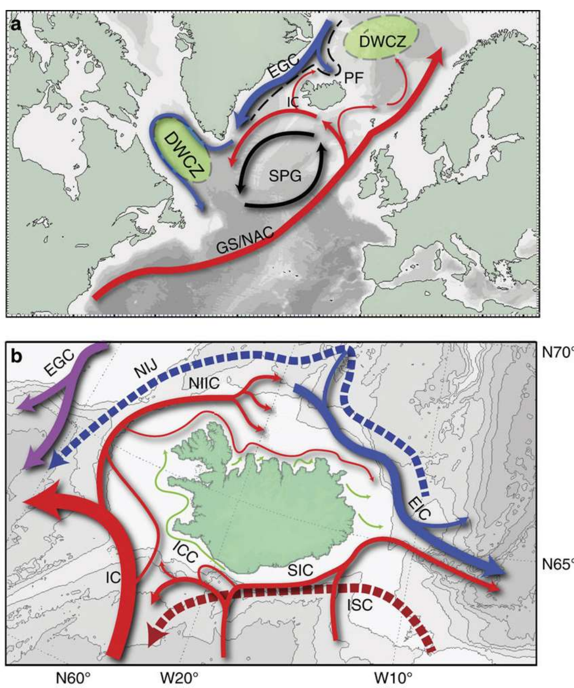


Figure 19. (a) North Atlantic circulation and (b) North Icelandic shelf circulation pattern. Arrows shown in blue correspond to cool and relatively fresh Arctic-sourced waters; arrows shown in red are warm and saline Atlantic-sourced waters; dashed lines correspond to deep currents whilst the solid arrows denote surface currents. The dashed black line in a refers to the approximate position of the North Atlantic Polar Front. DWCZ, deep water convection zones; EGC, East Greenland Current; EIC, East Icelandic Current; GS/NAC, Gulf Stream/North Atlantic Current; IC, Irminger Current; iNIIC, inner NIIC; ISC, Icelandic slope current; NIIC, North Icelandic Irminger Current; NIJ, North Icelandic Jet; oNIIC, outer NIIC; PF, polar front; SIC, South Icelandic Current; SPG, Sub-Polar Gyre. Source: Reynolds et al. (2016)

Primary production over the Icelandic Shelf is high, (150–300 g C m^{2} yr^{1}), and productivity is highest over the southwestern shelf (ICES, 2016). The onset of the annual phytoplankton spring blooms generally takes place between mid-April and mid-May, however a trend towards a later onset of blooms has been observed (MFRI, 2016). Variations in phytoplankton biomass and the timing of phytoplankton blooms have led to a decreasing trend in euphausiid abundance in the south-west, south and south-east of Iceland during the last fifty years, and from 2010 copepod biomass in spring has been lower than the long-term mean observed between 1960 and 2014. These changes are in contrast to previous decades, when mesozooplankton biomass fluctuated without trends on the Icelandic shelf (Silva et al., 2014). Such changes have important impacts on the marine environment since euphausiids in particular are a vital source of food for pelagic fish, such as herring and capelin, and support the larval and fry stages of all fish stocks. The abundance of krill is said to strongly affect the survivability of larval fish that have just begun to hunt for food (MFRI, 2016). For instance, MFRI studies have shown the correlation between the abundance of krill to the south-west in the spring and the number of cod fry in August and the recruitment of cod joining the stock.

Changes in sea temperatures have also had considerable effects on the fish fauna of the Icelandic ecosystem. During the last two decades, Atlantic water masses have been dominant (in contrast to previous decades), and temperatures on the western and northern parts of the Icelandic Shelf have increased. This has led to an increase in the abundance of previously rare warm water species, and a shift in the distribution of several demersal species. For example, haddock, anglerfish, witch, dab, tusk and ling have shown a clockwise northern movement from the south-western waters off Iceland in which they were previously restricted to the north-western and northern waters. Conversely stock abundance and distribution of several coldwater species such as Greenland halibut has declined in the region (Asthorsson et al. 2007, Vladimarsson et al. 2012). Over the last decade, the summer feeding grounds of capelin have moved further north from Iceland and also somewhat westward towards the colder waters off eastern Greenland, whilst Atlantic mackerel has extended its feeding grounds from the Norwegian Sea to Icelandic waters (Asthorsson et al. 2007, Oskarsson et al. 2016). As a result, pelagic mackerel and semi-pelagic blue whiting have been found and fished in east Icelandic water in large quantities. During the same period, Norwegian spring spawning herring has progressively been recorded once again on its traditional feeding grounds to the north and east off Iceland. These significant changes in the distribution and migration patterns of marine species found in Icelandic waters have been linked to a number of factors, including hydrographic conditions, changes in prey availability and stock densities (MFRI, 2016).

Research-vessel surveys indicate that shrimp biomass in Icelandic waters, both in inshore and offshore waters, has been declining in recent years, and the stock of northern shrimp collapsed in 2000. The driving factors are thought to include temperature changes, high levels of predation (due to increasing biomass of younger cod, haddock and whiting), and unsustainable levels of fishing mortality (MFRI, 2016). Consequently, the shrimp fishery has been reduced and is now banned in most inshore areas (ICES, 2016).

Fisheries have an important impact on Icelandic ecosystems, with the bulk of fisheries taking place over the continental shelf at depths of less than 500 m. Overall fishing effort of trawlers, longliners, gillnets, seines and Danish seines has decreased since 2005, however an increase in the fishing effort of pelagic trawlers and jiigers has been noted (MFRI, 2016). Several species included on the OSPAR list of threatened and / or declining species are known bycatch species in Icelandic fisheries. Only limited information is available on the impacts of fisheries on such species, however landings are generally small. A species which has been significantly impacted by fishing in Icelandic waters is Atlantic halibut (*Hippoglossus hippoglossus*), for which biomass decreased between 1985 and 1995, and has remained at a very low level since. A number of additional management measures have recently been introduced (including a total ban on all fishing of halibut and a mandatory release of viable halibut), and a small biomass increase was observed between 2015 and 2016 (MFRI, 2016). Bycatch of marine mammals (mainly small cetaceans and seals) and seabirds is known to occur in bottom set nets, in particular on the shelf off western and northern Iceland. Harbour porpoise (*Phocoena phocoena*) is the most commonly by-caught marine mammal, and seabirds such as northern fulmar (*Fulmarus glacialis*), common murre (*Uria aalge*), northern gannet (*Sula bassana*), and black guillemot (*Cepphus grille*) are caught frequently. However, bycatch in gillnets targeting cod has decreased as a result of a large decrease in gillnet fishing effort (MFRI, 2016). The reason for the decrease in gillnet fishing effort and the increase in long-line effort is that the long-line is believed to give catches of higher quality.

3.4.2 Retained species

The present assessment is an extension of scope to the MSC certified ISF Iceland saithe and ling fishery (fishery F-TUN-1106; certificate issue date 09/11/2014, certificate expiry date 10/09/2019). The assessment of the ISF Iceland saithe and ling fishery considered retained species for the entire Icelandic fleet operating bottom trawl, longline, handline, gillnet, Danish seine and *Nephrops* trawl when scoring PI 2.1.1 Retained species outcome / PI 2.1.2 Retained species management / PI 2.1.3 Retained species information. The analysis of retained species was updated during the first surveillance visit for 2014/2015 data. The team considered the available catch data and found no reason to repeat the existing assessment. The relevant information can be accessed here:
https://fisheries.msc.org/en/fisheries/isf-iceland-saithe-and-ling/@@assessments

3.4.3 Bycatch

The present assessment is an extension of scope to the MSC certified ISF Iceland saithe and ling fishery (fishery F-TUN-1106; certificate issue date 09/11/2014, certificate expiry date 10/09/2019). The assessment of the ISF Iceland saithe and ling fishery considered bycatch species for the entire Icelandic fleet operating bottom trawl, longline, handline, gillnet, Danish seine and *Nephrops* trawl when scoring PI 2.2.1 Bycatch species outcome / PI 2.2.2 Bycatch species management / PI 2.2.3 Bycatch species information.

However, during the site visit stakeholders stated that high catches of certain seabird and marine mammal species on gillnets and longlines may be a concern, and that such catches are highest close to the shore. Since some fishing grounds of Atlantic wolffish and plaice are closer to shore than saithe and ling grounds team decided to take precautionary approach and to score longline and gillnet by-catch PIs based on updated bycatch data, which was provided by the MFRI. Since there is no local designation of marine mammals and seabirds as ETP species, and none of the relevant species are listed in in Appendix 1 of the Convention on International Trade in Endangered Species (CITES), marine mammals and seabirds were scored as bycatch species (as was the case in the original saithe and ling assessment).

For other fishing gears the team found no reason to repeat the existing assessment. The relevant information can be accessed here:
https://fisheries.msc.org/en/fisheries/isf-iceland-saithe-and-ling/@@assessments

3.4.3.1 Bycatch of non-vulnerable species

The Icelandic Fisheries Management Act requires that all catches (including both commercial and non-commercial species) are landed; therefore, no discarding of any bycatch species should take place. Management measures that reduce discarding have been in place since 1991, and although there is no systematic monitoring of discarding, scientific evidence indicates that discards are, overall, a minor portion of total landings (Pálsson et al. 2005, 2012, 2013). Research by MFRI and measurements by the Directorate of Fisheries (DF) indicate that the most important discards in the Icelandic fisheries are of cod and haddock. Discards of these two species have been estimated on a regular basis by the MFRI since 2001 by comparing length composition samples taken at sea and from landings (making the assumption that discarding only occurs as high grading). Estimated discards of cod and haddock have declined in recent years and were at a minimum in 2011 in all gears. In 2011, the discards of cod amounted to 0.04% of total cod landings, and were only 0.14% for gillnets (Pálsson et al. 2013).

Moreover, based on the available Icelandic landings data it is evident that catches of low commercial value are indeed landed (e.g. dogfish, sea cucumber, black scabbard-fish, ribbonfish, and mackerel shark). The discarding ban, measures which reduce the incentive to discard, and the landing of catches of low commercial value suggest that the total catch is retained and landing data represents the approximate total catch of the fisheries.

3.4.3.2 Marine Mammals

Although Icelandic fishers are required to land all catches, based on the current practical interpretation of Icelandic fisheries laws seabirds and mammals can be discarded at sea, as long as such catches are recorded in logbooks by fishers (MFRI, pers. communication). Pálsson et al., 2015 used data from observers, the scientific cod gillnet surveys (conducted in April each year) and self-reported data to estimate bycatch of marine mammals in Icelandic waters. It should be noted that while bycatch reporting is mandatory, returns of electronic log books have been low. In order to improve the available data, MFRI observers stepped up efforts to monitor bycatch rates of cod gillnets, lumpfish nets (not considered in the present assessment) and longlines (coverage of ca. 1% of fishing trips) . Based on the most recent MFRI data made available to the assessment team duirng the site visit, marine mammal interactions with fisheries are restricted to gillnets. No marine mammal interactions were observed in the recent longline bycatch observer program (MFRI, unpublished), although toothed whales and seals may be attracted to the bait and to the fish that has swallowed the original bait. Interactions with towed gear such as trawls and the Danish seine are likely to be minimal.

Marine mammal population size estimates based on the most recent data available (data source for all species is the latest stock assessment advice issued by the MFRI taking into account the calculated 95% confidence intervals; see www.hafro.is) and average annual percentage of population impacted are by gillnet fisheries estimated by the MFRI are presented in *Table 8* below.

Table 8. Marine mammal bycatch taken in Icelandic gillnet fisheries. Population size estimates based on the most recent data available (see table footnotes for source information), and percentage of population impacted based on annual average bycatch rates estimated by the MFRI (bycatch data was provided by MFRI scientists during site visit) are presented.

Scientific Name	**Common Name**	**Icelandic Population Size**	**% of Icelandic Population Impacted by Gillnets**
Phocoena phocoena	Harbour porpoise	27,000[1]	0.34-1.74
Phoca vitulina	Harbour seal	9,000-17,000[2]	0.14-0.26
Pagophilus groenlandicus	Harp seal	470,540-784,280[2]	0.02-0.03
Phoca hispida	Ringed Seal	2,000,000-5,000,000[2]	0.0004-0.001
Cystophora cristata	Hooded Seal	67,104-98,573[2]	0.02-0.03

[1] Source: Sigurjónsson and Víkingsson 1997; Stenson, 2003.
[2] Source: Þorsteinn Sigurðsson (MFRI) / Vottunarstofan Tún pers. communication, 30 May 2016.

Harbour Porpoise

Harbour porpoises are found in the cold temperate to sub-polar waters of the Northern Hemisphere (Gaskin 1992, Read 1999). In the North Atlantic, harbour porpoise can be divided into two separate populations, one in the Northwest Atlantic and the other in the Northeast Atlantic (Gaskin 1984, Andersen 1993, Andersen 2003). Within these populations, Gaskin (1984) identified 14 putative sub-populations, based primarily upon coincident summer distribution patterns and the assumption that harbour porpoise is confined largely to continental shelf areas. However, sighting data, satellite telemetry and records of bycatches indicate that harbour porpoise are capable of considerable movements and are not restricted to nearshore areas (Stenson and Reddin, 1990).

Harbour porpoise is common in shallow waters all around Iceland in spring to autumn, but less during the winter months (Ólafsdóttir et al., 2002). Abundance estimates of harbour porpoise, based on the North Atlantic Sightings Surveys programme (NASS) conducted in 1987, 1989 and 1995, indicated a population size of around 27,000 animals (Sigurjónsson and Víkingsson 1997; Stenson, 2003). The estimate was based on the shipboard part of NASS in 1987 and mostly on offshore observations (Gilles et al. 2011). This rough estimate most likely represents an underestimation of abundance, as the proportion of porpoise sightings missed during ship surveys can be quite high (Gilles et al. 2011). The NASS programme aimed at estimating the summer distribution and abundance of cetacean populations in the North East Atlantic. The results demonstrated great variation in distribution of harbour porpoise sightings between surveys but their occurrence was mainly inshore. In 2007 an aerial survey was conducted which specifically was designed to get reliable estimates of harbour porpoise distribution and abundance in Icelandic waters (Gilles et al. 2011). Highest densities were estimated in Breiðafjörður and to the NW of the fjord as well as in inshore waters off East Iceland (see figure below). The estimated population size of harbour porpoise in Icelandic waters is estimated at 43,179 animals (95% confident interval: 31,755 – 161,899 animals), but current population trend is unknown.

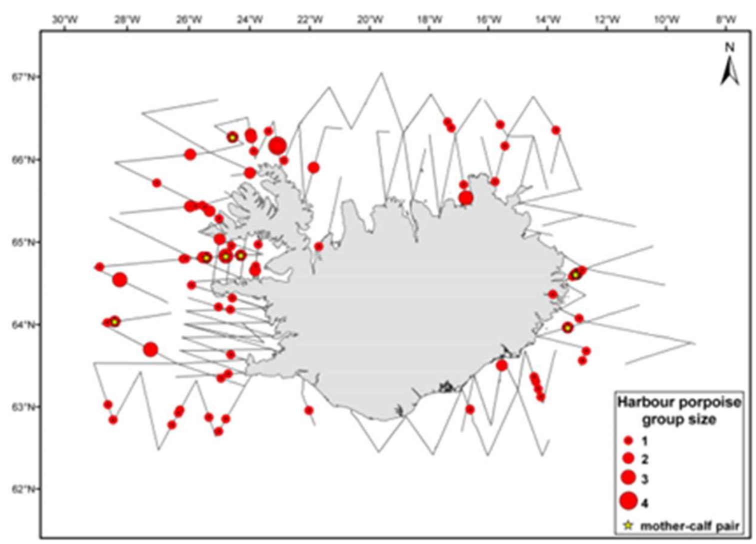


Figure 20. Aerial survey of harbour porpoise distribution in Iceland (2007). Results of aerial surveys conducted in the summer of 2007 in Icelandic waters based on sightings made by experienced observers. Grey line indicates effective survey effort in good or moderate harbour porpoise sighting conditions (Beaufort Sea states lower than 3), equivalent to 88% of the total effort. Source: Gilles et al. 2011.

The North Atlantic population of this species is large, and there is no evidence to suggest that any significant declines have occurred (although the population trend has not been quantified). This part of the European population should be considered 'Least Concern' (IUCN Cetacean Specialist Group, 2007). In Iceland, harbour porpoises are mainly caught in gillnets as bycatch in the lumpfish fishery (NAMMCO, 2016), rather than the cod-directed fisheries that are considered here. The hunting of harbour porpoise in Iceland has virtually ceased, but is still extensively hunted in neighbouring Greenland. According to the most recent MFRI data available, gillnets account for around 552 harbour porpoise deaths per year; based on the most recent estimates of population size available an estimated 0.34 – 1.74 % of the total population per year is impacted. ASCOBANS have set a provisional 1.7% limit for total anthropogenic removals for this species (ASCOBANS 2000), with removals above this level constituting an 'unacceptable interaction'.

Harbour seal

Harbour seals are one of the most widespread of the pinnipeds. They are found throughout coastal waters of the northern hemisphere, from temperate to polar regions. Available data show that the Eastern Atlantic Harbour Seal population is relatively large and widespread. A decline in numbers has recently occurred or are still occurring in some areas (e.g., Shetland and Orkney Islands, Firth of Tay), but in other parts of the range numbers are thought to be stable or increasing (Baltic Sea, southern Scandinavia).

The Icelandic Seal Centre (ISC) and Icelandic Institute of Freshwater Fisheries (IFF, now a part of MFRI) conducted a partial population count of harbour seals in 2014 during the moulting period in August-September (NAMMCO, 2016). Due to insufficient funding and thus limited coverage, the data provided by this survey did not produce a new reliable population estimate for the Icelandic harbour seal population. However, the results show a severe reduction of harbour seals in the surveyed areas since the last full count in 2011, implying that the population size is likely to be smaller than that defined in the management objectives by the Icelandic government. Nevertheless, the Eastern Atlantic Harbour Seal does not meet any of the IUCN criteria for 'threatened' categories, and is listed as 'Least Concern' (Bowen, 2016). Based on the most recent MFRI data available, gillnets account for around 23 harbour seal deaths per year, which would account for only 0.14-0.26% of the last available total estimated Icelandic population per year. However, it is possible that the impacts are higher since there is evidence that the Icelandic population has declined significantly since the last full population count in 2011.

Harp seal

Harp seals are widespread in the North Atlantic and the adjacent Arctic Ocean and shelf seas. The Harp Seal is the most abundant pinniped species in the northern hemisphere, and it is found in three separate populations, each of which uses a specific breeding site. The western North Atlantic stock, which is the largest, is located off eastern Canada. A second stock breeds on the "West Ice" off eastern Greenland, which contributes to Icelandic individuals. The third stock is found in the Barents Sea / White Sea. Globally this species numbers close to nine million animals with an annual pup production for all breeding sites combined of approximately 1.2 million (ICES 2013, Hammill et al. 2014). Due to its large population size, and the increasing trend in two of the three major population groups, the harp seal is currently classified by IUCN as 'Least Concern' (Kovacs, 2015). Based on the most recent MFRI data available, gillnets account for around 152 harp seal deaths per year, which accounts for only 0.02-0.03% of the total estimated Icelandic population per year.

Ringed seal

Ringed seals have a circumpolar distribution throughout the Arctic basin including near the North Pole (Rice 1998), and range widely into adjacent seas. Ringed seals are widely distributed in ice-covered waters of the northern hemisphere, and they may presently number about three million animals. This species is currently classified by IUCN as 'Least Concern' (Lowry, 2016). Based on the most recent MFRI data available, gillnets account for around 19 ringed seal deaths per year, which accounts for only 0.0004-0.001% of the total population per year.

Hooded seal

Hooded seals are found at high latitudes in the North Atlantic, and seasonally they extend their range north into the Arctic Ocean. They breed on pack ice and are associated with it much of the year, though they can spend significant periods of time in the pelagic realm (Lavigne and Kovacs 1988, Folkow and Blix 1999, Anderson et al. 2009, Folkow et al. 2010, Kovacs et al. 2011). Four distinct populations can be found on pack ice: (i) near Jan Mayen Island, (ii) off Labrador and northeastern Newfoundland, (iii) in the Gulf of St. Lawrence, and (iv) in the Davis Strait. The total hooded seal population is currently estimated to be 650,000, including 400,000 individuals in the northwest Atlantic Ocean, and 250,000 in the Jan Mayen population (MarineBio.org).

With changing sea ice conditions reducing the pack ice habitat needed by all hooded seals, there is good reason to believe that numbers in all stocks might be declining. As a result, this species is currently classified by IUCN as 'Vulnerable' (Kovacs, 2016). Based on the most recent MFRI data available, gillnets account for around 23 hooded seal deaths per year, which accounts for only 0.02-0.03% of the total estimated annual number of hooded seals which visit Icelandic waters to feed.

3.4.3.3 Seabirds

Seabirds use sea cliffs as nesting sites and breeding colonies of seabirds are found all around Iceland. Since the early eighties, the populations of seabirds have in general reduced significantly which most likely has been driven by changes in food availability (Hundeide, 2015). Seabirds are most vulnerable to be caught by fishing gear while feeding relatively close to the shore, in particular gillnets and longlines. It should be noted that several of Iceland's breeding seabirds are declining, for reasons which are unclear but which are thought to be related to changes in climate and oceanographic conditions in the Arctic regions.

Pálsson et al., 2015 used data from observers, the scientific cod gillnet surveys (conducted in April each year) and self-reported data to estimate bycatch of seabirds in Icelandic waters. It should be noted that while bycatch reporting is now mandatory, returns of electronic log books have been low. In order to improve the available data, MFRI observers stepped up efforts to monitor bycatch rates of cod gillnets, lumpfish nets (not considered in the present assessment) and longlines (coverage of ca. 1% of fishing trips). Based on the most recent MFRI data made available to the assessment team during the site visit, seabird interactions with fisheries are took place for both longlines and gillnets. Seabird population size estimates based on the most recent data available (data source for all species is the latest stock assessment advice issued by the MFRI taking into account the calculated 95% confidence intervals; see www.hafro.is) and average annual percentage of population impacted are by gillnet and longline fisheries are presented in *Table 9* below.

Table 9. Seabird bycatch taken in Icelandic gillnet and longline fisheries. Population size estimates based on the most recent data available (source: BirdLife International (2015) European Red List of Birds) and percentage of population impacted based on annual average bycatch rates estimated by the MFRI (bycatch data was provided by MFRI scientists during site visit) are presented.

			% Population Impacted	
Scientific Name	**Common Name**	**Icelandic Population Size (Individuals)**	**Gillnets**	**Longlines**
Fulmarus glacialis	Northern fulmar	2,300,000	0.1	0.1
Uria aalge	Common guillemot	368,000-1,060,000	0.06-0.17	N/A
Cheppus grylle	Black guillemot	10,000-15,000	N/A	1-1.6
Morus bassanus	Northern gannet	63,000	0.4	0.3
Alca torda	Razorbill	62,5000	0.01	N/A
Phalacrocorax aristotelis; P. carbo	Cormorant	9800/ 8200	N/A	1.2 / 1.4
Larus marinus	Greater black-backed gull	30,000-40,000	N/A	0.3
Fratercula arctica	Atlantic puffin	4,000,000-6,000,000[1]	unknown	N/A

[1] Only outdated (1992) estimates of the Icelandic population size exist

Fulmar

The northern fulmar is found throughout the north Atlantic and North Sea, north of 45°N (Hagemeijer and Blair 1997). Its boreal distribution has increased over the last 250 years to Iceland, the Faroes, Spitsbergen and suitable areas of coastline in Britain (Hagemeijer and Blair 1997, Snow and Perrins 1998). Based on the most recent estimates the European fulmar population is estimated at 3,380,000-3,500,000 pairs. Despite fluctuations in the fulmar population, it remains a common breeder in Iceland; in 1983-2009 the Icelandic population was estimated to number 1,150,000 breeding pairs. More recent estimates are not available, but both short and long term population trends for this species have been estimated to be decreasing in Iceland. Historically 3,300 and 10,500 fulmars were hunted annually in Iceland, but this practise is far less frequently nowadays. The species was recently given an IUCN status of 'Least Concern' in Europe (see http://www.iucnredlist.org/). Based on the most recent MFRI data available, gillnets account for around 2,173 fulmar deaths per year, and longlines account for around 2,023 fulmar deaths per year. This is the equivalent to 0.1% of the total estimated Icelandic population per year for each of these gears. Indeed, local experts do not consider that fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016).

Common guillemot

The common guillemot has a circumpolar distribution, occurring in the low-arctic and boreal waters of the north Atlantic. The Common Guillemot is a pursuit-diving marine bird which forages primarily during daylight. One parent remains at the colony with the chick whilst the other is on a foraging trip. Birds departing colonies usually splash-down to form large rafts close to the colony before departing to foraging areas. The European population is estimated at 2,350,000-3,060,000 mature individuals. Since 2005 a sharp decline has been observed in Iceland (where nearly a quarter of the European population is found) (BirdLife International, 2015). As a result of the reported decline in Iceland, the estimated and projected rate of decline of the European population size over the period 2005-2050 (three generations) varies from 25% to more than 50%, and the species was recently given an IUCN status of just 'Near Threatened' in Europe (see status on http://www.iucnredlist.org/). However, since 2000 a number of populations have been increasing elsewhere, including in the UK (which holds nearly half the European population) (JNCC 2014; BirdLife International, 2015).

Based on the most recent MFRI data available, gillnets account for around 620 common guillemot deaths per year, which accounts for only 0.06-0.17% of the total estimated Icelandic population per year. Indeed, local experts do not consider that gillnet fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016).

Black guillemot

According to IUCN (BirdLife International 2012), Iceland has about 3% of the North Atlantic breeding population with about two thirds breeding in Greenland or Norway (see 'supplementary material' to BirdLife International 2012). The species has a circumpolar distribution including the north coast of Russia as well as Alaska and Canada. The Icelandic population was estimated to number 10,000 to 15,000 individuals by the Icelandic Institute of Natural History in 2000. More recent estimates are not available, but both short and long term population trends for this species in Iceland have been estimated to be decreasing. The reasons for this decline are not fully understood, although various factors have been suggested as explanations including: human disturbance, incidental caputre in fishing nets, competition for nest sites with puffins, tick parasitism, changes in food resources and other environmental factores (Petersen, 2001). However, this species was recently given an IUCN status of 'Least Concern' in Europe. (see http://www.iucnredlist.org/).

Recent estimates of bycatch made available by the MFRI show that bycatch rates are low in longlines, although these estimates are based on on observer reports which cover ca. 1% of fishing trips and there were considerable differences between estimated bycatch levels in 2014 and 2015 (2014: 0 / 2015: 311 black guillemots caught as bycatch). Using the lower estimated Icelandic population size of 10,000 individuals, an average annual catch of 156 black guillemots caught as by catch would account for 1.6% of the total estimated Icelandic population per year.

<u>Northern gannet</u>

The northern gannet is found on both sides of the Atlantic Ocean; breeding sites include northern France, the United Kingdom, Ireland, Iceland, Norway and the eastern tip Quebec (Canada) (del Hoyo et al. 1992). The Icelandic population was estimated to number 31,500 breeding pairs in 2005-2008 (Arnthór Garðarsson. 2008a, cited in Birdlife International, 2015). This strictly marine species wanders mostly over continental shelves, feeding on shoaling pelagic fish which are mostly caught by plunge-diving from great heights. It also follows trawlers and will form large congregations where food is plentiful. Breeding is highly seasonal starting between March and April, usually in large colonies on cliffs and offshore islands, but also sometimes on the mainland.

Both short and long term population trends for this species have been estimated to be increasing in Iceland, and the species was recently given an IUCN status of 'Least Concern' in Europe (see status on http://www.iucnredlist.org/). According to the most recent bycatch estimates available from the MFRI, gillnets account for around an average of 222 gannet deaths a year. Based on the estimated Icelandic population size of 63,000 individuals, an average annual catch of northern gannets caught as bycatch would account for only 0.4% of the total estimated Icelandic population per year. Moreoever, according to the most recent bycatch estimates available from the MFRI, longlines account for around an average of 160 gannet deaths a year. Based on the estimated Icelandic population size of 63,000 individuals, an average annual catch of northern gannets caught as by-catch by longlines would account for 0.3% of the total estimated Icelandic population per year. Indeed, local experts consider that longline fisheries are not a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. comm., 24 May 2016).

<u>Razorbill</u>

The species breeds on northern Atlantic coasts, in Greenland and in Western Europe from north-western Russia to northern France. This auk began declining in parts of its European breeding range during the 2000s, primarily in Iceland, which holds at least 60% of the European population, but where the population declined by 18% over the period 2005-2008. This overall decline is estimated to range between 20-29%, resulting in an IUCN classification of 'Near Threatened' in Europe (see http://www.iucnredlist.org/). Based on the most recent MFRI data available, gillnets account for around 42 razorbill deaths per year, which accounts for 0.01% of the total estimated Icelandic population per year.

<u>Great cormorant / European Shag</u>

The great cormorant (*Phalacrocorax carbo*) inhabits both marine and freshwater areas, whilst the European Shag (*Phalacrocorax aristotelis*) is exclusively marine. Shags typically breed on (steep) sea cliffs whilst cormorants breed on top of small islands where they build their nests. Both shag and cormorant breed in the Breiðafjörður region of Iceland. During the winter, they can be found all along the coast. 4100 pairs of great cormorant and 4900 pairs of European shag are estimated to breed in Iceland (BirdLife International, 2015), representing 1% and 6% respectively, of the overall North Atlantic population.

The populations of the great cormorant are expected to increase both in the short and the long term, whilst the status of the European shag is less clear, with suspected decreasing short and long term population trends for unknown reasons. Nevertheless, both species were recently given a status of 'Least Concern' in Europe by IUCN (see http://www.iucnredlist.org/).

According to 2014-2015 bycatch estimates available from the MFRI, longlines account for an annual average of 119 cormorant / shag deaths a year. Since it is not known what percentage of the bycatch are cormorant and what percentage are shag (although breeding populations of the two species are similar in Iceland), the assessment team took the precautionary approach to assume all bycatch were one species and then the other. Based on these precautionary calculations, on average 1.4% of the total estimated Icelandic population per year would be affected for great cormorant, and 1.2% per year for shag. Indeed, local experts do not consider that fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016).

<u>Greater black-backed gull</u>

This species can be found breeding on coasts from the extreme north-west of Russia, along Scandinavia, on Baltic Sea coasts, on the coasts of north-western France, the United Kingdom and Ireland, across the north Atlantic in Iceland and southern Greenland and on the Atlantic coasts of Canada and the USA down to North Carolina. Individuals breeding in harsher environments will migrate south, wintering on northern coasts of Europe from the Baltic Sea to southern Portugal, and down North America as far south as the Caribbean (del Hoyo et al. 1996). In Iceland, they are common all along the coast, but more common in the south. The Icelandic population was estimated to number 15,000 to 20,000 breeding pairs by the Icelandic Institute of Natural History in 2000. The short-term trend of the Icelandic population is unknown, whilst the projected long term trend is decreasing (Birdlife International, 2015). This could possibly be due to the declining availability of discarded offal from ships and land-based waste (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands/South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016). However, this species was recently given a status of 'Least Concern' by IUCN (see http://www.iucnredlist.org/). According to the most recent bycatch estimates available from the MFRI, longlines account for around 104 black-backed gull deaths a year. Based on the lower estimated Icelandic population size of 30,000 individuals, an average annual catch of 104 greater black-backed gull caught as by catch would account for only 0.3% of the total estimated Icelandic population per year.

<u>Atlantic puffin</u>

The species can be found throughout the North Atlantic Ocean. It occurs in north-west Greenland, from north Norway down to the Canary Islands, and Spain (Nettleship et al. 2014). The population in Iceland and Norway, which together account for 80% of the European population, decreased markedly since the early 2000s and, although the population size was estimated to be increasing in the UK during 1969-2000, evidence suggests that it has undergone declines or probable declines since 2000 (Harris and Wanless 2011). As a result, the population size in Europe is estimated and projected to decrease by 50-79% between 2000-2065 (three generations). These declines resulted in an IUCN classification of 'Endangered' in Europe (see status on http://www.iucnredlist.org/). Based on the most recent MFRI data available, gillnets account for around 21 Atlantic puffin deaths per year. Only outdated Icelandic population data (Umhverfisráðuneytið, 1992 cited in BirdLife International, 2015) exist, so it is not possible to estimate the current population level impact of gillnet fishing on this species.

3.4.3.4 Bycatch Management

The Icelandic Fisheries Management Act requires that all catches shall be landed; therefore, discarding is illegal. All the catch landed by the Icelandic fishing fleet must be weighed and reported into a database operated by the Directorate of Fisheries (DF). There are several features in the fisheries management system which reduce the incentive to discard:

- Fishers can land small or undersize fish, with only 50% of the weight being charged against the annual catch quota up to a certain limit (generally 10% of the total landings of each species). This part of the catch should be separated from the rest when the vessel comes into harbour.

- When landing, up to 5% of the total catch (0.5% in case of pelagics) can be classified as being of a low commercial value and should not be subtracted from the quota allocated to the vessel. This part of the catch should be sold at an authorized auction and the proceeds go towards funding marine research (Verkefnasjóður sjávarútvegsins). This part of the catch should be separated from the rest when the vessel comes into harbour.
- There is strict surveillance of fishing vessels (including observers on board) and stiff penalties are imposed for violations of Individual Transferable Quotas (ITQ) rules and regulations.

Any remaining levels of discarding in fisheries is routinely assessed by the Marine and Freshwater Research Institute (MFRI). There are strict requirements for vessels to be equipped with VMS and the keeping of log books on-board all fishing vessels, containing information on fishing practices such as location, dates, gear and catch quantity. Vessels above 6 GT in size are required to carry electronic logbook, whilst smaller vessels are allowed to fill in logbooks manually, and all logbooks must be made available to inspectors from the DF and to MFRI for scientific purposes. A team of inspectors from DF monitors landing and weighing practices and inspectors may board fishing vessels to monitor catch composition, handling methods and fishing equipment. Following a random investigation, inspectors can join the vessel to the same fishing ground the vessel visited during the previous fishing trip, in order to examine their fishing practices. At landing, the catch of each vessel is monitored by certified weighers and logged into electronic database by dates and regions, species and quantities. This allows for the use of DF database to trace the origin and date of catch and to compare catches by an individual vessel to other vessels fishing at the same location and date. Discrepancies in catch composition can lead to further inspections. An observer system is operated by the DF, both at landing sites and on board vessels. Moreover, the Icelandic coast guard monitors fishing activities in Icelandic waters, e.g. via VMS, including surveillance of areas closed for fishing. Breach of regulations leads to a warning or a fine. Repeated offences lead to heavy fines, revocation of the vessel's license to fish and possibly a prison sentence.

Various measures are taken to ensure the protection of small fish and vulnerable habitats. This includes regulations on the type of fishing gear allowed in different areas, rules on the minimum mesh size, use of sorting grids on trawls and the closing of fishing grounds. If on board monitoring reveals that the percentage of small fish in the catch or the bycatch exceeds guideline limits, the MFRI may close the relevant fishing area for a short period of time, or for a longer period if small fish or by-catch repeatedly exceeds guideline limits. Also, temporary closures of areas are in force to protect spawning grounds of demersal species (*Figure 21*, *Figure 22*). Furthermore, various long-term area closures are in place, which may apply to specific fishing gear, fishing-vessel size or all fishing for certain periods of time. All these measures will serve to reduce bycatch; although not established to protect seabirds or mammals, area closures will also serve to maintain bycatch of marine mammals and seabirds at low levels since bycatch of many sensitive species is highest in inshore areas, which is where the closures are located (MFRI, pers. communication).

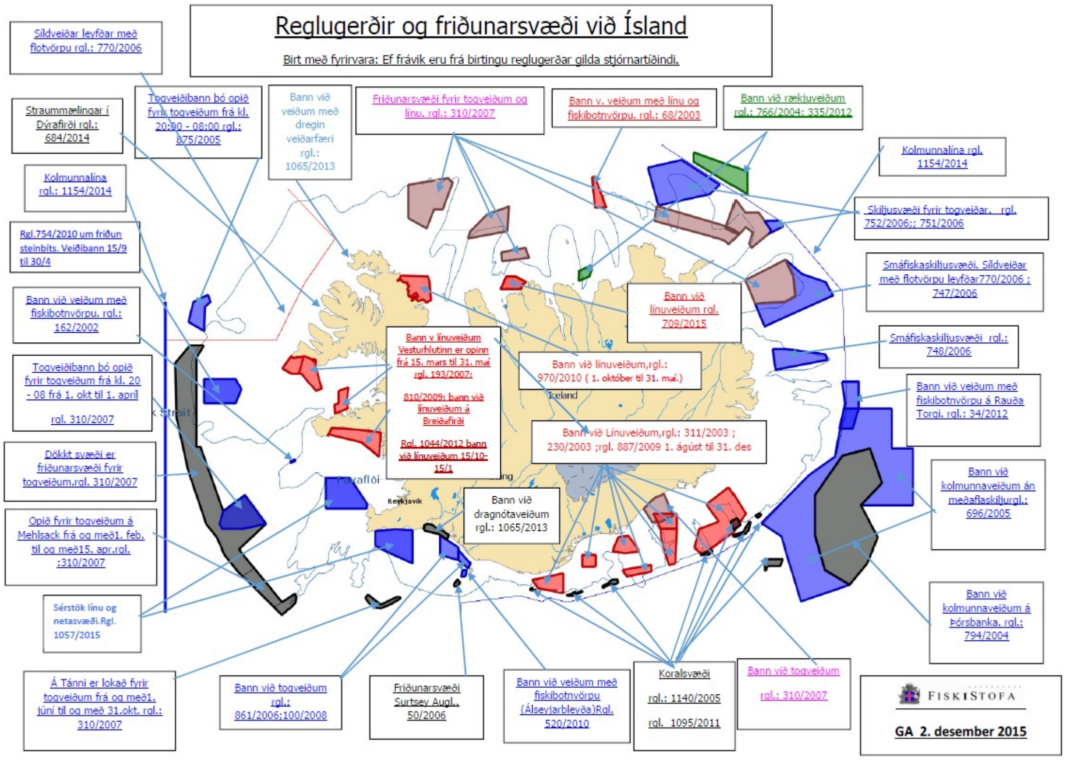


Figure 21. Map with information on temporarily closed areas in Icelandic waters. Source: Directorate of Fisheries (2015). A larger version is available here: http://www.fisheries.is/management/fisheries-management/area-closures/

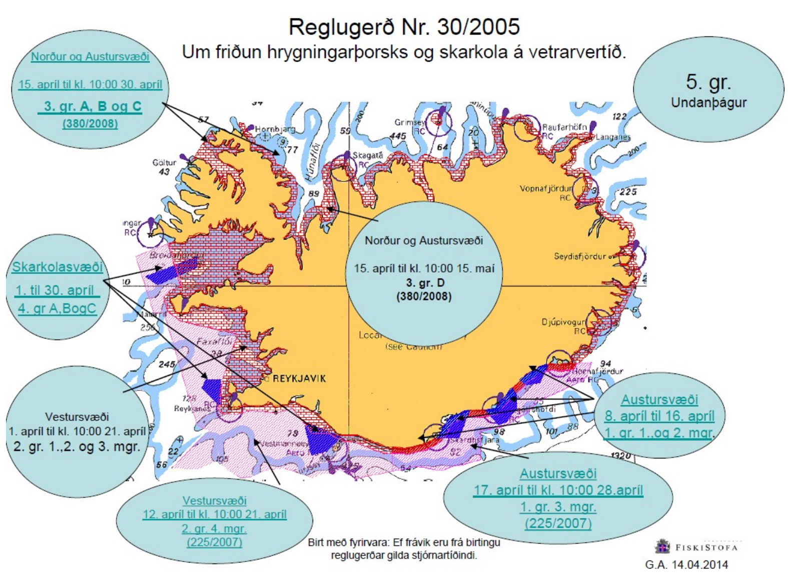


Figure 22. Map with information on spawning area closures in Icelandic waters. Source: Directorate of Fisheries (2015). A larger version is available here: http://www.fisheries.is/management/fisheries-management/area-closures/

Additional measures in place to manage bycatch of marine mammals and seabirds in Icelandic gillnet fisheries include:

- Marine mammal and seabird bycatch is monitored by mandatory eLog system, through the cod gillnet surveys (conducted in April each year), and onboard observers from the DF and the MFRI, although to date returns from the eLog system have been poor. The association of Small Boat Owners has taken steps to improve logbook reporting of marine mammal bycatch. In the effort to step up monitoring of such bycatch, the DF issued in 2014 a new simplified logbook form that is believed to improve reporting of bycatch[1]. This will allow a strategy to be implemented in the future.
- Observers monitored ca. 1% of all fishing trips by the gillnet and longline fleets in 2014 and 2015, and overall the quality of the data has improved in the last 5 years (MFRI pers. communication).
- Fishers are not allowed to offer for sale, give away, nor accept as a gift, any bird that has been killed in fishing nets.
- Any birds caught alive must be released.
- Some fishermen use flags, bird-scaring buoy lines or a gas alarm to scare birds away when setting the longlines, but the extent of such mitigation methods within the fleet is unknown.

3.4.4 ETP (Endangered, threatened or protected) species

The present assessment is an extension of scope to the MSC certified ISF Iceland saithe and ling fishery (fishery F-TUN-1106; certificate issue date 09/11/2014, certificate expiry date 10/09/2019). The assessment of the ISF Iceland saithe and ling fishery considered ETP species for the entire Icelandic fleet operating bottom trawl, longline, handline, gillnet, Danish seine and *Nephrops* trawl when scoring PI 2.3.1 ETP species outcome / PI 2.3.2 ETP species management / PI 2.3.3 ETP species information. The subsequent surveillance visits revisited ETP issues. The assessment team considered all available information (incl. input from stakeholders during site visit), but did not find any reason to repeat the existing assessment since based on the information available to the assessment team, there has been no listing of nationally protected marine species or of species in Appendix 1 of the Convention on International Trade in Endangered Species (CITES) since the original assessment and subsequent surveillance visits. The relevant information can be accessed here:
https://fisheries.msc.org/en/fisheries/isf-iceland-saithe-and-ling/@@assessments

3.4.5 Habitats

The present assessment is an extension of scope to the MSC certified ISF Iceland saithe and ling fishery (fishery F-TUN-1106; certificate issue date 09/11/2014, certificate expiry date 10/09/2019). The assessment of the ISF Iceland saithe and ling fishery considered habitat impacts caused by the entire Icelandic fleet operating bottom trawl, longline, handline, gillnet, Danish seine and *Nephrops* trawl when scoring PI 2.4.1 Habitat outcome / PI 2.4.2 Habitat management / PI 2.4.3 Habitat information.

Nevertheless, the team took a precautionary approach and chose to re-score PI 2.4.1 Habitat outcome (for all species / gears) by focussing on fishing grounds of species being added to the certificate since some fishing grounds of Atlantic wolffish and plaice are closer to shore than saithe and ling fishing grounds.

With regards to PI 2.4.2 Habitat management, the team decided to re-assess when the updated scoring of PI 2.4.1 revealed a habitat scoring element which was not explicitly considered in the original saithe and ling assessment. This was the case only for (i) Danish seine, and (ii) gillnet fisheries operating close to the coast. In the case of trawl, *Nephrops* trawl, longline and handline fisheries no additional scoring elements were identified when assessing PI 2.4.1, so there was complete overlap

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[1] http://www.hafro.is/undir.php?ID=242&REF=3

with the habitat management strategy PI as scored in the saithe and ling assessment. PI 2.4.2 was also scored when the assessment of PI 2.4.1 revealed a higher score for some habitat scoring elements compared to the saithe and ling fisheries. This was the case for bottom trawlers, where a lack of overlap with some habitat scoring elements that scored at SG 60 level for PI 2.4.1 and therefore at SG 75 level for PI 2.4.2 in the saithe and ling fisheries resulted in higher scores for the Atlantic wolffish and plaice fisheries.

With regards to PI 2.4.3 Habitat information the team decided to re-assess when the updated scoring of PI 2.4.1 revealed a habitat scoring element which was not explicitly considered in the original saithe and ling assessment. This was the case only for (i) Danish seine, and (ii) gillnet fisheries operating close to the coast. In the case of trawl, *Nephrops* trawl, longline and handline fisheries no additional scoring elements were identified when assessing PI 2.4.1, so there was complete overlap with the habitat information PI as scored in the saithe and ling assessment.

The saithe and ling assessment can be accessed here:
https://fisheries.msc.org/en/fisheries/isf-iceland-saithe-and-ling/@@assessments

3.4.5.1 Benthic habitats in the Icelandic ecoregion

Iceland is located at the junction of the Mid-Atlantic Ridge and the Greenland-Scotland Ridge just south of the Arctic Circle and this is reflected in the topography around the country. The different geomorphological features of the seafloor provide a broad range of benthic habitats, with substrate characteristics often related to depth. The main substrate types around Iceland are mud, gravel and lava; hard bottoms are more common in shallower waters, whilst in deeper waters, hard bottoms are often confined to abrupt features such as ridges and seamounts. Soft sediments often dominate in the troughs and beyond the continental slope. The shelf around Iceland is narrowest off the south coast and is cut by submarine canyons around the country (ICES, 2016). Differences in oceanographic conditions in the north and south of Iceland largely determine the distribution patterns of benthic species, with warmer water species found in areas dominated by Atlantic waters to the south, and colder water species found in colder Arctic waters to the north. The Greenland-Iceland-Faroe Ridge acts as a distribution barrier for many species, and overall benthic communities are characterised by high levels of both diversity and biomass (MFRI, 2016).

Figure 23 gives the MESH (OSPAR/JNCC) habitat map for OSPAR threatened and/or declining habitats for Iceland and around. Information on sensitive habitats in the Northeast Atlantic is available from OSPAR (2008a) and habitat related maps for Icelandic waters are provided in variety of published reports (e.g. Steingrímsson and Einarsson 2004, Garcia et al. 2006, Ólafsdóttir and Burgos 2012). OSPAR lists threatened and/or declining habitats in Icelandic waters as follows:

a) Present in Iceland and considered threatened/declining everywhere they occur

- *Lophelia pertusa* reefs
- Deep-sea sponge aggregations
- Maerl beds
- Intertidal *Mytilus* beds
- Coral gardens
- *Zostera* beds
- Intertidal mudflats
- *Modiolus* reefs

b) Present or possibly present, but not considered threatened/declining in Icelandic waters:

- Hydrothermal vents
- Seapens and burrowing megafauna
- Other subtidal sedimentary habitats

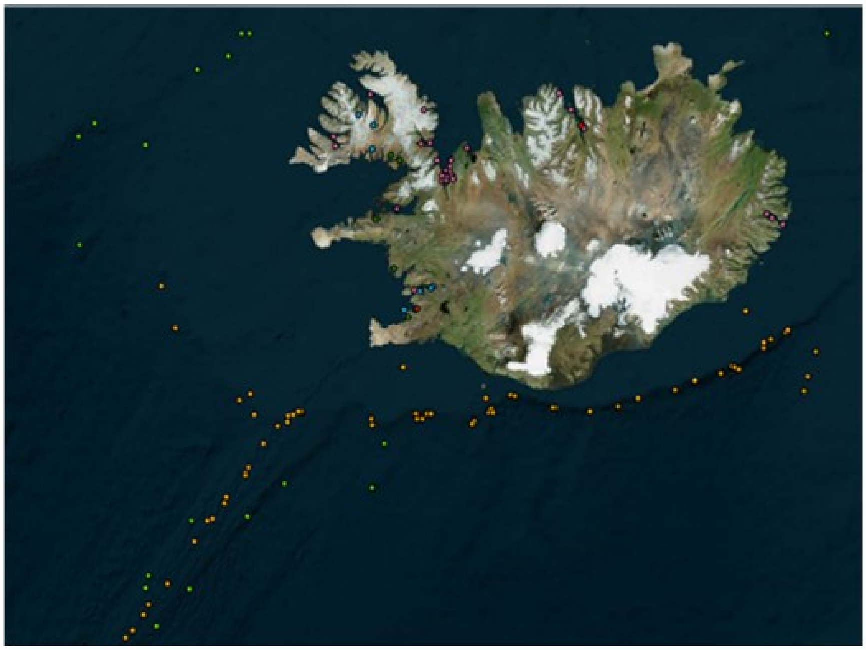

Figure 23. MESH (OSPAR/JNCC) habitat map for OSPAR threatened and/or declining habitats for Iceland. Yellow = Lophelia, green = deep-sea sponge aggregation, pink = maerl beds, red = hydrothermal vents, dark green = Zostera beds, blue = intertidal Mytilus edulis beds.

Based on a comparative review of (i) the bathymetric distributions of the target species Atlantic wolffish / plaice and the bathymetric distributions of habitats, and (ii) the spatial distribution of fishing effort / location of catches and the spatial distribution of habitats, the Scoring Elements listed in Table 12 in section 4.4.3 were identified.

<u>Maerl beds</u>

Maerl is a collective term for several species of coralline red algae (Corallinaceae) that grow unattached and can form extensive beds. Maerl beds can be found on the open coast, in tide-swept channels or in sheltered areas of marine inlets with weak currents, and are mainly found on coarse sediments such as gravels, on sands, or on muddy mixed sediments. Since coralline algae require light for photosynthesis maerl beds are generally only found at depths to about 40 m. Maerl beds are an important habitat for a wide variety of marine animals and plants which live between or attached to the nodules, or which burrow in the sediment underneath the algae (Grall and Glémarec, 1997).

In Iceland maerl beds appear to be most common off the northern coast (see *Figure 24*). Aðalsteinsdóttir and Garðarsson (1980) sampled a grid of stations in central Hvalfjord, showing coralline algae to be present close to the northern shore from Grunartangi to Katanes. Karl Gunnarsson (pers. communication cited in OSPAR, 2010) reports that maerl is widely distributed in northern Icelandic fjords, deep within the fjords but probably exposed to some wave action. His study at Langanes, Arnafjörður (Gunnarsson, 1977) shows the maerl to be situated on an exposed headland within the fjord. This is similar to its distribution at Hvammur, Hvalfjörður (K. Collins and J. Mallinson, unpublished observations cited in OSPAR, 2010). Icelandic maerl beds have rarely been reported below 20 m depth in Icelandic waters (MFRI, pers. communication).

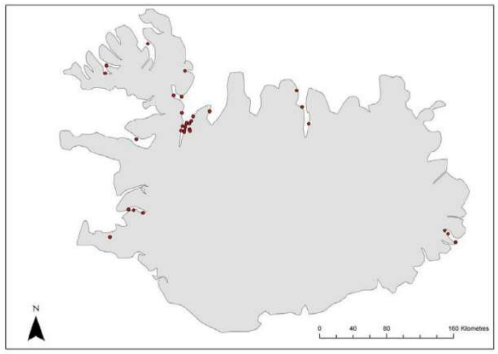

Figure 24. Geographic distribution of maerl grounds around Iceland (from various datasets including pers. communications with Karl Gunnarson, Reykjavik and Ken Collins, Southampton). Source: OSPAR, 2010.

Mechanical disturbance and re-suspension of nearby sediments, particularly by direct targeted extraction (e.g. for use as fertilisers), and through bottom trawling, are the most destructive human activities affecting maerl beds. Other threats include pollution (e.g. wastewater discharge, aquaculture), which results in increased turbidity and sedimentation, but also direct habitat destruction through artisanal and recreational fishing, coastal or offshore construction activities (including submarine cables), unregulated diving activities and anchoring. Climate change is also known to affect several key species that are part of coralligenous habitats (Martin et al., 2014). The main impacts on maerl beds in Iceland come from dredging for fertilisers and bycatch in the scallop dredges (Chen 2012 and references therein). Harvesting of maerl in Iceland is currently taking place at 3 locations within Arnarfjörður (MFRI, pers. communication), whilst scallop fishing in Iceland has declined significantly in recent years (in 2000 a total of 9081 tonnes of scallops were fished / during 2004-2013 there was no fishing of scallops in Iceland / in 2014 and 2015 the catch was 281 and 351 tonnes respectively).

Modiolus reefs

The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *M. modiolus* beds are found on a range of substrata, from cobbles through to muddy gravels and sands, where they tend to have a stabilising effect. Communities of both epibiota and infauna associated with horse mussel beds are diverse, including species such as for instance hydroids, red seaweeds, solitary ascidians and bivalves.

In a survey carried out in 1994 looking for fishable blue mussel beds in Icelandic waters, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* appears to be mainly concentrated near the coast on the western coast of Iceland (*Figure 25*).

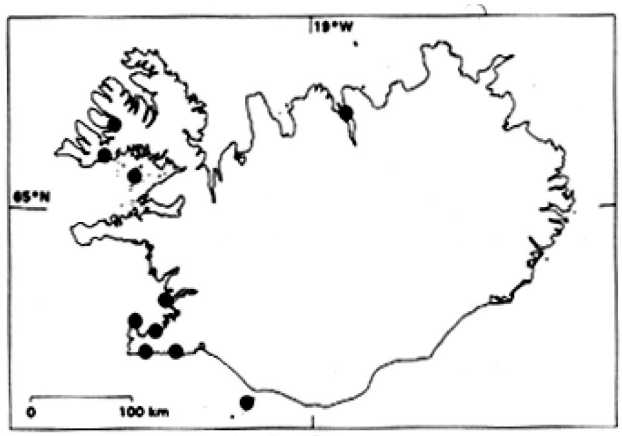

Figure 25. Distribution of Modiolus modiolus around Iceland. Source: Ingolfsson, 1996.

Activities which may impact horse mussel beds include dredge fisheries for scallops, beam and otter trawling, coastal developments, and run-off from agriculture, forestry and aquaculture. In Iceland reports from studies of the impacts of scallop dredging in Breidafjordur (off the western coast of Iceland) showed that *M. modiolus* was the most abundant by-catch species. However, the quantities picked up by the dredges indicated that even after about 30 years of fairly intensive fishing *M. modiolus* was still abundant (OSPAR, 2009).

Lophelia pertusa reefs

Lophelia pertusa is a cold-water, reef-forming coral that has a wide geographic distribution ranging from 55°S to 70°N, where water temperatures typically remain between 4-8°C. The larvae settle on hard substrata in relatively deep water and newly formed colonies have been found on the legs of oil platforms. These reefs are generally subject to moderate current velocities (0.5 knots). The biological diversity of the reef community can be three times as high as the surrounding soft sediment (ICES, 1999), suggesting that these cold-water coral reefs may be biodiversity hotspots. Characteristic species include other hard corals, such as *Madrepora oculata* and *Solenosmilia variabilis*, the redfish *Sebastes viviparus* and the squat lobster *Munida sarsi*. The mapping programme from Hornafjarðardjúp shows that three different zones can be distinguished within the coral area, live coral zone, dead coral zone and coral rubble zone. The fauna composition is different between these zones. The diversity is high for the dead coral and coral rubble zones but lower for the live coral zone (Ólafsdóttir, 2009).

Such coldwater coral areas in Icelandic waters occur close to the shelf break off the south and west coast of Iceland at 114 – 800 m depth (Copley et al, 1996), mainly along the Reykjanes Ridge, other ridges and the continental shelf foothills (*Figure 26*). Following scientific surveys to map the distribution of *Lophelia* reefs, fourteen coral areas have been closed for all fisheries using bottom contact gear.

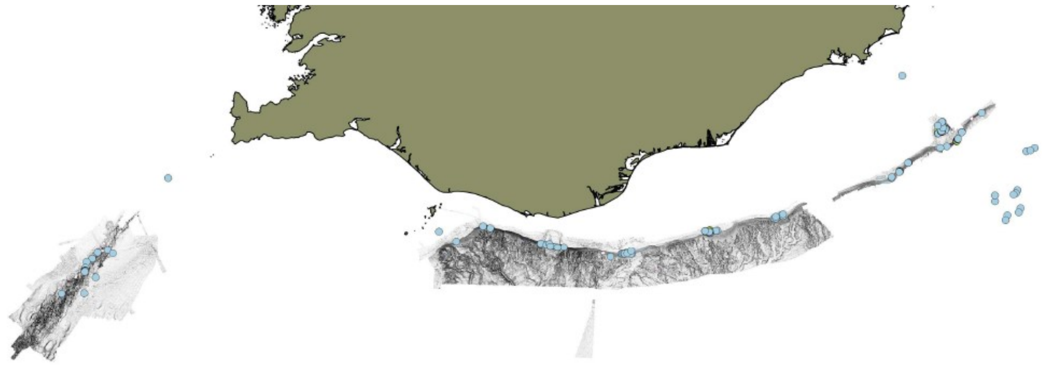

Figure 26. Present occurrence (light blue dots) of Lophelia pertusa in Icelandic waters. Source: Ólafsdóttir et al. 2014.

In common with many other corals, *Lophelia* is brittle which makes it vulnerable to physical damage, in particular from fishing gear (ACE, 2002). In the Norwegian EEZ, for example*, L. pertusa* is estimated to cover somewhere between 1,500 and 2,000 km² of seabed, mostly concentrated between depths of 200–400 m (Fosså et al., 2002). Analysis of information indicates that one half of the total reef area of Norway has been damaged to an observable extent (Mortensen et al., 2001). The current and past distribution of *L. pertusa* reefs around the Faroe Islands also show changes, and these are thought to be due to fishing (ICES, 2001). The MFRI has an ongoing programme mapping the seabed, including the location and distribution of *Lophelia* reefs. What remains uncertain is the length of time that apparent trawl damage can be identified in reef areas after the incident. At the depths involved it is quite probably decades rather than months. Economic self-interest means that skippers tend to avoid known reef areas due to the potential damage to trawls or loss of nets and lines with concomitant loss of catch and loss of fishing time to repair or recover gear.

MFRI interviewed retired fishermen who fished actively prior to 1970, and carried out a questionnaire to fishermen working in the fisheries more than 30 years later (Steingrímsson and Einarsson, 2004). This information was used to assess the current status of coral areas by comparing their historical and present distribution off Iceland. It was concluded that during the 1980s and 1990s some relatively large coral grounds vanished, e.g. one on the Reykjanes Ridge (36km²) and two near the Öræfagrunn Bank (68 and 30km², respectively; Garcia et al, 2007).

Based on analysis of logbook data about 79 km² were fished with towed bottom fishing gears in 2013, comprising 10% of the Icelandic ecoregion (MFRI, 2016). The total fishing effort by bottom trawls targeting fish and shrimp has decreased between 2000 and 2014 by around 40% while the *Nephrops* trawling effort has remained at similar level. The decrease in the fishing effort varied locally, with decreases mainly noted on the southern shelf and on typical shrimp trawling grounds on the northern shelf.

Deep-sea sponge aggregations

The waters around Iceland, at least down to 500 m depth, are very rich in habitat forming sponge communities, "ostur", dominated by *Geodia* spp. Klitgaard and Tendal (2004) describe the composition of "ostur" from sampling sites all around Iceland, the community south of Iceland being comprising *Geodia atlantica*, *G. mesotriaena* and *G. barretti* as well as *Geodia* (formerly *Isops*) *phlegraei (Figure 27)*. Very large catches of sponges (up to >20000 kg) were reported by Klitgaard and Tendal (2004) from the eastern and western flanks of the northern part of Reykjanes Ridge at more than 1000 m depth in Atlantic water. Bycatch analysis carried out during the 2002 groundfish survey enabled the estimation of the distribution of mass sponge occurrences on the Iceland shelf (Ragnarsson and Steingrimsson, 2003). The authors suspect that sponge bycatch is lower in areas of high fishing effort.

Very few species utilize the sponges as a food source; it is assumed, therefore, that the sponges act as keystone species providing associated species with habitat, refuge from predation or physical strain and enhanced food supply from the surrounding water. Juvenile redfish and other groundfish have been regularly observed in association with large sponges, suggesting that ostur is a suitable feeding ground for particular life-history stages of some fish species (Garcia et al, 2007).

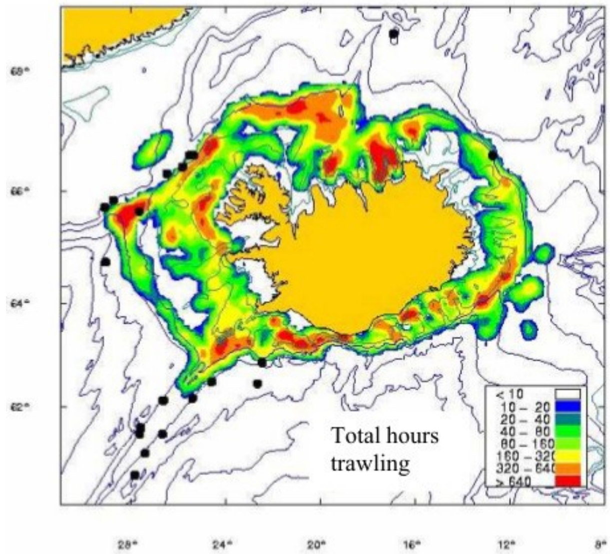

Figure 27. Geographic distribution of deep-sea, large-sized deomosponge aggregation ('ostur') around Iceland in relation to bottom trawling effort (total trawling hours 2003 [combined groundfish, shrimp and Nephrops fisheries]). Source: Garcia et al. 2006.

Self-evidently, direct trawl-gear impact will damage and break sponge colonies. The size structure within sponge populations indicates slow reproduction and recruitment, and high age of the large specimens. No exact aging has so far been done but both size structure and comparable investigations in Antarctica point to specimen which are decades if not centuries old (Dayton 1979; Gatti 2002). Consequently, it will take a long time for a sponge-dominated area to recover even after partial destruction, and repeated disturbance may lead to permanent extirpation of the species in the area. These risks, however, are mitigated by skippers' preference to avoid known areas of ostur for reasons of safety and economic common-sense. If a trawler strays into such an area it is all too easy to fill the net to an extent where it is difficult to haul, the net may burst and will the sponge bycatch can damage the catch to an extent that renders it unsalable (DNV, 2012).

<u>Coral gardens</u>

Coral gardens are mainly deep water habitats (OSPAR 2010b). Their main characteristic is a relatively dense aggregation of colonies or individuals of one or more coral species belonging to different taxonomic groups, such as leather corals (Alcyonacea), gorgonians (Gorgonacea), sea pens (Pennatulacea), black corals (Antipatharia) and hard corals (Scleractinia). They can occur on a wide range of soft and hard seabed substrata. Soft-bottom coral gardens may be dominated by solitary scleractinians, or sea pens, whereas hard-bottom coral gardens are often found to be dominated by groups like gorgonian corals (OSPAR 2010b).

Taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m (*Figure 28*). Soft corals do not form coral reefs, but where they occur they tend to be in high densities (Tendal 1992; Klitgaard and Tendal, 2001; Klitgaard and Tendal, 2004). Gorgonacea corals occur all around Iceland (*Figure 29*). They are relatively uncommon on the shelf (< 500 m depth) but are generally found in relatively high numbers in deep waters (>500 m) off the South, West and North Iceland. Similar patterns were observed in the distribution of

Pennatulaceans off Iceland, which are relatively rare in water shallower than 500 m but more common in deep waters, especially off South Iceland (*Figure 23*). Alcyoneacea occur at depths of 500 m to 1000 m (average depth 700 m), whilst Scleractinia have a wider depth distribution of 500 m to 1500 m with an average depth of 1200 m. Both Alcyoneacea and Scleractinia are only found in the warmer waters off the southern and western Icelandic coast (*Figure 30*). Alcyoniina are found at an average depth of 700 m and have a wide distribution around Iceland (*Figure 29*).

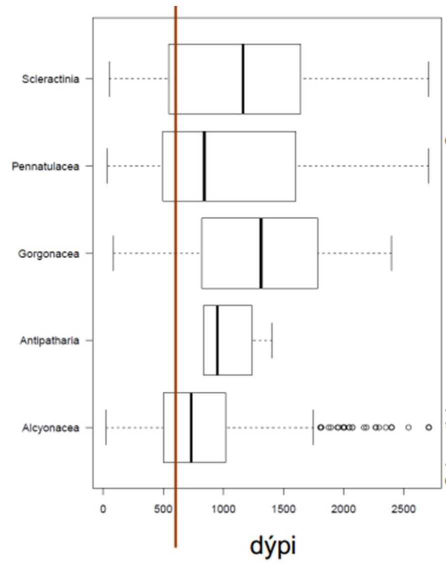

Figure 28. Boxplots showing the distribution of various groups of corals making up 'coral garden' habitat by depth (dýpi) around Iceland. (The red line should be ignored for these purposes.) Source: Ólafsdóttir et al. 2014.

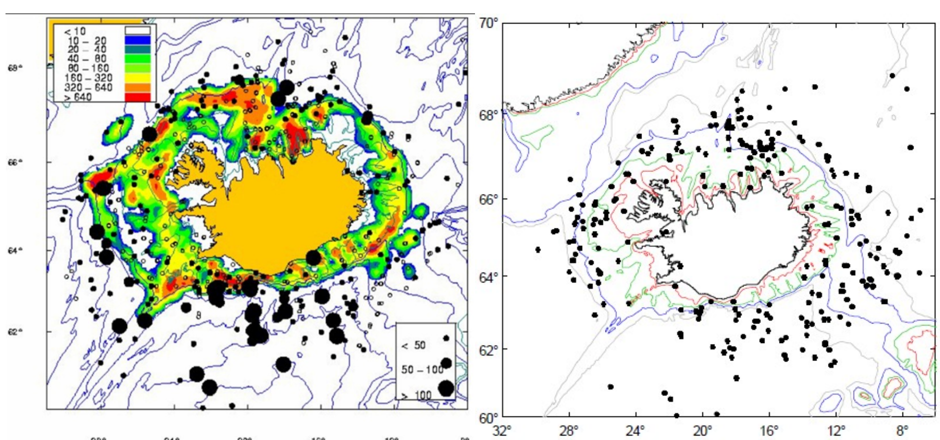

Figure 29. Left - Distribution of Gorgonacea corals (number of colonies in a sample) off Iceland in relation to bottom trawling effort (total trawling hours 2003 [combined groundfish, shrimp and Nephrops fisheries]). Data from the BIOICE database. Source: Garcia et al. 2006. Right - Distribution of Alcyoniina (leathery corals) off Iceland. Source: Ólafsdóttir et al. 2014.

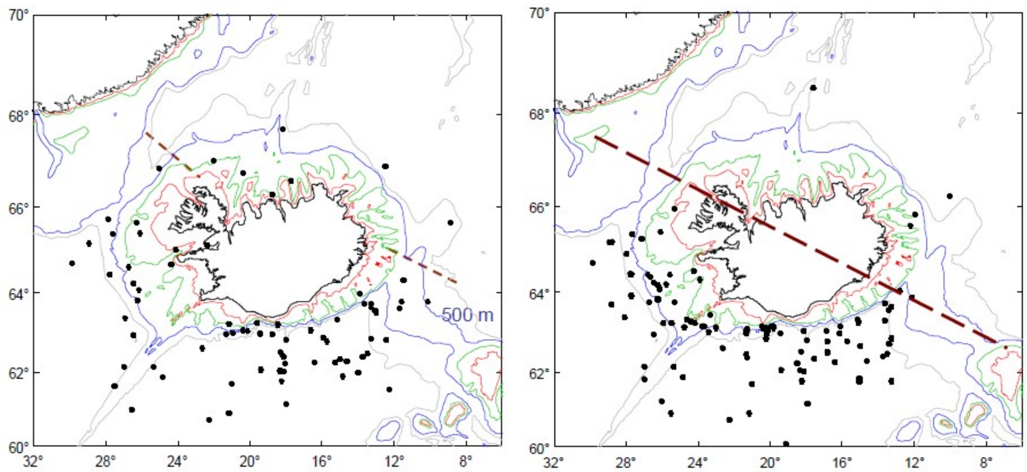

Figure 30. Left - Distribution of Alcyonacea (soft corals) off Iceland. Right - Distribution of Scleractinia (stony corals) off Iceland. Source: Ólafsdóttir et al. 2014.

As with the hard-coral reef features such as *Lophelia*, the soft coral species are vulnerable to direct impact damage by trawling, not least from *Nephrops* trawlers which work on mud grounds favoured by soft-coral species and seapens.

<u>Hydrothermal vents</u>

Hydrothermal vents are found in volcanic active areas including spreading ridges and fracture zones. They are formed by seawater penetrating the upper layers of the earth's crust through channels formed in cooling lava. The seawater reacts chemically inside the crust and rises back to the sea-bed, where hydrothermal vents are formed. The biological communities associated with such vents are unique since the communities contain a high diversity of chemo-autotrophic bacteria, which form the basis of the food webs found around hydrothermal vents (OSPAR, 2010c). In Icelandic waters such areas are the Mid Atlantic Ridge (i.e. the Reykjanes Ridge) and the Tjörnes Fracture Zone off Eyjafjörður, North Iceland (*Figure 31*). The main threats to hydrothermal vent systems and their associated biological communities are from unregulated scientific research (including collecting), seabed mining, tourism and bioprospecting (InterRidge, 2000). In order to ensure bottom otter trawling do not affect Icelandic hydrothermal vents, the area at Steinahóll is protected within a closed area where trawling has been prohibited since 1994 (*Figure 36*).

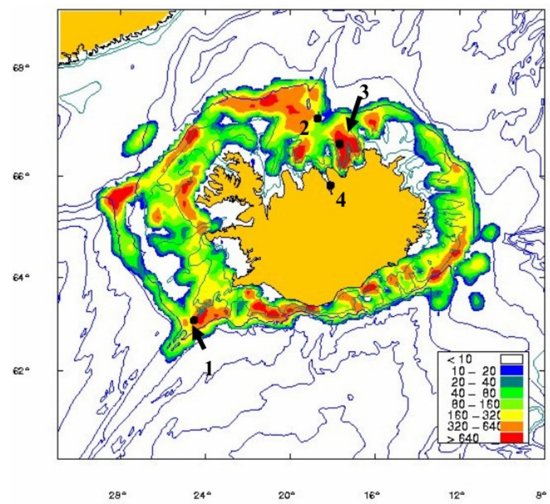

Figure 31. Location of areas of hydrothermal activity in Icelandic waters in relation to bottom trawling effort (total trawling hours 2003 [combined groundfish, shrimp and Nephrops fisheries]). (1) Steinahóll on the Reykjanes Ridge (2-4) Hydrothermal vents in the Tjornes Fracture Zone; Kolbeinsey vent fields (2), Grímsey vent fields (3) and in Eyjafjörður (4). Source: Garcia et al. 2006.

Seapens and burrowing megafauna

The habitat of *Nephrops norvegicus* is characterized by fine sand and mud, where sea-pen and burrowing megafauna communities can be found (OSPAR 2010d), at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna (*Figure 32*). The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

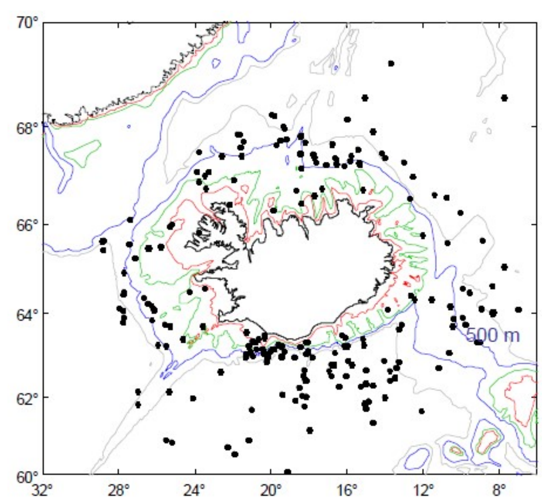

Figure 32. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, including Icelandic waters. Seapens are particularly sensitive to mechanical damage by *Nephrops* trawling. Studies on the impact of *Nephrops* trawling indicate that fishing intensity is the major factor controlling long-term negative trends in the benthos (Ball et al. 2000). However, compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000 (Garcia et.al. 2006), and during the period 2001-2013 the number of boats in the Nephrops fishery had reduced by around 50% (*Figure 33*).

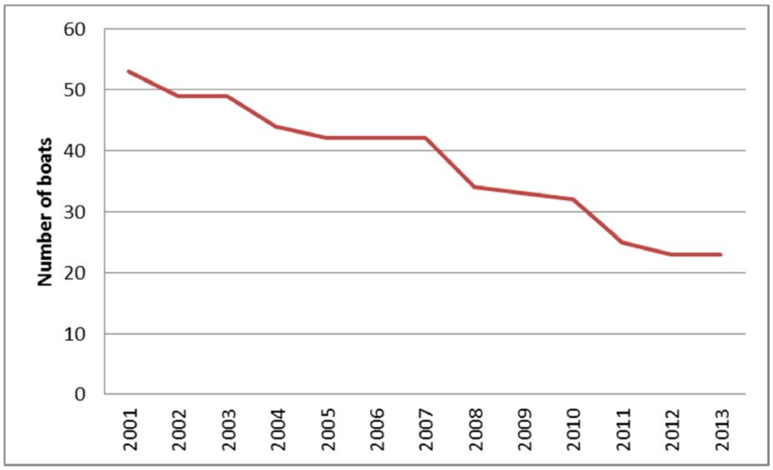

Figure 33. Number of boats licensed for Nephrops fishery during 2001-2013. Source: Icelandic Directorate for Fisheries database.

3.4.5.2 Management

The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention.

These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008a, 2008b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013).

Large areas of Icelandic waters are closed for fishing (see *Figure 21* and *Figure 22*), some of them temporarily (hours per day, days in total or seasonal) and others permanently (years). Areas are usually closed for fishing with bottom trawl or longline due to the presence of juvenile fish over extended periods of time or in order to protect spawning grounds. Although area closures are aimed at protecting juvenile fish, the measures have a secondary effect, i.e. protecting seabed habitats from being damaged by fishing activities. In addition, several areas have been closed to fishing explicitly to protect *Lophelia pertusa* reefs (*Figure*). The Icelandic Coast Guard monitors fishing activities in Icelandic waters, including surveillance of areas closed for fishing.

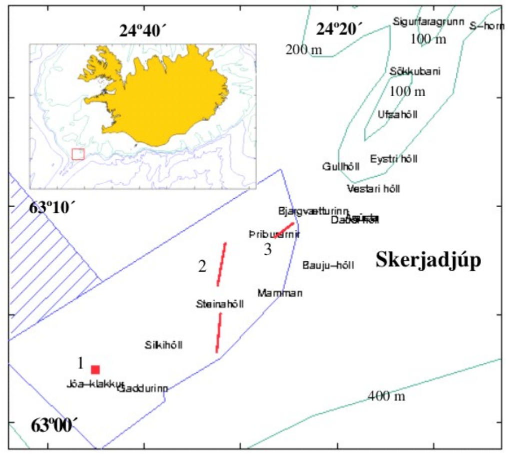

Figure 36. Position of the Steinahóll hydrothermal vent and occurrence of coral (indicated with red lines or square) on the Reykjanes Ridge. Area closed for otter trawling (since 1994) is outlined with a blue line (closed throughout the year) and blue hatched area (trawling allowed 1 st February – 15 th April). Source: Steingrmsson and Einarsson 2004.

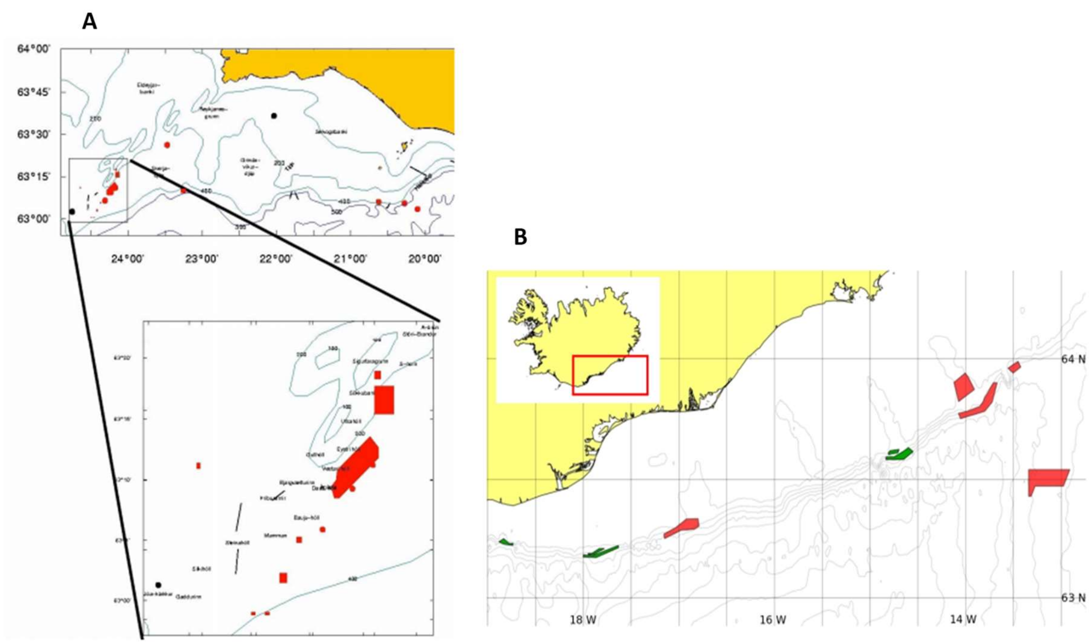

Figure 34. A: Coral areas off the SW coast of Iceland. B: Coral areas off SE Iceland where fishing operations have been banned since 2005 (green) and 2011 (red). Source: Ministry of Fisheries 2004; Ólafsdóttir and Burgos 2012a

3.4.6 Marine ecosystems and the assessed fisheries

The present assessment is an extension of scope to the MSC certified ISF Iceland saithe and ling fishery (fishery F-TUN-1106; certificate issue date 09/11/2014, certificate expiry date 10/09/2019). The assessment of the ISF Iceland saithe and ling fishery considered the impacts of bottom trawl, longline, handline, gillnet, Danish seine and *Nephrops* trawl on marine ecosystems when scoring PI 2.5.1 Ecosystem outcome / PI 2.5.2 Ecosystem management / PI 2.5.3 Ecosystem information. The subsequent surveillance visits revisited ecosystem issues. The assessment team considered all available information (incl. input from stakeholders during site visit), but did not find any reason to repeat the existing assessment. The relevant information can be accessed here: https://fisheries.msc.org/en/fisheries/isf-iceland-saithe-and-ling/@@assessments.

3.5 Principle Three: Management System Background

3.5.1 Area of operation and jurisdiction

All fishing for wolffish and plaice are within the Icelandic EEZ and managed by Icelandic authorities. All catches of wolffish and plaice are taken by Icelandic vessels.

3.5.2 Interest groups

Even if its importance in the Icelandic economy has gradually diminished in recent years and decades, the fishing industry is still very important in Iceland and its fortunes affect the whole economy. The largest organization of employers in the fishing and fish processing industry is the Fisheries Iceland (Icelandic: Samtök fyrirtækja í sjávarútvegi, SFS). The owners of smaller vessels are organized in National Association of Small Boat Owners (Icelandic: Landsamband Smábátasjómanna, LS). The employees are organized in the Federation of Captains and Mates (Icelandic: Farmanna- og fiskimannasamband Íslands, FFSÍ), the Icelandic Union of Marine Engineers and Metal Technicians (Icelandic: Félag vélstjóra og málmtæknimanna, VM) and the Federation of Seamen (Sjómannasamband Íslands, SÍ).

3.5.3 Objectives of the fishery

The Icelandic Fisheries Management Act (no. 116/2006) states (Art. 1) that the authorities should "contribute to the protection of (exploitable stocks in Icelandic waters) and their economic exploitation and thereby ensure secure employment and settlement in the country."[2] The Act on the utilization of exploitable marine stocks (no. 57/1996) states (Art. 1) that its aim is to contribute to "sustainable utilization which ensures maximum benefits to the Icelandic nation in the long-run."[3] These Acts make no references to the precautionary principle. The principle is embedded in some of the international conventions to which Iceland is a signatory to, e.g. the OSPAR convention and the United Nations Agreement on the implementation of the provisions of the United Nations convention on the Law of the Sea, 10 December 1982, which relates to the conservation and management of straddling fish stocks and highly migratory fish stocks (in force as of the 11 December 2001). The precautionary principle is also mentioned in the preface of the European Economic Area (EEA) agreement and is now firmly embedded in EEA law and regulations.[4]

3.5.4 Fishing rights and regulations

The Fisheries Management Act of 1990 established the present system of Individual Transferable Quotas (ITQ) for the Icelandic fisheries. The Act stipulates that each year fish quotas shall be allocated to eligible fishing vessels according to their quota shares. The Act does not define a terminal date for the system. In that sense, the shares can be considered permanent. On the other hand, the shares do not form a property right and can be altered or abolished by the Icelandic legislative assembly, the

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[2] Stjórn fiskveiða 2010/2011, lög og reglugerðir (Laws and regulations for fisheries management, in Icelandic), Ministry of Industry and Innovation, August 2010. An English translation is available, Act on Fisheries Management as subsequently amended, Icelandic Fisheries, the website of the Ministry of Industry and Innovation, 2010.

[3] No. 57, June 3 1996, accessible (in Icelandic) in Stjórn fiskveiða 2010/2011, lög og reglugerðir (Laws and regulations for fisheries management, in Icelandic), Ministry of Industry and Innovation, August 2010.

[4] See discussion on the precautionary principle in the proposal for law on main principles of environmental law (Frumvarp til laga um meginreglur umhverfisréttar, þskj. 842 – 566. mál, put forward during the 133. Session of the Althing 2006-2007, http://www.althingi.is/altext/133/s/0842.html.). This proposal was not passed.

Althing. The quota shares can be traded and so can the annual quota allocation. There are some restrictions on this trade, e.g. each vessel must catch at least half of its quota allocation each fishing year and there are specified upper limits for the quota holdings of any one company.

This legislation on fishing rights has been tested in the courts on many occasions. Two court cases in 1998 and 2000 settled basic disagreements on the foundations of the present system. On December the 3rd 1998, the High Court of Iceland ruled that the provision in the Fisheries Management Act, allowing the authorities to limit the entry of fishing vessels, was unconstitutional as it treated those that had originally got licensing of their fishing vessels (in 1984) differently from later applicants. The High Court ruled that such unequal treatment of Icelandic citizens could only be accepted as a temporary measure justified by some extraordinary conditions. Subsequently, the Act was amended in accordance with this ruling. The amendment opened up the possibility that anyone, who applies for the licensing of a fishing vessel which conforms to a particular standard, can obtain a fishing license. However, a fishing license is not a sufficient condition for commercial fishing of a species which is subject to quota restrictions; for such fishing to be legal some quota must also be registered to the vessel and/or – as currently is possible – the vessel may have a license for Coastal fishing.

The limitations of "the right to catch" set by the Fisheries Management Act were tested in court on the 6 of April 2000 when the High Court ruled that limitations of fish catch (TAC) is constitutional.[5]

The rights of different fishers to access the resource are clearly codified in the legislation. As with all other legislation in Iceland, the legislation on fisheries management has been developed through legally based, democratic processes where various stakeholder groups were consulted. Between plenary debates (readings) on draft legislation in the Althing, extensive hearings with experts and stakeholders have been conducted by permanent committees of the assembly.

Gradually the rights of different fishers to access the resource have become more homogenous and the total catch has become more predictable. The introduction of Coastal fishing (strandveiðar) in 2009, where small vessels using only hand-line can take part and where there is a common total quota for all vessels in the fishery, introduced some heterogeneity into the system. However, so far, the catch allocated to Coastal fishing is small, 6,000 tonnes in total. Before deciding the total quota for the present fishing year, the estimated catch in Coastal fishing was subtracted from the TACs for the relevant species. Practically all permissions to catch wolffish are allocated in the quota system and all catches are caught by Icelandic vessels and landed in Iceland.

3.5.5 Fishing regulations

The Ministry of Industries and Innovation (MII) is responsible for the management of fisheries in Iceland as well as for the implementation of fisheries legislation, including the issuing of relevant regulations. MII's duties include general administration, long-term planning and relations with other fisheries institutions at the international level. The Minister is responsible for deciding the annual TAC. Before making the decision, the Minister must consider the advice for the stock from the Marine and Freshwater Research Institute (MFRI).[6]

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[5] High Court ruling No. 12/2000, available in Icelandic at https://www.haestirettur.is/default.aspx?pageid=347c3bb1-8926-11e5-80c6-005056bc6a40&id=ec41e28f-73cc-422e-b1bd-2f903568667c.

[6] In 2015 Althing, the Icelandic Parliament, passed laws establishing a new instiution merging the old Marine Research Institute (MRI) (Icelandic: Hafrannsóknastofnun, website: www.hafro.is) and the much smaller Institute of Freshwater Fisheries (Icelandic: Veiðimálastofnun, website: www.veidimal.is) in Marine and Freshwater Research Institute (MFRI) (Icelandic: Hafrannsóknastofnun – rannsókna- og ráðgjafastofnun hafs og vatna, website: www.hafogvatn.is). This merger became effective 1st of July 2016. The new institution has 165 employees, thereof some 20 from the Institute of Freshwater Fisheries and has 2 specially equipped research vessels. To avoid confusion, we will always use the acronym MRI in this report.

Three public institutions are at the heart of Icelandic fisheries management: MFRI, the Directorate of Fisheries (DoF) and MII (formerly the Ministry of Fisheries and Agriculture). The Coast Guard also has a role in monitoring fishing activities, gears, fishing locations and discarding. Many areas in the waters around Iceland are closed for fishing, mostly because they contain large quantities of juvenile fish, but also for ecological reasons (e.g. to prevent the destruction of corals). Some areas are closed permanently to some fishing while other area closures are temporary. All discarding of catches is explicitly banned by Icelandic law.

The MFRI is responsible for biological research and stock assessments and provides advice on Total Allowable Catches (TACs) to MII. Its stock assessments are based on data from extensive research fishing as well as data on catches, length and age composition and sexual maturity of the fish. The MRI presents its advice at the end of May/beginning of June each year.

The MFRI plays an important role in communicating scientific advice to the fishing industry. This communication takes place through the web, newspapers and meetings with people from the industry, including public meetings. Most of the funding of the MFRI comes from the state budget, but the institute also obtains funds from domestic and international research funds, among them the fund "Verkefnasjóður". This body receives income from the tax on low value catch and from some fines for illegal fishing collected by DoF. The estimated funding of MFRI in 2016 amounts to 3,419 million ISK (25 million EUR). Of that sum 54% is estimated to come from the state budget.[7] The number of employees is 165 and it operates two specially equipped research vessels. MII is responsible for the management of living marine resources in Icelandic waters. The minister is constitutionally responsible to the Althing (Parliament). As fisheries are so important for the economy of Iceland, the Althing has a permanent committee on matters related to fisheries and fish processing[8]. This committee discusses all proposed legislation on these matters and can decide to discuss any aspect of the industry's behaviour or any concern that some people may have. It can require that information on the relevant matters be supplied by MII or the public institutions serving the fishing industry.

There is legislation ("Upplýsingalög" or Freedom of Information Act) in Iceland which requires ministers and public institutions to reveal existing information. Members of the Althing can obtain detailed information from MII and public institutions by putting questions to the appropriate minister in the Althing.

Before making decisions, the minister consults extensively with stakeholder organisations including Fisheries Iceland (Samtök fyrirtækja í sjávarútvegi, SFS), The National Association of Small Boat Owners (Landssamband smábátaeigenda, LS), the Federation of Captains and Mates (Farmanna- og fiskimannasamband Íslands, FFSÍ), the Icelandic Union of Marine Engineers and Metal Technicians (Félag vélstjóra og málmtæknimanna, VM) and the Federation of Seamen (Sjómannasamband Íslands, SÍ) as well as organisations of those working in fish processing (in Iceland both fishing and fish processing are frequently carried out within the same company). All laws and regulations are published in real time as they come into effect on MII's website. DoF has many important roles in fisheries management in Iceland. The DoF licenses fishing vessels, fish processing plants and authorizes harbour scales which are used for weighing all landings of fish. It also monitors the operators of those facilities to ensure that they follow relevant regulations. The DoF gathers information on both catches (including logbook information) from the vessels at sea and information on catches from the authorized harbour scales. This information is sent electronically to the DoF at

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[7] Additional 126.3 million ISK (0.92 m EUR) is allocated for international co-operation and research within international institutions like North Atlantic Marine Mammal Commission (NAMMCO), International Council for the Exploration of the Sea (ICES), Northwest Atlantic Fisheries Organization (NAFO), North-East Atlantic Fisheries Commission (NEAFC), International Commission for the Conservation of the Atlantic Tunas (ICCAT) and International Whaling Commission (IWC).

[8] In 2009, its remit was extended to agriculture and its name was changed to Althing´s Fisheries and Agriculture Committee.

least once every day and published on the DoF's website. The website makes available information on the quota positions of every vessel in Iceland, such as its quota allocations for each species and how much it has caught.[9] All trade in quotas and quota shares has to be reported to the DoF.

The DoF monitors fish processing as well as fishing. All sellers of fish must report the name of the purchaser to whom they sold fish as well as the quantity and price of fish they sold to them. Similarly, all purchasers of fish must report the name of their supplier, the quantity they purchased and the price paid. The DoF regularly checks if the output of fish products from a fish processing unit is consistent with the reported input of raw fish. Monitoring of the quota system in Iceland is strengthened by the traceability measures required for exports in a country where over 90% of all fish caught is eventually exported in some form.

There is no illegal, unreported and unregulated (IUU) fishing in Icelandic waters. All landing of fish from vessels that engage in IUU fishing and the servicing of such vessels is forbidden in Iceland.

In summary, the institutions, their roles and interactions are clearly defined within the three core areas of resource management: (1) The development of the knowledge base, (2) preparation and implementation of regulations, and (3) the enforcing of the regulations. The interactions between MII, DoF, the Coast Guard and the MFRI function well. The role of each institution is well defined, with MII taking political responsibility for decisions, and DoF performing the technical work at the behest of MII. Decision-making procedures are well established and allow for expeditious and effective interactions. There is an established, tested and proven annual decision-making process, which ultimately results in the setting of regulations for the following year.

The compliance with regulations is subject to a rigorous and efficient enforcement system.

Subsidies were abolished in the Icelandic fishing industry in the early 1990s and since 2004 the industry has been paying an annual fee based on estimated profitability of the sector and on the weighted volume of landings.[10] The fishing industry is expected to pay 8.57 b.ISK (63 m.EUR) in fees during 2016.[11] This amount is equal to 5.7% of the value of all landings in 2015.

3.5.6 Monitoring and surveillance controls

DoF is entrusted with the day-to-day administration of fisheries. The DoF is responsible for implementing legislation on fisheries management and it collects and publishes numerical data and other information on fisheries. The DoF issues fishing permits to vessels and licenses scales for weighing landings. It keeps records of quota shares and quotas, including all transfers of quotas and quota shares between vessels. It also checks that vessels do not fish in excess of their quotas.

The DoF is responsible for ensuring that fishers follow regulations on gears, fishing locations and discarding. It also ensures that vessels, provided they are in the quota system, have quotas for the probable catch before leaving harbour. The DoF gets some assistance in monitoring of gear, discarding and fishing locations from the Coast Guard, which also monitors fishing activities of foreign vessels near the Icelandic fisheries zone.

The DoF collects data on fishing and fish catches landed by the Icelandic fleet and monitors compliance with rules on the weighting and recording of catches. Other duties include imposing penalties for illegal catches.

The DoF provides supervision on board fishing vessels and in ports of landing, which involves inspecting the composition of catches, fishing equipment and handling methods. The DoF also issues

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[9] See DoF´s website www.fiskistofa.is. Some of the information on this website is also available in English.

[10] The weights are average landing prices during a recent 12-month period before the start of the fishing year.

[11] See the state budget for 2016.

licenses to processing plants and supervises their production. Processors have to meet specific requirements concerning hygiene, equipment and quality control. Approved inspection bodies are responsible for inspection of hygiene, facilities and in-plant monitoring of production, both in processing establishments on land and on board vessels. Accreditation of inspection bodies is required.

The DoF has the right to demand that inspectors are allowed on board fishing vessels as observers. These observers can demand that the vessel goes to a certain fishing location and that certain gear should be used. Requiring repetition of the fishing procedures of the last fishing trip enables inspectors to compare the catches from the two trips. Comparing the catches of different vessels fishing in the same location and using the same gear is also used for monitoring.

A vessel owner who is found to have acted in breach of regulations gets a warning and a fine. Repeated offenses lead to heavy fines, revocation of the vessel's license to fish and possibly to prison sentences. In 2015, the DoF meted out fines to the sum of 15.8 million ISK (116,000 EUR).[12]

The DoF co-operates with a number of other institutions, including the Icelandic Coast Guard and the Harbour Authorities regarding daily recording of landed catches throughout the country. The Icelandic Coast Guard monitors fishing activities in Icelandic waters, including surveillance of areas closed for fishing and inspection of mesh sizes and other gear related practices.

The DoF and the Coast Guard surveille and police the fishing of foreign fishing vessels in the Icelandic EEZ and in those cases where landings of catches take place abroad the DoF cooperates with counterparties in the relevant countries for proper weighing of the catch.

All discarding is explicitly banned by Icelandic laws. However, some discarding is known to take place. Discarding in Icelandic fisheries has been estimated on several occasions through co-operative studies by the Marine Research Institute and the DoF. Data collection is mainly related to cod, haddock, saithe (*Pollachius virens*) and golden redfish (*Sebastes norvegicus*) in demersal trawl fisheries, and plaice (*Pleuronectes platessa*) in the Danish seine fishery. Sampling for other species, such as wolffish, was not sufficient to warrant a satisfactory estimation of discarding. For each species, the discard was estimated by comparing data on length distributions of fish measured at sea and landed catch from the same fishing ground.[13] In the most recent report on discarding, published in September 2016[14], it is noted that estimated discarding of cod has been increasing. The discarding in bottom trawl fishing for cod is estimated to be 2.4% of the total catch in 2015, while discarding in long-line fishing for cod is estimated 1.8%.

The monitoring and policing of Icelandic fishing is enhanced and strengthened by the traceability measures required for exports, since over 90% of all catches are exported.

There have been several external reviews of the methods that the Marine Research Institute uses in its stock assessments and of the recommendations and advice it gives. ICES reviews most of MFRI's advice annually, but not the advice for wolffish. There have also been special reviews made by internationally respected experts. There has not been comparable external review of the work of the DoF, or of MII. However, these institutions are subject to regular reviews by the Althing´s committees, especially the permanent committee on fisheries issues. Like other public bodies, these institutions

[12] DoF´s Annual Report 2015 p. 22. In 2015 14 offences were sent to the police. Of 1370 warnings of withdrawals of fishing licences because of fishing in excess of quotas only 8 lead to actual withdrawals as the offenders were able to acquire the quotas that was required within the given time frame. In one case weighting licence was withdrawn. 77 fishing licences were withdrawn because of violations of logbook regulations and 15 licences were withdrawn because the owners didn't pay the resource (catch) tax. In 2015 42 fishing licences were withdrawn because the owners hadn't paid a fine for some offences.

[13] Pálsson *et al.* (2012), and Pálsson *et. al.* (2013).

[14] *Sigurdsson et al.* (2016).

are subjected to scrutiny by The Icelandic National Audit Office (Ríkisendurskoðun). The performance of the institutions involved in fisheries management is scrutinized and intensively debated in Iceland, especially in the many fishing communities.

The MfRI staff publishes its research in peer-reviewed scientific journals. The system of fisheries management is under regular review by the Althing as well as by local authorities, the fisheries sector and the general public. The management of the Icelandic fisheries and the level of fees paid for fishing rights (quotas) are presently important issues in Icelandic politics. The external review processes have been beneficial to the work of the MRI. It seems probable that other parts of the fisheries management system in Iceland would also benefit from more external reviews.

3.5.7 Management and research plans

An increasing number of stocks are now managed with a management plan. The first management plan was introduced in 1995, based on recommendations from a working group composed of experts from the MFRI and NEI (National Economic Institute) as well as people from the vessel-owners and seamen's union.[15] Management plans that have been implemented are reviewed regularly (every five years). The decision on the management plan is taken by the Minister but before taking the decision the Minister considers reactions from the stakeholders and experts. As yet there are no management plans for either wolffish or plaice.

The MFRI's long term research plan for 2012-2016[16] is in its last year. The plan emphasizes the importance of biological, ecological and environmental research. The need to evaluate long term exploitation of important species is recognised as well as the formulation of harvest rules for as many species as possible. The plan stresses research on the effects of neighbouring waters (Greenland and Faroese) on the fish stocks in Iceland and on the stock structure. It is to be expected that the new institution, MFRI, will produce a new long term research plan.

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[15] See Anon. (1994). Hagkvæm nýting fiskistofna (Optimal exploitation of fish stocks) written by the Working group on exploitation of fish stocks. The content of this report is available in english in Baldursson et al. (1996), On the Rational Utilizaton of the Icelandic Icelandic Cod Stock, ICES Journal of Marine Science Vol. 53 (1): 643-58 and in Danielsson et al. (1997), Utilization of the Icelandic Cod Stock in a Multispecies Context, Marine Researce Economics, Vol. 12: 329-344.

[16] Rannsókna- og starfsáætlun árin 2012-2016.

4 Evaluation Procedure

4.1 Harmonised Fishery Assessment

At the time of the assessment there were no other Atlantic wolffish or plaice fisheries under assessment within the Icelandic EEZ against the Marine Stewardship Council's (MSC) Fisheries Standards. In the framework of P2 and P3, full harmonization with other certified fisheries within Icelandic EEZ has been carried out. No other fishery targets the two stocks within the Icelandic EEZ.

4.2 Previous assessments

The original assessment of the ISF Iceland Saithe fishery was initiated in April 2013 and the fishery received its certificate in September 2014. The expedited assessment of ling as an extension of the ISF Iceland Saithe fishery was announced April 2015 and was successfully completed, resulting in certification in November 2015.

4.3 Assessment Methodologies

This assessment followed the standard requirements of *MSC Fisheries Certification Requirements v1.3,* the same standard that was used in the original ISF Iceland saithe fishery assessment. The team however followed the process requirements of *MSC Fisheries Certification Requirements (& Guidance) v2.0.* The setup of the report follows the "*MSC Full Assessment Reporting Template v1.3"* but with small changes that are in line with the process requirements of the "*MSC Full Assessment Reporting Template v2.0".*

The assessment team proposed the use of the Default Assessment Tree. No comments or objections were received in response to the proposed methodology. The Default Assessment Tree was therefore used.

4.4. Evaluation Processes and Techniques

4.4.1 Site Visits

Site visits and stakeholder meeting were conducted as announced in Reykjavík, Iceland, during the period 31st October to 2nd of November 2016, see *Table 10* below.

4.4.2 Consultations

Stakeholders were invited to submit comments and to consult the assessment team from the onset of the assessment process. Public notification of the assessment, its scope, methodology and assessment team, was issued with an invitation to comment and consult the team, and the same was sent out by e-mail to an extensive list of stakeholders. Meetings were arranged with representatives of the client and key stakeholders, as summarized in *Table 10*.

Fishing vessels of foreign nations fishing within the Icelandic EEZ under the terms of bilateral agreements were included in the Client´s original statement of policy on certificate sharing arrangements. As the Client later confirmed the wish not to include those vessels in the assessment, a variation was requested by the CAB and subsequently granted by the MSC to amend the units of assessment accordingly. The expedited assessment therefore only includes Icelandic vessels registered by the Fisheries Directorate to operate within the Icelandic EEZ. Notifications, including amended client statement on certificate sharing arrangements, were issued to stakeholders to confirm those changes.

Table 10: Itinerary of site visit and stakeholder consultation in the Icelandic Atlantic wolffish and plaice fishery assessment.

Meetings with Client and other Stakeholders	***Subjects of Consultation***
31.10.2016: Meeting with the Client (ISF). Kristinn Hjálmarsson (ISF), Erla Kristinsdóttir (ISF) Members of the Assessment team.	Meeting with the project management of the Client; general discussion on Iceland Sustainable Fisheries (ISF), the fishery practice and its management; relations of the fishery to research, management and control bodies; chain of custody issues.
31.10.2016: Ministry of Industries and Innovation and Directorate of Fisheries. Annas Jón Sigmundsson (MII), Erna Jónsdóttir (MII), Brynhildur Benediktsdóttir, Þorsteinn Hilmarsson (DF), Áslaug Eir Hólmgeirsdóttir (DF), Members of the Assessment team	Fisheries policy. Management practices and objectives. Ecosystem and habitat protection. Enforcement of fishery policies and management decisions. Monitoring, surveillance and landing statistics.
1.11.2016: Marine and Freshwater Research Institute Klara B. Jakobsdóttir (MFRI), Guðmundur Þórðarson (MFRI), Stefán Ragnarsson (MFRI), Guðjón Sigurðsson (MFRI), Members of the Assessment team.	Scientific research and data on the fishery. Bycatch, habitat and ecosystem issues.

4.4.3 Evaluation Techniques

All the required public announcements were published on the website of the MSC and mailed electronically to the client and a list of stakeholders. All stakeholders identified have internet access and access to an email account. This was identified as the most appropriate contact. A working knowledge of the Atlantic wolffish and plaice fisheries was obtained by literature review and by interviews with key actors and stakeholders in the fishery. Information on this fishery is readily available from the management (DF) and scientific authorities (MFRI, ICES).

Each team member was responsible for a single principle to develop scoring justifications. A Gap analysis conducted prior to the assessment identified the performance indicators which would need to be rescored, and the team further evaluated the need for rescoring of some performance indicators during the site visit. A group consensus was developed for the scoring of each scoring issue and this determined the final scores for each performance indicator. The standard MSC decision rule was applied for the final recommendation (i.e. aggregate category-level scores must all exceed 80 and each individual Performance Indicator must score 60 or above).

The assessment team interviewed representatives of the client, Iceland Sustainable Fisheries ehf. The assessment team conducted separate meetings with representatives of the Ministry of Industries and Innovation (MII), of the Marine and Freshwater Research Institute (MFRI) and the Directorate of Fisheries (DF) to discuss matters related to marine biological research data, fisheries advice, fisheries management and government policy, as well as the enforcement and monitoring of official regulations.

Table 11. Scoring elements.

Component	***Scoring elements***	***Main/not main***	***Data-deficient or not***
Principle 1	Atlantic wolffish (*Anarhichas lupus*) in Iceland EEZ Plaice (*Pleuronectes platessa*) in Iceland EEZ	Target species	Not
Principle 2: Gillnet Bycatch	Non-vulnerable species Harbour porpoise Harbour seal Harp seal Ringed seal Hooded seal Northern Fulmar Common guillemot Northern gannet Razorbill Atlantic puffin	Non-vulnerable species: Minor All marine mammals and seabirds: Main	Not
Principle 2: Longline Bycatch	Non-vulnerable species Northern fulmar Black guillemot Northern gannet Cormorant Greater black-backed gull	Non-vulnerable species: Minor All seabirds: Main	Not
Principle 2: Bottom Trawl Habitats	*Lophelia* reefs Seapens and burrowing megafauna Other subtidal sedimentary habitats	N/A	Not
Principle 2: Danish Seine Habitats	Maerl beds (only plaice UoA) *Modiolus* reefs Seapens and burrowing megafauna Other subtidal sedimentary habitats	N/A	Not
Principle 2: Gillnet Habitats	*Modiolus* reefs Seapens and burrowing megafauna Other subtidal sedimentary habitats	N/A	Not
Principle 2: Handline Habitats	Maerl beds (only plaice UoA) *Modiolus* reefs (only plaice UoA) Seapens and burrowing megafauna Non-vulnerable muddy / sandy habitats	N/A	Not
Principle 2: Longline Habitats	Maerl beds (only plaice UoA) Modiolus reefs (only plaice UoA) Seapens and burrowing megafauna (only plaice UoA) Vulnerable / sensitive habitats (only Atlantic wolffish UoA) Non-vulnerable muddy / sandy habitats	N/A	Not
Principle 2: *Nephrops* Trawl Habitats	Seapens and burrowing megafauna	N/A	Not
Principle 3	Icelandic Management Authority	N/A	Not

5 Traceability

5.1 Eligibility Date

The eligibility date for all the Atlantic wolfish and plaice units of assessment will be the date of publication of the first Public Comment Draft Report.

The eligibility date and its implications for chain of custody were discussed with the client prior to the launching of the assessment. As outlined below there is already in force a robust system of traceability and segregation that gives confidence in the eligibility date set. The catch is recorded at sea and again by official weighmasters at landing points by vessel, gear and species.

5.2 Traceability within the Fishery

Traceability within the ISF Iceland saithe and ling fishery, including the proposed extension of scope, is established by means of physical segregation and recording of the product at several key points of the chain from fishing to the first point of sale or processing. Vessels fishing within the Icelandic EEZ are subject to a permit issued by the Directorate of Fisheries (DF). Vessels are required to carry a vessel monitoring system (VMS), which is monitored 24hrs a day by the Coast Guard. An AIS system (Autonomous Identification System) applies to vessels while operating within 50 miles and an Inmarsat/Standard-C system for vessels operating further afield.

The DF collects, retains and publishes data on fishing and catches landed by the Icelandic fleet and by other vessels catching within the Icelandic EEZ. The DF monitors compliance with rules on weighing and recording of catches. The DF also collects information about all sales and purchases of unprocessed fish that is traceable to landings, i.e. to vessel, gear and area, which enables DF to monitor potential substitution.

Fishing vessels are required to fill out logbooks to record details of fishing practices, including location, dates, gear, species and catch quantity. Vessels above 6 GT in size are required to do so electronically while smaller vessels may do so manually. Logbooks must be submitted directly to the Directorate of Fisheries. Most fishing is conducted by means of single gear per trip. The use of multiple (more than one) gears during same fishing trip is rare, although this may occur in some cases on smaller vessels simultaneously using handline and longline. However, captains are required to report their catch by type of gear, as well as fishing area. Catch, whether gutted on board or not, is separated by species in large tubs. Tubs carry identification numbers, and vessels conducting multiple-days trips add removable tag to each tub on board to further identify day of catch, both of which are carried through landing, auction and first trading, unless processing is conducted at auction and in that case chain of custody is required. These measures serve to prevent substitution and to ensure segregation of fish of certified units (gears and areas) from fish of non-certified units, up to the point of landing.

Landings of each fishing vessel are monitored by persons officially licenced and employed by local port authorities. These certified weighers are responsible for weighing landed catch, using certified scales, and recording the catch by vessel, species, fishing gear used, and quantities landed. Inspectors from the DF regularly monitor the landing of catches to ensure that catch is weighed and recorded according to precise applicable rules. This provides a check on the accuracy of vessel logbooks for all landings and a support to traceability within the fishery. All fish caught within the Icelandic EEZ must be registered and weighed in Iceland, although DF may, with the Ministry´s permission, authorise derogation from that rule.

Fish catch remains segregated at the point of landing by vessel, species and gear. Identified tubs of landed fish are passed on either directly to first buyer (trader or processor), or to an auction that operates as an electronic facilitator of trade or as a physical facility where tubs received are passed on to first buyer. In the event an auction assembles small lots from more than one small vessels into a single lot, the delivery document specifies the names of the vessels and the gear applied. A few auction houses may perform primary processing (gutting), involving change of tub numbers, which will require the facilities to be chain of custody certified (or registered as processing sub-contractors for CoC certified entities) to assure traceability of fish supplied, back to the unit of certification. At the time of the release of this (Final) report, four auction operations are CoC certified in Iceland.

Fishing companies, especially ones operating large vessels with on-board processing facilities, may use sub-contracted cold storage facilities for storing landed catch prior to first sale or first processing after landing. This may be the case particularly with short-term storing of landed fish-on-ice, or longer-term storing of products frozen, packed and labelled on-board the vessel, typically loaded on pallets which in turn are sometimes loaded into containers. Either way, these are identified and traceable to vessel, catch dates, gear and fishing area.

The client was made aware of the special requirements set by the MSC´s Chain of Custody standard for the handling and segregation of under-assessment products from those fisheries.

The units of certification allow for catch from the entire Icelandic EEZ to enter chain of custody. All registered Icelandic fishing vessels, operating bottom trawl, Danish seine, gillnet, longline, handline, or *Nephrops* trawl within the Icelandic EEZ are eligible. Fish caught directly or purchased by members of the client group and their certificate sharers from vessels, auctions or processors, is traceable to catch dates, catch areas, fishing gears and vessels.

While the assessment team has confidence in the internal traceability of the proposed extended ISF Iceland saithe and ling fishery, a recommendation will be raised, requesting that the client issues a reminder to all of the client members, including auctions, to observe the following:

- to ensure full segregation of catch of each species by gear in the event more than one gear is applied during the same fishing trip;
- to ensure full segregation of catch of each species by management region, i.e. fish caught inside the Icelandic EEZ is kept separate, in the event a vessel catches the same species on the same trip inside and outside the Icelandic EEZ – and –
- to observe and implement appropriate measures of packing and labelling certified products prior to moving them to sub-contracting cooler or freezer storages upon landing, to ensure client members´ responsibility for product integrity prior to sale or further handling.

This recommendation is in harmony with a recently set recomendation for the ISF Iceland cod and haddock fisheries.

It should be noted that the vessels of foreign nations fishing within the Icelandic EEZ under the terms of bilateral agreements were included in the Client´s original statement of policy on certificate sharing arrangements. As the Client later confirmed the wish not to include those vessels in the assessment, a variation was requested by the CAB and subsequently granted by the MSC to amend the units of assessment accordingly. The expedited assessment therefore only includes Icelandic vessels registered by the Fisheries Directorate to operate within the Icelandic EEZ.

Table 12. Traceability Factors within the Fishery:

Traceability Factor	***Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)***
Potential for non-certified gear/s to be used within the fishery	Atlantic wolfish or plaice are also caught in pelagic trawl, shrimp trawl, lumpfish gillnets and anglerfish gillnets. Reported catches from these gears combined were less than 0.4% and 0.9%, respectively, of the total Atlantic wolffish and plaice catches from 2011-2016. Fish is segregated on board, landed and recorded by reference to vessel, date and gear. The use of certified and non-certified gears during the same fishing trip is considered quite rare and the risk of mixing catch of same species from the two is minimal. Fishing vessels are required to keep logbooks for the recording of fishing by species, gear and area. Furthermore, all landings in Iceland are recorded and monitored by certified weighers. Landings of Atlantic wolfish and plaice from non-certified gear used within the Icelandic EEZ are segregated from those species caught in certified gear, both physically and in records prior to entry into chain of custody.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	As outlined above, vessels covered by the UoC may catch Atlantic wolfish and plaice in some small amounts when using non-certified gears while targeting other species. Such bycatch would however also be recorded in vessel logbooks, specified by vessel, date, gear, quantity and fishing region. Vessels are unlikely to catch Atlantic wolfish or plaice within and outside the Icelandic EEZ on the same trip. A possible exception may be the case of larger trawlers on their return trips from fishing in foreign or international territories (like the Barents Sea). Risk to traceability is mitigated by mandatory segregation on board of catches in foreign area from catches in the Icelandic EEZ, real time electronic logging – and thus monitoring by DF – of catches and labelling of unprocessed and processed fish with reference to fishing dates and/or areas.
Potential for vessels outside of the UoC or client group fishing the same stock	Atlantic wolffish and plaice are caught by a large number of vessels, most of them Icelandic ones that are part of the UoA. A small proportion (0.4-1%) of Atlantic wolffish and 0.06% of plaice is caught by foreign vessels, mainly Faroese, operating within the Icelandic EEZ through bilateral agreement. They are subject to the monitoring and logging requirements outlined above. Such catch is therefore traceable to vessel and gear.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	Risks of comingling certified and non-certified catch during any kind of handling prior to first sale or processing after landing are primarily associated with the use of post-landing cold storage, the handling of fish at auction, and the landing of fish from foreign vessels. Mandatory on-board segregation and recording of catch, the keeping and submission of logbooks, as well as primarily single-gear trips, minimise risk of comingling on board. This segregation is maintained through the landing process under the management of certified weighers, which furthermore minimises the risk that catches from areas outside the UoC are mixed with certified catches. Fishing companies, especially ones operating large vessels with on-board processing facilities, may use sub-contracted cold storage facilities for storing

	landed catch prior to first sale or first processing after landing. This may be the case particularly with short-term storing of landed fish-on-ice in boxes or tubs, or longer-term storing of products frozen, packed and labelled on-board the vessel, typically loaded on pallets which in turn are sometimes loaded into containers. Either way, these are identified and traceable to vessel, catch dates, gear and fishing area. The risk of comingling at auction is also minimal. A substantial amount of fish is landed and traded via auction. Fish catch remains segregated at the point of landing by vessel, species and gear. Identified tubs of landed fish are passed on either directly to first buyer (trader or processor), or to an auction that operates as an electronic facilitator of trade or as a physical facility where tubs received are passed on to first buyer. However, a few auction houses may perform primary processing (gutting), involving change of tub numbers, which will require the facilities to be chain of custody certified (or registered as processing sub-contractors for CoC certified entities) to assure traceability of fish supplied, back to the unit of certification. Several Icelandic auction operations are now CoC certified. Foreign vessels (not eligible) may land Atlantic wolfish or plaice via auction at the same time as certified fish of same species from already approved vessels is being handled. Again, the risk here of comingling is minimal since there is mandatory segregation and recording of landed catch by reference to vessels. Icelandic regulation require fish from foreign vessels to be kept and processed separate from all other fish throughout the chain of custody. In case fish is landed and possibly also kept in cold storage in a Third Country, traceability is ensured back to unit of certification, since all vessels are obliged to report to Fisheries Directorate landings in foreign ports by type of species, fishing gear, area and quantities. At first point of sale and/or first post-landing processing, i.e. entry into chain of custody, the tracing of the fish back to UoC will require verification by the buyer and its CoC CAB.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	Chain of Custody is required for all post-landing processing activities. Risk to the integrity of certified fish processed on-board, which would be confined almost solely to large trawlers, may potentially emanate from fishing in areas not identified as part of the UoA during the same fishing trip. This risk is minimised and mitigated by the mandatory logging, as well as physical identification, of fish catch by management regions. Fishing by vessels with on-board processing facilities is monitored by weighing landed products in a similar way and converting to catch weight by means yield indices, estimated by sampling catch and processed products on board. Basic handling of the catch, such as gutting and possibly heading, is commonly conducted by most types of vessels at sea, during which a risk of mixing certified and non-certified catch is considered minimal or none.
Risks of mixing between certified and non-certified catch during transhipment	Trans-shipment of catch is not conducted in the Atlantic wolfish and plaice fisheries and risk from such activity to certified product integrity is therefore none. The DF monitors, via the vessel monitoring systems (VMS), that trans-shipment of fish is not conducted.
Any other risks of substitution between fish from the UoC (certified	None identified.

catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	

5.3 Eligibility to Enter Further Chains of Custody

Potential certification will include fish caught by all registered Icelandic vessels with valid permit to operate within the Icelandic EEZ. It will also include fish handled by officially licenced fish auctions, provided these auctions do not take ownership of the catch and/or are not involved in the processing of the catch either as owners of the fish or as sub-contractors. A list of vessels with valid licenses for fishing within the Icelandic EEZ is available from the Fisheries Directorate upon request (http://www.fiskistofa.is).

A list of vessels and their quotas can be found on the website of the Directorate of Fisheries, see http://www.fiskistofa.is/veidar/aflaheimildir/uthlutadaflamark/ (*Úthlutun aflaheimilda fiskveiðiárið 2016/2017*).

Fish from eligible fishing vessels, whole and/or semi-processed, landed at any officially approved landing site (harbour) and/or sold via (first sale) fish auction and/or kept in cold store facilities in Iceland or in a Third Country prior to first sale or post-landing processing, may therefore enter into further certified chain of custody and be eligible to carry the MSC eco-label, provided these are sold through a member of the client group, i.e. shareholder of the Iceland Sustainable Fisheries ehf. and/or its registered certificate sharing entities.

Chain of custody will commence as of the first point of sale and/or first processing after landing. Auctions that may or may not take possession of the fish and merely serve as facilitators of trade do not need chain of custody certification. Auctions that are not members of the client group and that either take ownership of the fish, as well as auction houses that engage in processing of the fish after landing, e.g. by gutting or otherwise, must have chain of custody certification.

Operators who do not share the certificate but who take ownership of the fish after landing and before it is sold to certificate sharers are required to hold MSC Chain of Custody certification. Subcontractors, who do not take ownership of the catch but are involved in the handling of the fish after landing, are required either to be holders of MSC Chain of Custody certification or to be listed as subcontractors in the scope of another MSC Chain of Custody certificate holder.

The Icelandic Consumer Agency (Neytendastofa) issues authorisations to conduct official weighing of fish landed in Icelandic ports. The current list of officially authorised weighmasters is available on https://rafraen.neytendastofa.is/pages/loggiltirvigtarmenn/.

A map of the official points of landing for fish can be found here: http://gafl.fiskistofa.is/index.php?-option=com_content&view=article&id=53:dreifikort&catid=38:kynningarefni&Itemid=62

The Client, Iceland Sustainable Fisheries Ltd., has issued a statement outlining the general terms of a potential extension of the client group for wider sharing of a potential certificate. A list of current members of the client group can be obtained directly on the ISF website[17] or from the Conformity Assessment Body upon request.

There are no inseparable or practically inseparable (IPI) species caught in the fisheries.

[17] http://www.isf.is/isf-aethildarfyrirtaeligki.html

6 Evaluation Results

6.1 Principle Level Scores

Table 13. Final principle level scores – Altantic wolffish

Principle		***Score***
Principle 1 – Target Species		80.0
Principle 2 – Ecosystem	Bottom Trawl (TB)	87.0
	Danish Seine (SD)	87.0
	Gillnet (GN)	84.3
	Handline (LH)	89.0
	Longline (LL)	86.3
	Nephrops Trawl (TN)	87.3
Principle 3 – Management System		90.3

Table 14. Final principle level scores – Plaice

Principle		***Score***
Principle 1 – Target Species		84.4
Principle 2 – Ecosystem	Bottom Trawl (TB)	87.0
	Danish Seine (SD)	87.0
	Gillnet (GN)	84.3
	Handline (LH)	89.0
	Longline (LL)	86.3
	Nephrops Trawl (TN)	87.3
Principle 3 – Management System		90.3

6.2 Summary of PI Level Scores

Table 15. PI level scores by gear – Atlantic wolffish

Scores awarded during the present extension of scope to the MSC certified ISF Iceland saithe and ling fishery assessment are **<u>underlined</u>**. TB: bottom trawl; SD: Danish seine; GN: gillnet; LH: handline; LL: longline; TN: *Nephrops* trawl. Details on why certain P2 PIs were re-assessed, but this was not deemed necessary for all P2 PIs, are given in section 3.4.

Principle	***Component***	***PI No.***	***Performance Indicator (PI)***	***Score***					
1	**Outcome**	1.1.1	Stock status	<u>80</u>					
		1.1.2	Reference points	<u>75</u>					
		1.1.3	Stock rebuilding	N/A					
	Management	1.2.1	Harvest strategy	<u>80</u>					
		1.2.2	Harvest control rules & tools	<u>75</u>					
		1.2.3	Information/monitoring	<u>90</u>					
		1.2.4	Assessment of stock status	<u>85</u>					
				TB	**SD**	**GN**	**LH**	**LL**	**TN**
2	**Retained species**	2.1.1	**Outcome**	80	80	80	80	80	80
		2.1.2	Management	80	80	85	85	80	85
		2.1.3	Information	85	85	85	85	85	85
	Bycatch species	2.2.1	**Outcome**	80	80	<u>75</u>	100	<u>80</u>	100
		2.2.2	Management	100	100	<u>75</u>	85	<u>80</u>	85
		2.2.3	Information	85	85	<u>75</u>	85	<u>75</u>	85
	ETP species	2.3.1	Outcome	80	80	80	80	80	80
		2.3.2	Management	80	80	80	80	80	80
		2.3.3	Information	85	85	85	85	85	85
	Habitats	2.4.1	Outcome	<u>80</u>	<u>85</u>	<u>85</u>	<u>100</u>	<u>100</u>	<u>80</u>
		2.4.2	Management	<u>85</u>	<u>85</u>	<u>85</u>	90	90	85
		2.4.3	Information	85	<u>80</u>	<u>80</u>	85	85	85
	Ecosystem	2.5.1	Outcome	100	100	100	100	100	100
		2.5.2	Management	100	100	100	100	100	100
		2.5.3	Information	100	100	95	95	95	95
3	**Governance and policy**	3.1.1	Legal &/or customary framework	95					
		3.1.2	Consultation, roles & responsibilities	95					
		3.1.3	Long term objectives	80					
		3.1.4	Incentives for sustainable fishing	100					
	Fishery specific management system	3.2.1	Fishery specific objectives	<u>80</u>					
		3.2.2	Decision making processes	80					
		3.2.3	Compliance & enforcement	100					
		3.2.4	Research plan	100					
		3.2.5	Management Performance Evaluation	<u>80</u>					

Table 16. PI level scores by gear – Plaice

Scores awarded during the present extension of scope to the MSC certified ISF Iceland saithe and ling fishery assessment are **underlined**. TB: bottom trawl; SD: Danish seine; GN: gillnet; LH: handline; LL: longline; TN: *Nephrops* trawl. Details on why certain P2 PIs were re-assessed, but this was not deemed necessary for all P2 PIs, are given in section 3.4.

Principle	***Component***	***PI No.***	***Performance Indicator (PI)***	***Score***					
1	**Outcome**	1.1.1	Stock status	80					
		1.1.2	Reference points	90					
		1.1.3	Stock rebuilding	N/A					
	Management	1.2.1	Harvest strategy	85					
		1.2.2	Harvest control rules & tools	75					
		1.2.3	Information/monitoring	90					
		1.2.4	Assessment of stock status	85					
				TB	**SD**	**GN**	**LH**	**LL**	**TN**
2	**Retained species**	2.1.1	**Outcome**	80	80	80	80	80	80
		2.1.2	Management	80	80	85	85	80	85
		2.1.3	Information	85	85	85	85	85	85
	Bycatch species	2.2.1	**Outcome**	80	80	75	100	80	100
		2.2.2	Management	100	100	75	85	80	85
		2.2.3	Information	85	85	75	85	75	85
	ETP species	2.3.1	Outcome	80	80	80	80	80	80
		2.3.2	Management	80	80	80	80	80	80
		2.3.3	Information	85	85	85	85	85	85
	Habitats	2.4.1	Outcome	80	85	85	100	100	80
		2.4.2	Management	85	85	85	90	90	85
		2.4.3	Information	85	80	80	85	85	85
	Ecosystem	2.5.1	Outcome	100	100	100	100	100	100
		2.5.2	Management	100	100	100	100	100	100
		2.5.3	Information	100	100	95	95	95	95
3	**Governance and policy**	3.1.1	Legal &/or customary framework	95					
		3.1.2	Consultation, roles & responsibilities	95					
		3.1.3	Long term objectives	80					
		3.1.4	Incentives for sustainable fishing	100					
	Fishery specific management system	3.2.1	Fishery specific objectives	80					
		3.2.2	Decision making processes	80					
		3.2.3	Compliance & enforcement	100					
		3.2.4	Research plan	100					
		3.2.5	Management Performance Evaluation	80					

6.3 Summary of Conditions

Table 17. Summary of Conditions

Condition number	***Condition***	***Performance Indicator***	***Related to previously raised condition? (Y; N; N/A)***
1	A limit reference point needs to be defined for Atlantic wolffish such that it is above the point where there is significant risk of impairing reproductive capacity. This might be achieved by providing scientific evidence that fishing at F_{MAX}, or an alternative reference point such as $F_{0.1}$, would not impair reproductive capacity and is sufficiently precautionary consistent with MSC requirements.	**PI 1.1.2**	**N/A**
2	A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock of Atlantic wolffish approaches the limit reference point. Evidence should be provided that the HCR is precautionary.	**PI 1.2.2**	**N/A**
3	A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock of plaice approaches the limit reference point. Evidence should be provided that the HCR is precautionary.	**PI 1.2.2**	**N/A**
4	Harbour seal, hooded seal, and Atlantic puffin must be shown highly likely to be within biologically based limits, or it must be demonstrated that there is a partial strategy of demonstrably effective mitigation measures in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding.	**PI 2.2.1 Bycatch species outcome (Gillnet)**	**N**
5	A demonstrably effective partial strategy should be put in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding of vulnerable marine mammal and seabird species. This should include a regular review of the potential effectiveness and practicality of alternative measures to minimise gillnet fishery related mortality of unwanted catch of vulnerable species such as harbour seal, hooded seal and Atlantic puffin, and regular reviews to ensure that the relevant measures are implemented as appropriate.	**PI 2.2.2 Secondary species management (Gillnet)**	**N**
6	By the second surveillance audit electronic logbook reporting for Atlantic wolffish / plaice gillnet and longline fisheries provides quantitative information on of seabird and marine bycatch for gillnets and longlines that is both available and adequate to detect any increase in risk to main bycatch species.	**PI 2.2.3 Secondary species information** **(Gillnet and Longline)**	**N**

6.4 Recommendations

One recommendation was set for the fishery for the purpose of managing risk to segregation and traceability within the fishery, which also serves to harmonise the assessed fisheries with the recently re-assessed cod and haddock fisheries.

Recommendation 1:
The assessment team recommends that the client issues a reminder to all of the client members, including auctions, to observe the following:

- to ensure full segregation of catch of each species by gear in the event more than one gear is applied during the same fishing trip;
- to ensure full segregation of catch of each species by management region, i.e. fish caught inside the Icelandic EEZ is kept separate, in the event a vessel catches the same species on the same trip inside and outside the Icelandic EEZ – and –
- to observe and implement appropriate measures of packing and labelling certified products prior to moving them to sub-contracting cooler or freezer storages upon landing, to ensure client members´ responsibility for product integrity prior to sale or further handling.

6.5 ***Draft*** Determination, Formal Conclusion and Agreement

The assessment team recommends that the MSC-certified ISF Iceland saithe & ling fishery shall be extended to include the Atlantic wolffish and plaice fisheries within the Icelandic EEZ, and that they are granted certification against the MSC Fisheries Standard as well managed and sustainable fisheries. This ***draft*** determination is made, provided the six conditions set are sufficiently addressed in a plan of action submitted by the Client (see also section 1 and Appendix 1.3).

A total of three conditions are set for the Atlantic wolfish and plaice against Principle 1. The Atlantic wolfish and plaice gillnet fisheries have two conditions against Principle 2, and the Atlantic wolffish and plaice gillnet and longline fisheries have one condition against Principle 2.

(REQUIRED FOR FR AND PCR)

1. The report shall include a formal statement as to the certification determination recommendation reached by the Assessment Team about whether or not the fishery should be certified. *(Reference: CR 27.16)*

(REQUIRED FOR PCR)

2. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

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Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Principle 1: Atlantic wolffish

Evaluation Table for PI 1.1.1 (Atlantic wolffish)

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?	Y	Y	N
	Justification	Since 1980 until 2013, fishing mortality for Atlantic wolffish has been above an F_{MSY} proxy (F_{max} = 0.29) used as reference point. In 2014 and 2015, the fishing mortality was below such threshold. Recruitment was low in 2008–2015 in comparison to levels observed in the 90's and increased again in 2016. The decreasing trend in recruitment could be due to various environmental factors, as it was evidenced during the meeting with MFRI, including decreased productivity of the spawning stock due to environmental changes occurring in the spawning grounds, increased predation of small fish and increased sea temperatures. Nevertheless, harvestable biomass levels since 2001 are close to the average and therefore it can be argued that the stock is highly likely to be above the point where recruitment would be impaired, therefore SG80 is met. Still, the declining trend in recruitment since 2000 remains an important uncertainty in the status, although this declining trend may relate to environmental conditions rather than the fishery. However, on this basis, SG 100 is not met.		
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?		Y	N

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing
	Justification	According to GSA2.2.4 (MSC CRv2.0) the use of fishing mortality as a means of scoring PI 1.1.1 when biomass information is not available is acceptable. In particular, the history of fishing mortality should be examined to determine whether the stock biomass could be assumed to be at the required level for each SG. This of course depends on the starting status for stock biomass, the trajectory of fishing mortality and the length of time that fishing mortality has been at a certain level. Moreveor, taking into consideration the Annex GCB (MSC CRv1.3), approximations for F_{MSY} and B_{MSY} can be used where they are expected to achieve performance consistent with MSY (e.g. Witherall et al 2000, Clarke 2002, Zhou et al 2012). Directly measurable (empirical) proxies or surrogates for fishing mortality or biomass (eg average length or length distribution, catch rate, recruitment, etc), and associated empirical harvest strategies, can be used where they are expected to achieve performance consistent with MSY or a similar highly productive level (Starr et al 1997, Prince et al 2011). In the Atlantic wolffish assessment a trend of biomass is available but there is not a biomass reference point estimated according with B_{MSY}. The current management objective is to maintain an F at or below an F_{MSY} proxy. Looking at the exploitation of Atlantic wolffish, the stock has for a long time been a valuable catch for the Icelandic fleet as well as for the English and German fleets when they conducted their fisheries around Iceland until the end of the 70s. The catch has been in the general range of 10,000 to 15,000 tons annually for the last 30 years. During this period F was above the F_{MSY} proxy and it declined from 2009 to 2014, being below the F_{MSY} proxy in the last two years. Taking into consideration the historical development of the fishery targeting the Atlantic wolffish, it is possible to argue that in the period anaysed (1980 onward), the catch rates were quite stable and the biomass has been in general constant or increased, and since 2000 is fluctuating around 30 tons. The harvest strategy in place (see 1.2.1) is limitating the catches in the last years and there is evidence that F is decreasing. According with Annex GCB (MSC CRv1.3), such evidences show that the level of exploitation has been in most of the years lower than a fishing mortality consistent with MSY and it is possible to assume that the level of biomass observed in the last 15 years is consistent with B_{MSY} or higher levels. On this basis, SG80 is met. However, taking into account the uncertainty related with the assumption of B_{MSY} is not possible to argue that 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. Therefore, SG100 is not met.
References		http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/ MSC Certification Requirements Guidance V1.3 Date of issue: 14 January 2013. MSC Certification Requirements Guidance V2.0 Date of issue: 1 October 2014 Clark, W.G. (2002) F35% revisited ten years later. *North American Journal of Fisheries Management* 22(1): 251-257. Starr, P.J., P.A. Breen, R. Hilborn and T.H. Kendrick (1997) Evaluation of a management decision rule for a New Zealand rock lobster substock. *Marine and Freshwater Research* 48: 1093-1101. Prince, J.D., N.A. Dowling, C. R. Davies , R. A. Campbell and D. S. Kolody (2011) A simple cost-effective and scale-less empirical approach to harvest strategies. *ICES Journal of Marine Science*. 68: 947–960 Witherall, D., C. Pautzke and D. Fluharty (2000) An ecosystem-based approach for Alaska groundfish fisheries. ICES Journal of Marine Science 57:771-7.

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
	Zhou, S., Y. Shaowu, J.T. Thorson, A.D.M.Smith and M. Fuller (2012) Linking fishing mortality reference points to life history traits: an empirical study. Canadian Journal of Fisheries and Aquatic Science. 69:1292-1301.		
Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
Target reference point	F_{MSY}	0.3	0.29
Limit reference point	F_{MSY}	0.3	0.29
OVERALL PERFORMANCE INDICATOR SCORE:			80
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 1.1.2 (Atlantic wolffish)

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?	Y	N	
	Justification	The reference point utilized is F_{max} coming from Yield per Recruit analysis. Although it could be argued that the use of F_{max} is a reasonable practice as a generic reference point for many species, as well as in the ICES advisory framework (before F_{MSY} became the target), the MSC standards states that a particular caution should be given regarding 'per-recruit' stock assessment approaches that do not include any form of stock-recruit relationship. Levels of $F_{0.1}$ or $F_{40\%SPR}$ provide usually more reliable proxies of F_{MSY} than F_{max} when a per-recruit approach is used. In particular taking into account the biology of Atlantic wolffish and its exploitation pattern the Y/R curve shows a flat shape and the use of $F_{0.1}$ it is recommended (Figure 3.3.1.2.3). Therefore, the SG60 is met but not the SG80.		
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?		Y	N
	Justification	While no limit reference point has been formally defined, the choice of F_{max} could imply both limit and target reference points. The administration has committed to using the MFRI harvest control framework to determine management decision such as the annual TAC. While the relationship with recruitment is unknown, the stock responded after the low biomass of 1993 to reach the highest on record in 2006, which lends support to the reference point value being adequate. Therefore, it can be inferred that the suggested reference point is set above a level where reproductive capacity is impaired. It is not true to say, however, that all precautionary issues have been considered in this management framework – notably the $F_{0.1}$ should be used as a more precautionary reference point than F_{max}. Therefore, SG100 is not met.		
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?		Y	N

<table>
<tr><th colspan="2">PI 1.1.2</th><th colspan="3">Limit and target reference points are appropriate for the stock</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">The level of fishing mortality is the management tool that defines whether to alter the TAC or not. Therefore, F of 0.29 is consistent with maintaining the stock above B_{MSY} based upon the history of the trend of F, the catch rate time series and the time series of harvestable biomass.

The implication of this policy is to maintain a sustainable population at a level consistent with the fishery over the previous two decades. By keeping mortality rates within the range of F_{MSY} proxy, it is expected that biomass will also be maintained within the acceptable range that has been experienced previously. While this may be sustainable, it is uncertain what relationship this has with B_{MSY}. Thus, the reference point appears adequate to maintain the productivity of the stock consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, and therefore meets SG80 but in relation to SG100, it cannot be argued that all precautionary issues are taken into account, nor that there is a high degree of certainty.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td>For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.</td><td></td></tr>
<tr><td>Met?</td><td></td><td>Not relevant</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">Atlantic wolffish is not an LTL species. The mean trophic level is 3.7±0.28, estimated from http://www.fishbase.org/TrophicEco/DietCompoList.php?ID=2501&GenusName=Anarhichas&SpeciesName=lupus&fc=396&StockCode=2695</td></tr>
<tr><td colspan="2">References</td><td colspan="3">http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>75</td></tr>
<tr><td colspan="4">CONDITION NUMBER:</td><td>1</td></tr>
</table>

Evaluation Table for PI 1.1.3 (Atlantic wolffish)

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?	(Y/N)		(Y/N)
	Justification	The stock is not depleted.		
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?	(Y/N)	(Y/N)	(Y/N)
	Justification	The stock is not depleted.		
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?	(Y/N)	(Y/N)	

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe	
	Justification	The stock is not depleted.	
References			
OVERALL PERFORMANCE INDICATOR SCORE:			
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 1.2.1 (Atlantic wolffish)

<table>
<tr><th colspan="2">PI 1.2.1</th><th colspan="3">There is a robust and precautionary harvest strategy in place</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.</td><td>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.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The basis for the harvest strategy is established by the allocation of a fishing quota of Atlantic wolffish. The TAC is recommended based on the outcome of the assessment carried out by MFRI in accordance with the MSY principle. Moreover specific mesh size regulations, real time area closures and a discard ban are enforced to protect both juvenile and big spawners of Atlantic wolffish.

Overall, the elements of the harvest strategy include effective data collection, scientific advice and appropriate management response. Under the MSY approach, these appear to be working together and have recently achieved target exploitation levels in this stock. As the management system includes evaluation of performance (annual estimates of fishing mortality compared to the target levels) and it is responsive to this, SG80 is met.

There is no evidence that the harvest strategy is designed to achieve objectives for this stock. The strategy for the multispecies fishery is based on the sum of single species management, and the strategy is the result of various responses to conflicts concerns within the fishery. Without further evidence of an overarching design to the current monitoring and set of controls, the SG100 cannot be met.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The harvest strategy is likely to work based on prior experience or plausible argument.</td><td>The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The harvest strategy is not fully evaluated by ICES or any other relevant scientific institution. Nevertheless, taking into account that the harvestable biomass is increasing as well as the recruitment in 2016 while the F is below the proxy of F_{MSY} in 2014 and 2015 it is possible to argue that the HS is achieving its objectives. This meets the second guideline for SG80 but not at SG100.</td></tr>
<tr><td>C</td><td>Guidepost</td><td>Monitoring is in place that is expected to determine whether the harvest strategy is working.</td><td></td><td></td></tr>
</table>

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Met?	Y		
	Justification	Extensive information is collected from the commercial catches and scientific surveys on this stock. This information is reviewed and analyzed at the annual working group meetings by MFRI. This should detect changes in stock status and is attempting to discriminate between causes of those changes. Given this level of monitoring, the working group should be able to determine whether the harvest strategy is able to achieve the fishery objectives.		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			N
	Justification	There is evidence of the strategy being improved as more information has become available. Now, with improved age information in particular, the stock is assessed using a model able to combine more sources of information into a single assessment. This has primarily brought Atlantic wolffish into line with other quota species. There has been no review of the overall strategy with respect to this stock. Therefore, SG100 is not met.		
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	The species is not a shark.		
References		http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.2 (Atlantic wolffish)

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?	Y	N	
	Justification	The harvest control rule is based on calculating the TAC corresponding to F_{MSY} proxy in the latest stock assessment model. This part of the harvest control rule is well-defined and is clearly consistent with the overall MSY-based harvest strategy. However, a formal trigger biomass reference point is not estimated and an appropriate action that would require further reductions in TAC below F_{MSY} is not in place. The clear target exploitation levels required and delivered by the harvest control rules, together with the intention to reduce exploitation below the trigger point, meets the SG60. However, the lack of a well-defined response when the stock falls below a trigger reference point, prevents the SG80 being met.		
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?		Y	N
	Justification	The harvest control rule is implicitly taking into account some uncertainties in that it is adjusting actions based upon the stock assessment model which takes into account the main uncertainties in the input data. However, the selection of F_{MSY} as F_{max} to set target fishing mortality level does not recognize uncertainty and stochastic simulations, which took into account recruitment uncertainty, are not available. Therefore, only SG80 is met.		
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?	Y	Y	N

PI 1.2.2	There are well defined and effective harvest control rules in place	
Justification	The main tool used to implement the harvest control rule is the TAC, based on the stock assessment and target fishing mortality. For the TAC to be effective, accurate catch monitoring is required. All fish landed are weighed on authorized scales, at harbor and inside the fish processing factory and the information on each landing of each vessel and the purchaser(s) of the catch is stored in a centralized database maintained by the Directorate and is available in real time on the Internet (www.fiskistofa.is). Discards and other incidental mortality are considered to be very low, and the accuracy of the landings statistics is generally considered acceptable. The information from the stock assessment indicates that the limits placed on the catch have been able to achieve the target exploitation rate. This meets SG80. Since the 2013/14 fishing-season, the national TAC set by the administration was the same recommended TAC advised by MFRI, but catches were higher than the TAC. Within the context of multispecies fisheries, opportunities to reduce the catch of a single species relative to other species are more limited, which may limit effectiveness of TACs in controlling exploitation. However, the available evidence indicates that the TAC system has so far been effective for all species where it has been applied. Given the same system is being applied to Atlantic wolffish, and the low percentage of catches higher than the recommended TAC (3-5%) evidence indicates that the system is effective in controlling exploitation of such stock, meeting SG80 but not SG100.	
References	http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/	
OVERALL PERFORMANCE INDICATOR SCORE:		**75**
CONDITION NUMBER:		**2**

Evaluation Table for PI 1.2.3 (Atlantic wolffish)

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?	Y	Y	Y
	Justification	Based on the available evidence (Gunnarsson, 2014), the assessment has been carried out considering the west and east as unique stocks within the Icelandic EEZ. Changes in stock productivity are not very well understood, but they are well monitored. In 2016 recruitment of Atlantic wolffish has increased. However, there is no strong hypothesis for the low recruitment observed in 2014 and 2015. The information on the fishing fleet is complete through the licensing and registration information and catches are well recorded. There is also a comprehensive range of information about the spatial, environmental and life history data (Gunnarsson et al., 2016; Gunnarsson, 2014; Gunnarsson et al., 2006) sufficient to support the harvest strategy, and to meet SG100.		
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?	Y	Y	N

PI 1.2.3		Relevant information is collected to support the harvest strategy		
	Justification	Approximately 60% of the annual landings of Atlantic wolffish in Division Va are caught in a mixed fishery by longliners and the remainder as a bycatch, mainly by trawlers that primarily target cod. Discards in the longline fishery can be considered negligible. Catches have decreased substantially in the last decade as population biomass has increased. Total catch in 2015 was 8,900t with 60% longline, 25% trawl, and 13% Danish seine and 2% other gears. There are two surveys: the Icelandic spring survey (started in 1985 to 500m depth) and the Icelandic autumn survey (started in 1996, but extended down to 1200m in 2000). There is a strong correlation between the surveys, but the catchability in the autumn survey is low, making it a less reliable index. Therefore, only the spring survey is used as an abundance index in the stock assessment. Weight, length and age data are sampled from the survey and the catches of the three main commercial fleets (longline, trawl and gillnet). All boats operating in Icelandic waters have to maintain a logbook record of catches in each haul/set. All data required for the stock assessment, and therefore estimation of the quantities used in the harvest control rule, are available. This meets the SG80. Furthermore, the data are monitored frequently and data are considered accurately measured. There is a good understanding of inherent uncertainties in the data, so that the uncertainties are explicitly included as part of the assessment and in the management of the uncertainty. The assessment is not tested using a specialised “bootstrap” process, which applies a re-sampling design consistent with known data errors, and short and long-term stochastic projections are not used to assess management robustness. Therefore, SG100 is not met.		
c	Guidepost		There is good information on all other fishery removals from the stock.	
	Met?		Y	
	Justification	Catches are assumed to be equal to landings and the figures to be reliable. All catches are taken in Iceland, recorded by the DF and are restricted to particular licensed landing sites and subject to landing regulations in Iceland. Information is collected on a daily basis by the Directorate of Fisheries in Iceland. Estimates of discards of Atlantic wolffish are negligible. The management regime has put in place strong disincentives for discarding (look section 3.5.6) which are thought to be effective. This meets SG80.		
References		http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/ Gunnarsson, A., 2014. Atlantic wolf-fish *Anarhichas lupus* population diversity: growth and maturation. Journal of Fish Biology (2014) 84, 339–353 Gunnarsson, A., Hjorleifsson, E., Thorarinsson, K., Marteinsdottir, G., 2006. Growth, maturity and fecundity of wolffish *Anarhichas lupus* L. in Icelandic waters. Journal of Fish Biology 68, 1158–1176. Gunnarsson, A., Björnsson, H., Elvarsson, B., Pampoulie, C., 2016. Spatio-temporal variation in the reproduction timing of Atlantic Wolffish (*Anarhichas lupus* L) in Icelandic waters and its relationship with size. Fisheries Research 183, 404–409.		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**

PI 1.2.3	Relevant information is collected to support the harvest strategy	
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 1.2.4 (Atlantic wolffish)

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?		Y	N
	Justification	The assessment used as the basis for scientific advice and to set the TAC is an analytical age structured model (“Gadget” model), that uses the IS-SMB survey and the data from commercial catches. The assessment is appropriate for the stock and harvest control rule. The Gadget software ("Globally applicable Area Disaggregated General Ecosystem Toolbox") can be used to model fish populations and marine ecosystems. It consists of an extensive set of data comparison and optimization routines. The software can be used to model multi-area, multispecies (including predation) and multi-fleet fisheries, but is used for Atlantic wolffish as a single species model. This meets the SG80. Beyond adapting standard life history parameters, the model does not take account of any special features of the biology of the species or the fishery. This could take the form of more detailed fleet or population structures adapted to this specific population. For the current more generic model, SG100 is not met.		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	This stock applies the MSY approach, which is founded on estimates of appropriate MSY reference points, although F_{max} should be used with caution (see 1.1.2). Fishing mortality, recruitment and SSB are estimated for the most recent years by the stock assessment, but only the first is evaluated relative to the MSY reference points. Therefore, SG60 is met		
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?	Y	Y	N

<table>
<tr><td colspan="2">PI 1.2.4</td><td colspan="3">There is an adequate assessment of the stock status</td></tr>
<tr><td></td><td>Justification</td><td colspan="3">The main sources of uncertainty have been identified. The stock assessment model simulates sampling and other errors. Retrospective analysis has also been carried out, which indicated that there is a downward revision of harvestable biomass in 2013 to 2015 and subsequently an upward revision of fishing mortality, while final year estimates of recruitment are slightly uncertain. This meets SG80.
While uncertainty is taken into account, it is not reported in management advice, as in, for example, decision tables or risk projections. Therefore, the assessment is not evaluating stock status relative to reference points in a probabilistic way, so SG100 is not met.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td></td><td>The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">The assessment has been tested using alternative approaches (ADAPT) and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored by MFRI (MFRI, 2016). Therefore, SG100 is met.</td></tr>
<tr><td rowspan="3">e</td><td>Guidepost</td><td></td><td>The assessment of stock status is subject to peer review.</td><td>The assessment has been internally and externally peer reviewed.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The assessment of stock status is subject to internal peer review. The status information is evaluated through annual MFRI review. This appears to constitute a basic peer review. Most recently, assessments have been conducted using GADGET with broad participation. However, this does not meet the requirement that the assessment has been internally and externally peer reviewed. Therefore, SG80 is met but not SG100.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">http://www.fisheries.is/main-species/other-demersal-fishes/atlantic-catfish/
MFRI, 2016. Marine and Freshwater Research Institute. State of marine stocks in Icelandic waters 2015/2016 and prospects for the quota year 2016/2017. Marine Research in Iceland 185. 188 pp.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>85</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

Principle 1: Plaice

Evaluation Table for PI 1.1.1 (Plaice)

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?	Y	Y	N
	Justification	Biomass indices from the spring survey indicate that the plaice fishable stock decreased considerably in 1985–2001. Indices have increased somewhat, and then remained steady. Based on an age-catch analysis, the stock has been estimated to have decreased by more than half in 1993–2000, reaching a minimum in 2000. Since 2000, fishing mortality has been reduced and the fishable biomass has been increasing despite low but stable recruitment. The quota is set at F_{MSY} and a seasonal closed area is used to protect the spawning stock. Given the new stock assessment results, it is highly likely that the stock is above PRI. Therefore, SG80 is met. However considering the trend of the recruitment is not precautionary to state that there is a high degree of certinity that the stock is above PRI. Therefore, SG 100 is not met.		
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?		Y	N

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing
	Justification	According to GSA2.2.4 (MSC CRv2.0) the use of fishing mortality as a means of scoring PI 1.1.1 when biomass information is not available is acceptable. In particular, the history of fishing mortality should be examined to determine whether the stock biomass could be assumed to be at the required level for each SG. Obviously this depends on the starting status for stock biomass, the trajectory of fishing mortality and the length of time that fishing mortality has been at a certain level. At least in scoring issue b an 80 score is justified if F is likely to have been at or below F_{MSY} for at least two generation times (or for at least four years, if greater). In the case of plaice, fishing mortality is set as target at the MSY proxy consistent to $F_{0.1}$ coming from and Y/R analysis. Although this is a common practice, it is well known (Mace, 2011) that F_{MSY} proxies as $F_{0.1}$ are usually an underestimation of F_{MSY} and, although $F_{0.1}$ appears to be the best proxy of F_{MSY}, it cannot indicate past and current levels of exploitation relative to F_{MSY} when there is uncertainty about the stock dynamics (Kell and Fromentin, 2007), as in most of the case for commercially exploited stocks. Therefore, the fishing mortality observed has been at or below the real F_{MSY} at least since 2001. Considering a generation time of 7 years [A_{50} = 1.5; M = 0.15 (MFRI communication)], it is possible to argue that the fishing mortality has been at or below F_{MSY} for at least two generation times (14 years). Therefore the stock biomass is at a level consistent with B_{MSY} and SG 80 is met. However, taking into consideration the uncertainty related with estimate of F_{MSY} proxy, is not possible to argue that 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. Thus, SG100 is not met.
References		http://www.fisheries.is/main-species/flatfishes/plaice/ Mace, P.M. 2001. A new role for MSY in single-species and ecosystem approaches to fisheries stock assessment and management. Fish and Fisheries 2: 2–32. Kell, L.T. and Fromentin, J.-M. (2007). Evaluation of the robustness of maximum sustainable yield based management strategies to variations in carrying capacity or migration pattern of Atlantic Bluefin tuna (Thunnus thynnus). Can. J. Fish. Aquat. Sci. 64: 837-847

Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
Target reference point	F_{MSY}	0.22	0.20
Limit reference point	F_{MSY}	0.22	0.20

OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 1.1.2 (Plaice)

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?	Y	Y	
	Justification	The fishery is managed under the "MSY approach" policy, which is used to provide scientific advice. F_{MSY} is based on a Yield per Recruit analysis and is set as $F_{0.1}$. The use of $F_{0.1}$ is a common practice and it is considered by the scientific community a precautionary proxy of F_{MSY} for most of the demersal stock such as plaice. This meets SG80.		
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?		Y	Y
	Justification	Considering the stable recruitment and the low F of the last decade it is possible to argue that the limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity and the use of $F_{0.1}$ suggest a precautionary approach. Thus, SG100 is met.		
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?		Y	N
	Justification	The target reference point is such that the stock is maintained at a level consistent with F_{MSY} or some measure or surrogate with similar intent or outcome. While no target reference point has been formally defined, the choice of F_{MSY} proxy implies a limit and target. Taking into account the increase of the stock in the last years and the stable recruitment, it is possible to argue that the choice of $F_{0.1}$ as proxy of F_{MSY} would maintain the stock at a level comparable to B_{MSY}, or some measure or surrogate with similar intent or outcome. SG80 is met. However, precautionary issues and uncertainty regarding the setting and implementation of reference points have not been addressed. Thus, SG100 is not met		

PI 1.1.2		Limit and target reference points are appropriate for the stock			
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	Plaice is not an LTL species. The mean trophic level is 3.5±0.50, estimated from http://www.fishbase.org/summary/1342			
References		http://www.fisheries.is/main-species/flatfishes/plaice/			
OVERALL PERFORMANCE INDICATOR SCORE:					90
CONDITION NUMBER (if relevant):					

Evaluation Table for PI 1.1.3 (Plaice)

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?	(Y/N)		(Y/N)
	Justification	The stock is not depleted.		
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?	(Y/N)	(Y/N)	(Y/N)
	Justification	The stock is not depleted.		
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?	(Y/N)	(Y/N)	

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe
	Justification	The stock is not depleted.
References		[List any references here]
OVERALL PERFORMANCE INDICATOR SCORE:		
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 1.2.1 (Plaice)

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?	Y	Y	Y
	Justification	The current harvest strategy for plaice appears to be broadly effective for this stock and fishery. The TAC is set consistent with F_{MSY} proxy and spawning areas have been closed during the spawning period since 2002. The stock size is increasing and the fishing mortality is below F_{MSY}. This stock is dependent on assessment and scientific advice from MFRI. MFRI implements a cycle of data collection, mainly based on catches and standard surveys. Controls on harvest are based on setting TAC and since 2010 the catches have been below the recommended quota. Therefore, SG100 is met.		
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?	Y	Y	N
	Justification	The harvest strategy is likely to work based on prior experience or plausible argument such as the trend of F and harvestable biomass and evidence exists that it achieves the MSY objectives. This meets SG80. The harvest strategy has not been fully evaluated, particularly given that it forms part of a multispecies, multigear fishery. The fishery has only just achieved its target exploitation level, so a number of years' information will be needed before evidence is available that it is able to maintain the stock at the target level. Therefore, SG100 is not met.		
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	Extensive information is collected from commercial catches and available based on scientific surveys on this stock. This information is reviewed and analyzed at the annual working group meetings and during the internal stock assessment workshops. Such approach detects changes in stock status and is attempting to discriminate between causes of those changes. Given this level of monitoring, MFRI should be able to determine whether the harvest strategy is able to achieve the fishery objectives. Therefore, SG60 is met.		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			N
	Justification	There is evidence of the strategy being improved as more information has become available. Now, with improved age information in particular, the stock is assessed using a model able to combine more sources of information into a single assessment. This has primarily brought plaice into line with other quota species. However, there has been no formal review of the overall strategy with respect to plaice. Therefore, SG100 is not met.		
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	The species is not a shark.		
References		http://www.fisheries.is/main-species/flatfishes/plaice/		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 1.2.2 (Plaice)

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?	Y	N	
	Justification	This stock does not have a well-defined HCR, but relies on MFRI advice from year to year. MFRI advice appears to be based on the precautionary approach and aims to achieve a proxy-MSY for stocks within Icelandic waters analogous to ICES MSY approach. However, to what extent exploitation might be reduced as the limit reference point is approached is not clear. The lack of a trigger biomass reference point indicates that an appropriate action is not defined and is not clear if a further reduction of TAC below F_{MSY} is foreseen in case of stock decrease. The clear target exploitation levels required and delivered by the harvest control rules meet the SG60. However, the lack of a well-defined response should the stock fall below the trigger reference point prevents the SG80 being met.		
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?		Y	N
	Justification	The uncertainties associated with the harvest control rule have been considered. The selection of $F_{0.1}$ as a proxy of F_{MSY} rather than B_{MSY} to set target fishing levels does not recognize uncertainty in future recruitment. Therefore, the SG80 is met. The HCR has not been tested against recruitment variation, and a wide range of uncertainties have not been tested through simulation or other means. Therefore, SG100 is not met.		
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?	Y	Y	Y

PI 1.2.2		There are well defined and effective harvest control rules in place
	Justification	The main tool used to implement the harvest control rule is the TAC, based on the stock assessment and target fishing mortality. For the TAC to be effective, accurate catch monitoring is required. All fish landed are weighed on authorized scales, at harbour and inside the fish processing factory and the information on each landing of each vessel and the purchaser(s) of the catch is stored in a centralized database maintained by the Directorate and is available in real time on the Internet (www.fiskistofa.is). Discards and other incidental mortality are considered to be very low, and the accuracy of the landings statistics is generally considered acceptable. The information from the stock assessment indicates that the limits placed on the catch have been able to achieve the target exploitation rate. This meets SG80. Since 2011 catches have been below both MFRI's advice and the TACs. Currently, the harvestable biomass is increasing and recruitment is stable, so the TAC has also been set high. Catches have broadly remained the same since 2000. Within the context of multispecies fisheries, opportunities to reduce the catch of a single species relative to other species are more limited, which may limit effectiveness of TACs in controlling exploitation. However, the available evidence indicates that the TAC system has so far been effective for all species where it has been applied. Given the same system is being applied to plaice, evidence clearly shows it should be effective in controlling exploitation for plaice as well, meeting SG100.
References		http://www.fisheries.is/main-species/flatfishes/plaice/
OVERALL PERFORMANCE INDICATOR SCORE:		**75**
CONDITION NUMBER:		**3**

Evaluation Table for PI 1.2.3 (Plaice)

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?	Y	Y	Y
	Justification	Information is comprehensive across fleets, stock distribution and catches for all Iceland fisheries. All vessels are registered and licensed. Vessels are required to retain VMS equipment on board and use electronic log-books for reporting fishing operations. Discarding is not allowed within Icelandic waters, so all catches are landed and can be monitored. There is also a comprehensive range of information about the spatial, environmental and life history data (Hjorleifsson and Palsson, 2001; Solmundsson et al., 2003) sufficient to support the harvest strategy, and to meet SG100.		
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?	Y	Y	N

<table>
<tr><th colspan="2">PI 1.2.3</th><th colspan="3">Relevant information is collected to support the harvest strategy</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">There is a presumption that Iceland can manage continental shelf and inshore stocks as management units. This is fully justified even if stock structure is uncertain. For most of these shallow water demersal stocks, the Icelandic populations are likely to be isolated from others outside Iceland. Stock structure has not been investigated in detail.

Iceland conducts ground-fish trawl surveys to cover the Icelandic shelf separately in spring and autumn. These surveys provide abundance information covering most demersal fish stocks. For the ground-fish surveys, lengths of all fish species are taken (sometimes sampled). In addition, specific sampling to obtain age, sex and maturity is also carried out. Otoliths for ageing are removed from many species, including plaice. In addition, the surveys are used to sample for diet, disease and measures of pollutants and other information relevant to fisheries and marine management issues.

The available information is sufficient to support the current harvest strategy and control rules as well as allow these to be developed and improved in future. This meets at least the SG80.

The inherent uncertainties in all the data are extensively described in ICES NWWG report and the stock annex 4 (ICES, 2015). This includes discussions of the potential impact of these uncertaintieson any stock assessment and management actions, and whether current approaches are robust to these uncertainties. However, the present assessment is not tested using a specialized re-sampling design consistent with known data errors, and short and long-term stochastic projections are not used to assess management robustness. This does not meet SG100.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>There is good information on all other fishery removals from the stock.</td><td></td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td></td></tr>
<tr><td>Justification</td><td colspan="3">Catches are assumed to be equal to landings and the figures are considered to be reliable. All catches are taken in Iceland, recorded by the DF and are restricted to particular licensed landing sites and subject to landing regulations in Iceland. The Directorate of Fisheries in Iceland collects information on a daily basis. Estimates of discards of ling indicate low levels of discarding (<1% by weight or numbers). The management regime has put in place strong disincentives for discarding which are thought to be effective (see section 3.5.6). This meets SG80.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">http://www.fisheries.is/main-species/flatfishes/plaice/

Hjörleifsson, E. and Pálsson, J., 2001. Settlement, growth and mortality of 0-group plaice (Pleuronectes platessa) in Icelandic waters. Journal of Sea Research 45 (3), 321-324.

ICES, 2015. Report of the North-Western Working Group (NWWG), 28 April-5 May, ICES HQ, Copenhagen Denmark. ICES CM 2015/ACOM:07. 717 pp.

Sólmundsson, J., Karlsson, H. and Pálsson, J., 2003. Sexual differences in spawning behaviour and catchability of plaice (Pleuronectes platessa) west of Iceland. Fisheries Research 61 (1), 57-71.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>90</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td></td></tr>
</table>

Evaluation Table for PI 1.2.4 (Plaice)

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?		Y	Y
	Justification	A new analytical age-based model was adopted this year, suggesting that fishing mortality was overestimated but harvestable biomass underestimated in the model used in 2013–2015. The assessment model is a statistical catch at age, the same model framework as used for saithe in Icelandic waters, which has gone through an ICES benchmark and HCR evaluation. Therefore, the assessment is appropriate for the stock and harvest control rule. The stock assessment estimates fishing mortality relative to reference point and spawning stock biomass and can be considered appropriate for the data, meeting SG100.		
b	**Guidepost**	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	As noted above the assessment model estimates status relative to reference point.		
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?	Y	Y	N
	Justification	The assessment identifies major sources of uncertainty. The actual application and the resulting status determinations indicate that major sources of uncertainty have been identified when making appropriate selection of data used in the assessment. SG80 is met. However, this method does not formally estimate uncertainty, nor does it evaluate status probabilistically. Thus, SG100 is not met.		
d	**Guidepost**			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.

PI 1.2.4		There is an adequate assessment of the stock status		
	Met?			N
	Justification	A new analytical age-based model was used in 2016, suggesting that fishing mortality was overestimated but harvestable biomass underestimated in the model used in 2013–2015. Considerable uncertainty is present in the assessment due to limited information on recruitment. Therefore, SG100 is not met.		
e	**Guidepost**		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	N
	Justification	The assessment of stock status is subject only to internal peer review. The status information is evaluated through annual MFRI review. This appears to constitute a basic peer review. However there is no external peer review. Thus SG100 is not met		
References		http://www.fisheries.is/main-species/flatfishes/plaice/		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				

Principle 2: Atlantic wolffish and plaice gillnet

Evaluation Table for PI 2.2.1: Gillnet (Atlantic wolffish, plaice)

<table>
<tr><th colspan="2">PI 2.2.1</th><th colspan="3">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</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="15">a</td><td>Guidepost</td><td>Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).</td><td>Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).</td><td>There is a high degree of certainty that bycatch species are within biologically based limits.</td></tr>
<tr><td>Met?</td><td>(Y/N)</td><td>(Y/N)</td><td>(Y/N)</td></tr>
<tr><td>Non-vulnerable species</td><td>N/A (not main)</td><td>N/A (not main)</td><td>N</td></tr>
<tr><td>Harbour porpoise</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Harbour seal</td><td>Y</td><td>N</td><td>N</td></tr>
<tr><td>Harp seal</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Ringed seal</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Hooded seal</td><td>Y</td><td>N</td><td>N</td></tr>
<tr><td>Northern Fulmar</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Common guillemot</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Northern gannet</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Razorbill</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Atlantic puffin</td><td>Y</td><td>N</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">1. Scoring

The team interpreted bycatch species to be species in the catch that are not retained but discarded at sea. The main bycatch species are defined as those considered to represent >5% of the catch, or as being particularly vulnerable. All seabirds and marine mammals recorded as bycatch in gillnet fisheries in recent Marine and Freshwater Research Institute (MFRI) data were considered as vulnerable species as a precautionary approach.

2.1 Non-vulnerable species

The Icelandic Fisheries Management Act states that collecting and bringing ashore any catches in the fishing gear of fishing vessels is obligatory, including both commercial and non-commercial catches; therefore, no discarding should take place. Management measures that reduce discarding have been in place since 1991, and although there is no systematic monitoring of discarding, scientific evidence indicates that discards are, overall, a minor portion of total landings (Pálsson et al. 2005, Pálsson et al. 2013). There are several features in the fisheries management system which reduce the incentive to discard, for instance fishers can land small or undersize fish, with only 50% of the weight being charged against the annual catch quota up to a certain limit (generally 10% of the total landings of each species). This part of the catch should be separated from the rest when the vessel comes into harbour.</td></tr>
</table>

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**

Research by MFRI and measurements by the Directorate of Fisheries (DF) indicate that the most important discards in the Icelandic fisheries are of cod and haddock. Discards of these two species have been estimated on a regular basis by the MFRI since 2001 by comparing length composition samples taken at sea and from landings (making the assumption that discarding only occurs as high grading). Estimated discards of cod and haddock have declined in recent years and were at a minimum in 2011 in all gears. In 2011 the discards of cod amounted to 0.04% of total cod landings, and were only 0.14% for gillnets (Pálsson et al. 2013). Since cod and haddock are the most commonly discarded species in Icelandic fisheries and their estimated discard rates are very low, the team concluded that the scale of discarding of other commercial species is likely to be even smaller.

With regards to non-commercial species there are features in the fisheries management system which reduce the incentive to discard: when landing, up to 5% of the total catch can be classified as being of a low commercial value and will not be subtracted from the quota allocated to the vessel. Based on landings data it is evident that catches of low commercial value are indeed landed (e.g. dogfish, sea cucumber, black scabbard-fish, ribbonfish, and mackerel shark). The discarding ban, measures which reduce the incentive to discard, and the landing of catches of low commercial value suggest that the total catch is retained and landing data represents the approximate total catch of the fisheries. Based on the available information the team concluded that there are no main non-vulnerable bycatch species (representing >5% if the total catch). SG 80 is met for non-vulnerable species.

However, since there is no systematic monitoring of discarding of some bycatch species in place it cannot be argued with sufficient degree of certainty that retention is exceptionally rare and negligible in its impact. SG 100 is not met.

2.2 Vulnerable Species

2.2.1 Mammals

The most recent annual bycatch estimates for marine mammals available from the MFRI (pers. communication) are presented in Table 1 below. Population size estimates based on the most recent data available (data source for all species is the latest stock assessment advice issued by the MFRI taking into account the calculated 95% confidence intervals; see www.hafro.is) and percentage of population impacted are also presented. The MFRI estimates are based on data from observers (coverage of 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015), the scientific cod gillnet surveys (conducted in April each year) and estimated indices of monthly abundances for marine mammals and seabirds. Due to the low observer coverage and the fact that data was only available for two years, the assessment team based estimates of the percentage of population impacted on the maximum estimated bycatch observed in the period 2014 - 2015; for example in the case of harbour seal the percentage was based on the 46 harbour seals recorded as bycatch taken in 2015.

Table 1. Marine mammal bycatch taken in Icelandic gillnet fisheries in 2014 and 2015 (unpublished data provided by MFRI, pers. communication). Population size estimates based on the most recent data available, and estimated percentage of population impacted based on the maximum estimated annual bycatch rates observed in the period 2014 - 2015 are also presented.

Scientific Name	Common Name	2014 Gillnet Bycatch	2015 Gillnet Bycatch	Icelandic Population Size	Maximum % of Icelandic Population Impacted by Gillnets
Phocoena phocoena	Harbour porpoise	551	553	31,755-161,899	0.34-1.74
Phoca vitulina	Harbour	0	46	9,000-17,000[1]	0.27-0.51[2]

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

	seal				
Pagophilus groenlandicus	Harp seal	92	212	470,540-784,280	0.03-0.05
Phoca hispida	Ringed Seal	38	0	2,000,000-5,000,000	0.0019-0.0008
Cystophora cristata	Hooded Seal	0	46	67,104-98,573	0.05-0.07

[1] Based on a partial population survey carried out in 2014 the population size is likely to be lower.
[2] Based on a partial population survey carried out in 2014 the % of the Icelandic population impacted by gillnets is likely to be higher.

Harbour Porpoise

In Iceland, harbour porpoises are mainly caught in gillnets as bycatch in the lumpfish fishery (NAMMCO, 2016), rather than the cod-directed fisheries that are considered here. Based on the most recent MFRI data available, gillnets nevertheless account for up to 553 harbour porpoise deaths per year; based on the most recent estimates of population size available an estimated 0.34 – 1.74 % of the total population per year is impacted. ASCOBANS have set a provisional 1.7% limit for total anthropogenic removals for this species (ASCOBANS 2000), with removals above this level constituting an 'unacceptable interaction'.

Since the IUCN considers that this species should have a status of 'Least Concern' in the North Atlantic due to its abundance, and it is likely that less than 1.7% of the Icelandic harbour porpoise population is impacted by gillnet fisheries the team considers that this species is highly likely to be within biologically based limits. SG 80 is met.

Harbour seal

Based on the most recent MFRI data available, gillnets account for up to 46 harbour seal deaths per year, which would account for 0.27-0.51% of the total estimated Icelandic population per year (based on 2011 population estimates). Since the available data indicates that relative to the total population size low numbers of harbour seals were caught in 2014-2015, and the IUCN considers that this species should have a status of 'Least Concern' in the Eastern Atlantic (including in Iceland) due to its abundance, the team considers that the team considers that this species is likely to be within biologically based limits; SG 60 is met.

However, since the 2014 harbour seal survey results show a severe reduction in numbers of seals at the surveyed areas since the last full count in 2011, implying that the population size is likely to be smaller than that defined in the management objectives by the Icelandic government, the team considers that this species is not highly likely to be within biologically based limits. SG 80 is not met.

Harp seal

Based on the most recent MFRI data available, gillnets account for up to 212 harp seal deaths per year, which accounts for only 0.03-0.05% of the total estimated Icelandic population per year. Since the available data indicates that relative to the total population size low numbers of harp seals were caught in 2014-2015, and the IUCN gives this species a status of 'Least Concern' due to its abundance, the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Ringed seal

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**

Based on the most recent MFRI data available, gillnets account for up to 38 ringed seal deaths per year, which accounts for only 0.0019-0.0008% of the total population per year. Since the available data indicates that relative to the total population size low numbers of ringed seals were caught in 2014-2015, and the IUCN gives this species a status of 'Least Concern', the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Hooded seal

Based on the most recent MFRI data available, gillnets account for up to 46 hooded seal deaths per year, which accounts for only 0.05-0.07% of the total estimated annual number of hooded seals which visit Icelandic waters to feed. Since the available data indicates that relative to the total population size low numbers of hooded seals were caught in 2014-2015, and the most recent estimates of population size indicate that this species continues to be common in Icelandic waters, the team considers that this species is likely to be within biologically based limits; SG 60 is met.

However, since the IUCN gives this species a status of 'Vulnerable' (which is one of the IUCN 'threatened' categories), including in Icelandic waters, this species is not highly likely to be within biologically based limits (i.e. the probability that the species is within biologically based limits does not reach 70%). Based on the most recent bycatch data available the number of hooded seals caught as bycatch in gillnets although low is higher than previously thought. SG 80 is thus not met for this species.

2.2.2 Seabirds

The most recent annual bycatch estimates for seabirds available from the MFRI (pers. communication) are presented in Table 2 below. Population size based on the most recent data available (data source for all species: Supplementary Material, European Red List of Birds, BirdLife International, 2015) and percentage of population impacted are also presented. The MFRI estimates are based on data from observers (coverage of 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015), the scientific cod gillnet surveys (conducted in April each year) and estimated indices of monthly abundances for marine mammals and seabirds. Due to the low observer coverage and the fact that data was only available for two years, the assessment team based estimates of the percentage of population impacted on the maximum estimated bycatch observed in the period 2014 - 2015; for example in the case of razorbill the percentage was based on the 83 individuals recorded as bycatch taken in 2015. It should be noted that several of Iceland's breeding seabirds are declining, for reasons which are unclear but which are thought to be related to changes in climate and oceanographic conditions in the Arctic regions.

Table 2. Estimated seabird bycatch taken in Icelandic gillnet fisheries in 2014 and 2015 (unpublished data provided by MFRI, pers. communication). Population size based on the most recent data available and estimated percentage of population impacted based on the maximum estimated annual bycatch rates observed in the period 2014 - 2015 are also presented.

Scientific Name	Common Name	2014 Gillnet Bycatch	2015 Gillnet Bycatch	Icelandic Population Size (Individuals)	Maximum % of Icelandic Population Impacted by Gillnets
Fulmarus glacialis	Northern fulmar	2717	1628	2,300,000	0.1
Uria aalge	Common guillemot	113	1127	368,000-1,060,000	0.11-0.31

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

Morus bassanus	Northern gannet	151	292	63,000	0.5
Alca torda	Razorbill	0	83	62,5000	0.01
Fratercula arctica	Atlantic puffin	0	42	4,000,000-6,000,000[1]	Unknown[2]

[1] Only outdated (1992) estimates of the Icelandic population size exist.
[2] Since more recent estimates of the Icelandic population size are lacking it is not possible to estimate the percentage of the population impacted by gillnets.

____

Fulmar

Based on the most recent MFRI data available, gillnets account for up to 2,717 fulmar deaths per year, which accounts for only 0.1% of the total estimated Icelandic population per year. Indeed, local experts do not consider that fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016). Since the available data indicates that relative to the total population size low numbers of fulmar were caught in 2014-2015, the species has an IUCN status of 'Least Concern' in Europe, and local expert opinion does not consider fishing to be a threat, the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Common guillemot

Based on the most recent MFRI data available, gillnets account for up to 1127 common guillemot deaths per year, which accounts for only 0.11-0.31% of the total estimated Icelandic population per year. Indeed, local experts do not consider that gillnet fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016). Since the available data indicates that relative to the total population size very low numbers of fulmar were caught in 2014-2015, the species has an IUCN status of just 'Near Threatened' (which is not part of the IUCN 'threatened' categories) in Europe, and local expert opinion does not consider fishing to be a threat, the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Northern gannet

According to the most recent bycatch estimates available from the MFRI, gillnets account for around an average of 222 gannet deaths a year. Based on the estimated Icelandic population size of 63,000 individuals, an average annual catch of northern gannets caught as by catch would account for only 0.4% of the total estimated Icelandic population per year. Since the available data indicates that relative to the total population size low numbers of Northern gannet were caught in 2014-2015, Birdlife International considers the Icelandic populations to be increasing, and the species has an IUCN status of 'Least Concern' in Europe, the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Razorbill

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**		
		Based on the most recent MFRI data available, gillnets account for up to 83 razorbill deaths per year, which accounts for only 0.01% of the total estimated Icelandic population per year. Since the available data indicates that relative to the total population size very low numbers of razorbill were caught in 2014-2015, and the species has an IUCN status of just 'Near Threatened' (which is not part of the IUCN 'threatened' categories) in Europe, the team considers that gillnet impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met. Atlantic puffin Based on the most recent MFRI data available, gillnets account for up to 42 Atlantic puffin deaths per year. Only outdated Icelandic population data (Umhverfisráðuneytið, 1992 cited in BirdLife Internationa, 2015) exist, so it is not possible to estimate the current population level impacts of gillnet fishing on this species. Since the available data indicates low numbers of Atlantic puffins were caught in 2014-2015 (0 in 2014, 42 in 2015), and the most recent estimates of population size indicated that this species was very common in Icelandic waters, the team considers that this species is likely to be within biologically based limits; SG 60 is met. However, since the IUCN gives this species a status of 'Endangered', including in Icelandic waters, and no recent estimates of Icelandic population size of this species are available, this species is not highly likely to be within biologically based limits (i.e. the probability that the species is within biologically based limits does not reach 70%). SG 80 is thus not met for this species. 2.2.3 All Vulnerable Species Limited monitoring means that there is not a high degree of certainty that the vulnerable bycatch species are within biologically based limits, and there is no certainty that retention is exceptionally rare and negligible in its impact for any of the species considered. This is evidenced by the differences in bycatch numbers recorded for several bird species in 2014 and 2015 (e.g. gillnet bycatch of common guillemot in 2014: 113, in 2015: 1127; razorbill 2014: 0, in 2015: 83). SG 100 is thus not met.		
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.	
	Met?	(Y/N)	(Y/N)	
	Harbour seal	Y	N	
	Hooded seal	Y	N	
	Atlantic puffin	Y	N	

<table>
<tr><th colspan="2">PI 2.2.1</th><th colspan="3">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</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">There are a set of measures in place for marine mammal and seabird protection in Icelandic gillnet fisheries:
• Marine mammal and seabird bycatch is monitored by mandatory eLog system, through the cod gillnet surveys (conducted in April each year), and onboard observers from the directorate of fisheries (Fiskistofa), although returns from the eLog system have been poor. The association of Small Boat Owners has taken steps to improve logbook reporting of marine mammal and seabird bycatch. In the effort to step up monitoring of such bycatch, the DF has issued a new simplified logbook form that is believed to improve reporting of bycatch (see section 3.4.3.4). This will allow a full bycatch management strategy to be implemented in the future.
• Observers monitored 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015; overall the quality of the data has improved in the last 5 years (MFRI pers. communication).
• Fishers are not allowed to offer for sale, give away, nor accept as a gift, any bird that has been killed in fishing nets.
• Any birds caught alive must be released.
• Several temporal and permanently closed areas have been established in Icelandic waters (see Figures 22 / 23 in section 3.4.3.4), mainly to protect critical habitats of commercial species. Although such closed areas were not established to protect mammals and seabirds and thus do explicitly take into account the distribution of breeding populations of these species, the closed areas will nonetheless also serve to maintain bycatch levels of coastal species such as hooded seal and Atlantic puffin at low levels. For example, all cod fisheries (including cod gillnets) are closed within 12 miles along the south and west coast and within 6 miles along the north and east coast over 8-16 April (6 nm) and 17-30 April (12 nm) each year.
There are thus mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding; SG 60 is met.
The team considers that there is currently no partial management strategy of <u>demonstrably effective</u> mitigation measures for gillnet bycatch (see PI 2.2.2 below). SG 80 is not met.</td></tr>
<tr><td>c</td><td>Guidepost</td><td>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.</td><td></td><td></td></tr>
<tr><td></td><td>Met?</td><td>N/A</td><td></td><td></td></tr>
<tr><td></td><td>Justification</td><td colspan="3">Sufficient information was available to estimate the current status of all impacted bycatch species.</td></tr>
</table>

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**
References	Anderson et al. 2009; ASCOBANS 2000; BirdLife International, 2015; Bowen, 2016; del Hoyo et al. 1992; Folkow et al. 2010; Folkow and Blix 1999; Gaskin 1992; Gunnarsson et al. 1998; Hagemeijer and Blair 1997; IUCN Cetacean Specialist Group, 2007; JNCC 2014; Kovacs et al. 2011a; Kovacs, 2015; Kovacs, 2016; Kristjánsson 1983; Lavigne and Kovacs 1988; Lowry, 2016; Pálsson et al. 2005, Pálsson et al. 2013; Thór 2002, 2003, 2005; Read 1999; Rice 1998; Snow and Perrins 1998; Stenson 2003; Thangstad et al., 2002.
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.2.1 for gillnet fisheries scored at SG 80 level since fewer vulnerable bycatch species were considered. In recent years, Icelandic authorities have increased efforts to obtain more reliable data on by-catch of vulnerable marine mammal and seabird species, and for the purpose of the present assessment the most recent bycatch data for the years 2014 and 2015 was made available to the assessment team. A larger number of species was evident in the more recent bycatch data, which resulted in a lower score of 75.
Combined Scores	(see table below)

	Scoring Issue Scores			
Scoring Element	a	b	c	All
Non-vulnerable species	80	N/A	N/A	80
Harbour porpoise	80	N/A	N/A	80
Harbour seal	60	60	N/A	60
Harp seal	80	N/A	N/A	80
Ringed seal	80	N/A	N/A	80
Hooded seal	60	60	N/A	60
Northern Fulmar	80	N/A	N/A	80
Common guillemot	80	N/A	N/A	80
Northern gannet	80	N/A	N/A	80
Razorbill	80	N/A	N/A	80
Atlantic puffin	60	60	N/A	60
				75

OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**4**

Evaluation Table for PI 2.2.2: Gillnet (Atlantic wolffish, plaice)

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?	Y	Y	N
	Justification	The Icelandic Fisheries Management Act requires that all catches shall be landed; therefore, discarding is illegal. All the catch landed by the Icelandic fishing fleet must be weighed and reported into a database operated by the Directorate of Fisheries (DF). There are several measures included in the fisheries management system which should disincentive fishermen from discarding, for example: • Fishers can land small or undersize fish, with only 50% of the weight being charged against the annual catch quota up to a certain limit (generally 10% of the total landings of each species). This part of the catch should be separated from the rest when the vessel comes into harbour. • When landing, up to 5% of the total catch (0.5% in case of pelagics) can be classified as being of a low commercial value and should not be subtracted from the quota allocated to the vessel. This part of the catch should be sold on an authorized auction and the price goes to funding marine research (Verkefnasjóður sjávarútvegsins). This part of the catch should be separated from the rest when the vessel comes into harbour. Any remaining levels of discarding in fisheries is routinely assessed by Marine and Freshwater Research Institute (MFRI). Fishers are required to keep fish logbooks. An observer system is operated by the DF, both at landing sites and on board vessels. Moreover, the Icelandic coast guard monitors fishing activities in Icelandic waters, e.g. via VMS, including surveillance of areas closed for fishing. Breach of regulations leads to a warning or a fine. Repeated offenses lead to heavy fines, revocation of the vessel's license to fish and possibly a prison sentence. Large areas of Icelandic waters are closed for fishing, some of them temporarily (hours per day, days in total or seasonal) and others permanently (years), which decreases the likelihood of large catches of juvenile fish (see Figures 22 / 23 in section 3.4.3.4). Areas are usually closed because of the presence of large amounts of juvenile fish or in order to protect spawning fish, but also vulnerable benthic habitats. As a result of the measures listed above, there are no main non-vulberable by-catch species, and SG 60 and SG 80 are met. There is in addition a set of measures in place to reduce bycatch of marine mammals and seabirds in Icelandic gillnet fisheries:		

<table>
<tr><th colspan="2">PI 2.2.2</th><th colspan="3">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</th></tr>
<tr><td></td><td></td><td colspan="3">

- Marine mammal and seabird bycatch is monitored by mandatory eLog system, through the cod gillnet surveys (conducted in April each year), and onboard observers from the DF and the MFRI, although returns from the eLog system have been poor. The association of Small Boat Owners have taken steps to improve logbook reporting of marine mammal bycatch. In the effort to step up monitoring of such bycatch, the DF has issued a new simplified logbook form that is believed to improve reporting of bycatch (see section 3.4.3.4). This will allow a strategy to be implemented in the future.
- Observers monitored 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015. Although overall the quality of the data has improved in the last 5 years, the low number of monitored trips in the smaller fisheries, including gillnets, continues to make extrapolation of bycatch estimates difficult (MFRI, pers. communication).
- Fishers are not allowed to offer for sale, sell, give, nor accept as a gift, any bird that has been killed in fishing nets.
- Any birds caught alive must be released.
- There are several temporal and permanent closed areas in Icelandic waters (see Figures 22 / 23 in section 3.4.3.4), which although not established to protect seabirds or mammals will also serve to maintain bycatch levels at low levels since bycatch of many sensitive species is highest in inshore areas, which is where the closures are located (MFRI, pers. communication). For example, all cod fisheries (including cod gillnets) are closed within 12 miles along the south and west coast and within 6 miles along the north and east coast over 8-16 April (6 nm) and 17-30 April (12 nm) each year.

Overall there is a partial strategy in place, which is expected to ensure that the fishery does not hinder recovery of bycatch species. SG 80 is met.

Since the measures in place for managing bycatch of vulnerable species such as seabirds and mammals are generally not designed to manage impact on that component specifically (e.g. temporal and seasonal closures are not designed to reduce bycatch of vulnerable species), and other measures require improvements to be appropriate for the fishery (e.g. more logbook returns / more observer trips are required to gather bycatch data for gillnets), the team considers that there is no cohesive and strategic arrangement in place to manage all bycatch species. SG 100 is not met for all bycatch species.
</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</td><td>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.</td><td>Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.</td></tr>
<tr><td>Met?</td><td>Y</td><td>N</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The Icelandic Fisheries Management Act requires that all catches shall be landed; therefore, discarding is illegal in Iceland. There are a number of measures that aim to ensure compliance with the law, including monitoring and surveillance which are conducted by the DF and the coast guard to ensure compliance of regulations. Annual assessment of discarding by MFRI indicates that discarding is very limited, and control and surveillance information indicates that temporal and permanent fishing ground closures</td></tr>
</table>

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		
		are respected. Estimated discards have declined in recent years and were at a minimum in 2011 in all gears, and total discard rates (weight discarded/weight landed) were lower than recorded over the period 2001-2011 (Pálsson et al. 2013). However, information available on the fishery / species involved indicates that the partial strategy currently in place is not sufficient and may not work to ensure the fishery does not pose a risk for bycatch populations as evidenced by the outcome score of SG 60 for harbour seal, hooded seal and Atlantic puffin. The measures in place for managing bycatch of vulnerable species such as seabirds and mammals are generally not designed to manage impact on that component specifically (e.g. temporal and seasonal closures are not designed to reduce bycatch of vulnerable species), and other measures require improvements to be appropriate for the fishery (e.g. more logbook returns / more observer trips are required to gather bycatch data). SG 80 is not met.		
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?		Y	N
	Justification	It is evident that almost all fish are landed even when they are below commercial sizes or of low commercial value (see PI 2.2.1). This, together with the fact that the most commonly discarded species in Icelandic fisheries are of cod and haddock and that the MFRI has estimated the discard rates to be less than 1% of landings, suggests that discarding in Icelandic fisheries is a minor problem. Indeed, discard studies have been in place for over 10 years with well established procedures in place by the MFRI, the DF and the coast guard. Control and surveillance information indicates that temporal and permanent fishing ground closures are respected. There is thus some evidence that the partial strategy is being implemented successfully; SG 80 is met. Low returns of electronic logbook data on bycatch rates of vulnerable species, and the lack of sufficient observer coverage to adequately monitor bycatch rates of vulnerable species in gillnet fisheries (MFRI, pers. communication) means that not all management measures are being implemented successfully; SG 100 is not met.		
d	**Guidepost**			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	Since the measures in place for managing bycatch of vulnerable species such as seabirds and mammals are generally not designed to manage impact on that component specifically (e.g. temporal and seasonal closures are not designed to reduce bycatch), and other measures require improvements to be appropriate for the fishery (e.g. more logbook returns / more observer trips are required to gather bycatch data), the team considers that there is no cohesive and strategic arrangement in place to manage all bycatch species, i.e. that there is at present no strategy in place for managing and minimising bycatch of all species. SG 100 is not met.		
References		Pálsson et al., 2013.		

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**	
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.2.2 for gillnet fisheries scored at SG 100 level since the authors considered that bycatch levels of vulnerable species (birds and porpoises) are not significant at the population level and that therefore a strategy is not required. In recent years Icelandic authorities have increased efforts to obtain more reliable data on by-catch of vulnerable marine mammal and seabird species, and for the purpose of the present assessment the most recent bycatch data for the years 2014 and 2015 was made available to the assessment team. A larger number of vulnerable species than previously known was evident in the more recent bycatch data, which resulted in a lower score of 75.	
OVERALL PERFORMANCE INDICATOR SCORE:		**75**
CONDITION NUMBER (if relevant):		**5**

Evaluation Table for PI 2.2.3: Gillnet (Atlantic wolffish, plaice)

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?	Y	Y	N
	Justification	Research by the Marine and Freshwater Research Institute (MFRI) and monitoring by the Directorate of Fisheries (DF), including through on-board surveillance, indicate that the most commonly discarded species of non-vulnerable / commercial species in the Icelandic fisheries are cod and haddock, and that discard levels in Icelandic fisheries are very low. This is a consequence of the Icelandic Fisheries Management Act, which requires that all catches shall be landed. Marine mammal and seabird bycatch is monitored by mandatory eLog system, through the cod gillnet surveys (conducted in April each year), and by onboard observers from the DF and the MFRI. Observers monitored 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015; overall the quality of the data has improved in the last 5 years (MFRI pers. communication). Both qualitative information and some quantitative information are available on the amount of main bycatch species taken in Icelandic gillnet fisheries, so the team considers SG 80 to be met. Returns from the eLog system have been poor (the paper based log books that this “new” system replaced had better returns), and variations in estimated numbers of bycatch species evident in the most recent data indicate that the available information may not be accurate and verifiable for all bycatch species. The low number of trips monitored by observers in the smaller fisheries, including gillnets, continues to make extrapolation of bycatch estimates difficult (MFRI, pers. communication). Moreover, uncertainties remain on total population sizes of several species of birds (and marine mammals), with only outdated information available on total population sizes. As such, the information available to assess consequences for the status of affected populations is not accurate and verifiable for all affected populations. SG100 is not met.		
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?	Y	Y	N
	Justification	The most commonly discarded species in Icelandic fisheries are cod and haddock. The MFRI has estimated the discard rate to be less than 1% of landings, which suggests that bycatch/discarding is a minor problem in the assessed fisheries, and has not reached the level of main bycatch species (5% of the total catch). Bycatch of vulnerable species is monitored by a mandatory eLog system and onboard observers from the DF and the MFRI; observers monitored 0.87% of fishing trips by the gillnet fleet in 2014, and 0.93% in 2015.		

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		
		The quality of the data has improved in the last 5 years as a result of increased levels of observer coverage (MFRI, pers. communication). In addition to fisheries dependent data, information on population status of species caught as bycatch comes from a number of scientific surveys which are routinely carried out around Iceland. This includes standardized annual groundfish surveys which have been conducted by the MFRI since 1985 (which includes biological sampling of large numbers of demersal fish species), seabird surveys carried out by the Icelandic Institute of Natural History, and *ad hoc* scientific studies (e.g. Garthe et al., 2016) recently carried out a study on migration routes and wintering sites of northern gannets *Morus bassanus* from south-eastern Iceland). The team considers that such information is sufficient to estimate outcome status with respect to biologically based limits of bycatch species. SG 80 is met. Since a number of uncertainties remain both for fisheries dependent and fisheries independent data the information is currently not sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty; SG 100 is not met.		
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?	Y	Y	N
	Justification	Information is collected on spatial and temporal fishing patterns through the use of Vessel Monitoring System, and the presence / absence of undersize or juvenile year class fish as well as bycatch of vulnerable species on the fishing grounds is evaluated through the use of onboard observers, scientific research at sea, and sampling of landed catches. There is thus a recurrent monitoring and scientific survey system in place to estimate the trend and relative quantities of bycatch, which is necessary prerequisite to the implementation of bycatch management measures. The team considers that the information is adequate to support a partial strategy to manage main bycatch species. In fact monitoring data is routinely used to support ongoing measures to manage bycatch, for instance to declare temporal closed areas to avoid discards of juvenile fish. SG 80 is met. The information is however not adequate to evaluate with a high degree of certainty whether the strategy is achieving its objective. SG 100 is not met.		
d	Guidepost		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 effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		N	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	There is ongoing recording and monitoring of spatial and temporal fishing patterns by the fleet which could be used to flag any potential changes in levels of risk to commercial species caught as bycatch. Sampling of catches at sea and of landings for the Icelandic gillnet fleet are adequate to determine whether there are increased risks of discarding due to the presence of undersize or unmarketable species in catches. The data available on bycatch of vulnerable species has improved over the last five years. For gillnet fisheries data is available from the annual MFRI spring gillnet survey, which is equivalent to 2% of the total cod gillnet fishing effort in April. The first year's gillnet survey was only conducted in the south and west of the country, but since 2002 it is also done in the north. Data on bycatch is available from onboard observations, which have increased in recent years; observers aim to monitor 1% of fishing trips annually. Additional information should be available from logbook data. Bycatch information from logbooks was received from ca. 5% of gillnet vessels until 2009, but since fishers switched to the mandatory eLog system returns have been so poor that the data cannot be used to estimate bycatch levels (MFRI, pers. communication). Since there are doubts that the monitoring data being collected by fishers is sufficient to detect any increase in risk to vulnerable species such as harbour seal, hooded seal, and Atlantic puffin, SG 80 is not met.	
References		Garthe et al., 2016.	
OVERALL PERFORMANCE INDICATOR SCORE:			**75**
CONDITION NUMBER (if relevant):			**6**

Principle 2: Atlantic wolfish and plaice longline

Evaluation Table for PI 2.2.1: Longline (Atlantic wolffish, plaice)

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?	(Y/N)	(Y/N)	(Y/N)
	Non-vulnerable species	N/A (not main)	N/A (not main)	N
	Northern fulmar	Y	Y	N
	Black guillemot	Y	Y	N
	Northern gannet	Y	Y	N
	Cormorant	Y	Y	N
	Greater black-backed gull	Y	Y	N
	Justification	1. Scoring The team interpreted bycatch species to be species in the catch that are not retained but discarded at sea. The main bycatch species are defined as those considered to represent >5% of the catch, or as being particularly vulnerable. All seabirds recorded as bycatch in longline fisheries in recent Marine and Freshwater Research Institute (MFRI) data were considered as vulnerable species as a precautionary approach. 2.1 Non-vulnerable species The Icelandic Fisheries Management Act requires that all catches shall be landed; therefore, no discarding should take place. Management measures that reduce discarding have been in place since 1991, and although there is no systematic monitoring of discarding in place, scientific evidence indicates that discards are, overall, a minor portion of total landings (Pálsson et al. 2005, Pálsson et al. 2013). There are several features in the fisheries management system which reduce the incentive to discard, for instance fishers can land small or undersize fish, with only 50% of the weight being charged against the annual catch quota up to a certain limit (generally 10% of the total landings of each species). This part of the catch should be separated from the rest when the vessel comes into harbour. Research by MFRI and measurements by the Directorate of Fisheries (DF) indicate that the most important discards in the Icelandic fisheries are of cod and haddock. Discards of these two species have been estimated on a regular basis by the MFRI since 2001 by comparing length composition samples taken at sea and from landings (making the assumption that discarding only occurs as high grading). Estimated discards of cod and haddock have declined in recent years and were at a minimum in 2011 in all gears. In 2011 the discards of cod amounted to 0.04% of total cod landings, and were only 0.01% for longlines (Pálsson et al. 2013). Since cod and haddock are		

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

the most commonly discarded species in Icelandic fisheries and their estimated discard rates are very low the team concluded that the scale of discarding of other commercial species is likely to be even smaller.

With regards to non-commercial species the team noted that there are features in the fisheries management system which reduce the incentive to discard: when landing, up to 5% of the total catch can be classified as being of a low commercial value and will not be subtracted from the quota allocated to the vessel. Based on landings data is evident that catches of low commercial value are indeed landed (e.g. dogfish, sea cucumber, black scabbard-fish, ribbonfish, mackerel shark). The discarding ban, measures which reduce the incentive to discard, and the landing of catches of low commercial value suggest that the total catch is retained and landing data represents the approximate total catch of the fisheries. Based on the available information the team concluded that there are no main non-vulnerable bycatch species (representing >5% if the total catch), and that SG 80 is automatically met for non-vulnerable species.

However, since there is no systematic monitoring of discarding of some bycatch species in place it cannot be argued with sufficient degree of certainty that retention is exceptionally rare and negligible in its impact. SG 100 is not met.

2.2 Vulnerable Species

Updated by-catch data for the period 2014-2015 was made available by the MFRI for the purpose of this assessment.

2.2.1 Seabirds

The most recent annual bycatch estimates for seabirds available from the MFRI (pers. communication) are presented in Table 1 below. Population size based on the most recent data available (data source for all species: Supplementary Material, European Red List of Birds, BirdLife International, 2015) and percentage of population impacted are also presented. The MFRI estimates are based on data from observers (observers monitored 0.9% of fishing trips by the longline fleet in 2014, and 1% in 2015). Due to the low observer coverage and the fact that data was only available for two years, the assessment team based estimates of the percentage of population impacted on the maximum estimated bycatch observed in the period 2014 - 2015; for example in the case of greater black-backed ull the percentage was based on the 207 individuals recorded as bycatch taken in 2015. It should be noted that several of Iceland's breeding seabirds are declining, for reasons which are unclear but which are thought to be related to changes in climate and oceanographic conditions in the Arctic regions.

Table 1. Estimated seabird bycatch taken in Icelandic longline fisheries in 2014 and 2015 (unpublished data provided by MFRI, pers. communication). Population size based on the most recent data available and estimated percentage of population impacted based on the maximum estimated annual bycatch rates observed in the period 2014 - 2015 are also presented.

Scientific Name	Common Name	2014 Longline Bycatch	2015 Longline Bycatch	Icelandic Population Size (Individuals)	Maximum % of Icelandic Population Impacted by Longlines
Fulmarus glacialis	Northern fulmar	2490	1555	2,300,000	0.1
Cheppus grylle	Black guillemot	0	311	10,000-15,000	2.1-3.1

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

Morus bassanus	Northern gannet	133	207	63,000	0.3
Phalacrocorax aristotelis; P. carbo	Cormorant	113	104	9800 / 8200	1.4 / 1.6
Larus marinus	Greater black-backed gull	0	207	30,000-40,000	0.5-0.7

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Northern fulmar

Based on the most recent MFRI data available, cod longlines account for up to 2,490 fulmar deaths per year, which accounts for only 0.1% of the total estimated Icelandic population per year. Indeed, local experts do not consider that fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016). Since the available data indicates that relative to the total population size low numbers of fulmar were caught in 2014-2015, the species has an IUCN status of 'Least Concern' in Europe, and local expert opinion does not consider fishing to be a threat, the team considers that longline impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Black guillemot

Recent estimates of bycatch made available by the MFRI however show that bycatch rates are low in longlines, although these estimates are based on observer reports which cover a relatively low proportion of the fishery and are therefore subject to wide confidence intervals (this is also suggested by the large disparity between 2014 and 2015 estimates; 2014: 0 / 2015: 311). Based on the estimated Icelandic population size of 10,000-15,000 individuals, an average annual catch of 156 black guillemots caught as by catch would account for 1.0-1.6% of the total estimated Icelandic population per year, whilst based on the maximum observed annual catches of 311 black guillemots this would account for 2.1-3.1% of the total estimated Icelandic population per year. Since the available data indicates that relative to the total population size low numbers of black guillemot were caught in 2014-2015 and the species has an IUCN status of 'Least Concern' in Europe the team considers that longline impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

Northern gannet

According to the most recent bycatch estimates available from the MFRI, longlines account for up to 207 gannet deaths a year. Based on the estimated Icelandic population size of 63,000 individuals, this represents only 0.3% of the total estimated Icelandic population per year. Indeed, local experts consider that longline fisheries are not a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. comm., 24 May 2016). Since the available data indicates that relative to the total population size low numbers of Northern gannet were caught in 2014-2015, Birdlife International considers the Icelandic populations to be increasing, the species has an IUCN status of 'Least Concern' in Europe, and local expert opinion does not consider longline fisheries to be a threat, the team considers that longline impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met.

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		
		Great cormorant / European Shag According to 2014-2015 bycatch estimates available from the MFRI, longlines account for up to 133 cormorant / shag deaths a year. Since it is not known what percentage of the bycatch are cormorant and what percentage are shag (although breeding populations of the two species are similar in Iceland), the assessment team took the precautionary approach to assume all bycatch were one species and then the other. Based on these precautionary calculations, a maxiumum of 1.6% of the total estimated Icelandic population per year may be affected for great cormorant, and 1.4% per year for shag. Indeed, local experts do not consider that fisheries are a threat to the population status of this species (Dr. Erpur Snær Hansen, Náttúrustofa Suðurlands / South Iceland Nature Research, Vottunarstofan Tún pers. communication, 24 May 2016). Since the available data indicates that relative to the total population size low numbers of cormorants / European shags were caught in 2014-2015, the species have an IUCN status of 'Least Concern' in Europe, and local expert opinion does not consider longlines to be a threat, the team considers that longline impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met. Greater black-backed gull According to the most recent bycatch estimates available from the MFRI, longlines account for up to 207 black-backed gull deaths a year. Based on the lower estimated Icelandic population size of 30,000 individuals, this accounts for only 0.5% of the total estimated Icelandic population per year. Since the available data indicates that relative to the total population size low numbers of black-backed gulls were caught in 2014-2015 and the species has an IUCN status of 'Least Concern' in Europe the team considers that longline impacts are not significant and that this species is highly likely to be within biologically based limits. SG 80 is met. 2.2.2 Mammals According to the 2014 and 2015 bycatch estimates available from the MFRI, no mammals were taken as bycatch in Icelandic longline fisheries. 2.2.3 All Vulnerable Species Limited monitoring means that there is not a high degree of certainty that the vulnerable bycatch species are within biologically based limits, and there is no certainty that retention is exceptionally rare and negligible in its impact for any of the species considered. This is evidenced by the differences in bycatch numbers recorded for several bird species in 2014 and 2015 (e.g. longline bycatch of Northern fulmar in 2014: 2490, in 2015: 1555; black guillemot in 2014: 0, in 2015: 311). SG 100 is thus not met.		
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.	
	Met?	(Y/N)	(Y/N)	

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		
	Justification	Not applicable – there are no main bycatch species outside biologically based limits.		
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?	(Y/N)		
	Justification	Not applicable – the fishery is not causing the bycatch species to be outside biologically based limits / is not hindering recovery.		
References		BirdLife International 2012; BirdLife International, 2015; Gunnarsson et al. 1998; del Hoyo et al. 1992; Hagemeijer and Blair 1997; Kristjánsson 1983; Pálsson et al. 2005; Pálsson et al. 2013; Thór 2002, 2003, 2005; Snow and Perrins 1998.		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Evaluation Table for PI 2.2.2: Longline (Atlantic wolffish, plaice)

<table>
<tr><td colspan="2">PI 2.2.2</td><td colspan="3">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</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>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.</td><td>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.</td><td>There is a strategy in place for managing and minimizing bycatch.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">
The Fisheries Management Act requires that all catches shall be landed; therefore discarding is illegal. All the catch landed in Iceland by the Icelandic fishing fleet must be weighed and reported into a database operated by the Directorate of Fisheries (DF). There are several measures included in the fisheries management system which should disincentive fishermen from discarding, for example:

Fishers can land small or undersize fish, with only 50% of the weight being charged against the annual catch quota up to a certain limit (generally 10% of the total landings of each species). This part of the catch should be separated from the rest when the vessel comes into harbour.
When landing, up to 5% of the total catch (0.5% in case of pelagics) can be classified as being of a low commercial value and should not be subtracted from the quota allocated to the vessel. This part of the catch should be sold on an authorized auction and the price goes to funding marine research (Verkefnasjóður sjávarútvegsins). This part of the catch should be separated from the rest when the vessel comes into harbour.

Any remaining levels of discarding in fisheries is routinely assessed by the Marine and Freshwater Research Institute (MFRI). Fishers are required to keep fish logbooks. An observer system is operated by the DF, both at landing sites and on board vessels. Moreover, the Icelandic Coast Guard monitors fishing activities in Icelandic waters, e.g. via Vessel Monitoring System (VMS), including surveillance of areas closed for fishing. Breach of regulations leads to a warning or a fine. Repeated offenses lead to heavy fines, revocation of the vessel's license to fish and possibly a prison sentence.
Large areas of Icelandic waters are closed for fishing, some of them temporarily (hours per day, days in total or seasonal) and others permanently (years) (see Figures 22 / 23 in section 3.4.3.4), which decreases the likelihood of large catches of juvenile fish. Areas are usually closed for fishing by means of bottom trawl and longline because of the presence of large amounts of juvenile fish or in order to protect spawning fish, but also vulnerable benthic habitats.
Moreover, there are a set of general measures in place for seabird protection in Icelandic longline fisheries:

Seabird bycatch is monitored by mandatory eLog system and onboard observers from the DF and the MFRI, although returns from the eLog system have been poor. The association of Small Boat Owners have taken place in order to improve logbook reporting of marine mammals and seabirds bycatch.

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<table>
<tr><th colspan="2">PI 2.2.2</th><th colspan="3">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</th></tr>
<tr><td></td><td></td><td colspan="3">In the effort to step up monitoring of such bycatch, the DF has issued a new simplified logbook form that is believed to improve reporting of bycatch (see section 3.4.3.4). This will allow a strategy to be implemented (if necessary) in the future.
• Observers monitored 0.9% of fishing trips by the longline fleet in 2014, and 1% in 2015. Overall the quality of the data has improved in the last 5 years (MFRI, pers. communication).
• Fishers are not allowed to offer for sale, sell, give, nor accept as a gift, any bird that has been killed in fishing nets.
• Any birds caught alive must be released.
• Some fishermen use flags, bird-scaring buoy lines or a gas alarm to scare birds away when setting the line, but the extent of such mitigation methods within the fleet is unknown (MFRI, pers. communication).
• During the winter time, the lines are often shot in the dark, which reduces the possible bycatch of seabirds.
• There are several temporal and permanent closed areas in Icelandic waters (see Figures 22 / 23 in section 3.4.3.4), which although not established to protect seabirds will also serve to maintain bycatch levels at low levels since bycatch of many sensitive species is highest in inshore areas, which is where the closures are located (MFRI, pers. communication).

The team thus considers that there is a partial strategy in place which is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits / to ensure that the fishery does not hinder recovery. SG 80 is met.

Although there appears to be a cohesive arrangement which includes a number of measures to manage and minimise bycatch, a complete strategy (including effective monitoring, implementation of targeted management measures and review of the effectiveness of such measures) to minimise bycatch for all bycatch species is lacking. SG 100 is thus not met.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</td><td>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.</td><td>Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">The Fisheries Management Act requires that all catches shall be landed; therefore discarding is illegal in Iceland. There are a number of measures that aim to ensure compliance with the law, including monitoring and surveillance which are conducted by the DF and the coast guard to ensure compliance of regulations. Annual assessment on discarding by MFRI indicates that discarding is very limited. Estimated discards have declined in recent years and were at a minimum in 2011 in all gears, and total discard rates (weight discarded/weight landed) were lower than recorded over the period 2001-2011 (Pálsson et al. 2013).

With regards to discards of vulnerable seabird species the team considers that the partial strategy in place consists of appropriate measures to manage seabird bycatch in a longline fishery (improved data collection to ensure data required to develop a full management strategy will be available / spatial and temporal closures of fishing grounds avoid bycatch). This is also evidenced by the outcome PI, where all species</td></tr>
</table>

<table>
<tr><th colspan="2">PI 2.2.2</th><th colspan="3">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</th></tr>
<tr><td></td><td></td><td colspan="3">were found to be highly likely to be within biologically based limits (i.e. SG 80 was met), and overall bycatch rates were very low relative to estimated total population sizes.
Based on the above there is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and species involved, and SG 80 is met.
There is currently no complete management strategy in place for managing and minimising bycatch of all main bycatch species. SG 100 is not met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>There is some evidence that the partial strategy is being implemented successfully.</td><td>There is clear evidence that the strategy is being implemented successfully.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">It is evident that most fish are landed even when they are below commercial sizes or of low commercial value (see PI 2.2.1 above). This, together with the fact that the most commonly discarded species in Icelandic fisheries are cod and haddock and that the MFRI has estimated the discard rates to be less than 1% of landings, suggests that discarding in Icelandic fisheries is a minor problem. Indeed, discard studies have been in place for over 10 years with well established procedures in place by the MFRI, the DF and the coast guard.
More recently the authorities have increased efforts to improve monitoring of bycatch of vulnerable species such seabirds, as evidenced by the improved bycatch data made available for 2014-2015 by the MFRI for the present assessment. A number of temporal and permanent area closures are routinely implemented in Icelandic waters, and compliance is monitored by the Icelandic Coast Guard, including through the use of VMS. Breach of regulations leads to a warning or a fine. Repeated offenses lead to heavy fines, revocation of the vessel's license to fish and possibly a prison sentence. A further indication that the management strategy is being implemented comes from the low bycatch observations themselves.
Overall the team considers that there is therefore some evidence that the partial strategy is being implemented successfully and SG 80 is met. There is currently no complete management strategy in place for managing and minimising bycatch of all bycatch species, so SG 100 is not met.</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td></td><td>There is some evidence that the strategy is achieving its overall objective.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">Since there is no strategy in place for managing bycatch of all main bycatch species SG 100 is not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Pálsson et al. 2013.</td></tr>
</table>

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
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.2.3: Longline (Atlantic wolffish, plaice)

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?	Y	Y	N
	Justification	Research by the Marine and Freshwater Research Institute (MFRI) and monitoring by the Directorate of Fisheries (DF), including through on-board surveillance, indicate that the most commonly discarded species of non-vulnerable / commercial species in Icelandic fisheries are cod and haddock, and that discard levels in Icelandic fisheries are very low. This is a consequence of the Icelandic Fisheries Management Act, which requires that all catches shall be landed. Marine mammal and seabird bycatch is monitored by mandatory eLog system and onboard observers from the DF and the MFRI. In addition, observers monitored 0.9% of fishing trips by the longline fleet in 2014 and 1% in 2015. The quality of the data has improved in the last 5 years (MFRI, pers. communication). Both qualitative information and some quantitative information are available on the amount of main bycatch species taken in Icelandic longline fisheries, so the team considers SG 80 to be met. Returns from the eLog system have been poor (the paper based log books that this “new” system replaced had better returns), and variations in estimated numbers of bycatch species evident in the most recent data indicate that the available information may not be accurate and verifiable for all bycatch species. Moreover, uncertainties remain on total population sizes of several species of birds (and marine mammals), with only outdated information available on total population sizes. As such, the information available to assess consequences for the status of affected populations is not accurate and verifiable for all affected populations. SG100 is not met.		
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?	Y	Y	N
	Justification	The most commonly discarded species in Icelandic fisheries are cod and haddock. The MFRI has estimated the discard rate to be less than 1% of landings, which suggests that bycatch/discarding is a minor problem in the assessed fisheries, and has not reached the level of main bycatch species (5% of the total catch). Bycatch of vulnerable species is monitored by a mandatory eLog system and onboard observers from the DF and the MFRI; in 2014 and 2015 observers monitored 0.9% and 1% of all fishing trips of the longline fleet respectively. The quality of the data has improved in the last 5 years as a result of increased levels of observer coverage (MFRI, pers. communication). In addition to fisheries dependent data, information on population status of species caught as by catch comes from a number of scientific surveys which are routinely carried out around		

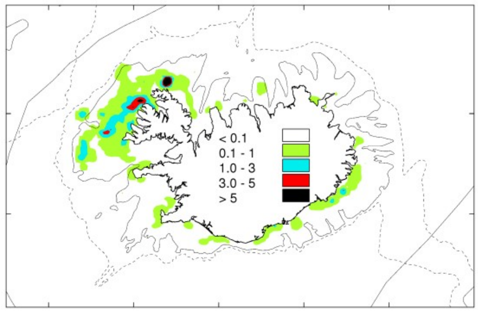
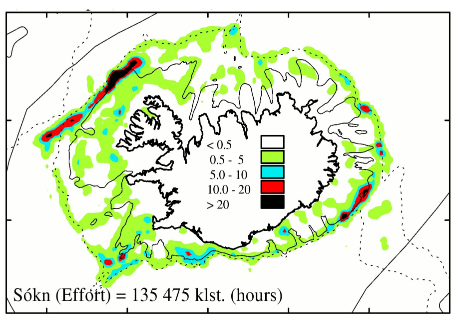
PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
		Iceland. This includes standardized annual groundfish surveys which have been conducted by the MFRI since 1985 (which includes biological sampling of large numbers of demersal fish species), seabird surveys carried out by the Icelandic Institute of Natural History, and *ad hoc* scientific studies (e.g. Gardarsson and Jónsson (2014) carried out a study on the status of the breeding population of Great Cormorants in Iceland in 2012). The team considers that such information is sufficient to estimate outcome status with respect to biologically based limits of bycatch species. SG 80 is met. Since a number of uncertainties remain both for fisheries dependent and fisheries independent data the information is currently not sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty; SG 100 is not met.		
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?	Y	Y	N
	Justification	Information is collected on spatial and temporal fishing patterns through the use of Vessel Monitoring System (VMS), and the presence / absence of undersize or juvenile year class fish as well as bycatch of vulnerable species on the fishing grounds is evaluated through the use of onboard observers, scientific research at sea, and sampling of landed catches. There is thus a recurrent monitoring and scientific survey system in place to estimate the trend and relative quantities of bycatch, which is necessary prerequisite to the implementation of bycatch management measures. The team considers that the information is adequate to support a partial strategy to manage main bycatch species. In fact, monitoring data is routinely used to support ongoing measures to manage bycatch, for instance to declare temporal closed areas to avoid discards of juvenile fish. SG 80 is met. The information is however not adequate to evaluate with a high degree of certainty whether the strategy is achieving its objective. SG 100 is not met.		
d	Guidepost		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 effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		N	N
	Justification	There is ongoing recording and monitoring of spatial and temporal fishing patterns by the fleet to determine which could be used to flag any potential changes in levels of risk to commercial species caught as bycatch. Sampling of catches at sea and of landings for the Icelandic gillnet fleet are adequate to determine whether there are increased risks of discarding due to the presence of undersize or unmarketable species in catches.		

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**	
		The data available on bycatch of vulnerable species has improved over the last five years. For longline fisheries data on bycatch is available from onboard observations, which have increased in recent years; observers aim to monitor 1% of fishing trips annually. Additional information should be available from logbook data, but since fishers switched to the mandatory eLog system returns have been so poor that the data cannot be used to estimate bycatch levels (MFRI, pers. communication). Since there are doubts that the monitoring data being collected by fishers is sufficient to detect any increase in risk to vulnerable species such as harbour seal, hooded seal, and Atlantic puffin, SG 80 is not met.	
References		Gardarsson and Jónsson 2014.	
OVERALL PERFORMANCE INDICATOR SCORE:			**75**
CONDITION NUMBER (if relevant):			**6**

Principle 2: Atlantic wolffish bottom trawl

Evaluation Table for PI 2.4.1: Bottom trawl (Atlantic wolfish)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Lophelia reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	N

	Justification	1. Fishing Area Atlantic wolffish mostly occurs at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, e.g. lava outcrops (MFRI, pers. Communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) peninsula in the north-west (Figure 1).  Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI). 2. Fishing Gear The bottom otter trawl is an important gear used in Icelandic fisheries at depths ranging from 80 m to 1500 m. Icelandic trawlers use steel trawl doors which are being constantly developed for better hydrodynamic shape and lighter construction, steel bobbins, so called 'rock hoppers' made from rubber. Species which are commonly caught by bottom trawl are cod, demersal redfish, haddock, saithe and Greenland halibut, but trawls also catch large amounts of plaice, Atlantic wolffish, spotted catfish, ling, blue ling, tusk, great silver smelt and lemon sole (Gunnarsson et al. 1998, Thór 2003, 2005 referenced on).  Figure 2. Location of effort with bottom trawl in 2014 (hours trawling); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI). 3. Likely impacts of the fishery on habitats The team determined that there was no impact by this fishery on the following habitats: - Deep-sea sponges; a comparison of Figure 1 with the map of dee-sea sponges provided in section 3.4.5.1 confirms that there is no potential overlap between this fishery and deep-sea sponge habitats.

- Maerl beds; a comparison of Figure 1 with the map of maerl beds provided in in section 3.4.5.1 shows that there is no potential overlap between this fishery and maerl beds.

- Coral gardens; since the Atlantic wolffish fishery is generally taking place in shallower waters close to shore (Atlantic wolffish mostly occur at depths of between 40 and 200 m) there is no overlap with the fishery with coral gardens.

- *Modiolus* reefs; given the fact that most recent records of horse mussel beds are from the western coast of Iceland, that bottom trawling does not take place in waters less than 80 m deep, and bottom trawling is not allowed within certain distance from land (generally around 12 nm) (MFRI, pers. communication), the team considers that there is no potential overlap between this fishery and the depth distribution of horse mussel beds in Icelandic waters.

- Hydrothermal vents; comparing Figure 1 with the map of hydrothermal vents in section 3.4.5.1 shows that the assessed fishery is not operating in areas where hydrothermal vents are located. Moreover, the hydrothermal vents at Steinahóll are situated inside a closed area for otter trawling which has been in operation since 1994.

4.1 *Lophelia* reefs

In the past some relatively large areas of coral have vanished due to bottom trawling (Figure 3; Steingrímsson and Einarsson 2004, Garcia et al. 2006). The present occurrence of *Lophelia pertusa* around Iceland is confined to the south and southeast continental slope and on the Reykjanes ridge (Figure 4). *Lophelia* is found at 200-600 m depth (Ólafsdóttir and Burgos 2012). Coral habitats are currently being explored and mapped by MFRI and based on this effort 10 coral areas have been closed for bottom contacting fisheries, in total 480 km2 (Figure 5). Furthermore, coral areas on the Reykjanes ridge have been protected for bottom trawling since 1994 (Figure 3).

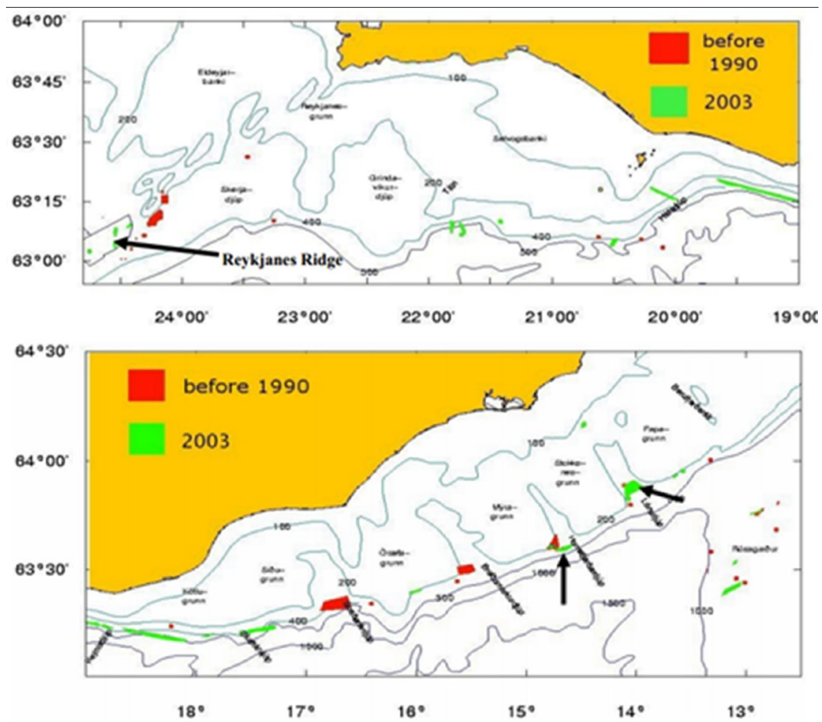


Figure 3. Occurrence of coral areas off Iceland, based on information from fishermen: Red - coral areas known to exist prior to 1990; green - coral areas existing in 2003. Arrows indicate the largest existing coral areas. Source: Garcia et al. 2006

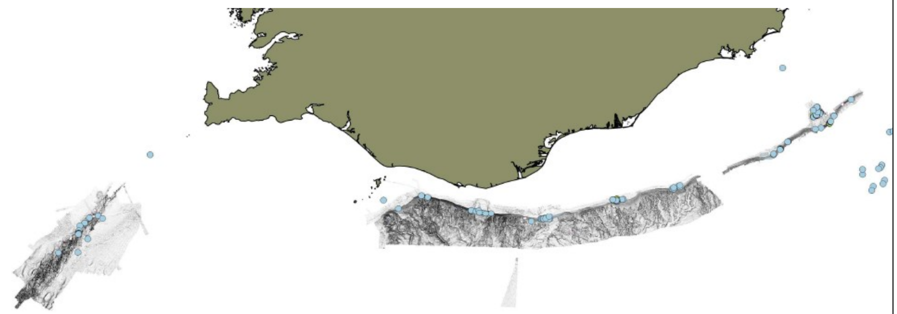


Figure 4. Present occurrence (light blue dots) of *Lophelia pertusa* in Icelandic waters. Source: Ólafsdóttir et al. 2014

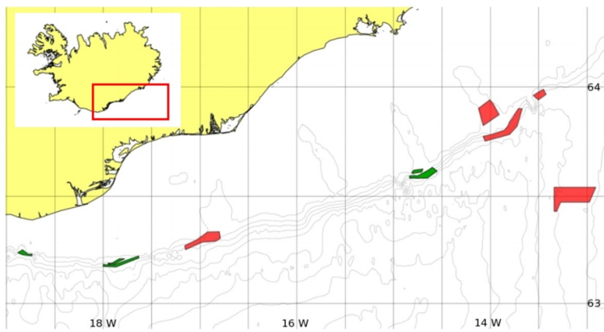


Figure 5. Coral areas (*Lophelia pertusa*) off SE Iceland where ban on using bottom contacting fishing gear has been in operation since 2005 (green) and 2011 (red). Source: Ólafsdóttir and Burgos 2012, Steingrímsson and Einarsson 2004)

In considering the probability of serious or irreversible harm to *Lophelia* reefs from this fishery, the team considered the facts that:

- Bottom trawling is known to have a serious and irreversible (or only reversible very slowly) impact on this habitat type. Some *Lophelia* areas are known to have been lost to trawling in the past in Icelandic waters.
- There is no overlap between fishing grounds for Atlantic wolffish (Figure 1) and known *Lophelia* habitats (Figure 5).
- Since 2005/2011 here is explicit protection of 10 *Lophelia* areas where no fishing gear with bottom contact are allowed, including bottom trawling (Figure 7). Permanent area closure for bottom trawling is in operation along the shelf break off western Iceland including seabed on the shallow part of the Reykjanes Ridge where *Lophelia* reefs occur (Figure 6). These measures do in fact apply to more or less all known *Lophelia* reefs (compare Figure 5 with 6 and 7).
- Detailed habitat mapping has so far concentrated on the areas most at risk from trawling or other threats. Ongoing habitat mapping may identify further areas and the intention is to protect these. In particular, since 2015, the bycatch of invertebrates is being monitored during the annual autumn ground fish survey in deep water carried out by MFRI. All invertebrates in the catch are identified by benthologist in those trawls observed (about half of the trawls carried out). This data will give considerable amount of information on benthos, including sponges and corals, as well as other species vulnerable to fishing in the near future (MFRI, pers. communication).

Overall, the team considered that the risk of serious or irreversible harm to known areas of *Lophelia* reef is low, because there is no overlap of Atlantic wolffish fishing grounds and coral habitats (Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters), and coral areas which were at high risk to bottom trawling have been closed specifically for their protection (Figures 6 and 7), or have been free from bottom trawling due to ban on bottom trawling in the west of Iceland with the aim of protecting juvenile redfish. Remaining areas are either too deep for trawling or are unsuitable for trawling (slope too steep, presence of escarpments). The team felt on this basis that SG80 is met (risk of some damage 30% or less).

In relation to SG100 the mapping of *Lophelia* reefs by MFRI up to now has focused on areas of high trawl activity, therefore the remaining unmapped areas are subject to less fishing pressure. However, the mapping is still ongoing and some undiscovered areas may still be exposed to risk. The risk of impact in this regard is obviously difficult to quantify, but the team considered that although remaining undiscovered areas which are exposed to trawling but unimpacted are likely to be small and/or sparse, it could not be argued on this basis that SG100 is met. The score for this element is therefore 80.

4.5 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

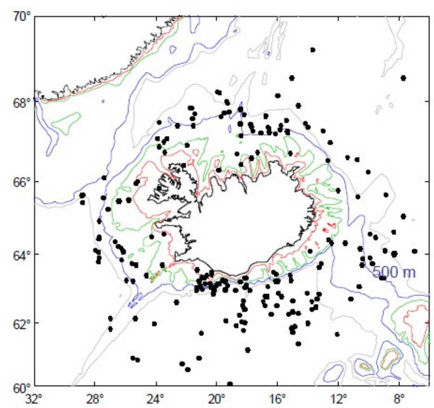


Figure 6. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

This habitat type is characteristic of *Nephrops* grounds, and this habitat type is therefore mainly relevant in relation to the gear type '*Nephrops* trawl'. However, since some trawling may occur in these areas, it is considered here as well.

In reviewing the likely habitat impact of trawling on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d).
- Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Figure 6; Garcia et al. 2006)
- The overlap of Atlantic wolffish fishing grounds and known locations where seapen colonies are found (compare Figures 1 and 2 to Figure 6) is restricted to two very small areas off the north-west and south-west of Iceland, where catches of Atlantic wolffish are low to medium (0.1 to 3 t/nmi2).

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
	Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met). In relation to SG100, there is some direct evidence regarding the effect of trawls on the habitat (e.g. Ball et al. 2000) but the team considered that there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100. The score for this component is therefore 80. 4.6 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary habitats - without the other features listed above - which are not considered threatened and/or declining. This includes subtidal muddy and sandy bottoms. The team considers that it is highly unlikely that bottom trawling will reduce the structure and function of subtidal sedimentary habitats to the point where there would be serious and in particular irreversible harm. These habitats have been fished for many years and are still productive fishing grounds. Moreover, research on the short- and long-term effects of otter trawling on a macrobenthic infaunal community in subtidal Icelandic waters that had never been trawled before found that no significant treatment effects could be detected on total abundance or on multivariate structure; tests for individual species revealed only a single short-term effect for a bivalve. Trawling did however cause significant short-term reduction in species richness and persistent effects on the Shannon-Wiener diversity index (Ragnarsson and Lindegarth 2009). Based on these considerations the team considers that SG 80 is met for this scoring element. Ragnarsson and Lindegarth (2009) carried out their research in shallow waters where storm induced disturbance will be higher than in the trawl fishing grounds for Atlantic wolffish being assessed. The team therefore considers that this study does not consitute sufficient evidence that that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. SG 100 is not met.
References	Ball et al. 2000; Bett and Rice 1992; Garcia et al. 2006; Gunnarsson et al. 1998; Ólafsdóttir and Burgos 2012; Ólafsdóttir et al. 2014; OSPAR 2008a; OSPAR 2009; OSPAR 2010a; OSPAR 2010d; Thór 2003; Thór 2005; Ragnarsson and Lindegarth 2009; Steingrímsson and Einarsson 2004.
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for bottom trawl fisheries scored at SG 75 level due to overlap between these fisheries with deep-sea sponge and coral garden habitats. Due to the lack of overlap between Atlantic wolffish fishing grounds and deep-sea sponge habitats / coral gardens the team considers that harmonisation is not appropriate in this case.
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.4.2: Bottom trawl (Atlantic wolfish)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG100 is met.		
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?	(Y/N)	(Y/N)	(Y/N)
	Lophelia reefs	Y	Y	Y
	Seapens and burrowing megafauna	Y	Y	N

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		
	Other subtidal sedimentary habitats	Y	Y	N
	Justification	*Lophelia* reefs Implementation of the habitat protection strategy has focused on this habitat type, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear. Several areas have been closed to fishing to protect *Lophelia* coral reefs (see Figure 7); the other reef areas are either within closed area for bottom trawling (e.g. Reykjanes Ridge, Figure 5), outside the depth range of trawling, or on grounds unsuitable for trawling (slope too steep, mountainous). While not all areas have been mapped, the unmapped areas are those considered at lowest risk from trawl damage, and not considered likely to have extensive coral habitat. Operation of all Icelandic fishing vessels is monitored by Vessel Monitoring System (VMS) and the Marine and Freshwater Research Institute (MFRI) has access to electronic logbooks for scientific purposes (high resolution data). During a site visit as part of the first surveillance of the saithe and ling certificate, the Icelandic Directorate of Fisheries (DF) confirmed that no vessel has violated the closure of coral areas. There is therefore an objective basis for high confidence that this strategy will work, and SG100 is met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR (OSPAR 2010d). The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the SG80 level. Thus SG80 is met. However, it is not possible to argue that there has been extensive testing in relation to impacts on this habitat type or its distribution over time, although there is some information available, so SG100 is not met. Other subtidal sedimentary habitats These habitats have been fished for many years and is not considered threatened in Icelandic waters. A limited amount of research has been carried out on the short- and long-term effects of otter trawling on a macrobenthic infaunal community in subtidal Icelandic waters (Ragnarsson and Lindegarth 2009), which did not identify a risk of serious or irreversible long term harm. The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the SG80 level. Thus SG80 is met. However, it is not possible to argue that there has been extensive testing in relation to impacts on this habitat type or its distribution over time since the available scientific studies were carried out sedimentary habitats which are shallower and exposed to higher energy levels compared to Atlantic wolffish fishing grounds, so SG100 is not met.		

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		
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?		(Y/N)	(Y/N)
	Lophelia reefs		Y	Y
	Seapens and burrowing megafauna		Y	N
	Other subtidal sedimentary habitats		Y	N
	Justification	For seapens and burrowing megafauna, as well as other subtidal sedimentary habitats there is some evidence that the strategy is working acceptably (habitat outcome = 80 although the strategy is not focused on this habitat type). However, there are no explicit protection measures for vulnerable habitats other than *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is met for *Lophelia* reefs, but not met for seapens and burrowing megafauna, for which only SG 80 is met.		
d	Guidepost			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	There is no evidence on whether closure of areas have contributed to habitat recovery, and there is only limited information on changes in distributions of habitats over time (limited historical information). SG100 is not met.		
Overall Scores		(see table below)		
References		Garcia et al. 2006b; OSPAR 2008a; OSPAR 2008b; OSPAR 2010d; OSPAR 2013; Ragnarsson and Lindegarth 2009; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.		

Overall Scores

	Scoring Issue Scores				
Scoring Element	a	b	c	d	All
Lophelia reefs	100	100	100	80	95
Seapens and burrowing megafauna	100	80	80	80	85
Other subtidal sedimentary habitats	100	80	80	80	85
					85

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**	
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.2 for bottom trawl fisheries scored at SG 75 level due to overlap between these fisheries with deep-sea sponge and coral garden habitats. Due to the lack of overlap between Atlantic wolffish fishing grounds and deep-sea sponge habitats / coral gardens the team considers that harmonisation is not appropriate in this case.	
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/A**

Principle 2: Atlantic wolffish Danish seine

Evaluation Table for PI 2.4.1: Danish seine (Atlantic wolffish)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	Y

Justification

1. Fishing Area

Atlantic wolffish mostly occurs at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, e.g. lava outcrops (MFRI, pers. communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) peninsula in the north-west.

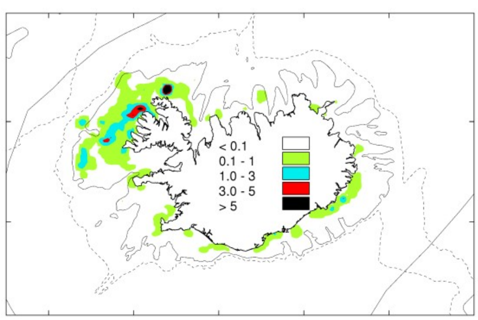


Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI).

2. Fishing Gear

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

The appearance of a Danish seine resembles a trawl since it also has wings, a 'belly', and a codend. Trawl doors are however not used and instead the Danish seine is operated with a set of towing-lines and drag-lines on each side. During the fishing operation the warps are gradually pulled together, causing the seine to move over the bottom and herding the fish in front of the seine. About 40% of Icelandic flatfish landings are caught by Danish seine, and the gear is also used to catch large quantities of cod and haddock. In 2015 13% of Atlantic wolffish catches came from Danish seines. It is mostly used in shallow waters at depths of 40-60 m, at locations all around Iceland although the bulk of the effort is concentrated southwest and west of the country (Gunnarsson et al. 1998, Eiríksson 2008, Thór 2005).

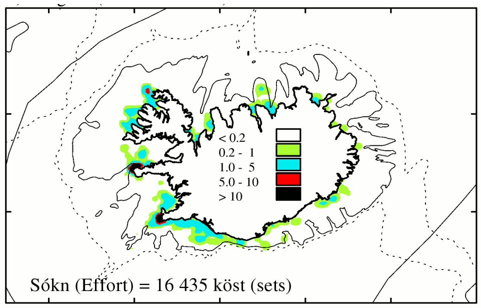


Figure 2. Location of effort with Danish seine in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

The Danish seine cannot be used to work on rough grounds and is used on relatively flat sandy or muddy seabeds lacking significant obstructions which could damage the gear. Since Danish seines encircle the target species rather than being towed across large areas of substrate this gear has a relatively limited spatial footprint, reducing seabed disturbance.

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; since Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters, there is no potential overlap between *Lophelia* reefs and Danish seine fishing for this species. Moreover, Danish seines cannot be used over rough grounds.

- Deep-sea sponges; since Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters, there is no potential overlap between deep-sea sponge habitats and Danish seine fishing for this species. Moreover, Danish seines cannot be used over rough grounds.

- Maerl beds; a comparison of Figure 1 with the map of maerl beds provided in section 3.4.5.1 shows that there is no spatial overlap between Danish seine fishing grounds where Atlantic wolffish are found and the location of maerl beds.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m (Ólafsdóttir et al. 2014), which is deeper than the fishing grounds of Atlantic wolffish (Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters). Moreover, Danish seines cannot be used over rough grounds.

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

- Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows that the assessed fishery is not operating in areas where hydrothermal vents are located.

3.1 *Modiolus* reefs

The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012).

Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* thus appears to be mainly concentrated near the coast on the western coast of Iceland (Figure 3).

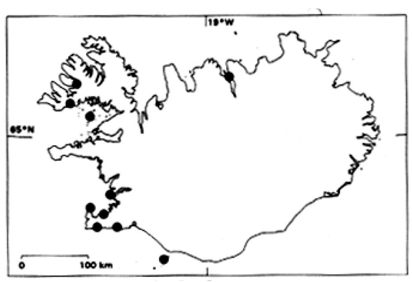


Figure 3. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

Overall a limited amount of recent data is available for this habitat type in Icelandic waters. This lack of data is a general problem affecting management in several jurisdictions, in fact OSPAR has concluded that there is not enough data to assess the overall extent of *M. modiolus* beds in the OSPAR area or the condition of the beds. Nevertheless, the OSPAR list recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.

In reviewing the likely habitat impact of Danish seines on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR List recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be ‘very high’ (OSPAR, 2009b). The team considers that it is reasonable to assume that Danish seines have lower impacts on benthic habitats (since they lack otter doors and are not dragged over large areas of seafloor), although it is possible

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

that Danish seine could nevertheless damage the organisms found growing on the horse mussel beds, and possibly damage the horse mussel bed matrix.

- There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the western coast of Iceland (Figure 3). Three sites where *M. modiolus* has been recorded in the south-west of Iceland overlap with areas from which low catches (between 0.1-1 tonnes/nmi2) of Atlantic wolffish were reported in 2015, and where Danish seine fishing efforts are medium (fishing effort of 1-5 sets).
- It is in fact unlikely that there would be fishing by Danish Seine over horse mussel beds, as it would lead to fishing gear damage, such as the footrope being damaged after getting hooked in the mussel bed matrix. It is likely that fishermen avoid fishing on grounds where there are beds with horse mussel (MFRI pers. communication).

Overall, the team considered that since i) the overlap of Danish seine fishing for Atlantic wolffish and *M. modiolus* is limited and there are several *Modiolus* beds in Iceland which are not affected by this type of fishing, ii) the most important fishing gears impacting horse mussel beds are scallop dredges and bottom otter trawls, and (iii) local experts consider that it is unlikely that there would be fishing by Danish Seine over horse mussel beds as it would lead to fishing gear damage, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met). However, in the absence of better / more up to date information on the distribution and status of horse mussel beds in Icelandic waters and due to the overlap of Danish seine fishing effort with known locations of *Modiolus* beds off the south-west of Iceland, SG 100 is not met.

4.5 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

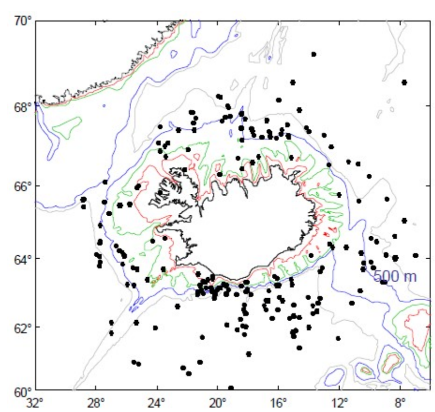


Figure 4. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant,

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
		but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, including Icelandic waters. There appears to be no specific information available on the impacts of Danish seine fishing gear on seapens and burrowing megafauna, however comparing the distribution of Pennatulacea to locations with high Danish seine fishing efforts (Figures 2 and 4) shows that Danish seining is concentrated close to land off the west and southwest coast off Iceland, in areas where Pennatulaceans are uncommon. Atlantic wolffish fishing grounds, Danish seine fishing effort and known seapen habitats only overlap in a small area to the south of Iceland. In reviewing the likely habitat impact of Danish seine fishing for Atlantic wolffish on this habitat, the team considered the following issues: • There is no explicit protection for this habitat type in Icelandic waters. • OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d). • Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (see Figure 4). • The overlap of Atlantic wolffish fishing grounds and known locations where seapen colonies are found is restricted to a very small area off the south-west of Iceland. Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met). In relation to SG100, the team considered that since Danish seine fishing can theoretically be damaging there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100. The score for this component is therefore 80. 4.6 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary habitats - without the other features listed above - which are not considered threatened and/or declining. This includes muddy and sandy bottoms. A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The study compared fished and closed areas within Skagafjörður found no differences in species composition between the two treatments, although abundance tended to be higher in the closed area (significant difference for two out of nine benthic taxa from grab sampling). The habitat in this area was sedimentary. On this basis, the team considered that there is evidence that the habitat type is not likely to suffer serious or irreversible harm from Danish seine fishing, although it may suffer some reversible changes, therefore 100 is met.
References		Bett and Rice, 1992; Eiríksson 2008; Garcia et al. 2006; Gunnarsson et al. 1998; Ingolfsson 1996; Ólafsdóttir and Burgos 2012; Ólafsdóttir et al. 2014; OSPAR 2008a; OSPAR 2009; OSPAR 2010d; OSPAR 2015; Thór 2005; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.

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	
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for Danish fisheries scored at SG 90 level since the only relevant scoring elements were (i) sedimentary habitats, and (ii) seapens and burrowing megafauna. The scores for these elements has remained the same, however the addition of *Modiolus* reefs as a scoring element in the Atlantic wolffish fishery has reduced the overall score to 85.	
OVERALL PERFORMANCE INDICATOR SCORE:		85
CONDITION NUMBER (if relevant):		N/A

Evaluation Table for PI 2.4.2: Danish seine (Atlantic wolffish)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG100 is met.		

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		
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?	(Y/N)	(Y/N)	(Y/N)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	Y

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		
	Justification	There are no explicit protection measures for vulnerable habitats in Icelandic waters, except for *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated (i.e. there is a strategy in general, but implementation has not focused on all habitat types). In relation to *Lophelia*, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear, however, several areas have been closed to fishing. Operation of all Icelandic fishing vessels is monitored by Vessel Monitoring System (VMS) and Marine and Freshwater Research Institute (MFRI) has access to electronic logbooks for scientific purposes (high resolution data). *Modiolus* reefs OSPAR recognises that M. *modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland (OSPAR, 2009b). Although there is a strategy in place for protecting sensitive habitats against fishing impacts, the team is not aware of any explicit protection for *Modiolus* reefs in Icelandic waters. However, OSPAR considers that key threats from fishing to Modiolus reefs are limited to dredge fisheries for scallops, beam and otter trawling (OSPAR, 2009b). It is reasonable to suppose the Danish seines have a lower impact than dredges or trawls on this habitat (in the absence of otter boards and since fishing grounds are spatially limited), although this has not been fully quantified. It is unlikely that there would be fishing by Danish Seine over horse mussel beds, as it would lead to fishing gear damage (MFRI pers. communication). The team considers that the measures are considered likely to work (strategy although not focused in implementation on this habitat type), since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore, SG100 is not met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR. The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the 80 level. However, it is not possible to argue that there has been extensive testing in relation to impacts on this habitat type or its distribution over time, although there is some information available, so SG100 is not met. The score for this component is 80. Other subtidal sedimentary habitats A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). Testing thus supports high confidence that the strategy will work, based on direct information about the habitats involved. SG 100 is met.		
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?		(Y/N)	(Y/N)

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		
	Modiolus reefs		Y	N
	Seapens and burrowing megafauna		Y	N
	Other subtidal sedimentary habitats		Y	Y
	Justification	For *Modiolus* reefs, seapens and burrowing megafauna, there is some evidence that the strategy is working acceptably (habitat outcome = 80 although the strategy is not focused on this habitat type). However, there are no explicit protection measures for vulnerable habitats other than *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is not met. For other non-vulnerable sedimentary habitats, there is clear evidence that no actions appear to be required under the strategy (habitat outcome = 100).		
d	**Guidepost**			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	There is no evidence on whether closure of areas have contributed to habitat recovery, and there is only limited information on changes in distributions of habitats over time (limited historical information).		
Overall Scores		(see table below)		
References		OSPAR 2008a; OSPAR 2008b; OSPAR 2009; OSPAR 2013; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.		
Harmonisation		The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for Danish fisheries scored at SG 90 level since the only relevant scoring elements were (i) sedimentary habitats, and (ii) seapens and burrowing megafauna. The scores for these elements has remained the same, however the addition of *Modiolus* reefs as a scoring element in the Atlantic wolffish fishery has reduced the overall score to 85.		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				**N/A**

	Scoring Issue Scores				
Scoring Element	a	b	c	d	All
Modiolus reefs	100	80	80	80	85
Seapens and burrowing megafauna	100	80	80	80	85
Other subtidal sedimentary habitats	100	100	100	80	95
					85

Evaluation Table for PI 2.4.3: Danish seine (Atlantic wolffish)

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="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</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There is basic understanding of the types and distribution of main habitats in the area of the fishery.</td><td>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.</td><td>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">1. Scoring methodology:

Since the Icelandic system for collecting data on the distribution of habitats and fishing effort does not vary in its general form according to habitat type or fishery, the team concluded that it did not make sense to break down the scoring by component habitats in this case. The rationale therefore considers the information available in general, covering all types of habitat.

2. Scoring:

SG 60-80: The BIOICE programme has provided basic inventory of benthic fauna within the Icelandic territorial waters (Figure 1). Benthic samples have been collected from a variety of habitats, ranging widely in depth (<100 to 3100 m) and in temperature conditions (12° to -0.9°C), and ROVs have also been used for habitat mapping (Garcia et al. 2006).

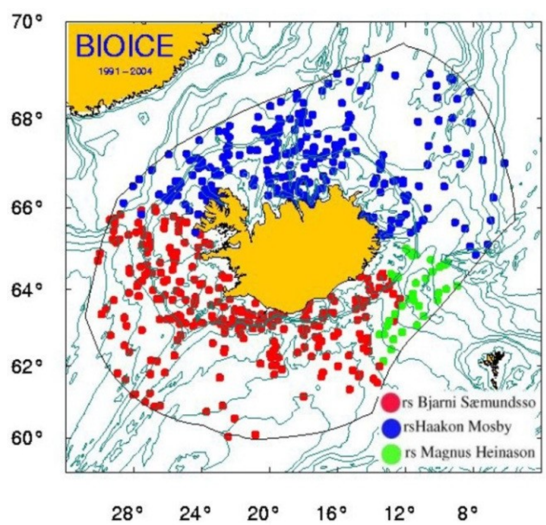


Figure 1. The research programme BIOICE (Benthic Invertebrates of Icelandic Waters): Distribution of sampling stations visited by three research vessels (different colours). Source: Ministry of Fisheries (2004).

The Icelandic Institute of Natural History has been leading a project involving mapping of intertidal habitats, including intertidal Mytilus beds, Zostera beds and intertidal mudflats (MFRI, pers. communication).</td></tr>
</table>

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		
		The Marine and Freshwater Research Institute (MFRI) has identified areas of vulnerable benthic habitats in Icelandic waters (cold water corals, areas with aggregation of large sponge, maerl beds) in relation to bottom trawl fishing activities (Steingrímsson and Einarsson 2004, Garcia et al. 2006). The MFRI is currently carrying out research programmes in order to map benthic habitats in Icelandic waters (biology and geology, using multibeam echo sounder), including mapping cold water corals (*Lophelia pertusa*) and studying the interaction between fish and cold water coral habitats: • The CoralFISHproject (http://eu-fp7-coralfish.net/) was recently completed and a report detailing the CoralFISH project is in progress. Two manuscripts from the CoralFISH project will be submitted soon, one comparing fish communities inside and outside cold-water coral habitats based on longline catches, and another examining bottom fishing activities. A manuscript on coral habitat classification observed during this project has furthermore been submitted (MFRI pers. communication). • Since 2015, the bycatch of invertebrates is being monitored during the annual autumn ground fish survey in deep water carried out by MFRI. All invertebrates in the catch are identified by benthologist in those trawls observed; half of the trawls are currently observed. This data will give considerable amount of information on benthos, including sponges and corals, as well as other species vulnerable to fishing (MFRI pers. communication). • In 2016, MFRI conducted a specific survey with the primary objective to map, and explore possible different habitat areas in several locations north and south of Iceland. This survey was a part of general mapping of habitats with in Icelandic waters where previous surveys targeted areas where high abundance of vulnerable species, particularly coral, were reported (MFRI, pers. communication). • In 2017, several potential vent sites on the Reykjanes Ridge will be surveyed (MFRI, pers. communication). Through VMS there is detailed information on the distribution of fishing effort around Iceland by all the assessed fishing gears. Therefore, it can be inferred where the fisheries overlap with vulnerable habitats. Overall the nature, distribution and vulnerability of the main habitats are well understood, so this meets SG 80. However detailed habitat maps are not yet available for the entire Icelandic EEZ, so SG 100 is not met.		
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?	Y	Y	N
	Justification	SG 60: The impacts of seine fishing are known to be less than those for bottom trawling since the ground-gear is lighter, there are no trawl doors, the successful use of the gear depends on the ropes not getting caugh on obstacles (Eigaard et al., 2016). In addition Danish seines encircle the target species rather than being towed across large areas of substrate, so this gear is known to have a relatively limited spatial footprint. There is good knowledge on the		

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="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</td></tr>
<tr><td></td><td></td><td colspan="3">distribution of total Danish seine fishing effort as well as Atlantic wolffish catches in Icelandic waters, which can be used to indicate if and where fishing grounds overlap with vulnerable habitats.

SG 80: Studies have been carried out on the impact of seine net fishing on benthos found in sedimentary areas in Icelandic waters (Thorarinsdóttir et al. 2010). Through VMS there is detailed information on the distribution of Danish seine fishing effort around Iceland. The VMS data is available for scientific purposes. Information is available on the distribution of invertebrate species and habitats in Icelandic waters. Therefore, there is reliable information to allow the nature of the impacts of the fishery on habitat types to be identified, on the spatial extent of interaction, and the timing and location of use of the fishing gear under assessment. SG 80 is met.

SG 100: A recent study on the impact of seine fishing on benthos showed that it had limited negative impact on sedimentary benthic habitats in the study area (Thorarinsdóttir et al. 2010). However, impacts on vulnerable habitats such as maërl and Modiolus beds have not been quantified fully. SG 100 is thus not met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>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).</td><td>Changes in habitat distributions over time are measured.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">SG80: The area coverage of the assessed fisheries is monitored through logbooks and VMS, thus their spatial distribution is known in relation to vulnerable habitats. The habitat mapping by MFRI is ongoing as described above, together with studies on the ecological function of vulnerable habitats (e.g. CoralFISH project). Recently a project was established that collects data on benthic bycatch in the MFRI autumn survey. This data will provide information on the temporal trends in the state of benthic communities and habitats and thus can be used for monitoring purposes. SG 80 is thus met.

SG100: The MFRI research program aims primarily to map benthic habitats in Icelandic waters but such scientific research is not directly aimed at measuring changes in habitat distribution over time. SG 100 is thus not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Garcia et al. 2006; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>80</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Principle 2: Atlantic wolffish gillnet

Evaluation Table for PI 2.4.1: Gillnet (Atlantic wolffish)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	Y

Justification

1. Fishing Area

Atlantic wolffish mostly occurs at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, e.g. lava outcrops (MFRI, pers. communication). The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, e.g. lava outcrops (MFRI, pers. communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) peninsula in the north-west.

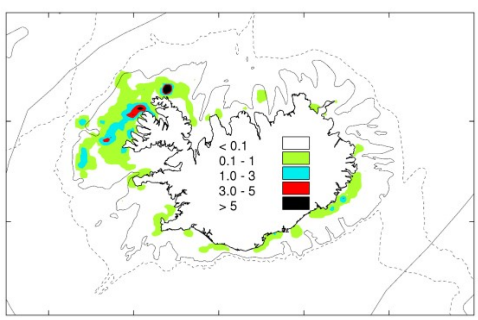


Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI).

2. Fishing Gear

Gillnets are used extensively during at the end of the winter season (starting in January, peaking in March and ending in May) to target cod which is migrating to spawning grounds. Large amounts of saithe are also fished, as well as lesser amounts of haddock,

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

monkfish, ling and some other species in even lower quantities. In 2010-2015 only 0.23% of Atlantic wolffish landed in Iceland were fished using gillnets.

Gillnetting in Iceland is mainly carried out by smaller vessels relatively close to the shore, and with only very few exceptions gillnets are deployed within the 200 m depth contour (see Figure 2).

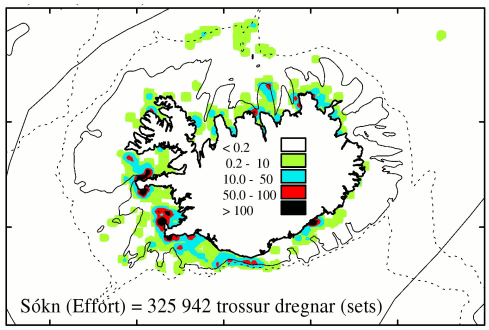


Figure 2. Location of gillnet fishing effort in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; since Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters there is no potential overlap between *Lophelia* reefs and Atlantic wolffish fishing grounds.

- Deep-sea sponges; since Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters, there is no potential overlap between deep-sea sponge habitats and Atlantic wolffish fishing grounds.

- Maerl beds; by comparing Figures 1 and 2 with the map of maerl beds provided in section 3.4.5.1 it is clear that there is no spatial overlap between maerl habitats, Atlantic wolffish fishing grounds, and areas where gillnets are deployed.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m (Ólafsdóttir et al. 2014), which is deeper than the fishing grounds of Atlantic wolffish (Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters).

- Hydrothermal vents; comparing Figures 1 and 2 the map of hydrothermal vents provided in section 3.4.5.1 shows there is no spatial overlap between the Icelandic anglerfish gillnet fishery and hydrothermal vents / vent fields.

3.1 *Modiolus* reefs

The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012).

Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of

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

Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* is thus mainly concentrated near the coast on the western coast of Iceland (Figure 3).

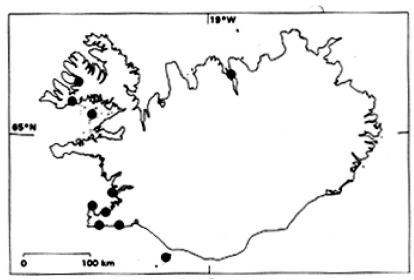


Figure 3. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

A relatively limited amount of recent data is available for this habitat type in Icelandic waters. This lack of data is a general problem affecting management in several jurisdictions, in fact OSPAR has concluded that there is not enough data to assess the overall extent of *M. modiolus* beds in the OSPAR area or the condition of the beds. Nevertheless, the OSPAR list recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.

In reviewing the likely habitat impact of gillnets on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR List recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be 'very high' (OSPAR, 2009b). Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003).
- There is only relatively limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the western coast of Iceland (Figure 3). Three sites where *M. modiolus* has been recorded in the south-west of Iceland overlap with areas from which low catches (between 0.1-1 tonnes/nmi2) of Atlantic wolffish were reported in 2015, and where gillnet fishing effort is medium to high.
- In 2010-2015 just 0.23% of Atlantic wolffish landed in Iceland were fished using gillnets.

Overall, the team considered that since i) the overlap of Atlantic wolffish fishing grounds, areas where gillnets are deployed and known *M. modiolus* beds is limited and there are several known *Modiolus* beds in Iceland which are not affected by this type of fishing, ii) the most important fishing gears impacting horse mussel beds are scallop dredges and bottom otter trawls, and (iii) Atlantic wolffish are only a minor bycatch in gillnet fisheries, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met).

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

In the absence of better / more up to date information on the distribution and status of horse mussel beds in Icelandic waters and due to the overlap of gillnet fishing effort with known locations of *Modiolus* beds off the south-west of Iceland, SG 100 is not met.

3.2 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

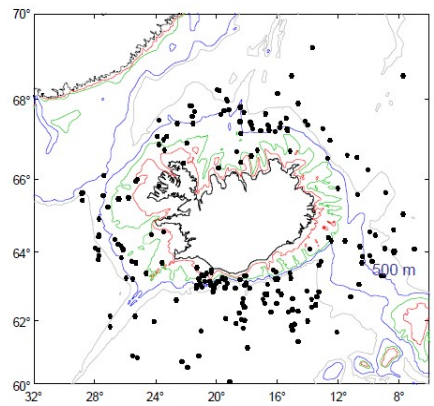


Figure 4. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, including Icelandic waters (OSPAR 2010d).

There appears to be no specific information available on the impacts of gillnet fishing gear on seapens and burrowing megafauna, however comparing the distribution of Pennatulacea to locations with gillnet fishing efforts (Figures 2 and 4) shows that gillnet fishing is with only very few exceptions concentrated close to the Icelandic coast in areas where Pennatulaceans are uncommon. Atlantic wolffish fishing grounds, gillnet fishing effort and known seapen habitats only overlap in a very small area to the south of Iceland.

In reviewing the likely habitat impact of the fishery on seapens and burrowing megafauna, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland.

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
		• Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (see Figure 4). • Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003). • The overlap of Atlantic wolffish fishing grounds, known locations where seapen colonies are found, and areas where gillnets are deployed is restricted to a very small area off the south of Iceland. Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met). In relation to SG 100, the team considered that since gillnets can theoretically be damaging and there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100. The score for this component is therefore 80. 3.3 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary (muddy, sandy and gravelly) habitats - without the other features listed above - which are not considered threatened and/or declining. A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The study compared fished and closed areas in sedimentary habitats within Skagafjörður. No differences in species composition between the two treatments was found, although abundance tended to be higher in the closed area (significant difference for 2 out of 9 benthic taxa from grab sampling). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. There is thus evidence that gillnet fishing is not likely to reduce habitat structure and function to a point where there would be serious or irreversible harm, and SG 100 is met.
References		Chuenpagdee et al. 2003; Garcia et al. 2006; Ingolfsson, 1996; Ólafsdóttir et al. 2014; OSPAR 2008a; OSPAR 2009; OSPAR 2010d; Ragnarsson and Burgos 2012; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.
Harmonisation		The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for gillnet fisheries scored at SG 90 level since the only relevant scoring elements were (i) seapens and burrowing megafauna, and (ii) non-vulnerable sedimentary habitats. The scores for these elements have remained the same, however the addition of *Modiolus* reefs as scoring element in the Atlantic wolffish fishery has reduced the overall score to 85.
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation Table for PI 2.4.2: Gillnet (Atlantic wolffish)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG 100 is met.		
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?	(Y/N)	(Y/N)	(Y/N)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N

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		
	Other subtidal sedimentary habitats	Y	Y	Y
	Justification	There are no explicit protection measures for vulnerable habitats in Icelandic waters, except for *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated (i.e. there is a strategy in general, but implementation has not focused on all habitat types). In relation to *Lophelia*, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear, however, several areas have been closed to fishing. Operation of all Icelandic fishing vessels is monitored by Vessel Monitoring System (VMS) and the Marine and Freshwater Research Institute (MFRI) has access to electronic logbooks for scientific purposes (high resolution data). *Modiolus* reefs OSPAR recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland (OSPAR, 2009b). Although there is a strategy in place for protecting sensitive habitats against fishing impacts, the team is not aware of any explicit protection for *Modiolus* reefs in Icelandic waters. However, OSPAR considers that key threats from fishing to *Modiolus* reefs are limited to dredge fisheries for scallops, beam and otter trawling (OSPAR, 2009b). It is reasonable to suppose that gillnets have a lower impact than dredges or trawls on this habitat (gillnets may drift small distances but are not actively pulled over benthic habitats), although this has not been fully quantified. The team considers that the measures are considered likely to work (strategy although not focused in implementation on this habitat type), since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore SG 100 is not met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR (OSPAR 2010d). The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore SG 100 is not met. Other subtidal sedimentary habitats A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. Testing thus supports high confidence that the strategy will work, based on direct information about the habitats involved. SG 100 is met.		
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.

<table>
<tr><td colspan="2">PI 2.4.2</td><td colspan="3">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</td></tr>
<tr><td rowspan="5"></td><td>Met?</td><td></td><td>(Y/N)</td><td>(Y/N)</td></tr>
<tr><td>Modiolus reefs</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Seapens and burrowing megafauna</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Other subtidal sedimentary habitats</td><td></td><td>Y</td><td>Y</td></tr>
<tr><td>Justification</td><td colspan="3">For Modiolus reefs, seapens and burrowing megafauna, there is some evidence that the strategy is working acceptably (habitat outcome = 80 although the strategy is not focused on this habitat type).

However, there are no explicit protection measures for vulnerable habitats other than Lophelia reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is not met.

For other non-vulnerable sedimentary habitats, there is clear evidence that no actions appear to be required under the strategy (habitat outcome = 100).</td></tr>
<tr><td rowspan="3">d</td><td>Guidepost</td><td></td><td></td><td>There is some evidence that the strategy is achieving its objective.</td></tr>
<tr><td>Met?</td><td></td><td></td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">There is no evidence on whether closure of areas have contributed to habitat recovery, and there is only limited information on changes in distributions of habitats over time (limited historical information).</td></tr>
<tr><td colspan="2">Overall Scores</td><td colspan="3">
<table>
<tr><td></td><td colspan="5">Scoring Issue Scores</td></tr>
<tr><td>Scoring Element</td><td>a</td><td>b</td><td>c</td><td>d</td><td>All</td></tr>
<tr><td>Modiolus reefs</td><td>100</td><td>80</td><td>80</td><td>80</td><td>85</td></tr>
<tr><td>Seapens and burrowing megafauna</td><td>100</td><td>80</td><td>80</td><td>80</td><td>85</td></tr>
<tr><td>Other subtidal sedimentary habitats</td><td>100</td><td>100</td><td>100</td><td>80</td><td>95</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>85</td></tr>
</table>
</td></tr>
<tr><td colspan="2">References</td><td colspan="3">OSPAR 2008a; OSPAR 2008b; OSPAR 2009; OSPAR 2010d; OSPAR 2013; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.</td></tr>
<tr><td colspan="2">Harmonisation</td><td colspan="3">The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.2 for gillnet fisheries scored at SG 90 level since the only relevant scoring elements were (i) seapens and burrowing megafauna, and (ii) non-vulnerable sedimentary habitats. The scores for these elements have remained the same, however the addition of Modiolus reefs as scoring element in the Atlantic wolffish fishery has reduced the overall score to 85.</td></tr>
</table>

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
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.4.3: Gillnet (Atlantic wolffish)

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?	Y	Y	N
	Justification	1. Scoring methodology: Since the Icelandic system for collecting data on the distribution of habitats and fishing effort does not vary in its general form according to habitat type or fishery, the team concluded that it did not make sense to break down the scoring by component habitats in this case. The rationale therefore considers the information available in general, covering all types of habitat. 2. Scoring: SG 60-80: The BIOICE programme has provided basic inventory of benthic fauna within the Icelandic territorial waters (Figure 1). Benthic samples have been collected from a variety of habitats, ranging widely in depth (<100 to 3100 m) and in temperature conditions (12° to -0.9°C), and ROVs have also been used for habitat mapping (Garcia et al. 2006).		

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

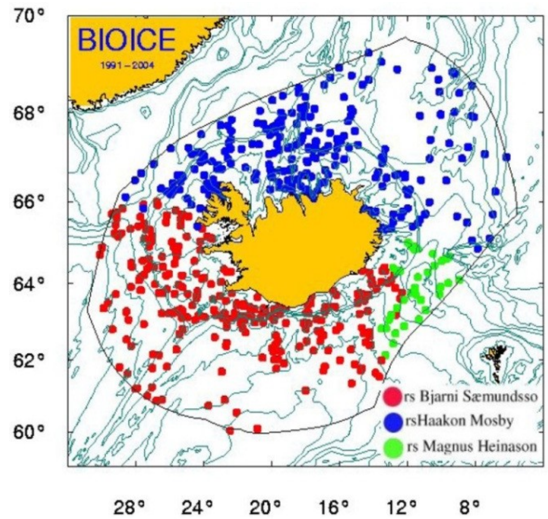


Figure 1. The research programme BIOICE (Benthic Invertebrates of Icelandic Waters): Distribution of sampling stations visited by three research vessels (different colours). Source: Ministry of Fisheries (2004).

The Icelandic Institute of natural History has been leading a project involving mapping of intertidal habitats, including intertidal *Mytilus* beds, *Zostera* beds and intertidal mudflats (MFRI, pers. communication).

The Marine and Freshwater Research Institute (MFRI) has identified areas of vulnerable benthic habitats in Icelandic waters (cold water corals, areas with aggregation of large sponge, maerl beds) in relation to bottom trawl fishing activities (Steingrímsson and Einarsson 2004, Garcia et al. 2006). MFRI is currently carrying out research programmes in order to map benthic habitats in Icelandic waters (biology and geology, using multibeam echo sounder), and studying the interaction between fish and cold water coral habitats:

- The CoralFISHproject (http://eu-fp7-coralfish.net/) was recently completed and a report detailing the CoralFISH project is in progress. Two manuscripts from the CoralFISH project will be submitted soon, one comparing fish communities inside and outside cold-water coral habitats based on longline catches, and another examining bottom fishing activities. A manuscript on coral habitat classification observed during this project has furthermore been submitted (MFRI pers. communication).
- Since 2015, the bycatch of invertebrates is being monitored during the annual autumn ground fish survey in deep water carried out by MFRI. All invertebrates in the catch are identified by benthologist in those trawls observed; half of the trawls are currently observed. This data will give considerable amount of information on benthos, including sponges and corals, as well as other species vulnerable to fishing (MFRI pers. communication).
- In 2016, MFRI conducted a specific survey with the primary objective to map, and explore possible different habitat areas in several locations north and south of Iceland. This survey was a part of general mapping of habitats within Icelandic waters where previous surveys targeted areas where high abundance of vulnerable species, particularly coral, were reported (MFRI, pers. communication).
- In 2017, several potential vent sites on the Reykjanes Ridge will be surveyed (MFRI, pers. communication).

<table>
<tr><th colspan="2">PI 2.4.3</th><th colspan="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</th></tr>
<tr><td></td><td></td><td colspan="3">Through VMS there is detailed information on the distribution of fishing effort around Iceland by all the assessed fishing gears. Therefore, it can be inferred where the fisheries overlap with vulnerable habitats. SG 80 is met.

Overall the nature, distribution and vulnerability of the main habitats are well understood, so this meets SG 80. However detailed habitat maps are not yet available for the entire Icelandic EEZ, so SG 100 is not met.</td></tr>
<tr><td rowspan="3">b</td><td>Guidepost</td><td>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.</td><td>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.</td><td>The physical impacts of the gear on the habitat types have been quantified fully.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">SG 60: Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003).There is good knowledge on the distribution of habitats, gillnet fishing effort and Atlantic wolffish catches, which can be used to indicate if and where fishing grounds overlap with vulnerable habitats.

SG 80: Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats since the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003).Through VMS there is detailed information on the distribution of gillnet fishing effort around Iceland. The VMS data is available for scientific purposes. Information is available on the distribution of invertebrate species and habitats in Icelandic waters. Therefore, there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear under assessment. SG 80 is met.

SG 100: A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. However, no similar studies have been conducted for gillnets, and impacts on vulnerable habitats such as maërl and Modiolus beds have not been quantified fully. SG 100 is not met.</td></tr>
<tr><td rowspan="2">c</td><td>Guidepost</td><td></td><td>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).</td><td>Changes in habitat distributions over time are measured.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
</table>

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	
	Justification	SG 80: The area coverage of the assessed fisheries is monitored through logbooks and VMS, thus their spatial distribution is known in relation to vulnerable habitats. The habitat mapping by MFRI is ongoing as described above, together with studies on the ecological function of vulnerable habitats (e.g. CoralFISH project). Recently a project was established that collects data on benthic bycatch in the MFRI autumn survey. This data will provide information on the temporal trends in the state of benthic communities and habitats and thus can be used for monitoring purposes. SG 80 is thus met. SG 100: The MFRI research program aims primarily to map benthic habitats in Icelandic waters but such scientific research is not directly aimed at measuring changes in habitat distribution over time. SG 100 is thus not met.	
References		Garcia et al. 2006; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.	
OVERALL PERFORMANCE INDICATOR SCORE:			**80**
CONDITION NUMBER (if relevant):			**N/A**

Principle 2: Atlantic wolffish handline

Evaluation Table for PI 2.4.1: Handline (Atlantic wolfish)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Seapens and burrowing megafauna	Y	Y	Y
	Non-vulnerable muddy / sandy habitats	Y	Y	Y

Justification

1. Fishing Area

Atlantic wolffish mostly occur at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, and lava outcrops (MFRI, pers. Communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) peninsula in the north-west.

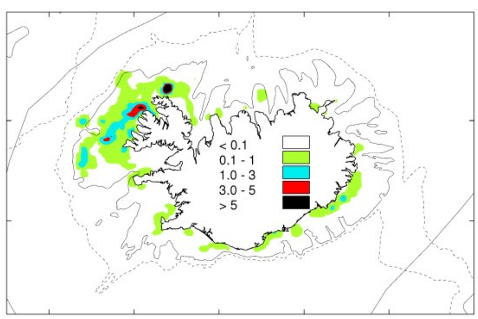


Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute(MFRI).

2. Fishing Gear

Fishing with handlines has a long history in Iceland. Both the types of lines and the types of hooks used have undergone numerous changes over time, resulting in an increase in efficiency over time. Handllines are mostly used to catch cod and a considerable quantity of saithe, as well as other groundfish species including Atlantic wolffish to a much lesser extent. The handline is primarily a summertime fishing gear, with more than 90% of the catch taken from May to August (Gunnarsson, Jónsson, and Pálsson 1998; Kristjánsson 1983; Thór 2002, 2003, 2005).

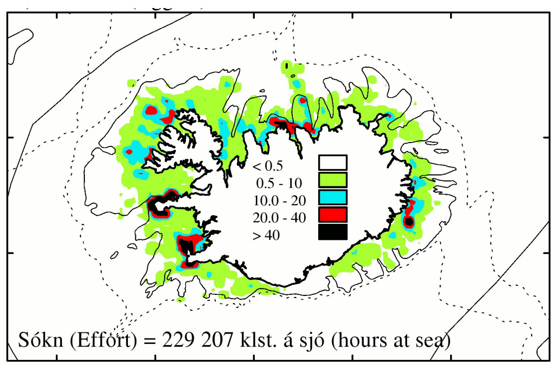


Figure 2. Location of handline fishing effort in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute(MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; by comparing Figures 1 and 2 with the map of *Lophelia* reefs provided in section 3.4.5.1 it is clear that there is no spatial overlap between Atlantic wolffish fishing grounds, areas where handlines are used, and *Lophelia* reefs. Moreover, Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters.

- Deep-sea sponges; by comparing Figures 1 and 2 with the map of deep-sea sponges provided in section 3.4.5.1 it is clear that there is no spatial overlap between the Atlantic wolffish fishing grounds, areas where handlines are used, and deep-sea sponge habitats. Moreover, Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters.

- Maer beds; by comparing Figures 1 and 2 with the map of maerl beds provided in section 3.4.5.1 it is clear that there is no spatial overlap between the Atlantic wolffish fishing grounds, areas where handlines are used, and maerl beds.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m, which is deeper than the fishing grounds of Atlantic wolffish (Atlantic wolffish are found at depths of between 40 and 200 m).

- *Modiolus* reefs; the Atlantic wolffish handline fishery does not interact with horse mussel beds because these habitats occur in waters which are generally shallower than those in which the fishery operates (Atlantic wolffish are found at depths of between 40 and 200 m). Moreover, a comparison of Figures 1 and 2 with the map of *Modiolus* reefs provided in section 3.4.5.1 shows that there is no significant spatial overlap between fishing grounds for Atlantic and horse mussel beds.

- Hdrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows there is no spatial overlap between the Atlantic wolffish fishing grounds, areas where handlines are used, and hydrothermal vent fields.

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

3.1 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

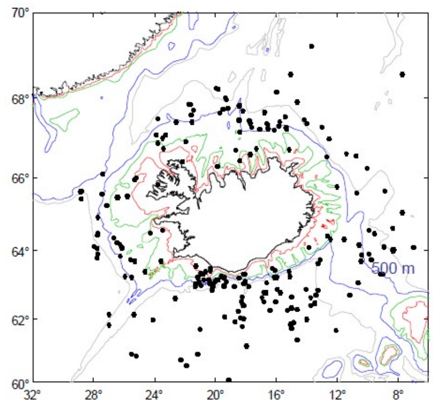


Figure 3. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Comparing Figures 1 and 2 with Figure 3 shows that there are very minor areas of overlap off the north-western coast between Atlantic wolffish fishing grounds, areas where handlines are used, and areas with known concentrations of seapens.

In reviewing the likely habitat impact of handline fishing for Atlantic wolffish on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d).
- Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Figure 3; Garcia et al. 2006)
- The overlap of Atlantic wolffish fishing grounds and known locations where seapen colonies are found is restricted to a very small area off the north-west of Iceland.
- Handlining is not perceived to have significant impacts on vulnerable benthic habitats. For example, the report ‘Shifting Gears’ on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) suggests that impacts of handlining on habitats are 'very low'.

Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, ii) the apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters), and (iii) the low impacts of handlines on benthic habitats in general meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met).

<table>
<tr><th colspan="2">PI 2.4.1</th><th colspan="2">The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</th></tr>
<tr><td></td><td></td><td colspan="2">An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that handline impacts on seapens and burrowing megafauna habitats would be lower still.

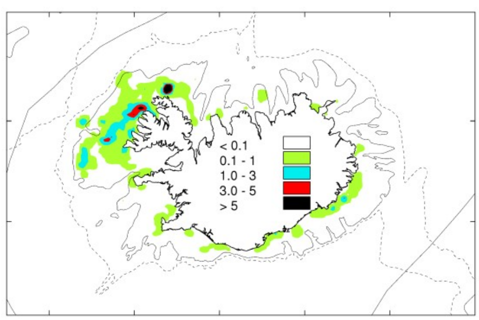
In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap suggested a risk level well below 20%, as required for SG100. SG100 is therefore met.

4.11 Other subtidal sedimentary habitats

The fishery operates on subtidal sedimentary (muddy and sandy) habitats - without the other features listed above - which are not considered threatened and/or declining. The team considers that there is no mechanism by which handlining can cause damage to this habitat type. SG100 is therefore met.</td></tr>
<tr><td colspan="2">References</td><td colspan="2">Chuenpagdee et al. 2003; Garcia et al. 2006; Gunnarsson, Jónsson, and Pálsson 1998; Kristjánsson 1983; Ólafsdóttir et al. 2014; OSPAR 2010d; Thór 2002; Thór 2003; Thór 2005; Sharp et al. 2009.</td></tr>
<tr><td colspan="3">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>100</td></tr>
<tr><td colspan="3">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Principle 2: Atlantic wolffish longline

Evaluation Table for PI 2.4.1: Longline (Atlantic wolffish)

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
A4	**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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Vulnerable / sensitive habitats	Y	Y	Y
	Non-vulnerable muddy / sandy habitats	Y	Y	Y
	Justification	1. Fishing Area Atlantic wolffish mostly occurs at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, and lava outcrops (MFRI, pers. Communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) peninsula in the north-west.  Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute(MFRI). 2. Fishing Gear Bottom longlines have historically been an important gear used in Icelandic fisheries to target groundfish. The longline fishery can be divided into traditional shallow water, coastal and more recent deep-water fisheries. Most of the fisheries are conducted in March or April when Atlantic wolffish are migrating back from the spawning grounds located at 160-200 m depth off Vestfirdir. At other times of the year Atantic wolffish are also caught as bycatch in longlines targeting other species (e.g. cod, haddock). In 2010-2015 58.1% of Atlantic wolffish landed in Iceland were		

caught using longlines. Longlines may be up to 20 km and can have up to 16,000 hooks. This gear can be used on rough grounds where other fishing gears cannot be used (Gunnarsson et al. 1998; Kristjánsson 1983; Thór 2002, 2003, 2005).

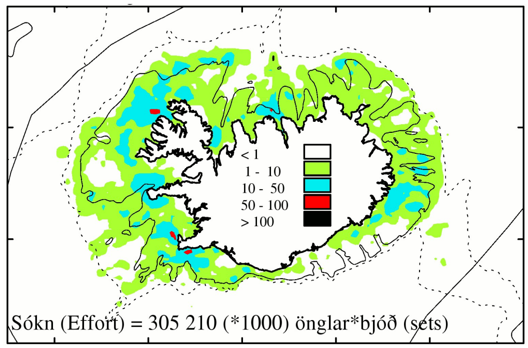


Figure 2. Location of longline fishing effort in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute(MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; by comparing Figures 1 and 2 with the map of *Lophelia* reefs provided in section 3.4.5.1 it is clear that there is no spatial overlap between the Atlantic wolffish longline fishery and Lophelia reefs. Indeed, Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters.

- Deep-sea sponges; by comparing Figures 1 and 2 with the map of deep-sea sponges provided in section 3.4.5.1 it is clear that there is no spatial overlap between the Atlantic wolffish longline fishery and deep-sea sponge habitats. Indeed, Atlantic wolffish are mainly found at depths of 40 to 200 m in Icelandic waters.

- Maerl beds; by comparing Figures 1 and 2 with the map of maerl beds provided in section 3.4.5.1 it is clear that there is no spatial overlap between the Atlantic wolffish longline fishery and maerl beds.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m, which is deeper than the fishing grounds of Atlantic wolffish (Atlantic wolffish are found at depths of between 40 and 200 m).

- *Modiolus* reefs; the Atlantic wolffish longline fishery does not interact with horse mussel beds because these habitats occur in waters which are generally shallower than those in which the fishery operates (Atlantic wolffish are found at depths of between 40 and 200 m). Moreover, a comparison of Figures 1 and 2 with the map of *Modiolus* reefs provided in section 3.4.5.1 shows that there is no significant spatial overlap between fishing grounds for Atlantic and horse mussel beds.

- Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows there is no significant spatial overlap between the Atlantic wolffish longline fishery and hydrothermal vent fields; landings originating from near Grímsey vent fields are very low (0.1 -1 tonnes/nmi2).

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
		- Seapens and burrowing megafauna; comparing Figures 1 and 2 with the relevant maps in section 3.4.5.1 shows that there is no spatial overlap between the Atlantic wolffish longline fishery and areas with high concentrations of seapens. 3.1 Scoring considerations for vulnerable habitats Overall the team considers that the Atlantic wolffish longline fishery does not take place in areas where sensitive habitats are concentrated. In addition, longlining is not perceived to have significant impacts on vulnerable benthic habitats. For example, the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) ranks the relative impact of demersal longlines on marine ecosystems at 30/100 - better than all other methods of demersal fishing. Conversely, this means that scientific resources have not in most places been invested in trying to quantify habitat impacts of longlining, including in Iceland. In the sub-Antarctic, however, a CCAMLR impact / risk assessment process has been carried out for some other toothfish longline fisheries in habitats which are potentially similar (including cold water coral taxa). There have been efforts for the New Zealand Ross Sea toothfish longline fishery, for example, to evaluate in a systematic way the spatial footprint of the fishery on key vulnerable taxa such as corals (Sharp et al. 2009). As part of this study an impact matrix was compiled, where impacts were considered at the scale of individual cold water coral colonies, and assigned to one of three categories, (i) no impact, (ii) non-lethal impact, and (iii) lethal impact. Impacts that necessitated re-growth from the substrate level (but not necessarily a new colonisation event) were considered to be lethal. Based on a number of scenarios the study concluded that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted. Overall, however, systematic analyses of this kind are rare, and empirical data on habitat impacts of longlines even rarer (Sharp et al. 2009). On this basis, and given the lack of geographic overlap with these habitats, the team concluded that habitat impacts from longlining are 'highly unlikely' (risk of impact of <<30%). In relation to 'evidence' SG100, the team considered that although there is no direct information from Iceland, and although Sharp et al. (2009) was carried out in a different biogeographic zone, the results were at least qualitatively comparable, and combined with the lack of geographic overlap suggested a risk level well below 20%, as required for SG100. SG100 is therefore met for all vulnerable habitats. 3.2 Scoring considerations for non-vulnerable sedimentary habitats The team considers that there is no mechanism by which longlining can cause damage to this habitat type. SG100 is therefore met.
References		Chuenpagdee et al. 2003; Gunnarsson et al. 1998; Kristjánsson 1983; Thór 2002; Thór 2003; Thór 2005; Sharp et al. 2009.

OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/A**

Principle 2: Atlantic wolffish *Nephrops* trawl

Evaluation Table for PI 2.4.1: *Nephrops* trawl (Atlantic wolffish)

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?	Y	Y	N
	Justification	See below		

Justification:

1. Fishing Area

Atlantic wolffish mostly occurs at depths of between 40 and 200 m. The species is found on a variety of substrate types, such as mud and sand, but also on rocky substrates, e.g. lava outcrops (MFRI, pers. communication). Atlantic wolffish are caught close to shore around Iceland, with the highest catches taken off the Vestfirdir (West Fjords) Peninsula in the north-west.

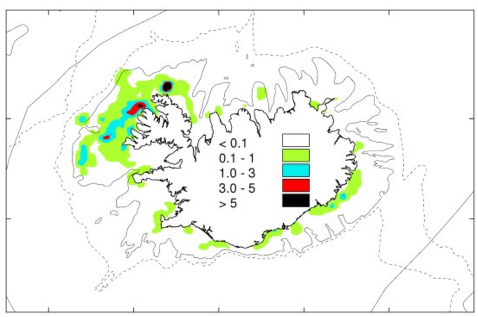


Figure 1. Distribution of 2015 Atlantic wolffish (*Anarhichas lupus*) catches around Iceland. All gears, dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI).

2. Fishing Gear

Nephrops trawlers are a variant of bottom trawls, which use smaller mesh sizes. Lobster trawls have a groundrope, but unlike groundfish or shrimp trawls do not use bobbins. This means this type of gear cannot be used on rough grounds. Instead the net is closer to the bottom, increasing catchability of the main target species, Norway lobster (*Nephrops norvegicus*), which is found on sedimentary bottoms. *Nephrops* trawling thus focusses on flat muddy substrates (MFRI, pers. communication). Sorting grids are not used by lobster trawlers, and as a result, other species such as cod, redfish, haddock, monkfish and witch flounder are caught as bycatch.

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

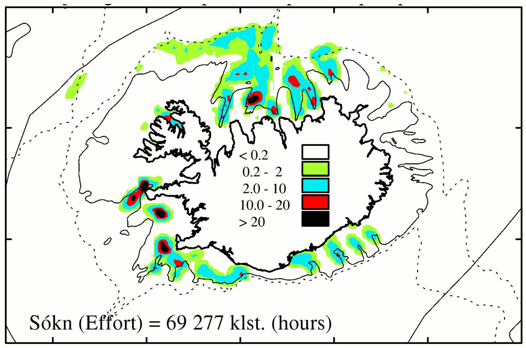


Figure 2. Location of *Nephrops* trawl fishing effort in 2014 (hours), dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

3. Likely impacts of the fishery on habitats

The habitat of *Nephrops norvegicus* is characterized by fine sand and mud, where sea-pen and burrowing megafauna communities can be found (OSPAR 2010a). Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, creeks and in deeper offshore waters. Typical species such as *Virgularia mirabilis*, *Pennatula phosphorea*, and *Funiculina quadrangularis* may also be present.

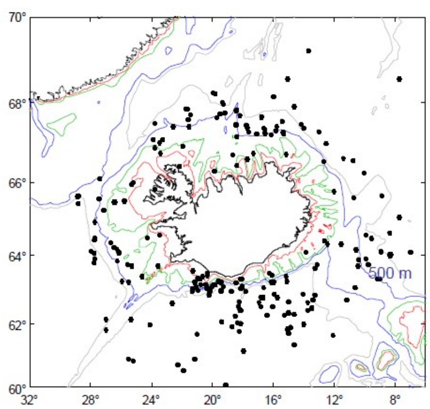


Figure 3. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Seapens are sensitive to mechanical damage by *Nephrops* trawling. Studies on the impact of *Nephrops* trawling indicate that fishing intensity is the major factor controlling long-term negative trends in the benthos (Ball et al. 2000). However, compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000 (Garcia et.al. 2006), and during the period 2001-2013 the number of boats in the *Nephrops* fishery had reduced by around 50% (Figure 4).

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**

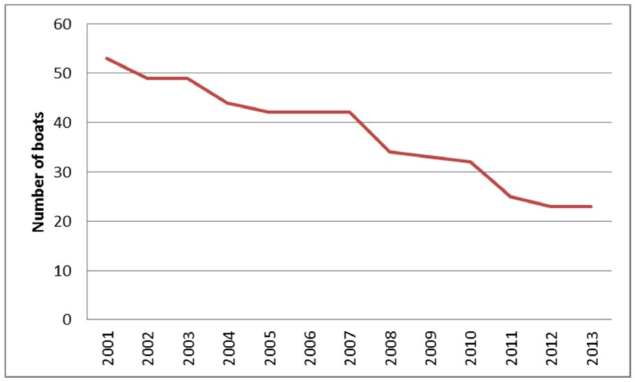


Figure 4. Number of boats licensed for *Nephrops* fishery during 2001-2013. Source: Directorate of Fisheries database.

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, which includes Icelandic waters.

In scoring, the team noted the following:

- There is no explicit protection for this habitat type in Icelandic waters, but Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters which are not affected by *Nephrops* trawling since they lie outside trawl fishing grounds (see Figure 3).
- High bottom trawling effort has been ongoing for decades, including trawling for *Nephrops*. The current effort by the *Nephrops* fishery is considerably less intensive than it used to be. Fishing intensity appears to be the main factor in determining damage in this habitat type (see Ball et al. 2000). Significant reduction in fishing effort in recent years (compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000) suggests that the habitat has more chance to recover, if the effort remains at current level or lower.
- OSPAR do not consider this habitat type to be 'threatened or declining' in Icelandic waters (or in any of area I) (OSPAR 2010d).
- The *Nephrops* trawl used in Icelandic waters has a ground rope but is not fitted with bobbins or tickler chain (www.fisheries.is), which reduces environmental impacts.

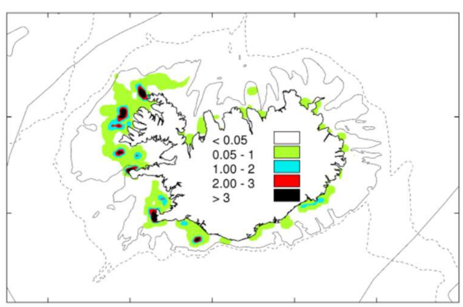
On this basis, the team considered it highly unlikely that the fishery will reduce seapen colonies and other key habitat forming species to a point where there would be serious or irreversible harm (risk of some damage from this gear type <30%). SG80 is met

However, the team did not consider that there was sufficient evidence for SG100 to be met.

References	Ball et al. 2000 ; Garcia et.al. 2006 ; OSPAR 2010a; OSPAR 2010d; Ólafsdóttir et al. 2014.
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Principle 2: Plaice bottom trawl

Evaluation Table for PI 2.4.1: Bottom trawl (plaice)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Lophelia reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	N
	Justification	1. Fishing Area Plaice is common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.  Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears, dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI). 2. Fishing Gear The bottom otter trawl is an important gear used in Icelandic fisheries at depths ranging from 80 m to 1500 m. Icelandic trawlers use steel trawl doors which are being constantly developed for better hydrodynamic shape and lighter construction, steel bobbins, so called 'rock hoppers' made from rubber. Species which are commonly caught by bottom trawl are cod, demersal redfish, haddock, saithe and Greenland halibut, but trawls also		

catch large amounts of plaice, Atlantic wolffish, spotted catfish, ling, blue ling, tusk, great silver smelt and lemon sole (Gunnarsson et al. 1998, Thór 2003, 2005).

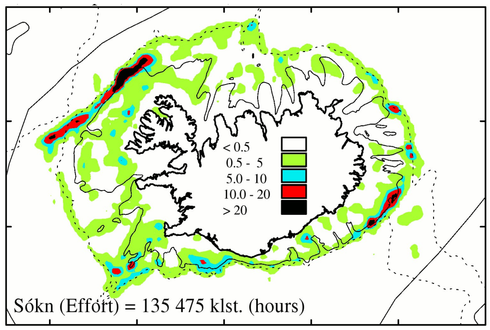


Figure 2. Location of effort with bottom trawl in 2014 (hours trawling), dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- Deep-sea sponges; since plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between deep-sea sponge habitats and plaice fishing grounds. Indeed comparing Figure 1 with the map of deep-sea sponges provided in section 3.4.5.1 confirms that there is no potential overlap between this fishery and deep-sea sponge habitats.

- Maerl beds; a comparison of Figure 1 with the map of maerl beds provided in section 3.4.5.1 shows that the bulk of plaice catches are not taken from areas with maerl grounds. An exception is Húnaflói Bay in north-west Iceland from where low catches (between 0.05-1 tonnes/nmi2) of plaice were reported in 2015 and a concentration of maerl beds are located. However, Figure 2 shows that bottom trawling does not take place in this area, i.e. plaice catches in this area are made with another gear (see section on Danish Seine). The assessment team therefore concluded that this fishery does not interact with maerl beds.

- Coral gardens; in reviewing the likely habitat impact of trawling on this habitat, the team considered that the plaice fishery is generally taking place in shallower waters close to shore (bottom otter trawling for plaice takes place between 80 m and 200 m depth) and that therefore there is no overlap with the fishery with coral gardens.

- *Modiolus* reefs; since bottom otter trawling for plaice takes place between 80 m and 200 m depth and and bottom trawling is not allowed within certain distance from land (generally around 12 nm) (MFRI, pers. communication), the team considers that there is no potential overlap between this fishery and the depth distribution of horse mussel beds in Icelandic waters.

- Hydrothermal vents; comparing Figure 1 with the map of hydrothermal vents provided in section 3.4.5.1 shows that the assessed fishery is not operating in areas where hydrothermal vents are located.

3.1 *Lophelia* reefs

In the past, some relatively large areas of coral have vanished due to bottom trawling (Figure 3; Steingrímsson and Einarsson 2004, Garcia et al. 2006). The present occurrence

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**

of *Lophelia pertusa* around Iceland is confined to the south and southeast continental slope and on the Reykjanes ridge (Figure 45). Lophelia is found at 200-600 m depth (Ólafsdóttir and Burgos 2012). Coral habitats are currently being explored and mapped by MFRI and based on this effort 10 coral areas have been closed for bottom contacting fisheries, in total 480 km2 (Figure 6). Furthermore, coral areas on the Reykjanes ridge have been protected for bottom trawling since 1994 (Figure 3).

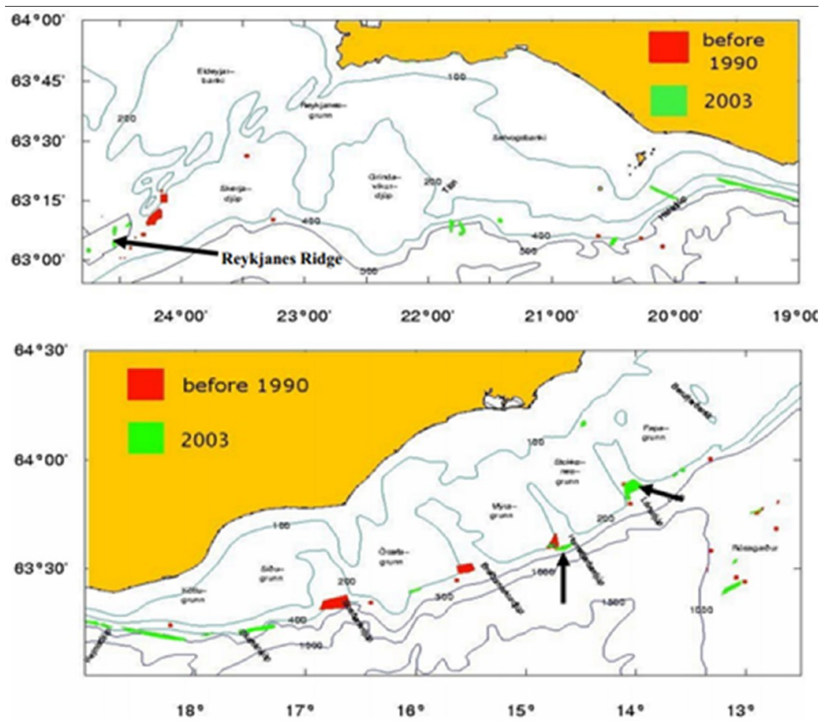


Figure 3. Occurrence of coral areas off Iceland, based on information from fishermen: Red - coral areas known to exist prior to 1990; green - coral areas existing in 2003. Arrows indicate the largest existing coral areas. Source: Garcia et al. 2006.

Figure 4. Present occurrence (light blue dots) of *Lophelia pertusa* in Icelandic waters. Source: Ólafsdóttir et al. 2014.

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

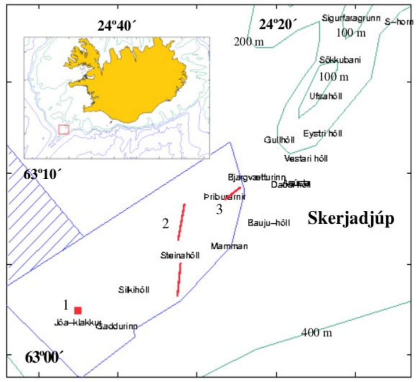


Figure 5. Position of the Steinahóll hydrothermal vent and occurrence of coral (indicated with red lines or square) on the Reykjanes Ridge. Area closed for otter trawling (since 1994) is outlined with a blue line (closed throughout the year) and blue hatched area (trawling allowed 1 st February – 15 th April). Source: Steingrmsson and Einarsson 2004.

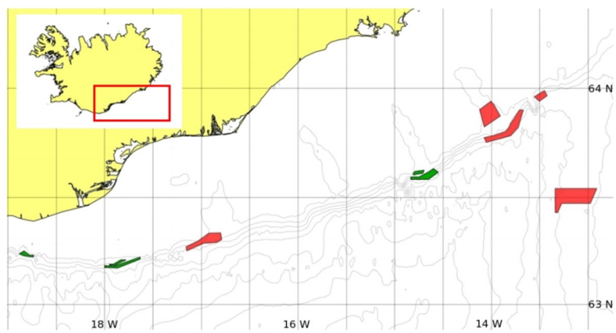


Figure 6. Coral areas (*Lophelia pertusa*) off SE Iceland where ban on using bottom contacting fishing gear has been in operation since 2005 (green) and 2011 (red). Source: Ólafsdóttir and Burgos 2012, Steingrímsson and Einarsson 2004)

In considering the probability of serious or irreversible harm to *Lophelia* reefs from this fishery, the team considered the facts that:

- Bottom trawling is known to have a serious and irreversible (or only reversible very slowly) impact on this habitat type. Some *Lophelia* areas are known to have been lost to trawling in the past in Icelandic waters.
- There is no overlap between fishing grounds for plaice (Figure 1) and known *Lophelia* habitats (Figure 4).
- Since 2005/2011 here is explicit protection of 10 *Lophelia* areas where no fishing gear with bottom contact are allowed, including bottom trawling (Figure 6). Permanent area closure for bottom trawling is in operation along the shelf break off W Iceland including seabed on the shallow part of the Reykjanes Ridge where Lophelia reefs occur (Figure 5). These measures do in fact apply to more or less all known *Lophelia* reefs (compare Figure 4 with 5 and 6).
- Detailed habitat mapping has so far concentrated on the areas most at risk from trawling or other threats. Ongoing habitat mapping may identify further areas and the intention is to protect these.

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

Overall, the team considered that the risk of serious or irreversible harm to known areas of *Lophelia* reef is low, because there is no overlap of plaice fishing grounds and coral habitats, and coral areas which were at high risk to bottom trawling have been closed specifically for their protection (Figures 5 and 6) or have been free from bottom trawling due to ban on bottom trawling in the west of Iceland with the aim of protecting juvenile redfish. Remaining areas are either too deep for trawling or are unsuitable for trawling (slope too steep, presence of escarpments). The team felt on this basis that SG80 is met (risk of some damage 30% or less).

In relation to SG100 the mapping of *Lophelia* reefs by MFRI up to now has focused on areas of high trawl activity, therefore the remaining unmapped areas are subject to less fishing pressure. However, the mapping is still ongoing and some undiscovered areas may still be exposed to risk. The risk of impact in this regard is obviously difficult to quantify, but the team considered that although remaining undiscovered areas which are exposed to trawling but unimpacted are likely to be small and/or sparse, it could not be argued on this basis that SG100 is met.

3.2 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

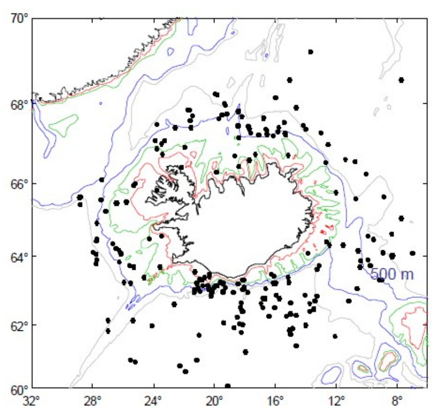


Figure 7. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014.

This habitat type is characteristic of *Nephrops* grounds, and this habitat type is therefore mainly relevant in relation to the gear type '*Nephrops* trawl'. However, since some whitefish trawling may occur in these areas, it is considered here as well.

In reviewing the likely habitat impact of trawling on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR, 2010d).

<table>
<tr><th colspan="2">PI 2.4.1</th><th>The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</th></tr>
<tr><td></td><td></td><td>

- Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Figure 7, Garcia et al. 2006).
- The overlap of plaice fishing grounds, areas where bottom otter trawlers operate, and known locations where seapen colonies are found (compare Figures 1 and 2 to Figure 7) is restricted to small areas off the south-west of Iceland.

Overall, the team considered that the evidence of i) limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less. SG80 is met.

In relation to SG100, there is some direct evidence regarding the effect of trawls on the habitat (e.g. Ball et al. 2000) but the team considered that there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100.

3.3 Other subtidal sedimentary habitats

The fishery operates on subtidal sedimentary habitats - without the other features listed above - which are not considered threatened and/or declining. This includes subtidal sand, muddy sand and gravel.

The team considers that it is highly unlikely that bottom trawling will reduce the structure and function of subtidal sedimentary habitats to the point where there would be serious and in particular irreversible harm. These habitats have been fished for many years and are still productive fishing grounds. Moreover, research on the short- and long-term effects of otter trawling on a macrobenthic infaunal community in subtidal Icelandic waters that had never been trawled before found that no significant treatment effects could be detected on total abundance or on multivariate structure; tests for individual species revealed only a single short-term effect for a bivalve. Trawling did however cause significant short-term reduction in species richness and persistent effects on the Shannon-Wiener diversity index (Ragnarsson and Lindegarth 2009). Based on these considerations the team considers that SG 80 is met for this scoring element.

Ragnarsson and Lindegarth (2009) carried out their research in shallow waters where storm induced disturbance will be higher than in the trawl fishing grounds for Atlantic wolffish being assessed. The team therefore considers that this study does not consitute sufficient evidence that that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. SG 100 is not met.

</td></tr>
<tr><td colspan="2">References</td><td>Ball et al. 2000; Garcia et al. 2006; Gunnarsson et al. 1998; Ólafsdóttir and Burgos 2012; Ólafsdóttir et al. 2014; OSPAR 2010d; Thór 2003; Thór 2005; Ragnarsson and Lindegarth 2009; Saemundsson 1926; Solmundsson et al., 2005; Steingrímsson and Einarsson 2004; Taning, 1929.</td></tr>
<tr><td colspan="2">Harmonisation</td><td>The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for bottom trawl fisheries scored at SG 60 level due to overlap between these fisheries with deep-sea sponge and coral garden habitats. Due to the lack of overlap between plaice fishing grounds and deep-sea sponge habitats / coral gardens the team considers that harmonisation is not appropriate in this case.</td></tr>
<tr><td colspan="3">OVERALL PERFORMANCE INDICATOR SCORE: | 80</td></tr>
<tr><td colspan="3">CONDITION NUMBER (if relevant): | N/A</td></tr>
</table>

Evaluation Table for PI 2.4.2: Bottom trawl (plaice)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG100 is met.		
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?	(Y/N)	(Y/N)	(Y/N)
	Lophelia reefs	Y	Y	Y
	Seapens and burrowing megafauna	Y	Y	N

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		
	Other subtidal sedimentary habitats	Y	Y	N
	Justification	*Lophelia* reefs Implementation of the habitat protection strategy has focused on this habitat type, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear. Several areas have been closed to fishing to protect *Lophelia* coral reef (see Figure 7); the other reef areas are either within closed area for bottom trawling (e.g. Reykjanes Ridge, Figure 5), outside the depth range of trawling or on grounds unsuitable for trawling (slope too steep, mountainous). While not all areas have been mapped, the unmapped areas are those considered at lowest risk from trawl damage, and not considered likely to have extensive coral habitat. Operation of all Icelandic fishing vessels is monitored by Monitoring System (VMS) and the Marine and Freshwater Research Institute (MFRI) has access to electronic logbooks for scientific purposes (high resolution data). During a site visit as part of the first surveillance of the saithe and ling certificate, the Icelandic Directorate of Fisheries (DF) confirmed that no vessel has violated the closure of coral areas. There is therefore an objective basis for high confidence that this strategy will work, and SG100 is met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR (OSPAR 2010d). The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the SG80 level. SG80 is met. However, it is not possible to argue that there has been extensive testing in relation to impacts on this habitat type or its distribution over time, although there is some information available, so SG100 is not met. Other subtidal sedimentary habitats These habitats have been fished for many years and is not considered threatened in Icelandic waters. A limited amount of research has been carried out on the short- and long-term effects of otter trawling on a macrobenthic infaunal community in subtidal Icelandic waters (Ragnarsson and Lindegarth 2009), which did not identify a risk of serious or irreversible long term harm. The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the SG80 level. Thus SG80 is met. However, it is not possible to argue that there has been extensive testing in relation to impacts on this habitat type or its distribution over time since the available scientific studies were carried out sedimentary habitats which are shallower and exposed to higher energy levels compared to plaice fishing grounds, so SG100 is not met.		
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.

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		
	Met?		(Y/N)	(Y/N)
	Lophelia reefs		Y	Y
	Seapens and burrowing megafauna		Y	N
	Other subtidal sedimentary habitats		Y	N
	Justification	For seapens and burrowing megafauna, as well as other subtidal sedimentary habitats, there is some evidence that the partial strategy is implemented successfully (habitat outcome = 80 although the strategy is not focused on this habitat type). However, there are no explicit protection measures for vulnerable habitats other than Lophelia reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is met for *Lophelia* reefs, but not met for seapens and burrowing megafauna, for which only SG 80 is met.		
d	**Guidepost**			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	There is no evidence on whether closure of areas have contributed to habitat recovery, and there is only limited information on changes in distributions of habitats over time (limited historical information).		

Overall Scores

	Scoring Issue Scores				
Scoring Element	a	b	c	d	All
Lophelia reefs	100	100	100	80	95
Seapens and burrowing megafauna	100	80	80	80	85
Other subtidal sedimentary habitats	100	80	80	80	85
					85

References	Garcia et al. 2006b; OSPAR 2008a; OSPAR 2008b; OSPAR 2010d; OSPAR 2013; Ragnarsson and Lindegarth 2009; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.2 for bottom trawl fisheries scored at SG 75 level due to overlap between these fisheries with deep-sea sponge and coral garden habitats. Due to the lack of overlap between plaice fishing grounds and deep-sea sponge habitats / coral gardens the team considers that harmonisation is not appropriate in this case.

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
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Principle 2: Plaice Danish seine

Evaluation Table for PI 2.4.1: Danish seine (Plaice)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Maerl beds	Y	Y	N
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	Y
	Justification	1. Fishing Area Plaice is common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.		

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

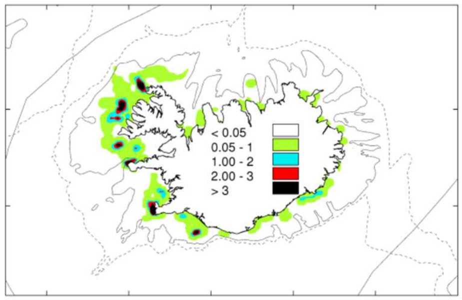


Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI).

2. Fishing Gear

The appearance of a Danish seine resembles a trawl since it also has wings, a 'belly', and a codend. Trawl doors are however not used and instead the Danish seine is operated with a set of towing-lines and drag-lines on each side. During the fishing operation the warps are gradually pulled together, causing the seine to move over the bottom and herding the fish in front of the seine. About 40% of Icelandic flatfish landings are caught by Danish seine, including 65% of the plaice catch in 2015. It is mostly used in shallow waters at depths of 40-60 m, at locations all around Iceland although the bulk of the effort is concentrated southwest and west of the country (Gunnarsson et al. 1998, Eiríksson 2008, Thór 2005).

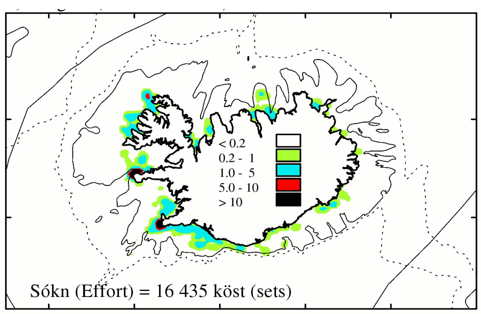


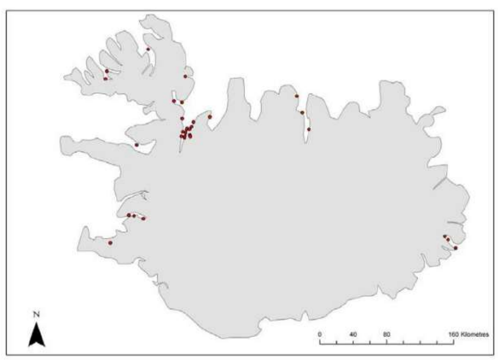
Figure 2. Location of effort with Danish seine in 2014 (hours), dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

The Danish seine cannot be used to work on rough grounds and is used on relatively flat sandy or muddy seabeds lacking significant obstructions which could damage the gear. Since Danish seines encircle the target species rather than being towed across large areas of substrate this gear has a relatively limited spatial footprint, reducing seabed disturbance.

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; since adult plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between *Lophelia* reefs and Danish seine fishing for plaice. Moreover, Danish seines cannot be used over rough grounds.

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
		- Deep-sea sponges; since adult plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between deep-sea sponge habitats and Danish seine fishing for plaice. Moreover, Danish seines cannot be used over rough grounds. - Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m (Ólafsdóttir et al. 2014), which is deeper than the fishing grounds of plaice (plaice are mainly found at depths of 10 to 150 m in Icelandic waters). Moreover, Danish seines cannot be used over rough grounds. - Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows that the assessed fishery is not operating in areas where hydrothermal vents are located. 3.1 Maerl beds Maerl beds are common in northern Icelandic fjords (Figure 3), and are rarely found below 20 m depth in Icelandic waters (MFRI, pers. communication). A comparison of Figure 1 with Figure 3 shows that the bulk of plaice catches are not taken from areas with maerl grounds. An exception is Húnaflói Bay in north-west Iceland from where low catches (between 0.05-1 tonnes/nmi2) of plaice were reported in 2015 and a concentration of maerl beds is located.  Figure 3. Geographic distribution of maerl grounds around Iceland. Source: OSPAR, 2010a. In reviewing the likely habitat impact of Danish seines on this habitat, the team considered the following issues: • There is no explicit protection for this habitat type in Icelandic waters (OSPAR, 2010). • OSPAR considers that there is evidence of threat to maerl beds and their decline in Regions I, II, III, IV, which includes Iceland (Region I). • Maerl is sensitive to substratum loss, smothering, increase in suspended sediment, abrasion and physical disturbance (Jones et al., 2000) and maerl beds are vulnerable as maerl thalli grow extremely slowly. The 'recovery potential' of maerl beds has been categorized by OSPAR as 'poor' meaning that only partial recovery is likely within 10 years and full recovery may take up to 25 years (IMPACT, 1998). Since Danish seines are in contact with the seafloor during the fishing operation, may cause sediment suspension and have a relatively heavy footrope, this gear has the potential to damage maerl beds.

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
		• The main impacts on maerl beds in Iceland come from dredging for fertilisers and bycatch in the scallop dredges (Chen 2012 and references therein). Harvesting of maerl in Iceland is currently taking place at 3 locations within Arnarfjörður (MFRI, pers. communication), however scallop fishing in Iceland has declined significantly in recent years (in 2000 a total of 9081 tonnes of scallops were fished / during 2004-2013 there was no fishing of scallops in Iceland / in 2014 and 2015 the catch was 281 and 351 tonnes respectively). • There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the north of Iceland (Figure 3). • Fishing with Danish seine rarely takes place in very shallow waters, and thus it is unlikely that there is much spatial overlap between Danish seine fishing effort and distribution of maerl beds (MFRI, pers. communication). Overall, the team considered that since i) the spatial overlap of Danish seine fishing for plaice and maerl beds is limited and there are several maerl beds in Iceland which are not at risk of being affected by this type of fishing, ii) the main threat to maerl beds in Iceland come from direct extraction and bycatch in scallop dredges, and (iii) MFRI experts were of the opinion that fishing with Danish seine will rarely take in waters less than 20 m deep where maerl beds are found in Icelandic waters, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met). However, in the absence of better information and due to the overlap of Danish seine fishing effort with the location of maerl beds in Húnaflói Bay in north-west Iceland SG 100 is not met. 3.2 *Modiolus* reefs The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012). Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998, another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* thus appears to be mainly concentrated near the coast on the western coast of Iceland (Figure 4).

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

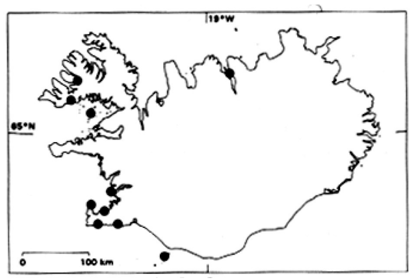


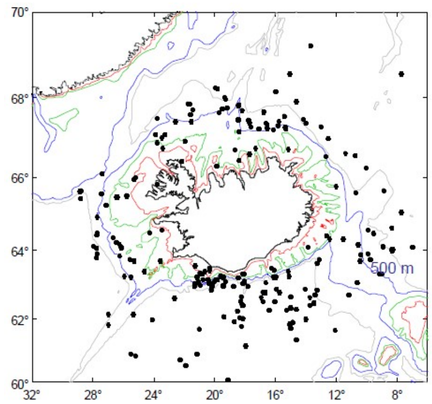
Figure 4. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

Overall a limited amount of recent data is available for this habitat type in Icelandic waters. This lack of data is a general problem affecting management in several jurisdictions, in fact OSPAR has concluded that there is not enough data to assess the overall extent of *M. modiolus* beds in the OSPAR area or the condition of the beds. Nevertheless, the OSPAR list recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.

In reviewing the likely habitat impact of Danish seines on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR List considers that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be 'very high' (OSPAR, 2009b). The team considers that it is reasonable to assume that Danish seines have lower impacts on benthic habitats (since they lack otter doors and are not dragged over large areas of seafloor), although it is possible that Danish seine could nevertheless damage the organisms found growing on the horse mussel beds, and possibly damage the horse mussel bed matrix.
- There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the western coast of Iceland (Figure 4). Several sites in the south-west of Iceland where *M. modiolus* has been recorded overlap with areas from where low catches (between 0.05-1 tonnes/nmi2) of plaice were reported in 2015, and two areas in the south of Iceland overlap with medium / important plaice fishing grounds where Danish seine fishing efforts are medium (fishing effort of 1-5 hours).
- It is unlikely that there would be fishing by Danish Seine over horse mussel beds, as it would lead to fishing gear damage, such as the footrope being damaged after getting hooked in the mussel bed matrix. It is likely that fishermen avoid fishing on grounds where there are beds with horse mussel (MFRI pers. communication).

Overall, the team considered that since i) the overlap of Danish seine fishing for plaice and *M. modiolus* is limited and there are several *Modiolus* beds in Iceland which are not affected by this type of fishing, ii) the most important fishing gears impacting horse mussel beds are scallop dredges and bottom otter trawls, and (iii) it is unlikely that there would be fishing by Danish Seine over horse mussel beds, as it would lead to fishing gear damage, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met). However, in the absence of better / more up to date information and due to the overlap of Danish

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
		seine fishing effort with the location of *Modiolus* beds off the south-west of Iceland, SG 100 is not met. 3.3 Seapens and burrowing megafauna Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.  Figure 5. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014 Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, including Icelandic waters. There appears to be no specific information available on the impacts of Danish seine fishing gear on seapens and burrowing megafauna, however comparing the distribution of Pennatulacea to locations with high Danish seine fishing efforts (Figures 2 and 5) shows that Danish seining is concentrated close to land off the west and southwest coast off Iceland, in areas where Pennatulaceans are uncommon. Plaice fishing grounds, Danish seine fishing effort and known seapen habitats only overlap in a small area to the south of Iceland. In reviewing the likely habitat impact of Danish seine fishing for plaice on this habitat, the team considered the following issues: There is no explicit protection for this habitat type in Icelandic waters. • OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d). • Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Figure 5; Garcia et al. 2006) • The overlap of plaice fishing grounds and known locations where seapen colonies are found is restricted to a very small area off the south-west of Iceland.

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
		Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less. SG80 is met. In relation to SG100, the team considered that there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100. 3.4 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary habitats - without the other features listed above - which are not considered threatened and/or declining. This includes subtidal sand, muddy sand and gravel. A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The study compared fished and closed areas within Skagafjörður found no differences in species composition between the two treatments, although abundance tended to be higher in the closed area (significant difference for two out of 9 benthic taxa from grab sampling). The habitat in this area was sedimentary. On this basis, the team considered that there is evidence that the habitat type is not likely to suffer serious or irreversible harm from Danish seine fishing, although it may suffer some reversible changes, therefore 100 is met.
References		Chen 2012; Eiríksson 2008; Garcia et al. 2006; Gunnarsson et al. 1998; IMPACT, 1998; Jones et al. 2000; Ólafsdóttir et al. 2014; OSPAR 2009; OSPAR 2010; OSPAR 2010a; OSPAR 2010d; Thór 2005; Ragnarsson and Burgos, 2012; Saemundsson 1926; Solmundsson et al. 2005; Taning 1929; Thorarinsdóttir et al. 2010.
Harmonisation		The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for Danish fisheries scored at SG 90 level since the only relevant scoring elements were (i) sedimentary habitats, and (ii) seapens and burrowing megafauna. The scores for these elements has remained the same, however the addition of maerl beds and *Modiolus* reefs as scoring elements in the plaice fishery has reduced the overall score to 85.
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/A**

Evaluation Table for PI 2.4.2: Danish seine (Plaice)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 ("um veiðar í fiskveiðilandhelgi Íslands") also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG100 is met.		
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?	(Y/N)	(Y/N)	(Y/N)
	Maerl beds	Y	Y	N
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal	Y	Y	Y

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		
	sedimentary habitats			
	Justification	There are no explicit protection measures for vulnerable habitats in Icelandic waters, except for *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated (i.e. there is a strategy in general, but implementation has not focused on all habitat types). In relation to *Lophelia*, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear, however, several areas have been closed to fishing. Operation of all Icelandic fishing vessels is monitored by Vessel Monitoring System (VMS) and Marine and Freshwater Research Institute (MFRI) has access to electronic logbooks for scientific purposes (high resolution data). Maerl beds The habitat type appears to be mainly limited to the fjords of northern Iceland and is considered threatened in Icelandic waters by OSPAR. Although there is a strategy in place for protecting sensitive habitats against fishing impacts, there is no explicit protection for mearl beds in Icelandic waters (OSPAR, 2010a). Nevertheless, since the main threats to this habitat in Icelandic waters come from scallop dredging and extraction for use as fertiliser, the overlap between Danish seine fishing grounds for plaice and maerl beds is limited to one area in the north-west of Iceland, Danish seine fisheries are unlikely to take place above 20 m depth and thus unlikely to impact maerl habitats, and the majority of locations where maerl beds are found are not impacted by the fishery, the team considers that the measures are considered likely to work (strategy although not focused in implementation on this habitat type), since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore, SG100 is not met. *Modiolus* reefs OSPAR recognises that M. *modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland (OSPAR, 2009b). Although there is a strategy in place for protecting sensitive habitats against fishing impacts, the team is not aware of any explicit protection for *Modiolus* reefs in Icelandic waters. However, OSPAR considers that key threats from fishing to *Modiolus* reefs are limited to dredge fisheries for scallops, beam and otter trawling (OSPAR, 2009b). It is reasonable to suppose the Danish seines have a lower impact than dredges or trawls on this habitat (in the absence of otter boards and since fishing grounds are spatially limited), although this has not been fully quantified. It is unlikely that there would be fishing by Danish Seine over horse mussel beds, as it would lead to fishing gear damage (MFRI pers. communication). The team considers that the measures are considered likely to work (strategy although not focused in implementation on this habitat type), since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore, SG100 is not met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR (OSPAR 2010d). The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the 80 level. However, it is not possible to argue that there has been extensive testing in relation to impacts on this		

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		
		habitat type or its distribution over time, although there is some information available, so SG100 is not met. The score for this component is 80. Other subtidal sedimentary habitats A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). Testing thus supports high confidence that the strategy will work, based on direct information about the habitats involved. SG 100 is met.		
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?		(Y/N)	(Y/N)
	Maerl beds		Y	N
	Modiolus reefs		Y	N
	Seapens and burrowing megafauna		Y	N
	Other subtidal sedimentary habitats		Y	Y
	Justification	For *Modiolus* reefs, maerl beds, and seapens and burrowing megafauna, there is some evidence that the partial strategy is being implemented successfully (habitat outcome = 80 although the strategy is not focused on this habitat type). SG80 is met However, there are no explicit protection measures for vulnerable habitats other than *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is not met. For other non-vulnerable sedimentary habitats, there is clear evidence that no actions appear to be required under the strategy (habitat outcome = 100).		
d	Guidepost			There is some evidence that the strategy is achieving its objective.
	Met?			N

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

Justification

There is no evidence on whether closure of coral areas have contributed to the recovery of the habitat, and limited information on changes in distributions of habitats over time (limited historical information).

Overall Scores

	Scoring Issue Scores				
Scoring Element	a	b	c	d	All
Maerl beds	100	80	80	80	85
Modiolus reefs	100	80	80	80	85
Seapens and burrowing megafauna	100	80	80	80	85
Other subtidal sedimentary habitats	100	100	100	80	95
					85

References

OSPAR 2008a; OSPAR 2008b; OSPAR 2009; OSPAR 2010a; OSPAR 2010d; OSPAR 2013; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.

Harmonisation

The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.1 for Danish fisheries scored at SG 90 level since the only relevant scoring elements were (i) sedimentary habitats, and (ii) seapens and burrowing megafauna. The scores for these elements has remained the same, however the addition of maerl beds and *Modiolus* reefs as scoring elements in the plaice fishery has reduced the overall score to 85.

OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.4.3: Danish seine (Plaice)

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="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</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>There is basic understanding of the types and distribution of main habitats in the area of the fishery.</td><td>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.</td><td>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">
1. Scoring methodology:

Since the Icelandic system for collecting data on the distribution of habitats and fishing effort does not vary in its general form according to habitat type or fishery, the team concluded that it did not make sense to break down the scoring by component habitats in this case. The rationale therefore considers the information available in general, covering all types of habitat.

2. Scoring:

SG 60-80: The BIOICE programme has provided basic inventory of benthic fauna within the Icelandic territorial waters (Figure 1). Benthic samples have been collected from a variety of habitats, ranging widely in depth (<100 to 3100 m) and in temperature conditions (12° to -0.9°C), and ROVs have also been used for habitat mapping (Garcia et al. 2006).

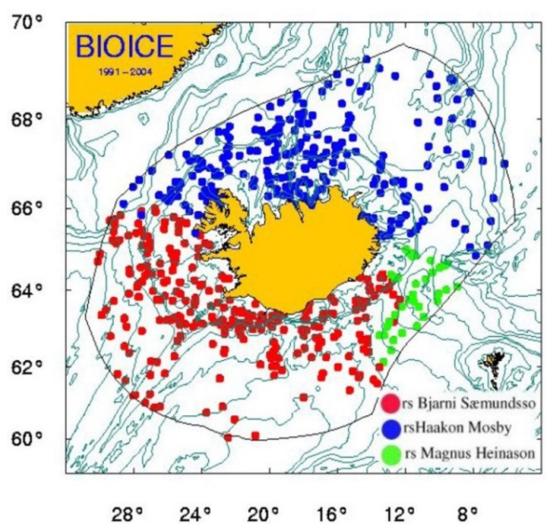


Figure 1. The research programme BIOICE (Benthic Invertebrates of Icelandic Waters): Distribution of sampling stations visited by three research vessels (different colours). Source: Ministry of Fisheries (2004).

The Icelandic Institute of Natural History has been leading a project involving mapping of intertidal habitats, including intertidal *Mytilus* beds, *Zostera* beds and intertidal mudflats (MFRI, pers. communication).
</td></tr>
</table>

<table>
<tr><th colspan="2">PI 2.4.3</th><th colspan="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</th></tr>
<tr><td></td><td></td><td colspan="3">The Marine and Freshwater Research Institute (MFRI) has identified areas of vulnerable benthic habitats in Icelandic waters (cold water corals, areas with aggregation of large sponge, maerl beds) in relation to bottom trawl fishing activities (Steingrímsson and Einarsson 2004, Garcia et al. 2006). The MFRI is currently carrying out research programmes in order to map benthic habitats in Icelandic waters (biology and geology, using multibeam echo sounder), including mapping cold water corals (Lophelia pertusa) and studying the interaction between fish and cold water coral habitats:
The CoralFISHproject (http://eu-fp7-coralfish.net/) was recently completed and a report detailing the CoralFISH project is in progress. Two manuscripts from the CoralFISH project will be submitted soon, one comparing fish communities inside and outside cold-water coral habitats based on longline catches, and another examining bottom fishing activities. A manuscript on coral habitat classification observed during this project has furthermore been submitted (MFRI pers. communication).
Since 2015, the bycatch of invertebrates is being monitored during the annual autumn ground fish survey in deep water carried out by MFRI. All invertebrates in the catch are identified by benthologist in those trawls observed; half of the trawls are currently observed. This data will give considerable amount of information on benthos, including sponges and corals, as well as other species vulnerable to fishing (MFRI pers. communication).
In 2016, MFRI conducted a specific survey with the primary objective to map, and explore possible different habitat areas in several locations north and south of Iceland. This survey was a part of general mapping of habitats with in Icelandic waters where previous surveys targeted areas where high abundance of vulnerable species, particularly coral, were reported (MFRI, pers. communication).
In 2017, several potential vent sites on the Reykjanes Ridge will be surveyed (MFRI, pers. communication).
Through VMS there is detailed information on the distribution of fishing effort around Iceland by all the assessed fishing gears. Therefore, it can be inferred where the fisheries overlap with vulnerable habitats.

Overall the nature, distribution and vulnerability of the main habitats are well understood, so this meets SG 80. However detailed habitat maps are not yet available for the entire Icelandic EEZ, so SG 100 is not met.</td></tr>
<tr><td rowspan="2">b</td><td>Guidepost</td><td>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.</td><td>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.</td><td>The physical impacts of the gear on the habitat types have been quantified fully.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
</table>

<table>
<tr><th colspan="2">PI 2.4.3</th><th colspan="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</th></tr>
<tr><td></td><td>Justification</td><td colspan="3">SG 60: The impacts of seine fishing are known to be less than those for bottom trawling since the ground-gear is lighter, there are no trawl doors, the successful use of the gear depends on the ropes not getting caugh on obstacles (Eigaard et al., 2016). In addition Danish seines encircle the target species rather than being towed across large areas of substrate, so this gear is known to have a relatively limited spatial footprint. There is good knowledge on the total distribution of Danish seine fishing effort as well as plaice catches in Icelandic waters, which can be used to indicate if and where fishing grounds overlap with vulnerable habitats.

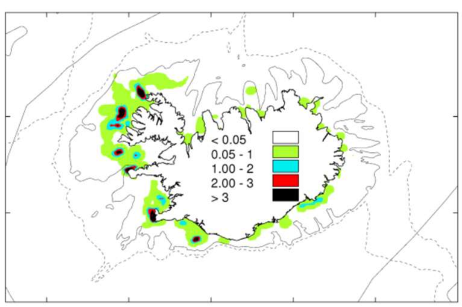
SG 80: Studies have been carried out on the impact of seine net fishing on benthos found in sedimentary areas in Icelandic waters (Thorarinsdóttir et al. 2010). Through VMS there is detailed information on the distribution of Danish seine fishing effort around Iceland. The VMS data is available for scientific purposes. Information is available on the distribution of invertebrate species and habitats in Icelandic waters. Therefore, there is reliable information to allow the nature of the impacts of the fishery on habitat types to be identified, on the spatial extent of interaction, and the timing and location of use of the fishing gear under assessment. SG 80 is met.

SG 100: A recent study on the impact of the seine fishing on benthos showed that it had limited negative impact on sedimentary benthic habitats in the study area (Thorarinsdóttir et al. 2010). However, impacts on vulnerable habitats such as maërl and Modiolus beds have not been quantified fully. SG 100 is thus not met.</td></tr>
<tr><td rowspan="3">c</td><td>Guidepost</td><td></td><td>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).</td><td>Changes in habitat distributions over time are measured.</td></tr>
<tr><td>Met?</td><td></td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">SG80: The area coverage of the assessed fisheries is monitored through logbooks and VMS, thus their spatial distribution is known in relation to vulnerable habitats. The habitat mapping by MFRI is ongoing as described above, together with studies on the ecological function of vulnerable habitats (e.g. CoralFISH project). Recently a project was established that collects data on benthic bycatch in the MFRI autumn survey. This data will provide information on the temporal trends in the state of benthic communities and habitats and thus can be used for monitoring purposes. SG 80 is thus met.

SG100: The MFRI research program aims primarily to map benthic habitats in Icelandic waters but such scientific research is not directly aimed at measuring changes in habitat distribution over time. SG 100 is thus not met.</td></tr>
<tr><td colspan="2">References</td><td colspan="3">Garcia et al. 2006; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.</td></tr>
<tr><td colspan="4">OVERALL PERFORMANCE INDICATOR SCORE:</td><td>80</td></tr>
<tr><td colspan="4">CONDITION NUMBER (if relevant):</td><td>N/A</td></tr>
</table>

Principle 2: Plaice gillnet

Evaluation Table for PI 2.4.1: Gillnet (Plaice)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal sedimentary habitats	Y	Y	Y
	Justification	1. Fishing Area Plaice are common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.  Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI). 2. Fishing Gear Gillnets are used extensively during at the end of the winter season (starting in January, peaking in March and ending in May) to target cod which is migrating to spawning grounds. Large amounts of saithe are also fished, as well as lesser amounts of haddock, monkfish, ling and some other species in even lower quantities. In 2010-2015 just 2.99% of plaice landed in Iceland were fished using gillnets.		

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

Gillnetting in Iceland is mainly carried out by smaller vessels relatively close to the shore, and with only very few exceptions gillnets are deployed within the 200 m depth contour (see Figure 2).

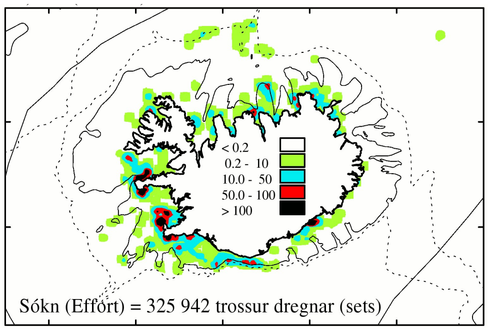


Figure 2. Location of gillnet fishing effort in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; since plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between *Lophelia* reefs and plaice fishing grounds.

- Deep-sea sponges; since plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between deep-sea sponges and plaice fishing grounds.

- Maerl beds; by comparing Figures 1 and 2 with the map of maerl beds provided in section 3.4.5.1 it is clear that there is no spatial overlap between maerl habitats, plaice fishing grounds, and areas where gillnets are deployed.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m (Ólafsdóttir et al. 2014), which is deeper than the fishing grounds of plaice (plaice are mainly found at depths of 10 to 150 m in Icelandic waters).

- Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows there is no spatial overlap between plaice fishing grounds and hydrothermal vents / vent fields.

3.1 *Modiolus* reefs

The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012).

Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was

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

carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* is thus mainly concentrated near the coast on the western coast of Iceland (Figure 3).

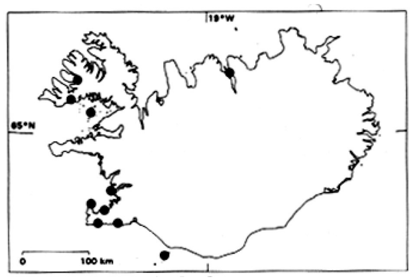


Figure 3. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

Overall a limited amount of recent data is available for this habitat type in Icelandic waters. This lack of data is a general problem affecting management in several jurisdictions, in fact OSPAR has concluded that there is not enough data to assess the overall extent of *M. modiolus* beds in the OSPAR area or the condition of the beds. Nevertheless, the OSPAR list recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.

In reviewing the likely habitat impact of gillnets on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR List recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be 'very high' (OSPAR, 2009b). Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003).
- There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the western coast of Iceland (Figure 3). Three sites where *M. modiolus* has been recorded in the south-west of Iceland overlap with areas from which medium to high catches (between 2->3 tonnes/nmi2) of plaice were reported in 2015, and where gillnet fishing effort is medium to high.
- In 2010-2015 just 2.99% of plaice landed in Iceland were fished using gillnets.

Overall, the team considered that since i) the overlap of plaice fishing grounds, areas where gillnets are deployed and known *M. modiolus* beds is limited and there are several known *Modiolus* beds in Iceland which are not affected by this type of fishing, ii) the most important fishing gears impacting horse mussel beds are scallop dredges and bottom otter trawls and gillnets do not have high impacts on benthic habitats, and (iii) plaice are a relatively minor bycatch in gillnet fisheries, the risk of serious and/or

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

irreversible damage from this fishery on this habitat type could be assessed to be 30% or less, SG80 is met

In the absence of better / more up to date information on the distribution and status of horse mussel beds in Icelandic waters and due to the overlap of gillnet fishing effort with known locations of *Modiolus* beds off the south-west of Iceland, SG 100 is not met.

3.2 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

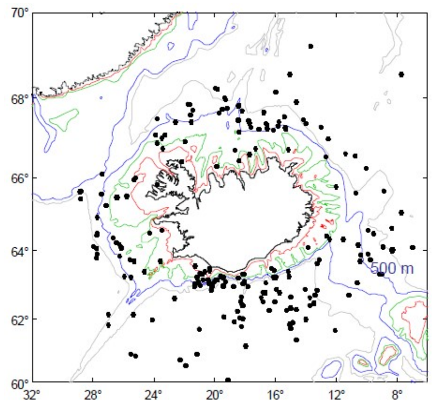


Figure 4. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, including Icelandic waters.

There appears to be no specific information available on the impacts of gillnet fishing gear on seapens and burrowing megafauna, however comparing the distribution of Pennatulacea to locations with gillnet fishing efforts (Figures 2 and 4) shows that gillnet fishing is with only very few exceptions concentrated close to the Icelandic coast in areas where Pennatulaceans are uncommon. Plaice fishing grounds, gillnet fishing effort and known seapen habitats only overlap in a very small area to the south of Iceland.

In reviewing the likely habitat impact of the fishery on seapens and burrowing megafauna, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d).

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
	• Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (see Figure 4). • Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003). • The overlap of plaice fishing grounds, known locations where seapen colonies are found, and areas where gillnets are deployed is restricted to a very small area off the south of Iceland. Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, and ii) apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters) meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less. SG80 is met. In relation to SG100, the team considered that since gillnets can theoretically be damaging and there is not sufficient quantitative information on trends in distribution and health of this habitat type over time to justify a score of 100. 3.3 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary (muddy, sandy and gravelly) habitats - without the other features listed above - which are not considered threatened and/or declining. A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The study compared fished and closed areas in sedimentary habitats within Skagafjörður. No differences in species composition between the two treatments was found, although abundance tended to be higher in the closed area (significant difference for 2 out of 9 benthic taxa from grab sampling). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. There is thus evidence that gillnet fishing is not likely to reduce habitat structure and function to a point where there would be serious or irreversible harm, and SG 100 is met.
References	Chuenpagdee et al. 2003; Ingolfsson 1996; Ólafsdóttir et al. 2014; OSPAR 2009; OSPAR 2010d; Ragnarsson and Burgos 2012; Saemundsson 1926; Solmundsson et al. 2005; Taning 1929; Thorarinsdóttir et al. 2010.
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.2 for gillnet fisheries scored at SG 90 level since the only relevant scoring elements were (i) seapens and burrowing megafauna, and (ii) non-vulnerable sedimentary habitats. The scores for these elements have remained the same, however the addition of *Modiolus* reefs as scoring element in the plaice fishery has reduced the overall score to 85.

OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.4.2: Gillnet (Plaice)

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?	Y	Y	Y
	Justification	In relation to this scoring issue, the team felt it made sense to score in relation to the measures/partial strategy/strategy for habitats in general – PI 2.4.2 (b) and 2.4.2 (c) are considered in relation to each component. The Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity (Ministry of Environment 2010). Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. Act 97/1997 (“um veiðar í fiskveiðilandhelgi Íslands”) also provides a framework which allows managers to close vulnerable habitats to fishing as and when the need arises. The Nature Conservation Act no. 44/1999 also provides measures to protect marine habitats. Iceland has ratified a number of conventions on the protection and management of marine species, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats and within them a number of mechanisms have been developed to detect and reduce impacts. For example, the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area has identified a number of key species and habitats which are considered threatened or declining (OSPAR Commission 2008 a and b). Iceland has nominated 14 areas to the OSPAR Network of Marine Protected Areas (OSPAR 2013; Umhverfisráðuneytið 2014). The team considered that this framework constituted a 'strategy' to protect marine habitats from fisheries impacts. SG100 is met.		
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?	(Y/N)	(Y/N)	(Y/N)
	Modiolus reefs	Y	Y	N
	Seapens and burrowing megafauna	Y	Y	N
	Other subtidal	Y	Y	Y

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		
	sedimentary habitats			
	Justification	There are no explicit protection measures for vulnerable habitats in Icelandic waters, except for *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated (i.e. there is a strategy in general, but implementation has not focused on all habitat types). In relation to *Lophelia*, which is widely perceived (not just in Iceland) to be the most vulnerable to towed fishing gear, however, several areas have been closed to fishing. Operation of all Icelandic fishing vessels is monitored by VMS and MFRI has access to electronic logbooks for scientific purposes (high resolution data). *Modiolus* reefs OSPAR recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland (OSPAR, 2009b). Although there is a strategy in place for protecting sensitive habitats against fishing impacts, the team is not aware of any explicit protection for *Modiolus* reefs in Icelandic waters. However, OSPAR considers that key threats from fishing to *Modiolus* reefs are limited to dredge fisheries for scallops, beam and otter trawling (OSPAR, 2009b). It is reasonable to suppose that gillnets have a lower impact than dredges or trawls on this habitat (gillnets may drift small distances but are not actively pulled over benthic habitats), although this has not been fully quantified. The team considers that the measures are considered likely to work (strategy although not focused in implementation on this habitat type), since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore, SG100 is not met. Seapens and burrowing megafauna The overlap of this fishery with this habitat type is limited – most fishing activity in these areas is by *Nephrops* trawls. The habitat type has remained widespread and is not considered threatened in Icelandic waters by OSPAR. The team therefore concluded that there is an objective basis for concluding that the current situation (strategy although not focused in implementation on this habitat type) is nonetheless sufficient, since habitat outcome is met at the 80 level. SG 80 is thus met. However, testing is lacking to support with high confidence that the strategy will work, particularly for areas which may be less well mapped. Therefore, SG100 is not met. Other subtidal sedimentary habitats A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. Testing thus supports high confidence that the strategy will work, based on direct information about the habitats involved. SG 100 is met.		
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?		(Y/N)	(Y/N)
	Modiolus reefs		Y	N

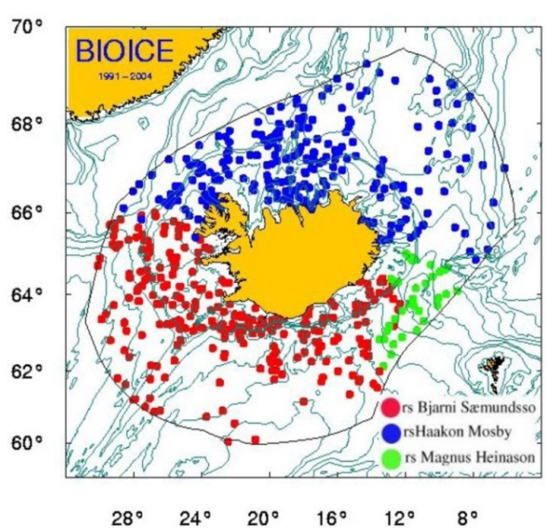
PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
	Seapens and burrowing megafauna		Y	N
	Other subtidal sedimentary habitats		Y	Y
	Justification	For *Modiolus* reefs, seapens and burrowing megafauna, there is some evidence that the partial strategy is being implemented successfully (habitat outcome = 80 although the strategy is not focused on this habitat type). SG80 is met However, there are no explicit protection measures for vulnerable habitats other than *Lophelia* reefs, although there is a legal and regulatory framework which would allow such areas to be designated. There is thus no clear evidence that the strategy is being implemented successfully for all vulnerable / sensitive habitat types. SG 100 is not met. For other non-vulnerable sedimentary habitats, there is clear evidence that no actions appear to be required under the strategy (habitat outcome = 100).		
d	**Guidepost**			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	There is no evidence on whether closure of areas have contributed to habitat recovery, and there is only limited information on changes in distributions of habitats over time (limited historical information).		

Overall Scores

Scoring Element	a	b	c	d	All
	Scoring Issue Scores				
Modiolus reefs	100	80	80	80	85
Seapens and burrowing megafauna	100	80	80	80	85
Other subtidal sedimentary habitats	100	100	100	80	95
					85

References	OSPAR 2008a; OSPAR 2008b; OSPAR 2009; OSPAR 2013; Thorarinsdóttir et al. 2010; Umhverfisráðuneytið 2014.
Harmonisation	The ISF Saithe and Ling / ISF Golden Redfish assessments of PI 2.4.2 for gillnet fisheries scored at SG 90 level since the only relevant scoring elements were (i) seapens and burrowing megafauna, and (ii) subtidal sedimentary habitats. The scores for these elements has remained the same, however the addition of *Modiolus* reefs as scoring element in the plaice fishery has reduced the overall score to 85.
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/A**

Evaluation Table for PI 2.4.3: Gillnet (Plaice)

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?	Y	Y	N
	Justification	1. Scoring methodology: Since the Icelandic system for collecting data on the distribution of habitats and fishing effort does not vary in its general form according to habitat type or fishery, the team concluded that it did not make sense to break down the scoring by component habitats in this case. The rationale therefore considers the information available in general, covering all types of habitat. 2. Scoring: SG 60-80: The BIOICE programme has provided basic inventory of benthic fauna within the Icelandic territorial waters (Figure 1). Benthic samples have been collected from a variety of habitats, ranging widely in depth (<100 to 3100 m) and in temperature conditions (12° to -0.9°C), and ROVs have also been used for habitat mapping (Garcia et al. 2006).  Figure 1. The research programme BIOICE (Benthic Invertebrates of Icelandic Waters): Distribution of sampling stations visited by three research vessels (different colours). Source: Ministry of Fisheries (2004). The Icelandic Institute of natural History has been leading a project involving mapping of intertidal habitats, including intertidal *Mytilus* beds, *Zostera* beds and intertidal mudflats (MFRI, pers. communication).		

<table>
<tr><th colspan="2">PI 2.4.3</th><th colspan="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</th></tr>
<tr><td></td><td></td><td colspan="3">The Marine Research Institute (MFRI) has identified areas of vulnerable benthic habitats in Icelandic waters (cold water corals, areas with aggregation of large sponge, maerl beds) in relation to bottom trawl fishing activities (Steingrímsson and Einarsson 2004, Garcia et al. 2006). MFRI is currently carrying out research programmes in order to map benthic habitats in Icelandic waters (biology and geology, using multibeam echo sounder), including mapping cold water corals (Lophelia pertusa) and studying the interaction between fish and cold water coral habitats:
The CoralFISHproject (http://eu-fp7-coralfish.net/) was recently completed and a report detailing the CoralFISH project is in progress. Two manuscripts from the CoralFISH project will be submitted soon, one comparing fish communities inside and outside cold-water coral habitats based on longline catches, and another examining bottom fishing activities. A manuscript on coral habitat classification observed during this project has furthermore been submitted (MFRI pers. communication).
Since 2015, the bycatch of invertebrates is being monitored during the annual autumn ground fish survey in deep water carried out by MFRI. All invertebrates in the catch are identified by benthologist in those trawls observed, but only half of the trawls are currently observed. This data will give considerable amount of information on benthos, including sponges and corals, as well as other species vulnerable to fishing (MFRI pers. communication).
In 2016, MFRI conducted a specific survey with the primary objective to map, and explore possible different habitat areas in several locations north and south of Iceland. This survey was a part of general mapping of habitats with in Icelandic waters where previous surveys targeted areas where high abundance of vulnerable species, particularly coral, were reported (MFRI, pers. communication).
In 2017, several potential vent sites on the Reykjanes Ridge will be surveyed (MFRI, pers. communication).
Through VMS there is detailed information on the distribution of fishing effort around Iceland by all the assessed fishing gears. Therefore, it can be inferred where the fisheries overlap with vulnerable habitats.

Overall the nature, distribution and vulnerability of the main habitats are well understood, so this meets SG 80. However detailed habitat maps are not yet available for the entire Icelandic EEZ, so SG 100 is not met.</td></tr>
<tr><td rowspan="2">b</td><td>Guidepost</td><td>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.</td><td>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.</td><td>The physical impacts of the gear on the habitat types have been quantified fully.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
</table>

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		
	Justification	SG 60: Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats - not as high as towed gears but higher than other forms of passive gear - this is because the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003). There is good knowledge on the distribution of gillnet fishing effort and plaice catches which can be used to indicate if and where fishing grounds overlap with vulnerable habitats. SG 80: Demersal gillnets are perceived in general to have medium impacts on vulnerable habitats since the nets can move across the bottom due to wave or current action (Chuenpagdee et al. 2003). Through VMS there is detailed information on the distribution of gillnet fishing effort around Iceland. The VMS data is available for scientific purposes. Information is available on the distribution of invertebrate species and habitats in Icelandic waters. Therefore, there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear under assessment. SG 80 is met. SG 100: A recent study on the impact of the Danish seine on benthos showed that it had limited negative impact on benthic habitats in the study area (Thorarinsdóttir et al. 2010). The team considered that habitat impacts of gillnets are likely to be less since gillnets are not dragged over the bottom. However, no similar studies have been conducted for gillnets, and impacts on vulnerable habitats such as maërl and *Modiolus* beds have not been quantified fully. SG 100 is thus not met.		
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.
	Met?		Y	N
	Justification	SG80: The area coverage of the assessed fisheries is monitored through logbooks and VMS, thus their spatial distribution is known in relation to vulnerable habitats. The habitat mapping by MFRI is ongoing as described above, together with studies on the ecological function of vulnerable habitats (e.g. CoralFISH project). Recently a project was established that collects data on benthic bycatch in the MFRI autumn survey. This data will provide information on the temporal trends in the state of benthic communities and habitats and thus can be used for monitoring purposes. SG 80 is thus met. SG100: The MFRI research program aims primarily to map benthic habitats in Icelandic waters but such scientific research is not directly aimed at measuring changes in habitat distribution over time. SG 100 is thus not met.		
References		Garcia et al. 2006; Steingrímsson and Einarsson 2004; Thorarinsdóttir et al. 2010.		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/A**

Principle 2: Plaice handline

Evaluation Table for PI 2.4.1: Handline (Plaice)

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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Maerl beds	Y	Y	Y
	Modiolus reefs	Y	Y	Y
	Seapens and burrowing megafauna	Y	Y	Y
	Non-vulnerable muddy / sandy habitats	Y	Y	Y

Justification

1. Fishing Area

Plaice is common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.

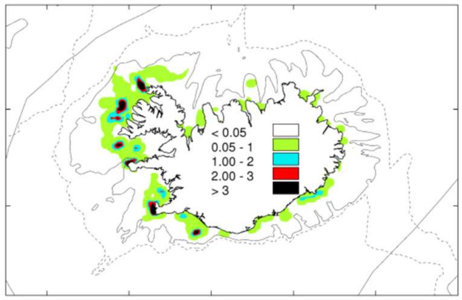


Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute(MFRI).

2. Fishing Gear

Fishing with handlines has a long history in Iceland. Both the types of lines and the types of hooks used have undergone numerous changes over time, resulting in an increase in efficiency over time. Handllines are mostly used to catch cod and a considerable quantity of saithe, as well as other groundfish species to a much lesser extent. The handline is primarily a summertime fishing gear, with more than 90% of the catch taken from May to August (Kristjánsson 1983; Gunnarsson, Jónsson, and Pálsson 1998; Thór 2002, 2003, 2005).

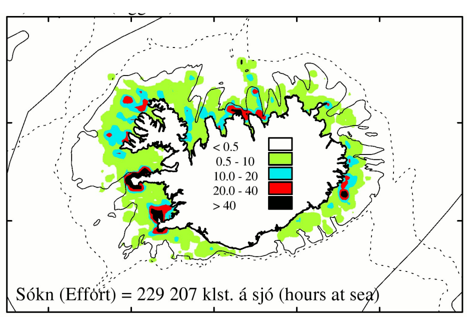


Figure 2. Location of handline fishing effort in 2014 (hours), dark areas indicate highest effort. Source: Marine and Freshwater Research Institute(MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; comparing Figures 1 and 2 with the map of *Lophelia* reefs provided in in section 3.4.5.1 shows that there is no spatial overlap between the handline fishery, plaice fishing grounds and areas where *Lophelia pertusa* reefs are known to be present. Moreover, plaice are mainly found at depths of 10 to 150 m in Icelandic waters.

- Deep-sea sponges; since adult plaice are mainly found at depths of 10 to 150 m in Icelandic waters, there is no potential overlap between deep-sea sponge habitats and handline fishing for plaice.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m, which is deeper than the fishing grounds of plaice (plaice are mainly found at depths of 10 to 150 m in Icelandic waters).

- Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows there is no spatial overlap between the plaice fishing grounds, areas where handline are deployed, and hydrothermal vent fields.

3.1 Maerl beds

Maerl beds are common in northern Icelandic fjords (Figure 3), and are rarely found below 20 m depth in Icelandic waters (MFRI, pers. communication). A comparison of Figure 1 with Figure 3 shows that the bulk of plaice catches are not taken from areas with maerl grounds. An exception are parts of Húnaflói Bay in north-west Iceland from where low catches (between 0.05-1 tonnes/nmi2) of plaice were reported in 2015, where fishing with handlines takes place, and a concentration of maerl beds is located.

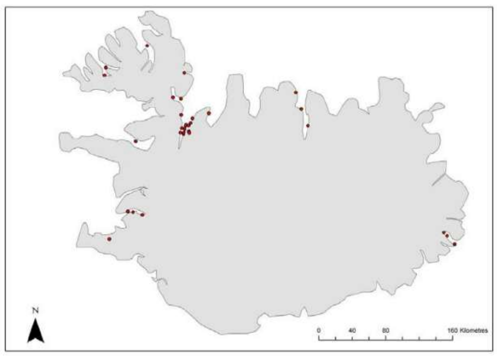


Figure 3. Geographic distribution of maerl grounds around Iceland. Source: OSPAR, 2010a.

In reviewing the likely habitat impact of fishing with handlines on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters (OSPAR, 2010).
- OSPAR considers that there is evidence of threat to maerl beds and their decline in Regions I, II, III, IV, which includes Iceland (Region I).
- Maerl is sensitive to substratum loss, smothering, increase in suspended sediment, abrasion and physical disturbance (Jones et al., 2000) and maerl beds are vulnerable as maerl thalli grow extremely slowly. The "recovery potential" of maerl beds has been categorized by OSPAR as 'poor' meaning that only partial recovery is likely within 10 years and full recovery may take up to 25 years (IMPACT, 1998). Fishing with handlines however does not have significant impacts on vulnerable benthic habitats. For example, the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) suggests that impacts of handlining on habitats are 'very low'.
- The main impacts on maerl beds in Iceland come from dredging for fertilisers and bycatch in the scallop dredges (Chen 2012 and references therein). Harvesting of maerl in Iceland is currently taking place at 3 locations within Arnarfjörður (MFRI, pers. communication), however scallop fishing in Iceland has declined significantly in recent years (in 2000 a total of 9081 tonnes of scallops were fished / during 2004-2013 there was no fishing of scallops in Iceland / in 2014 and 2015 the catch was 281 and 351 tonnes respectively).

- There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the north of Iceland (Figure 3).

Overall, the team considered that since i) the spatial overlap of handline fishing for plaice and maerl beds is limited and there are several maerl beds in Iceland which are not at risk of being affected by this type of fishing, ii) the main threat to maerl beds in Iceland come from direct extraction and bycatch in scallop dredges, and (iii) the low impacts of handlines on benthic habitats in general meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met).

An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that handline impacts on maerl habitats would be lower still.

In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap suggested a risk level well below 20%, as required for SG100. SG100 is therefore met.

3.2 *Modiolus* reefs

The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012).

Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* appears to be mainly concentrated near the coast on the western coast of Iceland (Figure 4).

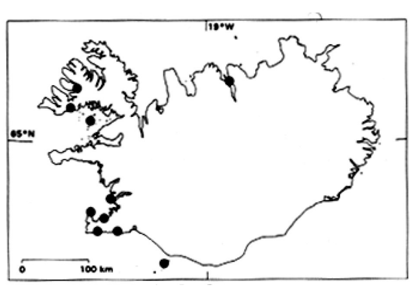


Figure 4. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

Comparing Figures 1 and 2 with Figure 4 shows that there are some areas of overlap in the south-west of Iceland where handline fishing effort is high, plaice catches are high, and *Modiolus* reefs have been recorded.

In reviewing the likely habitat impact of handlines fishing plaice on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.

- OSPAR recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland.
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be 'very high' (OSPAR, 2009b). Handlining is not perceived to have significant impacts on vulnerable benthic habitats. For example, the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) suggests that impacts of handlining on habitats are 'very low'.
- In 2010-2015 only 0.01% of total plaice catches were made with handlines.
- There is only limited information available on this habitat in Iceland, but its distribution appears to be mainly limited to the western coast of Iceland (Figure 4), in particular Breidafjördur, where no plaice catches were recorded in 2015.

Overall, the team considered that since i) the overlap of plaice fishing grounds, areas where handlines are deployed and *M. modiolus* beds is limited, ii) the majority of known *Modiolus* beds in Iceland (including the known beds in Breidafjördur) are not affected by this fishery, and iii) handlining in general does not have significant impacts on benthic habitats, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met).

An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that handline impacts on *Modiolus* habitats would be lower still.

In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the low catches of plaice by handlines suggested a risk level well below 20%, as required for SG100. SG100 is therefore met.

3.3 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

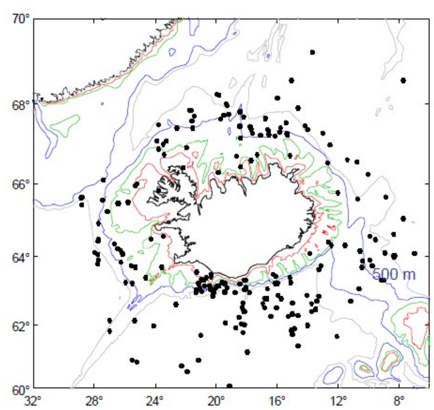


Figure 5. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

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
		Comparing Figures 1 and 2 with Figure 5 shows that there is a small area of overlap off the south-western coast between areas with low handline fishing effort, a fishing ground with high plaice catches and areas with known concentrations of seapens. In reviewing the likely habitat impact of plaice caught by handline fishing on this habitat, the team considered the following issues: • There is no explicit protection for this habitat type in Icelandic waters. • OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d). • Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Garcia et al. 2006). • The overlap of plaice fishing grounds and known locations where seapen colonies are found is restricted to a very small area off the south-west of Iceland, where handline fishing effort is low. • Handlining does not have significant impacts on vulnerable benthic habitats. For example, the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) suggests that impacts of handlining on habitats are 'very low'. • In 2010-2015 only 0.01% of total plaice catches were made with handlines. Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, ii) the apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters), and (iii) the low impacts of handlines on benthic habitats in general, and (iv) the very low catches of plaice actually coming from handlines in 2010-2015 meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met). An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that handline impacts on seapens and burrowing megafauna habitats would be lower still. In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap and low catches of plaice by handlines suggested a risk level well below 20%, as required for SG100. SG100 is therefore met. 3.4Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary (muddy and sandy) habitats - without the other features listed above - which are not considered threatened and/or declining. The team considers that there is no mechanism by which handlining can cause damage to this habitat type. SG100 is therefore met.
References		Chen 2012; Chuenpagdee et al. 2003; Garcia et al. 2006; Gunnarsson, Jónsson, and Pálsson 1998; IMPACT, 1998; Ingolfsson, 1996; Jones et al., 2000; Kristjánsson 1983; Ólafsdóttir et al. 2014; OSPAR 2009; OSPAR 2010; OSPAR 2010a; OSPAR 2010d; Ragnarsson and Burgos 2012; Thór 2002; Thór 2003; Thór 2005; Saemundsson 1926; Sharp et al. 2009; Solmundsson et al., 2005; Taning 1929.
OVERALL PERFORMANCE INDICATOR SCORE:		**100**

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
CONDITION NUMBER (if relevant):	**N/A**

Principle 2: Plaice longline

Evaluation Table for PI 2.4.1: Longline (Plaice)

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
A4	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?	(Y/N/Partial)	(Y/N/Partial)	(Y/N/Partial)
	Maerl beds	Y	Y	Y
	Modiolus beds	Y	Y	Y
	Seapens and burrowing megafauna	Y	Y	Y
	Non-vulnerable muddy / sandy habitats	Y	Y	Y

Justification

1. Fishing Area

Plaice is common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.

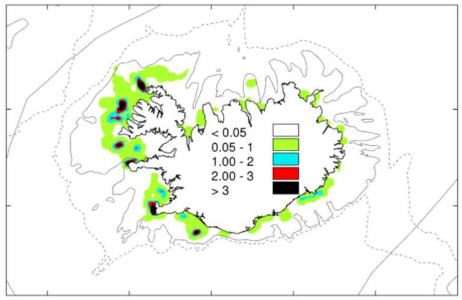


Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears; dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute(MFRI).

2. Fishing Gear

Bottom longlines have historically been an important gear used in Icelandic fisheries to target groundfish. The longline fishery can be divided into traditional shallow water, coastal and more recent deep-water fisheries. Cod and haddock are the primary targets in shallow water fisheries, but Atlantic catfish, tusk and ling are also commonly caught. The main species fished in deep waters are Greenland halibut and redfish. In 2010-2015 only 2.8% of total Icelandic plaice catches were landed by longliners. Longlines may be up to 20 km long, and can have up to 16,000 hooks. This gear can be used on rough grounds where other fishing gears cannot be used (Gunnarsson et al. 1998; Kristjánsson 1983; Thór 2002, 2003, 2005).

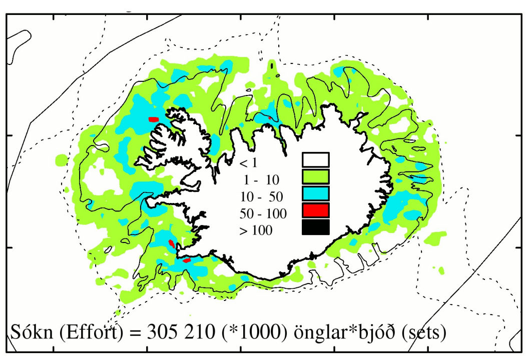


Figure 2. Location of longline fishing effort in 2014 (hours); dark areas indicate highest effort. Source: Marine and Freshwater Research Institute(MFRI).

3. Likely impacts of the fishery on habitats

The team determined that there was no impact by this fishery on the following habitats:

- *Lophelia* reefs; by ccomparing Figures 1 and 2 with the map of *Lophelia* reefs provided in section 3.4.5.1 it is clear that there is no spatial overlap between plaice fishing grounds, areas where longlines are deployed and Lophelia reefs. Indeed, plaice are mainly found at depths of 10 to 150 m in Icelandic waters.

- Deep-sea sponges; by comparing Figures 1 and 2 with the map of deep-sea spinges provided in section 3.4.5.1 it is clear that there is no spatial overlap between plaice fishing grounds, areas where longlines are deployed and deep-sea sponge habitats. Indeed, plaice are mainly found at depths of 10 to 150 m in Icelandic waters.

- Coral gardens; taxonomic groups that make up coral garden habitats in Icelandic waters are found primarily in the depth range of approx. 500-1700 m, which is deeper than the fishing grounds of plaice (plaice are mainly found at depths of 10 to 150 m in Icelandic waters).

- Hydrothermal vents; comparing Figures 1 and 2 with the map of hydrothermal vents provided in section 3.4.5.1 shows that there is no spatial overlap between the plaice fishing grounds, areas where longlines are deployed, and hydrothermal vent fields.

3.1 Maerl beds

Maerl beds occur in shallow waters above 100 m, and are common in northern Icelandic fjords (Figure 3). In Icelandic waters maerl beds are rarely found below 20 m (MFRI, pers. communication). A comparison of Figure 1 with Figure 3 shows that the bulk of plaice catches are not taken from areas with maerl grounds. An exception are parts of Húnaflói Bay in north-west Iceland from where low catches (between 0.05-1 tonnes/nmi2) of plaice were reported in 2015, fishing with longlines takes place, and a concentration of maerl beds is located.

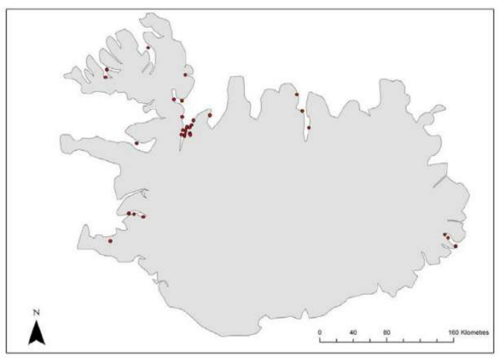


Figure 3. Geographic distribution of maerl grounds around Iceland. Source: OSPAR, 2010a.

In reviewing the likely habitat impact of fishing with longlines on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters (OSPAR, 2010a).
- OSPAR considers that there is evidence of threat to maerl beds and their decline in Regions I, II, III, IV, which includes Iceland (Region I).
- Maerl is sensitive to substratum loss, smothering, increase in suspended sediment, abrasion and physical disturbance (Jones et al., 2000) and maerl beds are vulnerable as maerl thalli grow extremely slowly. The 'recovery potential' of maerl beds has been categorized by OSPAR as 'poor' meaning that only partial recovery is likely within 10 years and full recovery may take up to 25 years (IMPACT, 1998).
- Longlining however does not have significant impacts on vulnerable benthic habitats; the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) ranks the relative impact of demersal longlines on marine ecosystems at 30/100 - better than all other methods of demersal fishing.

		• The main impacts on maerl beds in Iceland come from dredging for fertilisers and bycatch in the scallop dredges (Chen 2012 and references therein). Harvesting of maerl in Iceland is currently taking place at 3 locations within Arnarfjörður (MFRI, pers. communication), however scallop fishing in Iceland has declined significantly in recent years (in 2000 a total of 9081 tonnes of scallops were fished / during 2004-2013 there was no fishing of scallops in Iceland / in 2014 and 2015 the catch was 281 and 351 tonnes respectively). • There is only limited information available on this habitat in Iceland and its distribution appears to be mainly limited to the north of Iceland (Figure 3). Overall, the team considered that since i) the spatial overlap of plaice fishing grounds, areas where longlines are deployed and maerl beds is limited and there are several maerl beds in Iceland which are not at risk of being affected by this type of fishing, ii) the main threat to maerl beds in Iceland come from direct extraction and bycatch in scallop dredges, and (iii) the low impacts of longlines on benthic habitats in general meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met). An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that longline impacts on maerl habitats would be similarly low. In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap suggested a risk level well below 20%, as required for SG100. SG100 is therefore met. 3.2 *Modiolus* reefs The horse mussel (*Modiolus modiolus*) normally occurs in the form of dense beds, at depths up to 70 m and may extend onto the lower shore, often in tide-swept areas (OSPAR, 2009b). *Modiolus modiolus* beds have been shown to provide an important habitat for various epibenthic organisms in Icelandic waters (Ragnarsson and Burgos, 2012). Information on distribution is limited, but in a survey carried out in 1994 looking for fishable blue mussel beds, horse mussel beds were observed in the mouth of Hvalfjördur and in Grundarfjördur at 10-18 m depth (Stofnstærðarmat og kortlagning kræklings í Faxaflóa í júní 1994, unpublished report). In 1998 another survey was carried out in the northern part of Breidafjördur and in most of the small fjords there, horse mussels were found at 5-50 m depth (Stofnstærðarmat og kortlagning kræklings í Breidafirði 1998, unpublished report). In a stock assessment survey for green sea urchin in southern Breidafjördur in 2016, horse mussle beds were observed in Breidasund at 15-50 m depth (report in preparation; MFRI pers. communication). Overall, the distribution of *M. modiolus* thud appears to be mainly concentrated near the coast at depths of up to 50 m on the western coast of Iceland (Figure 4).

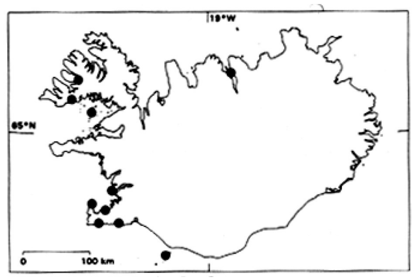


Figure 4. Distribution of *Modiolus modiolus* around Iceland. Source: Ingolfsson, 1996.

Comparing Figures 1 and 2 with Figure 4 shows that there are some areas of overlap in the south-west of Iceland where handline fishing effort is medium, plaice catches are high, and *Modiolus* reefs have been recorded.

In reviewing the likely habitat impact of handlines fishing plaice on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR List recognises that *M. modiolus* beds are under threat and/or decline in all regions where they occur, including Iceland
- Key threats from fishing to *Modiolus* reefs are dredge fisheries for scallops, beam and otter trawling, for which OSPAR considers the threat to be 'very high' (OSPAR, 2009b). Longlining however does not have significant impacts on vulnerable benthic habitats; the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) ranks the relative impact of demersal longlines on marine ecosystems at 30/100 - better than all other methods of demersal fishing.
- In 2010-2015 only 2.8% of total plaice catches were made with longlines.
- There is only limited information available on this habitat in Iceland, but its distribution appears to be mainly limited to the western coast of Iceland (Figure 4), in particular Breidafjördur, where no plaice catches were recorded in 2015.

Overall, the team considered that since i) the overlap of plaice fishing grounds, areas where longlines are deployed and *M. modiolus* beds is limited, ii) the majority of known *Modiolus* beds in Iceland (including the beds in Breidafjördur) are not affected by this fishery, and iii) longlining in general does not have significant impacts on benthic habitats, the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG 80 is met).

An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume that longline impacts on *Modiolus* habitats would also be low.

In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap suggested a risk level well below 20%, as required for SG100. SG100 is therefore met.

3.3 Seapens and burrowing megafauna

Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species are *Virgularia mirabilis*, *Pennatula phosphorea*; *Funiculina quadrangularis* may also be present.

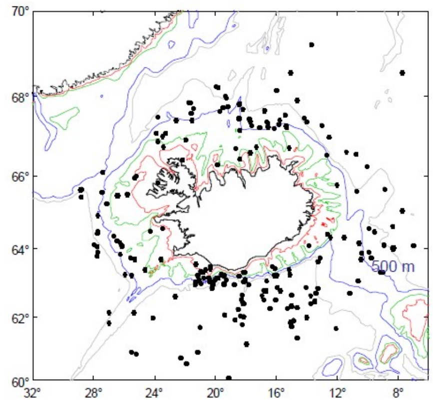


Figure 5. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Comparing Figures 1 and 2 with Figure 5 shows that there is a small area of overlap off the south-western coast between areas with low longline fishing effort, a fishing ground with high plaice catches and areas with known concentrations of seapens.

In reviewing the likely habitat impact of plaice caught by handline fishing on this habitat, the team considered the following issues:

- There is no explicit protection for this habitat type in Icelandic waters.
- OSPAR considers this habitat 'threatened and/or declining' in some areas (such as the North Sea) but not in Area I, which includes Iceland (OSPAR 2010d).
- Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters (Garcia et al. 2006).
- The overlap of plaice fishing grounds and known locations where seapen colonies are found is restricted to a very small area off the south-west of Iceland, where longline fishing effort is low.
- Longlining however does not have significant impacts on vulnerable benthic habitats; the report 'Shifting Gears' on ecosystems impacts of fisheries (Chuenpagdee et al. 2003) ranks the relative impact of demersal longlines on marine ecosystems at 30/100 - better than all other methods of demersal fishing.
- In 2010-2015 only 2.8% of total plaice catches were made with longlines.

Overall, the team considered that the evidence of i) very limited scale of the fishery compared to the habitat, ii) the apparent continued abundance of this habitat type (and acceptance by OSPAR that this habitat type is not threatened and/or declining in Icelandic waters), and (iii) the low impacts of longlines on benthic habitats in general, and (iv) the very low catches of plaice actually coming from longlines in 2010-2015 meant that the risk of serious and/or irreversible damage from this fishery on this habitat type could be assessed to be 30% or less (i.e. SG80 is met).

An analysis of the likely impacts of longlining (Sharp et al. 2009) suggested that less than 1% of all coral colonies occurring within the spatial extent of the footprint of a typical longline deployment event were lethally impacted (see PI 2.4.1, longline fisheries for more details). The team considered that it was reasonable to assume

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	
		that longline impacts on seapens and burrowing megafauna habitats would be similarly low. In relation to 'evidence', the team considered that although there is no direct information from Iceland, the results of Sharp et al. (2009) are at least qualitatively comparable, and combined with the lack of geographic overlap and low catches of plaice by handlines suggested a risk level well below 20%, as required for SG100. SG100 is therefore met. 3.4 Other subtidal sedimentary habitats The fishery operates on subtidal sedimentary (muddy and sandy) habitats - without the other features listed above - which are not considered threatened and/or declining. The team considers that there is no mechanism by which longlining can cause damage to this habitat type. SG100 is therefore met.	
References		Chen 2012; Chuenpagdee et al. 2003; Garcia et al. 2006; Gunnarsson et al. 1998; IMPACT 1998; Ingolfson 1996; Jones et al., 2000; Kristjánsson 1983; Ólafsdóttir et al. 2014; OSPAR 2009; OSPAR 2010a; OSPAR 2010d; Thór 2002, 2003, 2005; Ragnarsson and Burgos, 2012; Saemundsson 1926; Sharp et al. 2009; Solmundsson et al. 2005; Taning, 1929.	
OVERALL PERFORMANCE INDICATOR SCORE:			**100**
CONDITION NUMBER (if relevant):			**N/A**

Principle 2: Plaice *Nephrops* trawl

Evaluation Table for PI 2.4.1: *Nephrops* trawl – Plaice

<table>
<tr><th colspan="2">PI 2.4.1</th><th colspan="3">The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</th></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td>Guidepost</td><td>The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</td><td>The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</td><td>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.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N</td></tr>
<tr><td>Justification</td><td colspan="3">

1. Fishing Area

Plaice is common on sandy or muddy bottoms all around Iceland from the shore to 200 m depth, with adult plaice mainly found at depths of 10 to 150 m in Icelandic waters (Saemundsson, 1926; Taning, 1929; Solmundsson et al., 2005). The highest catches of plaice are taken close to shore off the west coast of Iceland by Danish seine and bottom trawl fishing.

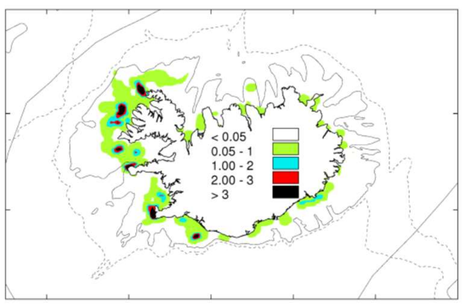


Figure 1. Distribution of 2015 plaice (*Pleuronectes platessa*) catches around Iceland. All gears, dark areas indicate highest catch (tonnes/nmi2). Source: Marine and Freshwater Research Institute (MFRI).

2. Fishing Gear

Nephrops trawlers are a variant of bottom trawls, which use smaller mesh sizes. Lobster trawls have a groundrope, but unlike groundfish or shrimp trawls do not use bobbins. This means this type of gear cannot be used on rough grounds. Instead the net is closer to the bottom, increasing catchability of the main target species, Norway lobster (*Nephrops norvegicus*), which is found on sedimentary bottoms. *Nephrops* trawling thus focusses on flat muddy substrates (MFRI, pers. communication). Sorting grids are not used by lobster trawlers, and as a result, other species such as cod, redfish, haddock, monkfish and witch flounder are caught as bycatch.

</td></tr>
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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**

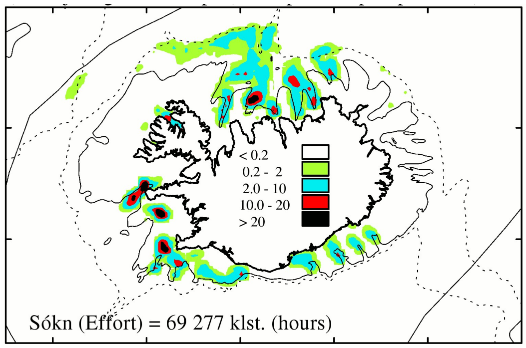

Figure 2. Location of *Nephrops* trawl fishing effort in 2014 (hours), dark areas indicate highest effort. Source: Marine and Freshwater Research Institute (MFRI).

3. Likely impacts of the fishery on habitats

The habitat of *Nephrops norvegicus* is characterized by fine sand and mud, where sea-pen and burrowing megafauna communities can be found (OSPAR 2010a). Seapens and burrowing megafauna habitats are found on plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration, which occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters. Typical species such as *Virgularia mirabilis*, *Pennatula phosphorea*, and *Funiculina quadrangularis* may also be present.

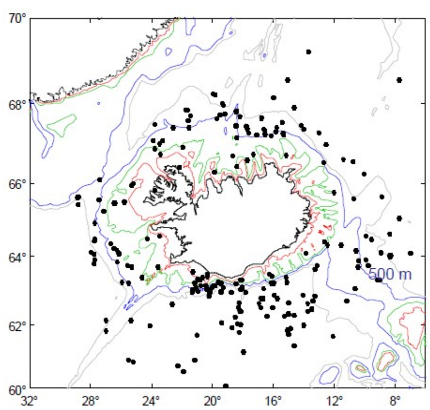

Figure 3. Distribution of Pennatulacea (seapens; number of colonies in a sample) off Iceland. Source: Ólafsdóttir et al. 2014

Seapens are sensitive to mechanical damage by *Nephrops* trawling. Studies on the impact of *Nephrops* trawling indicate that fishing intensity is the major factor controlling long-term negative trends in the benthos (Ball et al. 2000). However, compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000 (Garcia et.al. 2006), and during the period 2001-2013 the number of boats in the *Nephrops* fishery had reduced by around 50% (Figure 4).

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

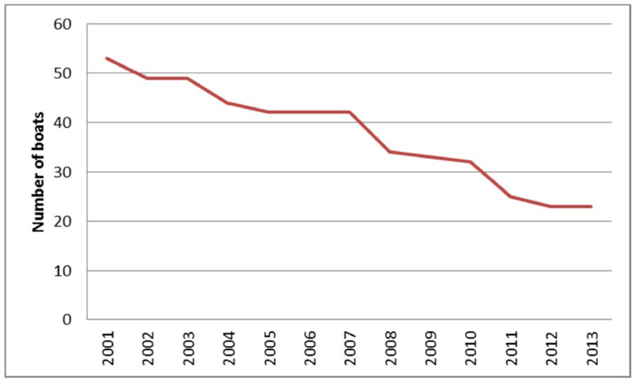

Figure 4. Number of boats licensed for *Nephrops* fishery during 2001-2013. Source: Directorate of Fisheries database.

Based on an assessment against the Texel-Faial criteria (selection criteria for habitats are: global importance, regional importance, rarity, sensitivity, ecological significance, status of decline) carried out by OSPAR such communities are ecologically significant, but not classified as rare or regionally important. Seapen- and burrowing megafauna communities are on the OSPAR List of threatened and/or declining species and habitats for region II (Greater North Sea) and III (Celtic Seas), but not for region I, which includes Icelandic waters.

In scoring, the team noted the following:

- There is no explicit protection for this habitat type in Icelandic waters, but Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters which are not affected by *Nephrops* trawling since they lie outside trawl fishing grounds (see Figure 3).
- High bottom trawling effort has been ongoing for decades, including trawling for *Nephrops*. The current effort by the *Nephrops* fishery is considerably less intensive than it used to be. Fishing intensity appears to be the main factor in determining damage in this habitat type (see Ball et al. 2000). Significant reduction in fishing effort in recent years (compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000) suggest that the habitat has more chance to recover, if the effort remains at current level or lower.
- OSPAR do not consider this habitat type to be 'threatened or declining' in Icelandic waters (or in any of area I) (OSPAR 2010d).
- The *Nephrops* trawl used in Icelandic waters has a ground rope but is not fitted with bobbins or tickler chain (www.fisheries.is), which reduces environmental impacts.

On this basis, the team considered it highly unlikely that the fishery will reduce seapen colonies and other key habitat forming species to a point where there would be serious or irreversible harm (risk of some damage from this gear type <30%). However, the team did not consider that there was sufficient evidence for SG100 to be met.

References	Ball et al. 2000 ; Garcia et.al. 2006 ; OSPAR 2010a; OSPAR 2010d ; Ólafsdóttir et al. 2014 ; Saemundsson, 1926; Solmundsson et al., 2005 ; Taning, 1929.
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/A**

Principle 3: Atlantic wolffish and plaice (all units of assessment)

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
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?	Y	Y	N
	Justification	The management of Atlantic wolfish is based on the reference point F_{MAX} from the yield per recruit analysis while the management of plaice is based on a MSY approach using yield per recruit analysis (see the rationales for the scoring of PI1.1.2 for Atlantic wolfish and plaice above). There is a total ban on discarding and effective monitoring system to ensure that fishing mortality is in line with the TAC and the management plan. The first article of the Act on Fisheries Management states that "The exploitable marine stocks of the Icelandic fishing banks are the common property of the Icelandic nation. The objective of this Act is to promote their conservation and efficient utilization, thereby ensuring stable employment and settlement throughout Iceland. The management wolfish and plaice in Icelandic EEZ aims to maintain the exploitation rate at the rate which is consistent with the precautionary approach and that generates maximum sustainable yield (MSY) in the long term. This objective is defined in a measurable way by the reference points against which the stock is assessed on an annual basis. Iceland has ratified a number of conventions on species protection and management, such as the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. These conventions have established objectives for conserving endangered, threatened or protected species and habitats, and if issues are identified relating to ETP species, a number of mechanisms have been developed to detect and reduce impacts. These objectives are attained through various restrictions on gear and area closures to protect vulnerable habitats and juvenile fish. The management of wolffish and plaice includes measures relevant to the effects the fishery has on the ecosystem. The biological reference points used in the setting of the TAC for target and main retained species are explicit and consistent with the outcomes expressed by MSC's Principle 1 and 2. In relation to Principle 2 specifically, most of the main retained species have management plans, and for species of low commercial importance, a key objective is to eliminate discarding in order to ensure that catches and stocks can be monitored and that incentives are in place to fish selectively. SG80 is met. Short and long-term objectives for non-commercial, vulnerable species caught as by-catch (such as mammals and seabirds) are not well defined and measureable since a comprehensive strategy to manage bycatch of such species is not in place. As such SG 100 is not met.		
References		Act on Fisheries Management as subsequently amended, Icelandic Fisheries, the website of the Ministry of Industry and Innovation, 2010.		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**

PI 3.2.1	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	
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?	Y	Y	N
	Justification	The methods that MFRI uses to assess fish stocks and the advice it gives to government have been reviewed externally by foreign experts. There has not been a comparable external review of the work of the Directorate of Fisheries or of the Ministry of Industry and Innovation. However, these institutions are subject to regular reviews by the Althing´s committees, especially the permanent committee on fisheries issues. As with other public institutions in Iceland these institutions are subjected to scrutiny by The Icelandic National Audit Office (Rikisendurskodun). The performance of these institutions is also intensively debated in Iceland, especially in the many fishing communities. The MFRI experts have published their research in peer reviewed scientific journals. The overall performance of the management regime for the resource is examined annually, including assessment of stock status and feeding ecology. Since 1970 the MFRI has carried out extensive environmental surveys up to four times per year in relation to oceanography and primary- and secondary production. SG80 is met. There is a certain risk that this system of reviews operates too much on an ad hoc basis focusing on those issues that come up. The Icelandic management system would benefit from regular assessment of all aspects of the management. Therefore, the score of 100 is not warranted.		
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?	Y	Y	N
	Justification	There have been several reviews of the management system in Iceland during the last 30 years since the introduction of the system of transferable catch quotas. In most cases those involved in these reviews were internal to the political process in Iceland and to the fishing industry. The external review processes have been beneficial to the work of the MFRI. Assessment and advice relating to Atlantic wolffish and plaice fisheries is regularly reviewed internally by the MFRI's TAC committee, but not externally by ICES. The system would benefit from external assessment of all aspects of the management. Therefore, the score of 100 is not warranted.		
References		Skýrsla starfshóps um endurskoðun á lögum um stjórn fiskveiða (Report of a working group on revision of the laws on fisheries management, MII, September 2010, available (in Icelandic) at https://www.atvinnuvegaraduneyti.is/media/Skyrslur/meginskyrsla_uppsett_lokaeintak.pdf.		

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**	
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/A**

Appendix 1.2 Risk Based Framework (RBF) Outputs

This assessment applied the default tree as outlined in *MSC Fisheries Certification Requirements v1.3*. There was not a need to apply the Risk Based Framework.

Appendix 1.3 Conditions, Recommendations and Client Action Plan

Six conditions were set for the proposed extension of the ISF Iceland saithe and ling fishery, i.e. for the Atlantic wolffish and plaice fisheries within the Icelandic EEZ. One recommendation was also set with the purpose of managing risks to traceability.

The conditions were forwarded to the client who has submitted a plan of action to address those during the certification period and beyond, in the event the whole (and extended) ISF Iceland saithe and ling fishery is granted re-certification.

Table A1.3.1: Condition 1 UoA: Atlantic wolffish	
Performance Indicator	**PI 1.1.2 Limit and target reference points are appropriate for the stock**
Score	75
Rationale	The reference point utilized is F_{MAX} coming from Yield per Recruit analysis. Although it could be argued that the use of F_{MAX} is a reasonable practice as generic reference point for many species as well as in ICES advisory framework (before FMSY became the target), the MSC standards states that a particular caution should be given regarding 'per-recruit' stock assessment approaches that do not include any form of stock-recruit relationship. Levels of $F_{0.1}$ or $F_{40\%SPR}$ provide usually more reliable proxies of F_{MSY} than F_{MAX} when a per-recruit approach is used. In particular, taking into account the biology of Atlantic wolffish and its exploitation pattern the Y/R curve shows a flat shape and the use of a more precautionary $F_{0.1}$ it is recommended (Figure 3.3.1.2.3).
Condition	A limit reference point needs to be defined for Atlantic wolffish such that it is above the point where there is significant risk of impairing reproductive capacity. This might be achieved by providing scientific evidence that fishing at F_{MAX}, or an alternative reference point such as $F_{0.1}$, would not impair reproductive capacity and is sufficiently precautionary consistent with MSC requirements.
Milestones	It is recognised that re-evaluation of the reference point may require another benchmark assessment. Therefore, timing for setting a new reference point, or justifying the current reference point, may need to fit into the MFRI stock assessment cycle. Year 1: Evidence is available indicating reassessment of the current limit reference point. Score 75. Year 2: Evidence is available indicating reassessment of the current limit reference point. Score 75. Year 3: Evidence is available indicating reassessment of the current limit reference point. Score 75. Year 4: Justification is provided for the current or new point that it is precautionary, so that if the stock is at or above this point, there is a low risk of recruitment impairment. Score 80.
Client action plan	**Year 1 and 2** Engage with the MFRI in improving sustainable fisheries of Iceland. The client group shall engage with the MFRI and outline an approach to meeting the conditions imposed by the MSC Certification Requirements. Specifically, evaluating the rational for the current reference point for Atlantic wolffish fisheries, and subsequently re-evaluate the

	reference point, as needed. And, if needed, consider internal options to evaluate scientific evidence that the current reference point is sufficiently precautionary and consistent with the MSC requirements. Internal options can include client initiated co-operation between the fishing industry and the MFRI (e.g. hire an outside consultant, cooperate with the University of Iceland, and/or implement new practices among ISF members). Further, the client group aims to establish a basis for developing improved strategies for the management of resources utilized by ISF vessels. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 3:** ISF shall ensure that options developed in year 2 are evaluated in year three as possible changes to the limit reference point have been modified or proven as precautionary. Consult with all members of the client group and MFRI if needed on proposed options. Among the options considered are to hire an outside consultant, cooperate with the University of Iceland, and implement new practices among ISF members. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 4:** Follow up on implementation of a new reference point if needed, developed in year 3 and continue engagement with the MII and the MFRI to follow up on strategies and plans developed as a result of outcomes in year 1 and options evaluated in year 3. Implementation may need to fit with MFRI stock assessment cycle. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. ***CAB assessment of progress:*** The CAB will assess progress of the condition by reviewing evidence supplied by the client and interviews with all parties involved as needed.
Consultation on condition	Consultation with MFRI and MII

Table A1.3.2: Condition 2 UoA: Atlantic wolffish	
Performance Indicator	**PI 1.2.2 There are well defined and effective harvest control rules in place**
Score	75
Rationale	The harvest control rule is based on calculating the TAC corresponding to a proxy of F_{MSY} in the latest stock assessment model. At least this part of the harvest control rule is well defined and is clearly consistent with the overall MSY-based harvest strategy. However, to what extent exploitation might be reduced as the limit reference point is approached is not clear. The clear target exploitation levels required and delivered by the harvest control rules, together with the intention to reduce exploitation below the trigger point, meet the SG60. However, the lack of a well-defined response should the stock fall below the trigger reference point prevents the SG80 being met.

Condition	A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock approaches the limit reference point. Evidence should be provided that the HCR is precautionary within 4 years.
Milestones	It is recognised that changes to the harvest control rule may require another benchmark assessment. Therefore, timing may need to fit into the MFRI stock assessment cycle. Year 1: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 2: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 3: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 4: A new harvest control rule is adopted that reduces exploitation as the limit reference point is approached. Score 80.
Client action plan	**Years 1 and 2** Engage with MFRI and MII for establishing a harvest control rule (HCR) including how the exploitation rate will be reduced as the stock approaches the limit reference point. The client group shall engage with the MFRI and outline an approach to meeting the conditions imposed by the MSC Certification Requirements. The client group aims to establish a basis for developing improved strategies for the sustainable management of resources utilized by ISF vessels. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 3:** Follow up on results of engagement in year 1 and 2 regarding a harvest control rule. The client group promotes the necessity for a harvest control rule, ensuring reduced exploitation rates as the stock approaches a limit reference point. The client will conduct an evaluation of a harvest control rule, either through MFRI or internal options as set out above. The actions in year 3 are dependent on outcomes in previous years. If a clear and precautionary HCR is implemented by the MII in previous years, there is no need for further actions. If not, ISF will seek support within the client group to further look for alternatives to develop and adopt a precautionary HCR. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 4:** Implement measures developed and evaluated in year 3. This may need to fit into MFRI assessment cycle. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. ***<u>CAB assessment of progress</u>***: The CAB will assess progress of the condition by reviewing evidence supplied by the client and interviews with all parties involved as needed.
Consultation on condition	Consultation with MFRI and MII

Table A1.3.3: Condition 3 **UoA: Plaice**	
Performance Indicator	**PI 1.2.2 There are well defined and effective harvest control rules in place**
Score	75
Rationale	The harvest control rule is based on calculating the TAC corresponding to a proxy of F_{MSY} in the latest stock assessment model. At least this part of the harvest control rule is well defined and is clearly consistent with the overall MSY-based harvest strategy. However, to what extent exploitation might be reduced as the limit reference point is approached is not clear. The clear target exploitation levels required and delivered by the harvest control rules, together with the intention to reduce exploitation below the trigger point, meet the SG60. However, the lack of a well-defined response should the stock fall below the trigger reference point prevents the SG80 being met.
Condition	A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock approaches the limit reference point. Evidence should be provided that the HCR is precautionary within 4 years.
Milestones	It is recognised that changes to the harvest control rule may require another benchmark assessment. Therefore, timing may need to fit into the MFRI stock assessment cycle. Year 1: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 2: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 3: Evidence is available indicating reassessment of the harvest control rule. Score 75. Year 4: A new harvest control rule is adopted that reduces exploitation as the limit reference point is approached. Score 80.
Client action plan	**Years 1 and 2** Engage with MFRI and MII for establishing a harvest control rule (HCR) including how the exploitation rate will be reduced as the stock approaches the limit reference point. The client group shall engage with the MFRI and outline an approach to meeting the conditions imposed by the MSC Certification Requirements. The client group aims to establish a basis for developing improved strategies for the sustainable management of resources utilized by ISF vessels. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 3** Follow up on results of engagement in year 1 and 2 regarding a harvest control rule. The client group promotes the necessity for a harvest control rule, ensuring reduced exploitation rates as the stock approaches a limit reference point. The client will conduct an evaluation of a harvest control rule, either through MFRI or internal options as set out above. The actions in year 3 are dependent on outcomes in previous years. If a clear and precautionary HCR is implemented by the MII in previous years, there is no need for further actions. If not, ISF will seek support within the client group to further look for alternatives to develop and adopt a precautionary HCR. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out

	in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. **Year 4** Implement measures developed and evaluated in year 3. This may need to fit into MFRI assessment cycle. ISF will record the process and maintain a log of all interactions where the action plan is being discussed and carried out in cooperation with all parties, e.g. MFRI, MII, and Directorate of Fisheries, Universities, independent consultants and ISF members. ***CAB assessment of progress*:** The CAB will assess progress of the condition by reviewing evidence supplied by the client and interviews with all parties involved as needed.
Consultation on condition	Consultation with MFRI and MII

Table A1.3.4: Condition 4 UoAs: Atlantic wolffish and plaice gillnet fisheries	
Performance Indicator	**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**
Score	Scoring Issue (a) (harbour seal, hooded seal, Atlantic puffin/gillnet/Atlantic wolffish and plaice): 60
Rationale	**Harbour seal:** Due to insufficient funding and thus limited coverage, the 2014 harbour seal survey did not produce a new reliable population estimate for the Icelandic harbour seal population. However, the results show a severe reduction in the number of seals in the surveyed areas since the last full count in 2011, implying that the population size is likely to be smaller than that defined in the management objectives by the Icelandic government. **Hooded seal:** Since the IUCN gives this species a status of 'Vulnerable' (which is one of the IUCN 'threatened' categories), including in Icelandic waters, this species is not highly likely to be within biologically based limits (i.e. the probability that the species is within biologically based limits does not reach 70%). Based on the most recent bycatch data available the number of hooded seals caught as bycatch in gillnets although low is higher than previously thought. **Atlantic puffin:** The population in Iceland and Norway, which together account for 80% of the European population, decreased markedly since the early 2000s. As a result, the population size in Europe is estimated and projected to decrease by 50-79% during 2000-2065 (three generations). These declines resulted in an IUCN classification of 'Endangered'. Only outdated Icelandic population data (Umhverfisráðuneytið, 1992) exist, so it is not possible to estimate the current population level impacts of gillnet fishing on this species.
Condition	Harbour seal, hooded seal, and Atlantic puffin must be shown highly likely to be within biologically based limits, or it must be demonstrated that there is a partial strategy of demonstrably effective mitigation measures in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding.

Milestones	Year 1: Develop and propose a partial or full strategy that ensures that the (gillnet) UoA does not hinder any recovery and rebuilding of the harbour seal, hooded seal, and Atlantic puffin. Resulting score: 70 Year 2: Consult with industry and all stakeholders on the proposed strategy and amend accordingly. Resulting score: 70 Year 3: Formally commit to the new strategy and, with industry, commence its implementation. Resulting score: 70 Year 4: Demonstrate that the adopted strategy has been fully adopted and is being implemented in an effective manner. Resulting score: 80
Client action plan	**Year 1** Harbour seal, hooded seal, Atlantic puffin*: **Improve on board logging:*** Engage with fishery operators in order to improve logbook recording of marine mammal and seabird bycatch. The reliability of logbook records should be periodically verified by comparison with data coming from onboard observations by Marine and Freshwater Research Institute (MFRI) observers. Harbour seal, hooded seal, Atlantic puffin*: **Evaluate need for partial strategy***: Consult with the Directorate of Fisheries (DF) and the MFRI and/or other parties with the objective to determine if recording and monitoring of harbour seal, hooded seal, and Atlantic puffin bycatch is at a level that is sufficient to detect increased risk to the population. Harbour seal, hooded seal, Atlantic puffin*: **Evaluate impacts:*** Consult with the DF, the MFRI and/or other institutions with the objective of evaluating the risk to marine mammal and seabird bycatch in the fishery or engage with independent parties to evaluate the risk to harbour seal, hooded seal and Atlantic puffin by the fishery. ISF will call for recommendations for methods from the fishermen to a prevent marine mammals and seabirds approaching, getting tangled, and drowning in gillnets. ISF will form a stakeholder panel to mitigate information on progress and to channel tasks regarding the condition to representative stakeholders within or outside of ISF. The panel will convene twice a year during the lifetime of the certificate, or as needed, and be comprised of ISF representatives and from other stakeholders as fitting for each condition. ***Improvements expected:*** Steps have been taken to improve the available information on bycatch of marine mammals and seabirds, and to identify bycatch prevention and mitigation measures. ***Auditing:*** At the Year 1 audit, ISF will present i) evidence of engagement with fishery operators and the relevant local authorities to improve bycatch monitoring; ii) evidence of engaging the relevant stakeholders to identify effective means of preventing and mitigating marine mammal and seabird bycatch. **Year 2** Harbour seal, hooded seal, Atlantic puffin: ***Improve on board logging:*** Continue engagement with fishery operators and the MFRI to ensure adequate logbook recording of bycatch. Harbour seal, hooded seal, Atlantic puffin: ***Evaluate need for partial strategy:*** Continue engagement with the DF and the MFRI to promote monitoring marine mammal and seabird bycatch in the fishery and to determine if logbook recording and monitoring is adequate.

	Harbour seal, hooded seal, Atlantic puffin: ***Evaluate need for partial strategy:*** Continue consultation with the MFRI and/or other institutions with the objective to continue evaluating the risk to marine mammals and seabirds in the fishery, or continue engagement with independent parties to continue evaluation of the risk to marine mammals and seabirds in the fishery. Harbour seal, hooded seal, Atlantic puffin: ***Evaluate impacts:*** Present a preliminary assessment of measures that could be included in a partial strategy to prevent the fishery from posing a risk of serious or irreversible harm to harbour seal, hooded seal, and Atlantic puffin if necessary. In year 2 ISF will have a report from the industry outlining the progress that has been done and how successful the actions have been. ***Improvements expected:*** Continued improvements in the quality of information on bycatch of marine mammals and seabirds are expected. ***Auditing:*** At the Year 2 audit, ISF will present i) suggestions on methods been to prevent harbour seal, hooded seal, and Atlantic puffin as bycatch; ii) an initiative to work with authorities on a demonstrably effective partial strategy. **Year 3** Harbour seal, hooded seal, Atlantic puffin: ***Improve on board logging:*** Prepare a written report (or commission such a report) during Year 3 on the reliability of logbook recordings, onboard observations and monitoring. Harbour seal, hooded seal, Atlantic puffin: ***Evaluate need for partial strategy:*** Present a draft plan for addressing impacts on harbour seal, hooded seal, and Atlantic puffin if necessary depending on research results. Harbour seal, hooded seal, Atlantic puffin: ***Evaluate impacts:*** Present evidence of ongoing consultation with relevant parties to address problems and areas for further action, e.g. work with the Small BoatAassociation and net locations and with MFRI on same matter. ***Improvements expected:*** An outline for a demonstrably effective partial strategy addressing solutions to bycatch. ***Auditing:*** At the Year 3 audit, ISF will present i) a completed report on logbook reliability; ii) a draft partial strategy to address bycatch; iii) evidence of cooperation between ISF, DF, NASBO (National Association of Small Boat Owners) and MFRI on solutions. **Year 4** The strategies established in year 3 shall be in implementation by year four, if necessary. ISF will meet with MFRI to evaluate the progress, meet with the DF to follow up on MFRI findings and discuss progress and the commitment to the implemented strategies. In year 4, ISF is monitoring the effectiveness of plans, actions and strategies implemented in first 3 years, and base further actions on results from previous years, to fulfil the condition. ***Improvements expected:*** A demonstrably effective partial strategy addressing solutions to marine mammal and seabird bycatch has been implemented. ***Auditing:*** At the Year 4 audit ISF will present (i) evidence of monitoring the implementation of the plans, actions and strategies implemented in years 1-3; (ii) a report summarising how the implemented actions and strategies have effectively reduced and / or mitigated marine mammal and seabird bycatch, and - if applicable - what further improvements are required.
Consultation on condition	Consultation between the fishing industry SFS, NASBO, fishermen, the DF as well as the MFRI will be necessary as part of fulfilment of this condition.

Table A1.3.5: Condition 5 **UoAs: Atlantic wolffish and plaice gillnet fisheries**	
Performance Indicator	**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**
Score	Scoring Issue (a): 80 Scoring Issue (b): 60 Scoring Issue (c): 80 Scoring Issude (d): 80
Rationale	Information available on the fishery / species involved indicates that the partial strategy currently in place is not sufficient and may not work to ensure the fishery does not pose a risk for bycatch populations as evidenced by the outcome score at SG 60 level for harbour seal, hooded seal and Atlantic puffin. The measures in place for managing bycatch of vulnerable species such as seabirds and mammals are generally not designed to manage impact on that component specifically (e.g. temporal and seasonal closures are not designed to reduce bycatch of vulnerable species), and other measures require improvements to be appropriate for the fishery (e.g. more logbook returns / more observer trips are required to gather more reliable bycatch data).
Condition	A demonstrably effective partial strategy should be put in place such that the Atlantic wolffish / plaice gillnet fisheries do not hinder recovery and rebuilding of vulnerable marine mammal and seabird species. This should include a regular review of the potential effectiveness and practicality of alternative measures to minimise gillnet fishery related mortality of unwanted catch of vulnerable species such as harbour seal, hooded seal and Atlantic puffin, and regular reviews to ensure that the relevant measures are implemented as appropriate.
Milestones	Year 1: Develop and propose a demonstrably effective partial or full strategy that ensures that the (gillnet) UoA does not hinder recovery and rebuilding of vulnerable marine mammal and seabird species, including in particular harbour seal, hooded seal, and Atlantic puffin. Initiate a regular review process to identify and evaluate alternative measures that would reduce unwanted catch. Resulting score: 70 Year 2: Consult with industry and all stakeholders on the proposed strategy and amend accordingly. Resulting score: 70 Year 3: Formally commit to the new strategy and, with industry, commence its implementation. Resulting score: 70 Year 4: Demonstrate that the adopted strategy has been fully adopted and is being implemented in an effective manner. Demonstrate that at least one review (of a regular process) to reduce unwanted catch has taken place. Resulting score: 80
Client action plan	**Year 1** <u>Harbour seal, hooded seal, and Atlantic puffin</u>*:* ***Improve on board logging:*** Engage with fishery operators in order to improve logbook recording of marine mammal and seabird bycatch. The reliability of logbook records should be periodically verified by comparison

	with data coming from onboard observations by Marine and Freshwater Research Institute (MFRI) observers. Harbour seal, hooded seal, and Atlantic puffin*:* ***Evaluate need for partial strategy***: Consult with the Directorate of Fisheries (DF) and the MFRI and/or other parties with the objective to determine if recording and monitoring of marine mammal and seabird bycatch is at a level that is sufficient to detect increased risk to the population. Harbour seal, hooded seal, and Atlantic puffin*:* ***Evaluate impacts:*** Consult with the DF, the MFRI and/or other institutions with the objective of evaluating the risk to marine mammal and seabird bycatch in the fishery or engage with independent parties to evaluate the risk to harbour seal, hooded seal, and Atlantic puffin by the fishery ISF will call for recommendations for methods from the fishermen to a prevent harbour seal, hooded seal and Atlantic puffin from approaching, getting tangled, and drowning in gillnets. ISF will form a stakeholder panel to mitigate information on progress and to channel tasks regarding the condition to representative stakeholders within or outside of ISF. The panel will convene twice a year during the lifetime of the certificate, or as needed, and be comprised of ISF representatives and from other stakeholders as fitting for each condition. ***Improvements expected:*** Steps have been taken to improve the available information on bycatch of marine mammal and seabird bycatch prevention and mitigation measures. ***Auditing:*** At the Year 1 audit, ISF will present i) evidence of engagement with fishery operators and the relevant local authorities to improve bycatch monitoring; ii) evidence of engaging the relevant stakeholders to identify effective means of preventing and mitigating harbour seal, hooded seal, and Atlantic puffin bycatch. **Year 2** Harbour seal, hooded seal, and Atlantic puffin*:* ***Improve on board logging:*** Continue engagement with fishery operators and the MFRI to ensure adequate logbook recording bycatch. Harbour seal, hooded seal, and Atlantic puffin*:* ***Evaluate need for partial strategy:*** Continue engagement with the DF and the MFRI to promote monitoring marine mammal and seabird bycatch in the fishery and to determine if logbook recording and monitoring is adequate. Harbour seal, hooded seal, and Atlantic puffin*:* ***Evaluate need for partial strategy:*** Continue consultation with the MFRI and/or other institutions with the objective to continue evaluating the risk to harbour seal, hooded seal, and Atlantic puffin in the fishery or continue engagement with independent parties to continue evaluation of the risk to harbour seal, hooded seal, and Atlantic puffin in the fishery. Harbour seal, hooded seal, and Atlantic puffin*:* ***Evaluate impacts:*** Present a preliminary assessment of measures that could be included in a partial strategy to prevent the fishery from posing a risk of serious or irreversible harm to harbour seal, hooded seal, and Atlantic puffin if necessary. In year 2 ISF will have a report from the industry what have been done and success of it. ***Improvements expected:*** Continued information on bycatch of harbour seal, hooded seal, and Atlantic puffin is expected. ***Auditing:*** At the Year 2 audit, ISF will present i) suggestions on methods been to prevent harbour seal, hooded seal, and Atlantic puffin as bycatch; ii) an initiative to work with authorities on a demonstrably effective partial strategy. **Year 3**

	<u>Harbour seal, hooded seal, and Atlantic puffin</u>*:* ***Improve on board logging:*** Prepare a written report (or commission such a report) during Year 3 on the reliability of logbook recordings, onboard observations and monitoring. <u>Harbour seal, hooded seal, and Atlantic puffin</u>*:* ***Evaluate need for partial strategy:*** Present a draft plan for addressing impacts on harbour seal, hooded seal, and Atlantic puffin, if necessary depending on research results. <u>Harbour seal, hooded seal, and Atlantic puffin</u>*:* ***Evaluate impacts:*** Present evidence of ongoing consultation with relevant parties to address problems and areas for further action, e.g. work with the small boat association and net locations and with MFRI on same matter. ***Improvements expected:*** An outline for a demonstrably effective partial strategy addressing solutions to bycatch. ***Auditing:*** At the Year 3 audit, ISF will present i) a completed report on logbook reliability; ii) a draft partial strategy to address bycatch; iii) evidence of cooperation between ISF, DF, NASBO (National Association of Small Boat Owners) and MFRI on solutions. **Year 4** The strategies established in year 3 shall be in implementation by year four, if necessary. ISF will meet with MFRI to evaluate the progress, meet with the DF to follow up on MFRI findings and discuss progress and the commitment to the implemented strategies. In year 4, ISF is monitoring the effectiveness of plans, actions and strategies implemented in first 3 years, and base further actions on results from previous years, to fulfil the condition. ***Improvements expected:*** A demonstrably effective partial strategy addressing solutions to Atlantic puffin bycatch has been implemented. ***Auditing:*** At the Year 4 audit ISF will present (i) evidence of monitoring the implementation of the plans, actions and strategies implemented in years 1-3; (ii) a report summarising how the implemented actions and strategies have effectively reduced and / or mitigated harbour seal, hooded seal, and Atlantic puffin bycatch, and - if applicable - what further improvements are required.
Consultation on condition	Consultation between the fishing industry SFS, NASBO, fishermen the DF as well as the MFRI will be necessary as part of fulfilment of this condition

Table A1.3.6: Condition 6 UoAs: Atlantic wolffish and plaice gillnet fisheries	
Performance Indicator	**PI 2.2.3 Secondary species information** **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**
Score	Scoring Issue (a): 80 Scoring Issue (b): 80 Scoring Issue (c): 80 Scoring Issude (d): 60
Rationale	The data being collected may not be not sufficient to detect any increase in risk to vulnerable species such as harbour seal, hooded sea,l and Atlantic puffin. Bycatch of these species should be routinely monitored by fishers through the mandatory eLog system,

	but returns have been so poor that the data can not be used to estimate bycatch levels (MFRI, pers. communication).
Condition	By the second surveillance audit electronic logbook reporting for Atlantic wolffish / plaice gillnet and longline fisheries provides quantitative information on of seabird and marine bycatch for gillnets and longlines that is both available and adequate to detect any increase in risk to main bycatch species.
Milestones	Year 1: There shall be evidence of the Client's plan to encourage and enable fishing vessels to record all seabird and marine mammal bycatch in electronic logbook systems. Score 75 Year 2: By the end of Year 2 there shall be evidence that quantitative information on seabird and marine mammal bycatch is both available and adequate to detect any increase in risk to main bycatch species. Score 80
Client action plan	**Year 1** <u>Bird/mammal bycatch: Data collection:</u> Engage with fishery operators in order to improve logbook recording of bird and mammal bycatch species. ISF will launch an independent onboard research where bycatch of birds are physically counted by a contracted 3rd party in cooperation with the NASBO (National Association of Small Boat Owners), Fuglavernd and Birdlife International. <u>Bird/mammal bycatch: Data evaluation:</u> Consult with the Directorate of Fisheries and the Marine Research Institute with the objective to determine if recording and monitoring of main bird- and marine mammal bycatch is at a level that is sufficient to detect increased risk to the main bycatch. <u>Bird/mammal bycatch: Evaluate Risk:</u> Consult with the Directorate of Fisheries, the Marine Research Institute and/or other institutions with the objective of evaluating the risk to main bird- and marine mammal bycatch in the fishery or engage with independent parties to evaluate the risk to bird- and marine mammal bycatch species in the fishery. **Year 2** <u>Bird/mammal bycatch: Data collection:</u> Continue engagement with fishery operators to ensure adequate logbook recording of bird and mammal bycatch. <u>Bird/mammal bycatch: Data evaluation:</u> Continue engagement with the Directorate of Fisheries and the Marine Research Institute to promote monitoring of bird and mammal bycatch in the fishery and to determine if logbook recording and monitoring is adequate. <u>Bird/mammal bycatch: Evaluate Risk:</u> Continue consultation with the Marine Research Institute (MRI) and/or other institutions with the objective to continue evaluating the risk to main bird- and marine mammal bycatch in the fishery or continue engagement with independent parties to continue evaluation of the risk to main bird- and marine mammal bycatch in the fishery. ***Improvements expected:*** ISF will present an introduction of data and information being collected for year 3 report. ***Audit:*** At the Year 2 audit, ISF will present progress on logbooks report. **Year 3** <u>Bird/mammal bycatch: Data collection and evaluation:</u> Prepare a written report (or commission such a report) during Year 3 on the reliability of logbook recordings and monitoring.

	<u>Bird/mammal bycatch: Evaluate Risk:</u> Prepare a written report (or commission such a report) on the evaluation of the risk to main bird- and marine mammal bycatch species in the fishery. The report is based on ISF initiated research and MRI research. ***Improvements expected:*** ISF will present a report addressing the accuracy of logbooks and the risk to main bird- and marine mammal bycatch. ***Audit:*** At the Year 3 audit, ISF will present a written report on logbooks, addressing possible solutions and actions.
Consultation on condition	Consultation between the fishing industry (SFS and HB Grandi or other ISF member) and Marine Research institute as well as the Directorate of Fisheries will be necessary as part of fulfilment of this condition.

Table A1.3.7: Recommendation 1 UoAs: Atlantic wolffish and plaice fisheries – All gears	
Performance Indicator	**Traceability**
Purpose	Management of risks to segregation and traceability within the fishery
Recommendation	The team requests that the client issues a reminder to all of the client members, as well as auctions, to observe the following: - to ensure full segregation of catch of each species by gear in the event more than one gear is applied during the same fishing trip; - to ensure full segregation of catch of each species by management region, i.e. fish caught inside the Icelandic EEZ is kept separate, in the event a vessel catches the same species on the same trip inside and outside the Icelandic EEZ – and – - to observe and implement appropriate measures of packing and labelling certified products prior to moving them to sub-contracting cooler or freezer storages upon landing, to ensure client members´ responsibility for product integrity prior to sale or further handling.

Appendix 2. Peer Review Reports

Peer reviewer 1

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**CAB Response**
Justification: The Team has carried out a very careful analysis of all the PIs required for this expedited assessment for a scope extension for these two species and correctly identified the PIs in Principles 2 and 3 which needed re-assessment taking a precautionary approach.		*No response needed*

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? ***[Reference: FCR 7.11.1 and sub-clauses]***	**Yes**	**CAB Response**
Justification: I have noted in my scoring comments that Conditions I and 2 related to harvest control rule, which are appropriate and well worded, should be set against PI 1.2.1 and not 1.2.2. These Conditions should be achieved well within the four year timeframe Conditions 4 and 5 are correctly addressing issues related to specific by-catch species in the Gillnet fishery. The MSC certification process of annual surveillance should provide the necessary impetus to get these Condition achieved within the 4 year time frame to the undoubted benefit of the fishery.		*The reviewer appears to be referring to conditions 2 and 3. These conditions are related to 1.2.2 because is not clear how the harvest control rules are going to be triggered, in practice the lack of a well-defined response when the stocks fall below a trigger reference point, prevents for both species the SG80 being met. This problem is more related with the harvest control rules (1.2.2, scoring issue a) than the harvest strategy (1.2.1), which provides a wider framework where the harvest control rules are applied.*

Do you think the client action plan is sufficient to close the conditions raised? ***[Reference FCR 7.11.2-7.11.3 and sub-clauses]***	**Yes/No**	**CAB Response**
Justification: The action plans on Conditions 1, 2 and 3 involve the client in putting pressure on the MFRI and MII to resolve all the issues related to reference points for the Atlantic wolfish and satisfactory harvest control rules for both species. The action plan indicates a strong commitment to do this. The action plans for Conditions 4 and 5 relate very specifically to the gillnet fishery on both species. The client has produced an imaginative action plan which, given their undoubted commitment, should achieve the desired end result within the specified timeframe.		*No response needed*

Performance Indicator review

Table for reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1 Wolffish Plaice	No No	No No	N/A N/A	I must be missing the point here! You state in the report that *'the stock is considered in a good state, showing a fishing mortality that has been lower than FMSY proxy in the last two years'* You have in the Table a target and limit reference point of Fmsy at 0.3 and then you have the current stock status related to these reference points at F0.96. If this is the case then the fishery certainly does not reach SG 80. Please explain. If it is meant to be 96% of Fmsy then say so and actually quote current F. That is the normal practice in this Table. Same applies to plaice, I do not understand the logic of stock relative to reference points Table. Again, is it meant to be 90% of Fmsy?	The value 0.96 refers to the ratio $F_{current}/F_{MSY\ proxy}$. The team will change the table providing the correct number instead of the ratio.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.2 Wolffish Plaice	Yes	Yes	Yes	It certainly needs a Condition here to sort out the ambiguity related to these reference points. Reference points OK for plaice	No response needed.
1.1.3	N/A	N/A			

Performance Indicator	**Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
1.2.1 Wolffish Plaice	 Yes Yes	 No No	 N/A N/A (sse 1.2.2 below)	In my opinion the team has introduced an element of confusion in relation to the interpretaion of this PI and PI 1.2.2. My take on these two PIs is that 1.2.1 represents the 'map and the route' (management plans etc) and PI 1.2.1 is the 'mode of transport' (TACs, mesh regulations, area closures etc) I agree that a Condition is needed here but feel that the emphasis should be on the absence of a managemnt plan (harvest strategy rather than on 1.2.2. You have applied the right criteria here with the comments mainly related to a management strategy / plan. See comments on 1.2.2 as I feel that the Condition should be on this PI not 1.2.2	The condition should go to 1.2.2 scoring issue a, and not as suggested in 1.2.1, because the harvest strategy (map and route), which is not only the management plan but also the data collection and the governance of the fishery overall, is consistent with the MSC standards. The lack of a mangemnt plan is not a problem in 1.2.1, because the management system in Iceland is organized in the way that the exploitation is carried out according to a F_{MSY} value (proxy, in the case of atlantic wolfish). However, the way HCRs are going to be set in the case of stock decline is not clearly defined. The actions adopted in such case are critical to the performance of the HCR and not for the harvest strategy, that is composed by several elements, including effective data collection, scientific advice and appropriate management. Due to such rationale the team will keep the conditions in 1.2.2 for both species.

Performance Indicator	**Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
1.2.2 Wolffish Plaice	Yes Yes	No No	Yes (see 1.2.1 above) Yes (at 1.2.1)	See related notes on 1.2.1 above. This Condition describes a Management Strategy and should be in 1.2.1 *A well-defined harvest control rule should be put in place that is consistent with the harvest strategy and defines how the exploitation rate will be reduced as the stock approaches the limit reference point. Evidence should be provided that the HCR is precautionary within 4 years.* Whilst some of your comments here are relevant I still feel that there is some confusion and that this PI mainly relates to the TAC and other controls on the fishery. Again, and as for Wolffish, a Condition is needed but it should be on 1.2.1	See previous response.

Performance Indicator	**Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
1.2.3 Wolffish Plaice	Yes	Yes	N/A	Well suported score in report and scoring comments. Well suported score in report and scoring comments.	No response needed.
1.2.4 Wolffish	Yes	No	N/A	Not convinced that the assessment achieves SG 80 at scoring issue (d) in the context of rigorous exploitation of other assessment methods. I see little evidence of this. Score reduced to 80.	A GADGET model is rigorosly applied by MFRI so the SG 100 is sutisfied.
Plaice	Yes	Yes	N/A	Score and comments OK	
2.1.1 Not Required					
2.1.2 Not Required					
2.1.3 Not Required					

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.1 Wolffish & Plaice Gillnet: (75) Longline: (80)	Yes Yes	Yes Yes	Yes N/A	A very comprehensive evaluation of all the issues and a correct conclusion regarding the Condition for Harbour seals, hooded seals and Atlantic puffin. Well reasoned arguments in support of 80 score in relation to potential impacts on the listed bird species.	No response needed.
2.2.2 Wolffish & Plaice Gillnet: (75) Longline (80)	Yes Yes	Yes Yes	Yes N/A	Well reasoned in support of a Condition	No response needed.
2.2.3 Wolffish & Plaice Gillnet: (80) Longline (80)	Yes Yes	Yes Yes	N/A N/A	Information adequate for 80 score to supprt a strategy and manage risk for both gear types	No response needed.
2.3.1 Not required					
2.3.2 Not required					
2.3.3 Not required					

2.4.1 General Comment Bottom trawl: Wolffish (85) Plaice (85 Danish seine: Wolffish (85) Plaice (85) Gillnet: Wolffish (85) Plaice (85) Handline: Wolffish (100) Plaice (100) :	 Yes Yes Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes Yes Yes Yes	 N/A N/A N/A N/A N/A N/A N/A N/A	The team haave produced an excellent illustrated description of all the importamt elements of the Icelandic benthic ecosystem.They have taken advantage of the wealth of published information from surveys, both recent and historic. On that basis the potential impact of each fishery has been carefully analysed and the conclusions acted on accordingly in relation to this assessment. Lack of firm evidence on some impacts of trawling have corectly reduced the score for both species Weaknesses correctly identified in relation to the vulneracle habitats. Excellent supporting evidence in the report and scoring comments Weaknesses correctly identified in relation to the vulneracle habitats. Excellent supporting evidence in the report and scoring for both speciescomments. An expected score for this PI against this low impact fishery for both species	No response needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.1 Longline: Wolffish (100) Plaice (100) Nephrops trawl: Wolffish (80) Plaice (80)	 Yes Yes Yes Yes	 Yes Yes Yes Yes	 N/A N/A N/A N/A	An expected score for this PI against this low impact fishery for both species. A well reasoned explanation of the higher substrate impact of this type of trawl compared with the standard bottom trawl and hence a lower score for both species.	No response needed.
2.4.2 Bottom trawl: Wolffish (90) Plaice (90) Danish seine: Wolffish (85) Plaice (85) Gillnet: Wolffish (85) Plaice (85)	 Yes Yes Yes Yes Yes Yes	 Yes Yes Yes Yes Yes Yes	 N/A N/A N/A N/A N/A N/A	Well presented comprehensive evidence, supporting the score, in the report and scoring comments for both species An interesting differemce on the impact on Maerl beds by the plaice fishery but not the wollfish fishery. Plenty of good evidence presented in the report and scoring comments in support of the score for both species.	No response needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.3 Danish seine: Wolffish (85) Plaice (85) Gillnet: Wolffish (85) Plaice (85)	 Yes Yes Yes Yes	 Yes Yes Yes Yes	 N/A N/A N/A N/A	The distribution of the habitats in relation to the location of this fishery type is exceptionally well described. However the actual impact of this gear, which has significant sea-bed contact,is not so well known for both species As above but I am surprised that this type of gear has any significant sea-bed impact as deployment on the sea-bed would surely result in unwanted damage.	Additional comments on the impacts of Danish seines and gillnets on the sea-bed have been added to the justification for PI 2.4.3.
2.5.1 Not required					
2.5.2 Not required					
2.5.3 Not required					
3.1.1 Not required					
3.1.2 Not required					
3.1.3 Not required					

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.1.4 Not required					
3.2.1	Yes	Yes	N/A	Generally the Icelandic fisheries are exceptionally well managed in terms of both short and long term objectives. However for the non-commercial, vulnerable species, taken as by-catch (mammals and seabirds) the management strategy is not so well defined.	The team concurs. Therefore we comment in the justification for the scoring of 80 for this PI: "Short and long-term objectives for non-commercial, vulnerable species caught as by-catch (such as mammals and seabirds) are not well defined and measureable since a comprehensive strategy to manage bycatch of such species is not in place. As such SG 100 is not met."
3.2.2 Not required					
3.2.3 Not required					
3.2.4 Not required					
3.2.5	Yes	Yes	N/A	Evidence in the report and scoring comments fully support the SG 80 scores. Achieving the SG 100 for either scoring issue is difficult and for scoring issue (b) real external reviews of the fishery management system are rare.	Agreed.

Peer reviewer 2

Summary of Peer Reviewer Opinion

<table>
<tr><th>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</th><th>Mostly yes, with caveats as noted</th><th>CAB Response</th></tr>
<tr><td colspan="2">
Justification:
In general, the report is very well written and justifications are appropriate for the scores given. I do believe the fishery should meet the MSC Standard overall.
However, there are a number of concerns which I feel need to be addressed in order to confirm the generally high scores given:
1) That information was not presented on bycatch – instead, the information was presented on discards, which in the MSC context is not the same thing. Essentially, data on discards of commercial species are presented (but only in the full report for the saithe and ling fishery), but there is no information on things like starfish, crabs, echinoderms, non-commercial fish, etc that must to some extent be taken in the fisheries. A full catch profile for each gear type would give much greater confidence that the scores are appropriate.
2) Observer coverage is very low (the aim is to achieve 1% coverage, but the achieved coverage levels are not provided), and it is not clear what the confidence intervals are around the catch estimates for seabirds and marine mammals – they could be huge. Given this issue, I strongly suspect that relying on these limited data to validate the elog data is also all but pointless.
3) With regard to habitat impacts, I feel the scoring of PI 2.4.1 has not been done correctly. This applies to all gears/UoAs, but, for example, the focus of scoring 2.4.1 for Nephrops trawl and wolffish is on the overlap of Nephrops trawling with just the recognised wolffish fishing grounds (e.g., “In scoring, the team noted the following: ... limited overlap of areas where seapens have been recorded with areas where Atlantic wolffish are caught in Nephrops trawls (compare Figure 1 and Figure 3).” But, I believe it is all wolffish taken with Nephrops trawls that will be certified, not just wolffish taken by Nephrops trawls in the main wolffish fishing grounds, and so it is the impact of Nephrops trawling in total that should be certified. The way it is assessed currently implies that only wolffish taken from the recognised wolffish grounds should be certified, which I am sure is not the intent.
4) Following from Point 3), the issue of assessing impacts only in recognized fishing grounds for the target species is compounded because the fishery has been broken down in to so many UoAs. To continue the Nephrops trawl example,
</td><td>
<u>1) </u>Since discarding of all catches is illegal in Iceland the landing profile is the same as the catch profile. The landing profile for the fisheries under assessment is available in the original assessment, and was recently updated during a surveillance visit, which is explained in the report. The assessment is an expedited assessment (extension of scope) and as is explained in section 3.4.2 the team considered the available catch data and found no reason to repeat the existing assessment of PI 2.1.1 / 2.1.2 / 2.1.3. With regards to <u>non-vulnerable</u> species the report explains that (i) landing profiles of Icelandic fisheries include information on catches of low commercial value such as sea cucumbers etc., and that (ii) the landing of such catches suggest that the total catch is retained and that landing data thus represents the approximate total catch of the fisheries for non-vulnerable species.
2) Information on bycatch in Icelandic fisheries is available from (i) logbooks, (ii) scientific surveys (e.g. the annual cod gillnet surveys), and (iii) on-board observers. Estimated indices of monthly abundance for marine mammals and seabirds are taken into account when bycatch numbers are raised to the fleet level wherever possible. The consideration of these different data sources when estimating bycatch numbers has been clarified in the report. With regards to the confidence intervals, the report included references to instances where there were large discrepancies between the numbers observed between separate years were noted. The report has now been updated to include all the data available on bycatch (provided by the MFRI), scoring justifications take into account the estimated percentage of population impacted based on the <u>maximum</u> estimated annual bycatch rates, and details on the achived observer coverage have been added to the report.
</td></tr>
</table>

if all wolffish and all plaice and all saithe and all ling that are taken in *Nephrops* trawls are to be certified, then assessing each species – gear type combination separately based on just the areas where these species are more commonly taken means that the overall impact of each gear type is minimised. The end result of such an approach is that even an extremely destructive gear type could pass for all UoAs separately when it wouldn't pass in aggregate. It would be more consistent with the overall MSC approach (and certainly with CRv.2.0) if the impact of each gear type on habitats was assessed overall, and then it wouldn't matter which of the certified species was being considered, they would all score the same for each gear type. This would also allow the report to be shortened considerably, as currently there are separate PIs scored for each species - gear type combination. In this regard, it is noted that the scoring for 2.2.1, 2.2.2 and 2.2.3 was done on the basis of wolffish and plaice combined for gillnet and longline, so it is unclear why the report switches to scoring each UoA separately when it comes to habitats. 5) It is not clear why some of the UoAs are scored for 2.4.1 only (e.g., wolffish *Nephrops* trawl, wolffish longline), some are scored for 2.4.1 and 2.4.2 (wolffish trawl) and some are scored for all three habitat PIs (e.g., Wolffish Danish seine, wolffish gillnet, wolffish handline)?	An additional condition was raised for both the gillnet and longline fisheries to improve bycatch monitoring. 3) & 4) The team explicitely considers overlap between habitats, the distribution of fishing grounds of each species, <u>and</u> the overall distribution of fishing effort with each gear type. To remain with the example of 2.4.1 for *Nephrops* trawl and wolffish, the full sentence included in the justification for PI 2.4.1 states the following: 'In scoring the team noted the following: ... There is limited overlap of areas where seapens have been recorded with *Nephrops* trawl fishing grounds (compare Figures 2 and 3), <u>and also</u> limited overlap of areas where seapens have been recorded with areas where Atlantic wolffish are caught in *Nephrops* trawls (compare Figure 1 and Figure 3)'. Figure 1 shows the distribution of 2015 Atlantic wolffish catches around Iceland; Figure 2 shows the location of Nephrops trawl fishing effort in 2014; and Figure 3 shows the distribution of the relevant habitat type. The citation provided by the reviewer is thus taken out of context, and the team did assess the impact of *Nephrops* trawl fishing in total for each of the scoring elements. As is explained in section 3.4.5 of the report, the team took the precautionary approach of re-scoring PI 2.4.1 for each species / gear combination since some fishing grounds of Atlantic wolffish and plaice are closer to shore than the saithe and ling fishing grounds. This approach was based on a gap analysis of assessment components which highlighted the following: '*Fishing areas closer to shore in the Atlantic wolffish, and plaice fisheries may affect VMEs not assessed in the original assessments. Therefore, any expedited assessment must consider these areas specifically to determine whether rationales still apply and whether other VME's may be impacted*'. Since there are differences in the distribution of Atlantic wolffish and plaice fishing grounds these were also taken into account to ensure all potential impacts were considered. Please refer to the MSC website for the further details on the gap analysis: https://fisheries.msc.org/en/fisheries/isf-

	iceland-saithe-and-ling/@@assessments 5) Section 3.4.5 of the report explains the rationale behind scoring certain Habitat PIs and not others in detail.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? ***[Reference: FCR 7.11.1 and sub-clauses]***	**Yes**	**CAB Response**
Justification: Yes – they appear consistent with requirements.		No response needed.

Do you think the client action plan is sufficient to close the conditions raised? ***[Reference FCR 7.11.2-7.11.3 and sub-clauses]***	**Yes, but with a caveat**	**CAB Response**
Justification: The actions associated with each Condition appear OK, and are expected to result in the conditions being closed. However, as noted at several points in the main response to each PI, I am concerned that there appears to have been no consideration of CR 7.11.3 and 7.11.4, which require that the UoA shall not be certified unless evidence is provided that finding and/or resources will be in place. At present, there is no such evidence in the report.		Please refer to the CAB response provided in Table 1.

Performance Indicator Review

Table for report using one of the default assessment trees

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1 Wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.
1.1.2 Wolffish	Yes	Yes	Yes (noting comment in justification)	Condition: It is noted that the section titled "Consultation on condition" states merely "*Consultation with MFRI and MII*". Given the requirements of CR 7.11.3 and 7.11.4, it needs to be clarified if this means that these bodies have been consulted and have agreed to the CAP. At present, it is not clear, because there is no letter of support for the CAP from these bodies included in the report, which is what I would normally expect in a Peer Review report.	Letters of support have been provided both by MFRI and MII
1.1.3 Wolffish	Not scored	Not scored	Not scored	Not scored	
1.2.1 Wolffish	Yes	Probably Yes, but needs clarification	N/A	It s noted that SIa states that the harvest strategy 'should be responsive'. To score 80, the report needs to demonstrate that the harvest strategy 'is responsive'.	Taking into consideration that TAC are applied every year based on the outcomes of the assessment carried out by MFRI, the HS is clearly

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
					responsive of the state of the stock. Such evidence is well supported by the report both in section 3.2.1 and in the Evaluation Table for PI 1.2.1 (Atlantic wolffish). Thus, the team thinks that no actions are needed.
1.2.2 Wolffish	Yes	No	Yes	SIa is scored at 60 because of "*the lack of a well-defined response when the stock falls below a trigger reference point*". SIb is then scored 80 on the basis that the "*The proposed harvest control rule is implicitly taking into account some uncertainties*". However, it is not clear what is proposed, and a score of 80 for SIb seems inappropriate if the HCR is not yet in place. Condition: Same comment as PI 1.1.2 with respect to the section titled "Consultation on condition" stating merely "*Consultation with MFRI and MII*".	The HCR rule is implicitly taking into account some uncertainties because the adjusting actions are based upon the stock assessment model, which takes into account the main uncertainties in the input data. Thus, the team thinks that no actions are needed.
1.2.3 Wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.4 Wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	
1.1.1 Plaice	Yes	Probably Yes, but needs clarification	N/A	In the introduction, the report states that "A new statistical catch at age-based model was used in 2016, suggesting that fishing mortality was overestimated but harvestable biomass underestimated in the model used in 2013–2015. Considerable uncertainty is present in the assessment due to limited information on recruitment". Happily, the new assessment indicates a change in the right direction for the sustainability of the fishery, but it is not clear if this new method has been adopted, or whether the differences in status have been reconciled. Essentially, a clarification would be useful as to whether the status is taken from the new assessment or the old?	In section 3.3.2.2 it is clearly stated that the new analytical age-based model was used in 2016 to provide the scientific advice. Thus, the team thinks that no actions are needed.
1.1.2 Plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.3 Plaice	Not scored	Not scored	Not scored	Not scored	
1.2.1 Plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.
1.2.2 Plaice	Yes	No	Yes	SIa is scored at 60 because "*this stock does not have a well-defined HCR … to what extent exploitation might be reduced as the limit reference point is approached is not clear*". SIb is then scored 80 on the basis that "*The uncertainties associated with the harvest control rule have been considered*." However, it is not clear what the HCR is in this case that allows 80 to be met? Condition: Same comment as for wolffish PI 1.1.2 with respect to the section titled "Consultation on condition" stating merely "*Consultation with MFRI and MII*".	See the same comments for Atlantic wolffish.
1.2.3 Plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.4 Plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.
2.1.1	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.
2.1.2	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.
2.1.3	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.
2.2.1 Gillnet	No	No	Generally, yes, but see comments in jsutification.	I would normally expect a catch profile to be included in the report, but no actual figures for bycatch are provided. Going back to the original report was not helpful either, as the data on discards was focused entirely on commercial species. I would not necessarily expect gillnets to	Since discarding is illegal in Iceland the landing profile is the catch profile. The landing profile for the fisheries under assessment is available in the original assessment, and was recently updated during a surveillance visit, which is explained in the report. The

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				take a lot of non-commercial bycatch, but a catch profile would give much greater assurance that we are seeing the full picture. It does not necessarily follow that there are no main non-vulnerable bycatch species because the discard rates of cod and haddock are low?! I note that the report states that observers aim to go on 1% of all fishng trips by the (gillnet) fleet, but I don't think the actual coverage level is provided (i.e., observer coverage could be lower). In any case, 1% is very low, and the confidence intervals around the seabird and marine mammal bycatch figures have not been provided – given the level of coverage, I would expect them to be huge, indicating that there is potential for a more significant number of animals to be taken than the point estimates indicate. It may also be that rarer, more vulnerable species are taken but are not represented in the data as they've never been detected at this low level of sampling.	assessment is an expedited assessment (extension of scope), and as is explained in section 3.4.2 the team considered the available catch data and found no reason to repeat the existing assessment of PI 2.1.1 / 2.1.2 / 2.1.3. The team did not conclude that 'there are no main non-vulnerable bycatch species because the discard rates of cod and haddock are low'. What is stated in the report is that research by MFRI and measurements by the Directorate of Fisheries (DF) indicate that the most important discards in the Icelandic fisheries are of cod and haddock. Since scientific studies (referenced in the report) have shown that cod and haddock are the most commonly discarded species in Icelandic fisheries and their estimated discard rates are very low, the team concluded that the scale of discarding of other commercial species is likely to

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
				Also, the report notes that the marine mammal and seabird bycatch is monitored by mandatory elog system, but that "*returns from the eLog system have been poor*." I am not surprised – in all honesty, there is very little incentive for fishermen to self report seabird and marine mammal bycatch, and little weight is rightly given to these data in the report. Finally, I also note that the original report highlights that of the Icelandic gillnet fisheries, the lumpfish fishery takes more seabirds than any other, and that the most commonly taken species are black guillemot and common eider. However, neither species appears in the table provided in the scoring text for 2.2.1 showing 'Seabird bycatch taken in Icelandic gillnet fisheries'. Essentially, there is already a condition on this PI for some elements/species, but there is missing information and some	be even smaller. With regards to <u>non-vulnerable</u> species in general the report explains that (i) landing profiles of Icelandic fisheries include information on catches of low commercial value (e.g. dogfish, sea cucumber, black scabbard-fish, ribbonfish, and mackerel shark), and that (ii) the landing of catches of low commercial value suggest that the total catch is retained, and that landing data thus represents the approximate total catch of the fisheries for non-vulnerable species. With regards to the confidence intervals, the report included references to instances where there were large discrepancies between the numbers observed between separate years were noted (e.g. text for PI 2.2.1 (a) Gillnet (Atlantic wolffish; plaice): '*This is evidenced by the differences in bycatch numbers recorded for several bird species in 2014 and 2015 (e.g.*

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
				inconsistencies that should be rectified before the passing score can be justified for the other species. Condition: Again, it is not clear that 7.11.3 and 7.11.4 have been addressed appropriately through the section 'Consultation on Condition'. Finally, the CAP states: "*The reliability of logbook records should be periodically verified by comparison with data coming from onboard observations by Marine and Freshwater Research Institute (MFRI) observers*." I agree with the thrust of this comment, but consideration must be given in this case to the very low levels of observer coverage in this gillnet fleet. I suspect that a power analysis will reveal much about the observers' ability to detect seabird and marine mammal captures with any reliability, but also to determine if the very limited observer data has any power to check the reliability of the logbook data.	*gillnet bycatch of common guillemot in 2014: 113, in 2015: 1127; razorbill 2014: 0, in 2015: 83)*'. The report has now been updated to clarify that information on bycatch in Icelandic fisheries is available from (i) logbooks, (ii) scientific surveys (e.g. the annual cod gillnet surveys), and (iii) on-board observers. The report now also includes all the data available on bycatch as provided by the MFRI, scoring justifications take into account the estimated percentage of population impacted based on the maximum estimated annual bycatch rates observed, and details on the achived observer coverage have been added to the report. The fact that observer coverage is low was taken into account duirng the evaluation,for example the justification for PI 2.2.2 (b) Gillnet (Atlantic wolffish; plaice) states: *'other*

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
					measures require improvements to be appropriate for the fishery (e.g. more logbook returns / more observer trips are required to gather bycatch data). SG 80 is not met'. An additional condition was raised for both the gillnet and longline fisheries to improve bycatch monitoring (condition 6). The species listed in the scoring text for 2.2.1 are based on data provided for (1) gillnet, and (2) longline fisheries by the MFRI. Black guillemot was recorded in bycatch taken by longlines and is discussed in the scoring text for this gear. There were no records of common eider caught as bycatch in the data provided for the gears being assessed in the bycatch data provided by the MFRI; lumpfish nets are not a separate gear type which are not included in the assessment (see revised information on UoAs included

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
					in the assessment / the revised section on traceability). The reference to common eider has been removed from the report to avoid confusion. With regards to 7.11.3 and 7.11.4 please note that letters of support have been received from the MFRI and the MII. With regards to the recommended power analysis, conditions 4 and 5 already require the client to consult with the Directorate of Fisheries (DF) and the MFRI and/or other parties with the objective to determine if recording and monitoring of marine mammal and seabird bycatch is at a level that is sufficient to detect increased risks. An additional condition has been raised to improve bycatch monitoring through logbook data (condition 6).

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.2 Gillnet	Yes	Possibly – see Justification	Subject to 2.2.1, Yes	My concerns regarding scorinng bycatch are reflected in the jsutification to PI 2.2.1. I have nothgin further to add, here.	Please refer to CAB response above.
2.2.3 Gillnet	Yes	Possibly – see Justification	Subject to 2.2.1, Yes	Noting my concern over the data available to determine risk (as discussed in comments on PI 2.2.1), I think this is all OK.	Please refer to CAB response above.
2.2.1 Longline	No	No	Generally, yes, but see comments in justification.	Many of the comments leveled at the gillnet scoring text are also made here – the data behind the estimates of bycatch again appear to be very limited, and there is no catch profile, which would help to lessen the uncertainty around the scoring of these PIs enormously. Also, the seabird bycatch table used in the scoring text is titled 'seabird bycatch taken in Icelandic gillnet fisheries', when it is longlines that are being discussed. However, it is also noted that there is no figure provided for observer coverage on the longline fleet – it is reported to be 'good' (in PI 2.2.2, according to MFRI), but	Please refer to CAB response above regarding the catch profile and the concerns with the bycatch data. The title above the table in section 2.2.1 was a copy and paste error which was not spotted earlier and has now been amended in the report. The table column headings were however correct and scoring was also based on the correct data. Information on the actual observer coverage achieved in 2014 / 2015 for the longline and gillnet fleets has been added to the report.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				what does that mean?	
2.2.2 Longline	Yes	Possibly – see Justification	Subject to 2.2.1, Yes	My concerns regarding scorinng bycatch are reflected in the justification to PI 2.2.1. I have nothgin further to add, here.	Please refer to CAB response above.
2.2.3 Longline	Yes	Possibly – see Justification	Subject to 2.2.1, Yes	It is noted that the report stetas here (and elsewhere for scoring bycatch information, that firstly: "*Returns from the eLog system have been poor (the paper based log books that this "new" system replaced had better returns*)*,*" but also secondly: "*Bycatch of vulnerable species is monitored by a mandatory eLog system and onboard observers from the DF, and observers aim to go on 1% of all fishing trips of the longline fleet. The quality of the data has improved in the last 5 years (MFRI, pers. communication)*." These two statements appear to contradict one another – the data are now	The statement 'The quality of the data has improved in the last 5 years' refers to the fact that observer coverage has increased in these fisheries. It is as a result of this increased observer coverage that the MFRI was able to provide bycatch estimates for both gillnet and longline fisheries for the year 2014 and 2015 (please note that such data was not previously available). The statement has been amended in the report to clarify this aspect. Please refer to CAB response above regading data available to determine risk to bycatch species.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				worse, but the data are better ?? What is the return rate for the eLogs, and what is the actual level of observer coverage that is achieved on each fleet?? Otherwise, noting my concern over the data available to determine risk to bycatch species (as discussed in comments on PI 2.2.1), I think this is all OK.	
2.3.1	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.
2.3.2	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.
2.3.3	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	Not scored for any UoA (expedited assessment)	No response needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
2.4.1 Trawl wolffish	Yes	Probably, yes	N/A	The score and rationale are likely to be appropriate, but the scoring is confounded by the lack of a clear description of the type of gear being employed. Are the trawls designed with a simple, lightweight footrope for use on snag-free, sedimentary bottoms, or are they heavyweight rockhoppers with large discs? Understandnig this would help to detemrine the typs of grounds being fished and the potential for the gears to impact habtats.	A more detailed description of the trawl gear used in the fishery has been included in the report.
2.4.2 Trawl wolffish	No	No	N/A	The fishery is scored 100 for SIa for there being a National Strategy Plan for the preservation of biological diversity in place. Two of the key elements of this strategy are (a) develop fishing methods with less impact on marine ecosystems, and (b) protect vulnerable benthic ecosystems. However, there is no information on progress with respect to a). How has trawling changed as a result of implementing the strategy?	With regards to PI 2.4.2 SI (a) the fishery scored 100 because (1) the Ministry of the Environment has developed a National Strategy Plan for the preservation of biological diversity, (2) The Nature Conservation Act no. 44/1999 provides measures to protect marine habitats, and (3) Iceland has ratified a number of conventions on the protection and management of marine species. The team considers that a strategy is thus in place for

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				Given that bottom trawling does not occur in depths less than 80m, I am then concerned that, for SIb, 'Other subtidal sedimentary habitats', the report states "*There has been testing (Garcia et al. 2006b, Ragnarsson and Lindegarth 2009, Thorarinsdóttir et al. 2010) showing that demersal trawling has low impacts on this habitat type in Icelandic waters and elsewhere. Therefore, SG100 is met*." I have not reviewed the Garcia reference in depth, but I note that the case study is of a shrmip fishery (which I would expect to use a much lighter, bottom skimming gear in comparison to a trawl targeting species includng wolffish). Further, the Thorarinsdóttir et al. reference is focused on fly-dragging (which again is a lighter gear), while *Ragnarsson and Lindegarth stated: "The depth within the study site ranged from 32 to 35 m. The sediment can be categorised as mud or muddy sand … Storms are frequent and due to shallow depth at the study site, storm-induced*	managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SI under PI 2.4.2. The statement justifying the score for SI (b) for the SE 'Other subtidal sedimentary habitats' is based on the Evaluation Table for PI 2.4.2 for bottom trawlers included in the 1st Surveillance Report of the ISF Iceland Saithe Fishery. The team however agrees with the observations made by the peer reviewer. The score has thus been lowered to 80 for both SI (b) and (c) for this SE.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				suspension of sediments is likely to be considerable." Essentially, I believe firmly that none of the studies quoted are relevant to the fishery, and so they do not justify a score of 100 for interations between trawls and this habitat type (ie. sediments in 80-200 m depth, where natural disturbance levels will be much less). This then transfers elsewhere in PI 2.4.2, where 100 is given for this habitat type.	
2.4.3 Trawl wolffish	Not scored for trawl	Not scored for trawl	Not scored for trawl	I presumed initially that 2.4.3 was not being scored under this expedited assessment, but then 2.4.3 is scored for other gear types. As such, it appears that 2.4.3 should be scored here, also.	As is explained in section 3.4.5 of the report the team decided to re-assess PI 2.4.3 Habitat information when the updated scoring of PI 2.4.1 revealed a habitat scoring element which was not explicitly considered in the original saithe and ling assessment. This was the case only for Danish seine, and gillnet fisheries operating close to the coast. In the case of trawl, *Nephrops* trawl, longline and handline fisheries no additional scoring elements were

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
					identified when assessing PI 2.4.1, so there was complete overlap with the habitat information PI as scored in the saithe and ling assessment.
2.4.1 Danish seine wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.
2.4.2 Danish seine wolffish	Yes	Probably Yes	N/A	The same comment as for the trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in place applies here –there is no information on progress with respect to develop fishing methods with less impact on marine ecosystems. Otherwise, the rationale is OK.	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish the fishery scored 100 for PI 2.4.2 SI (a) because the team considers that a strategy is in place for managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SIs.
2.4.3 Danish seine wolffish	Yes	No	N/A	I am content that SG80 is met, but I disagree that SG100 is met for SIa. Some detailed mapping covering specific areas has been done or is being done (noting that only limited wieght should be given to work that is yet to be completed), and	The team agrees with the reviewer's comments. The score for PI 2.4.3 SI (a) - Danish seine wolffish has thus been lowered to 80, and the justification has been amended accordingly.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
				efforts are being made to identify areas with higher concentrations of vulnerable habitats. This tends towards SG100, but at this level I would expect a detaield habitat map to be available for the Icelandic waters, and there does not appear to be one (certainly, one has not been provided in the report). The summary paragraph also tends very much towards SG80 ("*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*."), where it states "*The distribution of **main** vulnerable habitats in Icelandic waters has been documented and the detail of **knowledge is at a relevant scale***."	
2.4.1 Gillnet wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed.
2.4.2 Gillnet wolffish	Yes	Probably Yes	N/A	The same comment as for the trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish the fishery scored 100 for PI 2.4.2 SI (a) because the team

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				place applies here –there is no information on progress with respect to develop fishing methods with less impact on marine ecosystems. Otherwise, the rationale is OK.	considers that a strategy is in place for managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SIs.
2.4.3 Gillnet wolffish	Yes	No	N/A	Same comment as for 2.4.3 Danish Seine – I am content that SG80 is met, but I disagree that SG100 is met.	The team agrees with the reviewer's comments. The score for PI 2.4.3 SI (a) - Gillnet wolffish has been lowered to 80, and the justification has been amended accordingly.
2.4.1 Handline wolffish	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response needed
2.4.2 Handline wolffish	Yes	Probably Yes	N/A	The same comment as for the trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in place applies here –there is no information on progress with respect to develop fishing methods with less impact on marine ecosystems.	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish the fishery scored 100 for PI 2.4.2 SI (a) because the team considers that a strategy is in place for managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				Otherwise, the rationale is OK.	were scored in the subsequent SIs.
2.4.3 Handline wolffish	Yes	No	N/A	Same comment as for 2.4.3 Danish Seine – I am content that SG80 is met, but I disagree that SG100 is met.	The team agrees with the reviewer's comments. The score for PI 2.4.3 SI (a) - Handline wolffish has been lowered to 80, and the justification has been amended accordingly.
2.4.1 Longline wolffish	Yes	Yes, probably	N/A	The score is probably appropriate, but the rationale is at least partly based on a study of fishing impacts on a Southern Ocean fishery. Comparing the Icelandic situation to that is not appropriate as the percentage of the habitat impacted depends on how much fishing occurs and how much habitat is present! As far as I can tell, we have no comparable data for the Icelandic situation.	The team agrees that the percentage of habitat impact can not be directly applied to Iceland, this was never the intention. Sharp et al. in fact considered impacts at the level of individual colonies; this aspect has been clarified in the text. The justification for PI 2.4.1 - Longline wolffish states that (i) there is no direct information from Iceland, (ii) the team considers that the results of Sharp et al. (2009) are only qualitatively comparable, and (iii) points out that combined with the lack of geographic overlap there is no more than a 20% probability that the true status of the component is within the

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
					range where there is risk of serious or irreversible harm. The team considers the rationale to be appropriate.
2.4.2 Longline wolffish	Not scored for longline	Not scored for longline	Not scored for longline	As 2.4.2 is scored for other gear types, it appears that 2.4.2 should be scored here, also.	As is explained in section 3.4.5 of the report the team decided to re-assess PI 2.4.2 Habitat management when the updated scoring of PI 2.4.1 revealed a habitat scoring element which was not explicitly considered in the original saithe and ling assessment. This was the case only for Danish seine, and gillnet fisheries operating close to the coast. In the case of trawl, *Nephrops* trawl, longline and handline fisheries no additional scoring elements were identified when assessing PI 2.4.1, so there was complete overlap with the habitat management strategy PI as scored in the saithe and ling assessment.
2.4.3 Longline wolffish	Not scored for longline	Not scored for longline	Not scored for longline	As 2.4.3 is scored for other gear types, it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.1 Nephrops trawl wolffish	Possibly, yes	No	N/A	The SG80 requirement here is that "*The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm*." For seapen habitats, the score of 80 is essentially justified on two points: 1) That fishing is less than it used to be ("*Studies on the impact of Nephrops trawling indicate that fishing intensity is the major factor controlling long-term negative trends in the benthos (Ball et al. 2000). However, compared to early 1970s fishing effort had decreased by some 60–70% by the year 2000 (Garcia et.al. 2006), and during the period 2001-2013 the number of boats in the Nephrops fishery had reduced by around 50%*"). Vessels today, however, are more powerful and almost certainly use gears with a larger swept area than previously, and are able to fish across more of the ground than previously given the improvements in ground	The assessment team agrees with the reviwer's argument that technological creep means a 50% reduction in boats does not equate to a 50% reduction in fishing effort; this claim is not made in the report. With regards to swept area please note that a map showing the location of *Nephrops* trawl fishing effort is included in the report; scoring was based on the most recent maps of fishing effort distribution. The justification for a score of 80 has been revised on the reviewer's comments, and is now based on the following points: (1) Pennatulacea corals (seapens) are known to be relatively common in Icelandic waters; (2) fishing intensity appears to be the main factor in determining damage in this habitat type, and significant reduction in fishing effort in recent years suggests that the habitat has more chance to recover if the effort remains at current levels or lower; (3)

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				discrimination and navigational equipment. As such, a reduction in vessel numbers does not equate to a simialr reduction in effort – in fact, more of the habitat may be being impacted now than previously. 2) That "*There is limited overlap of areas where seapens have been recorded with Nephrops trawl fishing grounds*". However, the report also notes that "*The habitat of Nephrops norvegicus is characterized by fine sand and mud, where sea-pen and burrowing megafauna communities can be found (OSPAR 2010a)*." and "*Seapens are sensitive to mechanical damage by Nephrops trawling*". As such, the question becomes, does a lack of evidence for seapens in the Nephrops ground show that seapens don't live there, or that trawling has removed the seapens?? I believe there is insufficient evidence to conclude the former!	OSPAR do not consider this habitat type to be 'threatened or declining' in Icelandic waters, and (4) *Nephrops* trawlers in Iceland have a ground rope but do not use bonnins or tickler chain, which somewhat reduces environmental impacts. The assessment team explicitely refers the reader to a comparison of maps of both Nephrops trawl fishing grounds in general and maps of anglerfish catches in particular (references to the relevant Figure numbers are included in the report). Overall the assessment team considers that the detailed justification provided does support a score of 80 for this PI.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				Further, the assertion that "limited overlap of areas where seapens have been recorded with areas where Atlantic wolffish are caught in Nephrops trawls" is of limited relevance because certification is being sought for any wolffish taken in Nephrops trawls, so it is not just the main wolffish fishing grounds that are being considered – it is the area that is fished using Nephrops trawls! Essentially, the fishery may warrant a score of 80, here, but the justification currently doesn't meet that standard. Instead, there needs to be an understanding of how much of the Nephrops/seapen habitat is subjected to trawling and the recovery rate of the habitat. In the absence of such an analysis, it is not clear that SG80 is met.	
2.4.2 Nephrops trawl wolffish	Not scored for Nephrops trawl	Not scored for Nephrops trawl	Not scored for Nephrops trawl	As 2.4.2 is scored for other gear types, it appears that 2.4.2 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.2 Longline wolffish.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.3 Nephrops trawl wolffish	Not scored for Nephrops trawl	Not scored for Nephrops trawl	Not scored for Nephrops trawl	As 2.4.3 is scored for other gear types, it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish.
2.4.1 Trawl plaice	Possibly, yes	No	N/A	A score of 100 is justified on the basis of a study that took place at a shallow water site (approximately 32 -35m depth, where "*storms are frequent and due to shallow depth at the study site, storm-induced suspension of sediments is likely to be considerable*"). However, fishing with trawls in Iceland reportedly does not take place in less than 80 m water depth, where such storm induced disturbance will be greatly reduced (such that the communities will almost certianly be less-well adapted to regular perturbation, and more sensitive to trawling as a result). As such, the results fo the study cannot be assumed to be representative of the effects of the fishery. I would expect to see an analysis of fished area (trawls, total, if any and all plaice are to be certified) in comparison to the	The statement justifying the score for PI 2.4.1 for the SE 'Other subtidal sedimentary habitats' is based on the Evaluation Table for PI 2.4.1 for bottom trawlers included in the 1st Surveillance Report of the ISF Iceland Saithe Fishery. The team however agrees with the observations made by the peer reviewer. The score has thus been lowered to 80 for this SE for both the Atlantic wolffish and the plaice fisheries.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				habitat area for SG100 to be met.	
2.4.2 Trawl plaice	Yes	Not completely	N/A	The same comment as for the wolffish trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in place applies here –there is no information on progress with respect to develop fishing methods with less impact on marine ecosystems. Also, similar to PI2.4.2 for wolffish trawl, I believe firmly that none of the studies quoted are relevant to the fishery, and so they do not justify a score of 100 for 'testing' iinteractions between trawls and habitat type where trawling occurs (ie. sediments in 80-200 m depth, where natural disturbance levels will be much less). This then transfers elsewhere in PI 2.4.2, where 100 is given for this habitat type.	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish, the fishery scored 100 for PI 2.4.2 SI (a) because the team considers that a strategy is in place for managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SIs. The statement justifying the score for SI (b) for the SE 'Other subtidal sedimentary habitats' is based on the Evaluation Table for PI 2.4.2 for bottom trawlers included in the 1st Surveillance Report of the ISF Iceland Saithe Fishery. The team however agrees with the observations made by the peer reviewer. The score has thus been lowered to 80 for both SI (b) and (c) for this SE.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.3 trawl plaice	Not scored for trawl	Not scored for trawl	Not scored for trawl	As 2.4.3 is scored for other gear types, it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish above.
2.4.1 Danish seine plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response is needed.
2.4.2 Danish seine plaice	Yes	Probably Yes	N/A	The same comment as for the wolffish trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in place applies here –there is no information on progress with respect to develop fishing methods with less impact on marine ecosystems. Otherwise, the rationale is OK.	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish, the fishery scored 100 for PI 2.4.2 SI (a) because the team considers that a strategy is in place for managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SIs.
2.4.3 Danish seine plaice	Yes	No	N/A	I am content that SG80 is met, but I disagree that SG100 is met. Some detailed mapping covering specific areas has been done or is being done (noting that only limited wieght should be given to work that is yet to be completed), and efforts are being made to identify areas with	The team agrees with the reviewer's comments. The score for PI 2.4.3 SI (a) - Danish seine plaice has thus been lowered to 80, and the justification has been amended accordingly.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	**CAB Response**
				higher concentrations of vulnerable habitats. This tends towards SG100, but at this level I would expect a detaield habitat map to be available for the Icelandic waters, and there does not appear to be one (certainly, one has not been provided in the report). The summary paragraph also tends very much towards SG80 ("*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*."), where it states "*The distribution of **main** vulnerable habitats in Icelandic waters has been documented and the detail of **knowledge is at a relevant scale***."	
2.4.1 Gillnet plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response is needed.
2.4.2 Gillnet plaice	Yes	Probably Yes	N/A	The same comment as for the trawl UoA regarding scoring 100 for there being a National Strategy Plan for the preservation of biological diversity in place applies here –there is no	As explained in more detail in response to the comment on PI 2.4.2 Trawl wolffish, the fishery scored 100 for PI 2.4.2 SI (a) because the team considers that a strategy is in place for

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				information on progress with respect to develop fishing methods with less impact on marine ecosystems. Otherwise, the rationale is OK.	managing the impact of the fishery on habitat types. Issues related to the implementation / the evidence of success of the management strategy were scored in the subsequent SIs.
2.4.3 Gillnet plaice	Yes	No	N/A	Same comment as for 2.4.3 wolffish Danish Seine – I am content that SG80 is met for SIa, but I disagree that SG100 is met.	The team agrees with the reviewer's comments. The score for PI 2.4.3 SI (a) - Gillnet plaice has thus been lowered to 80, and the justification has been amended accordingly.
2.4.1 Handline plaice	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response is needed.
2.4.2 Handline plaice	Not scored for handline plaice	Not scored for handline plaice	Not scored for handline plaice	PI 2.4.2 was scored for handline wolffish (as well as other gear types), so it appears that 2.4.2 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.2 Longline wolffish.
2.4.3 Handline plaice	Not scored for handline plaice	Not scored for handline plaice	Not scored for handline plaice	PI 2.4.3 was scored for handline wolffish (as well as other gear types), so it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish.
2.4.1 Longline plaice	Yes	Yes, probably	N/A	As for longline wolffish, the score is probably appropriate, but the rationale is	Please refer to the CAB response to comment PI 2.4.1 Longline wolffish.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
				at least partly based on a study of fishing impacts on a Southern Ocean fishery. Comparing the Icelandic situation to that is not appropriate as the percentage of the habitat impacted depends on how much fishing occurs and how much habitat is present! As far as I can tell, we have no comparable data for the Icelandic situation.	
2.4.2 Longline plaice	Not scored for longline	Not scored for longline	Not scored for longline	As 2.4.2 is scored for other gear types, it appears that 2.4.2 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.2 Longline wolffish.
2.4.3 Longline plaice	Not scored for longline	Not scored for longline	Not scored for longline	As 2.4.3 is scored for other gear types, it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish above.
2.4.1 Nephrops trawl plaice	Possibly, yes	No	N/A	I have concenrs exactly the same as those for Nephrops trawl wolffish – that SG80 might be met but that the impact of trawling on seapns is not addressed adequately	Please refer to CAB response to comment on PI 2.4.1 Nephrops trawl wolffish above.
2.4.2 Nephrops	Not scored for	Not scored for	Not scored for	As 2.4.2 is scored for other gear types, it	Please refer to CAB response to

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
trawl plaice	Nephrops trawl	Nephrops trawl	Nephrops trawl	appears that 2.4.2 should be scored here, also.	comment on PI 2.4.2 Longline wolffish.
2.4.3 Nephrops trawl plaice	Not scored for Nephrops trawl	Not scored for Nephrops trawl	Not scored for Nephrops trawl	As 2.4.3 is scored for other gear types, it appears that 2.4.3 should be scored here, also.	Please refer to CAB response to comment on PI 2.4.3 Trawl wolffish above.
2.5.1	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
2.5.2	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
2.5.3	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.1.1	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.1.2	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.1.3	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.1.4	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.2.1	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response is needed.
3.2.2	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.2.3	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.2.4	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	Not scored for any UoA	No response is needed.
3.2.5	Yes	Yes	N/A	None – the score and rationale are appropriate.	No response is needed.

Appendix 3. Stakeholder submissions

Appendix 3.1: Stakeholder Submission Regarding Conditions

Appendix 3.1.1 Letter from the Marine and Freshwater Research Institute

Icelandic Sustainable Fisheries
Grandagarður 16
101 Reykjavik

MARINE & FRESHWATER RESEARCH INSTITUTE

Reykjavik, 14.02.2017
Tilv. 2017-0075 - 21.09.00
SG/mp

Re: Consultations on fish stocks in Icelandic waters subject to MSC certification

In recent months the Icelandic Sustainable Fisheries plc. (ISF) representatives and experts at the Marine and Freshwater Research Institute (MFRI), Reykjavik have consulted on fish stocks exploited in Icelandic waters that have been subject to different stages of MSC certification.

The species that have been consulted on include Atlantic wolffish, plaice, tusk and blue ling. The MFRI, as the principal organization in Iceland responsible for research and advice on sustainable harvest of fish stocks in Icelandic waters, has provided information on various aspects of the most recent assessments of the stocks in question, including explaining the type of analytical methods used, evaluation of parameters, stock status and development. Also one has consulted on the fishing operations and environmental aspects related to fishing activities, as far as it concerns matters related to the responsibilities of the MFRI.

The MFRI welcomes future cooperation with ISF in this area, including annual consultations on the development of the above fish stocks and other stock in Icelandic waters when and if relevant in this context.

On behalf of Marine and Freshwater Research Institute,

Sigurður Guðjónsson
Director

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Sími 575 2000 | Fax 575 2001 | hafogvatn@hafogvatn.is

Appendix 3.1.2 Letter from the Ministry of Industries and Innovation

Iceland Sustainable Fisheries
Grandagarði 16
101 Reykjavík

ATVINNUVEGA- OG
NÝSKÖPUNARRÁÐUNEYTIÐ

Ministry of Industries and Innovation

Skúlagötu 4 101 Reykjavík Iceland
tel.: +(354) 545 9700 postur@anr.is
anr.is

Reykjavík March 6, 2017
Reference: ANR17020355/11.0

Icelandic authorities emphasize a responsible and sustainable utilization of marine resources. Stock assessment as well as advice on Total Allowable Catch (TAC) is received from the Icelandic Marine Research Institute (MRI) and from International Council for the Exploration of the Sea (ICES). Icelandic authorities have since 2007 followed the policy to base fisheries management in Icelandic waters on the application of long term management plans (LTMP) and harvest control rules (HCR) which have been evaluated by ICES. At the moment there are harvest control rules in place for the most important stocks such as cod, haddock, saithe, Golden redfish and capelin. It's now a strictly enforced governmental policy in Iceland to increase the number of stocks which could be subject to a HCR when technically possible. Among new HCR-candidates are definitely ling (Molva molva), catfish (Anarhichas lupus), plaice (Pleuronectes platessa), tusk (Brosme brosme), Greenland halibut (Reinhardtius hippoglossoides), blue ling (Molva dypterysia) and the Icelandic summer-spawning herring (Clupea harengus L.).

Þorgerður Katrín Gunnarsdóttir

Þorgerður Katrín Gunnarsdóttir
Minister of Fisheries and Agriculture

Appendix 3.1.3 Letter from the Directorate of Fisheries

Icelandic Sustainable Fisheries

Akureyri, 20. 02. 2017
0012/2017 – 1.1.1

Effort to minimize bycatch of marine mammals and seabirds in Icelandic fisheries

Fiskistofa has in recent years joined the various stekeholders within Icelandic fisheries, the scientific community and civil society in efforts to reduce the amont of bycatch of marine mammals and seabirds. In cooperation with the same parties, Fiskistofa has taken measures in order to encourage improvent in registering such bycatch in logbooks.

Fiskistofa welcomes future cooperation with ISF and its partners in this field.

On behalf of
Fiskistofa

Eyþór Björnsson

Eyþór Björnsson
Director General

Appendix 3.1.4 Letter from the National Association of Small Boat Owners

LANDSSAMBAND
smábátaeigenda

Icelandic Sustainable Fisheries
Grandagarður 16
101 Reykjavík
Iceland

Reykjavík, 14.2.2017

Memorandum of understanding.

In December 2014 the Icelandic lumpfish was MSC certified. In Iceland the largest share of the lumpfish is fished by small boats which are NASBO members. The certificate has a condition regarding information on the nature and amount of bycatch in lumpfish nets and fisheries. A second conditions is regarding a strategy which needs to be in place for managing bycatch. The condition stipulates that the fishery should not pose a risk of serious or irreversible harm to bycatch populations. NASBO has been working with ISF since 2015 on a solution on these matters with good results and the two conditions are each on target.

The NASBO welcomes future cooperation with ISF in this area and for other fish species. NASBO is willing to work on consultations between the fishing industry SFS, the DF as well as the MFRI and MRI to fulfil conditions regarding bycatch with in fisheries and other issues needed to maintain MSC certifications on fisheries by small boat owners and members of NASBO.

On behalf of NASBO,

Axel Helgason

Appendix 3.2: Comments from ASI GmbH

As a part of its annual surveillance of the CAB, ASI (Accreditation Services International GmbH) conducted a witness assessment of this expedited assessment, including a desk study of the Preliminary Draft Report (PDR). The comment below, which relates particularly to this expedited assessment, is a result of that desk study.

Comments from ASI´s desk study of the Preliminary Draft Report	
Date detected/ submitted	21.4.2017
Normative reference and requirement	MSC-FCR-V2.0-7.10.6.1 7.10.6.1 A rationale shall be presented to support the team's conclusion.
Description	In a number of instances the CAB provided scoring rationales that did not support the team scoring conclusion.
Evidence observed (pertaining to this expedited assessment)	Evidence of non-conformity observed for atlantic wolfish (*Anarhichas lupus*): PI 1.1.1 "Stock Status" Issue b: Stock status in relation to the target reference point was scored using fishing mortality-based reference points. The CAB provided the following rationale for PI 1.1.1 issue b: "The current management objective is to maintain an F at or below an FMSY proxy identified as Fmax. The F has been fluctuating around the target 0.29 since 2010. It declined from 2009 to 2014 and increased again in 2015, but remaining below the reference point. On this basis, SG80 is met but not SG100". However, the CAB did not provide a justification to conclude whether the stock biomass is at or fluctuating at levels consistent with Bmsy. Under clause CB 2.2.4 (of version 1.3, under which the fishery was assessed) it is required to determine whether the stock biomass is in rebuilding status or not. Evidence of assessing the stock biomass in relation to Bmsy is not provided for wolfish.
	Evidence of non-conformity observed for plaice (*Pleuronectes plates*): Stock status in relation to the target reference point was scored using fishing mortality-based reference points. The CAB provide the following rationale for PI 1.1.1 issue b: "Fishing mortality is set at the MSY level, the stock size is likely to be around or approaching the MSY level. With the exception, of 2012 the F is below the FMSY since 2011. Therefore, it is possible to state that the stock is fluctuating around its target reference point..." Using the sentence "stock size is likely to be around or approaching the MSY level" does not support the conclusion of whether the stock biomass is at or fluctuating around Bmsy as it is needed to determine whether PI 1.1.3 stock rebuilding shall or shall not be triggered. Note that the term "approaching" implies that the stock is in rebuilding status.
	Finding GRADE: It is considered that this finding could have significant implications on the validity of certification decision-making and therefore is graded as a major NC; i.e. depending on whether it can be concluded that these fish stock are at or fluctuating at Bmsy will determine whether PI 1.1.3 needs to be scored and ultimately could determine whether these stock are meeting the MSC standard under Principle 1.
CAB response	The CAB modified the text in 1.1.1(b) justifications for both stocks in accordance with the comments provided by ASI.

ALL REPORTS:

1. The report shall include: a. All written submissions made by stakeholders during consultation opportunities listed in CR 27.15.3.1 b. All written and a detailed summary of verbal submissions received during site visits regarding issues of concern material to the outcome of the assessment *(Reference CR 27.15.3.2)* c. Explicit responses from the team to stakeholder submissions included in line with above requirements *(Reference CR 27.15.3.3)*

(REQUIRED FOR FR AND PCR)

2. The report shall include all written submissions made by stakeholders about the public comment draft report in full, together with the explicit responses of the team to points raised in comments on the public comment draft report that identify: a. Specifically, what (if any) changes to scoring, rationales, or conditions have been made. b. A substantiated justification for not making changes where stakeholders suggest changes but the team makes no change. *(Reference: CR 27.15.4)*

Appendix 4. Surveillance Frequency

(REQUIRED FOR THE PCR ONLY)

1. The report shall include a rationale for determining the surveillance score.
2. The report shall include a completed fishery surveillance plan table using the results from assessments described in CR 27.22.1

Table A4: Fishery Surveillance Plan

Score from CR Table C3	**Surveillance Category**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
[e.g. 2 or more]	[e.g. Normal Surveillance]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit]	[e.g. On-site surveillance audit & re-certification site visit]

Appendix 5. Client Agreement

(REQUIRED FOR PCR)

The report shall include confirmation from the CAB that the Client has accepted the PCR. This may be a statement from the CAB, or a signature or statement from the client. *(Reference: CR: 27.19.2)*

Appendix 5.1 Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)

The report shall include all written decisions arising from an objection. *(Reference: CR 27.19.1)*