Iceland Responsible Fisheries (IRF) Certification Programme

4th Surveillance Assessment Report

Of The

Icelandic Cod *(Gadus morhua)* Commercial Fisheries

Facilitated By

Iceland Responsible Fisheries Foundation (IRFF)

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Report Code: **ICE/COD/001.4/2018**
Date: **15 February 2019**

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ICELAND RESPONSIBLE FISHERIES
CERTIFIED

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Glossary

AIS	Automatic Identification System
B_{4+}	Biomass of 4 years and older fish
B_{lim}	The biomass limit reference point below which there is a high risk that recruitment will be impaired and that the stock could collapse
B_{loss}	The biomass below which there is no historical record of recruitment
B_{MSY}	SSB that is associated with Maximum Sustainable Yield (MSY)
B_{pa}	Precautionary reference point designed to have a low probability of being below B_{lim}
EEZ	Exclusive Economic Zone
EU	European Union
ETP	Endangered, Threatened and Protected species*
FAO	United Nations Food and Agriculture Organization
F_{lim}	Fishing mortality which in the long term will result in an average stock size at B_{lim}
F_{max}	Fishing mortality rate that maximizes equilibrium yield per recruit
F_{MGT}	Management elected fishing mortality target/limit; usually specified in FMP
FMP	Fishery Management Plan
F_{MSY}	Fishing mortality which in the long term will result in an average stock size at B_{MSY}
F_{pa}	Precautionary reference point for fishing mortality designed to avoid true fishing mortality being above F_{lim}
HCR	Harvest Control rule
ICES	International Council for the Exploration of the Sea
ICG	Icelandic Coast Guard
IMA	Icelandic Maritime Administration
ITQ	Individual Transferable Quota
IUU	Illegal, Unreported and Unregulated fishing
IWC	International Whaling Commission
kt	kilo tonnes
MCS	Monitoring, Control and Surveillance
MII	Ministry of Industries and Innovation
MFRI	Marine and Freshwater Research Institute (formerly MRI)
MRI	Marine Research Institute (now MFRI)
MSY $B_{trigger}$	Parameter in the ICES MSY framework which triggers advice on a reduced fishing mortality relative to F_{MSY}
MSY	Maximum Sustainable Yield; the largest average catch or yield that can continuously be taken from a stock under existing environmental conditions
NAFO	Northwest Atlantic Fisheries Organisation
NAMMCO	North Atlantic Marine Mammal Commission
NEAFC	North East Atlantic Fisheries Commission
NPA	National Program Action
NWWG	North-Western Working Group (within ICES)
SSB	Spawning stock biomass; total weight of all sexually mature fish in the stock
SSB_{MGT}	Management elected SSB target/limit; usually specified in FMP
$SSB_{trigger}$	SSB level that acts as a trigger when the stock fall below a certain level
TAC	Total Allowable Catch
UN	United Nations
VMEs	Vulnerable Marine Ecosystems
VMS	Vessel Monitoring System

*Species recognised by Icelandic legislation and/or binding intemational agreements to which the Icelandic authorities are party. Binding intemational agreements as applicable in Icelandic jurisdiction.

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i. Summary and Recommendations

The Fisheries Association of Iceland on behalf of the Federation of Icelandic Fishing Vessel Owners (LÍÚ), the Federation of Icelandic Fish Processing Plants (SF) and the National Association of Small Boat Owners, Iceland (NASBO) requested an assessment of the Icelandic cod *(Gadus morhua)* commercial fisheries to the FAO Based Icelandic Responsible Fisheries Management (IRF) Certification Programme. Certification was granted the 7th October 2014. The purpose of the Programme is to provide the fishing industry with a "Certification of Responsible Fisheries Management" at the highest level of market acceptance. Certification to the Programme demonstrates a commitment that will communicate to customers and consumers the responsibility of fishermen and fisheries management authorities and the provenance of Icelandic fish. The Iceland Responsible Fisheries Foundation, established in February 2011, owns and operates the brand of Iceland Responsible Fisheries.

The Certification Programme is accredited to the international standard ISO/IEC 17065, confirming that consistent, competent and independent certification practices are applied. Formal ISO/IEC 17065 accreditation by an IAF (International Accreditation Forum) Accreditation body gives the Programme formal recognition (since September 2014) and a credibility position in the International marketplace and ensures that products certified under the Programme are identified at a recognised level of assurance. Demonstration of compliance is verified through a rigorous assessment by a competent, third party, accredited certification body, SAI Global. The assessment was conducted by a team of SAI Global appointed Assessors comprising of internal staff and externally contracted fishery experts. Details of the assessment team are provided in Appendix 1.

The unit of certification includes the Icelandic cod *(Gadus morhua)* commercial fisheries, under state management by the Icelandic Ministry of Industries and Innovation, fished directly with demersal trawls, long-lines, Danish seine nets, gill nets, and hook and line by small vessels, and indirectly with Nephrops trawls, shrimp trawls, pelagic trawls and purse seines within Iceland's 200 nautical miles Exclusive Economic Zone (EEZ).

This Assessment report comprises the 4th Surveillance Report for Icelandic cod. Therefore, this report monitors for any changes in the management regime, regulations and their implementation, stock assessment and status, and wider ecosystem considerations since the 3rd surveillance assessment in 2017. Ultimately this assessment evaluates whether current practices in the management of the cod fishery remain consistent with criteria contained in Revision 2.0 of the IRF Standard. The assessment was conducted according to the Global Trust procedures for FAO-Based IRFM certification using Version 2.0 of the IRFM Standard (July 2016).

The main Key outcomes have been summarized in Section 5. Assessment Outcome Summary.

Conformance against the IRFF Standard V2

During this audit all clauses but one were found to be in full conformance. One minor non-conformance was identified against clause 2.3.2.4 of the IRFF Standard (V2), relating to the appropriate recording of marine mammal and seabird bycatch data in fishing logbooks:

Clause 2.3.2.4. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels.

As a result, in February 2019, the Client provided a corrective action plan to address the gap identified - which the Audit Team accepted. Accordingly, projected future surveillance actions are detailed below.

Clause No.	Surveillance Action
2.3.2.4. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels	According to the corrective action plan stating that such work will be carried out in the "next (coming) months", and considering that clause 2.3.2.4 is a Fishing Vessel Monitoring and Control System clause dealing with the continuous recording of catch amounts by species and fishing area in logbooks (as opposed to data collection generated by research programs), the Client shall provide, in time for the next audit, measurable evidence of corrective action towards the appropriate recording of marine mammal and seabirds catches in fishing logbooks on-board of fishing vessels, as per regulation no.126/2014[1].

Further to the non-conformance identified, two recommendations have been noted.

Recommendation #1 (relating to clause 3.2.2.3)
The assessment team recommends that the population and status of harbour porpoise (*Phocoena phocoena)* and that of harbour seal (*Phoca vitulina*) in Iceland are appropriately monitored due to potential risk of significant depletion to both populations, specifically in regards to their performance in relation to current targets (i.e. FMRI management objective of 12,000 harbour seals) and annual replacement potential (e.g. ASCOBANS threshold of 1.7% for harbour porpoises [2]).

Recommendation #2 (relating to clause 3.1.1 and 3.1.2)
Several fisheries management plans (e.g. those for cod, haddock, saithe and redfish) state that it is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs). VMEs of particular importance within Iceland include cold-water coral communities and hydrothermal vent areas, but also deep-sea sponge aggregations (a threatened and declining habitat, according to OSPAR[3]) and sea-pen fields[4]. Currently, there are explicit conservation measures for cold-water corals and hydrothermal vents (i.e. area closures) but nothing explicit for either deep-sea sponge aggregations or sea pen fields. The assessment team recommends that more formal conservation plans/measures be formulated for these VMEs.

[1] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[2] http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena
[3] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf
[4] https://novasarc.hafogvatn.is/vmes/

Recommendation

The assessment team recommends that the management system of the applicant fisheries, the Icelandic cod (*Gadus morhua*) commercial fisheries under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl, long-line, gill net, Danish seine net, (and hook and line by small vessel gear) and indirectly by Nephrops trawls, shrimp trawls, pelagic trawls and purse seines, are granted continued certification.

ii. Assessment Team Details

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1. Introduction

This surveillance assessment of the Icelandic cod commercial fishery fulfills part of the procedure for the continuing certification of the fishery to the Iceland Responsible Fisheries Programme (hereafter IRF Programme). The IRF Programme is a voluntary program for Icelandic fisheries initially established by the Fisheries Association of Iceland (FAI) and now owned and administered by the Iceland Responsible Fisheries Foundation (IRFF). The IRFF was established in February 2011 and operates on a cost basis, as a non-profit organisation.

IRFF wishes to provide the Icelandic fishing industry with a "Certification of Responsible Fisheries Management" at the highest level of market acceptance. The purpose of the Programme is to provide Certification to requirements under the Programme that demonstrates a commitment that will communicate to customers and consumers the responsibility of fishermen and fisheries management authorities and the provenance of Icelandic fish.

This Surveillance Report comprises the 4th Surveillance Report for Icelandic cod. Therefore, this report monitors for any changes in the management regime, regulations and their implementation, stock assessment and status, and wider ecosystem considerations since the last surveillance assessment in 2017.

The assessment was conducted according to the Global Trust procedures for FAO-Based IRFM certification using Revision 2.0 of the IRFM Standard (July 2016). The IRFM Standard is based on the 1995 FAO Code of Conduct for Responsible Fisheries and on the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009, which in turn are based on the current suite of agreed international instruments addressing fisheries.

The Assessment is based on the 3 major Sections of responsible fisheries management, as outlined in Revision 2.0 of the IRFM Standard, namely:

Section 1: Fisheries Management
Section 2: Compliance and Monitoring
Section 3: Ecosystem Considerations

2. Fishery Applicant Details

Table 1. Fishery applicant details.

Applicant Contact Information	
Organisation/Company Name:	Samtök fyrirtækja í sjávarútvegi (SFS) (Fisheries Iceland)
Date:	8th February 2010
Correspondence Address:	Samtök fyrirtækja í sjávarútvegi (SFS)
Street:	Borgartún 35
City:	Reykjavík
Country:	Iceland
Postal Code:	
Phone:	(354) 591 0300
Web:	www.sfs.is
E-mail Address	info@sjavarutvegurinn.is
Organisation/Company Name:	The National Association of Small Boat Owners, Iceland (NASBO)
Date:	8th February 2010
Correspondence Address:	Landssamband smábátaeigenda
Street:	Hverfisgötu 105
City:	101 Reykjavik
Country:	Iceland
Postal Code:	IS-101
Phone:	(354) 552 7922
Web:	www.smabatar.is
E-mail Address:	ls@smabatar.is

3. Proposed Unit(s) of Assessment and Certification

The applicant Units of Assessment (UoA)(s) (i.e., what is to be assessed) are described by the following:

Table 2. Unit(s) of Assessment (UoA(s)).

Units of Assessment (UoAs)			
Common Across all UoAs		UoA	
Species:	**Common name:**	All	Atlantic cod (Þorskur)
	Latin name:	All	*Gadus morhua*
Geographical Area(s):		All	Iceland 200 mile EEZ within FAO Fishing Area 27
Stock(s):		All	Cod in ICES Division 5a (Iceland grounds)
Principal Management Authority:		All	Ministry of Industries and Innovation (Iceland)
Unique to each UoA		UoA	
Fishing gears:		1	Demersal trawl
		2	Long-line
		3	Gill net
		4	Danish Seine
		5	Hook and line (Handline)
		6	Gears from other Icelandic fisheries legally landing cod* (Nephrops trawl, shrimp trawl, pelagic trawl, purse seine)

*comprised of gears contributing less than 1% to total landings of target species.

The applicant Unit of Certification (UoC) (i.e., what is to be covered by the certificate if all Units of Assessment listed above meet the required standard) is described by the following table.

Table 3. Unit of Certification.

Unit of Certification (UoC)				
Species:	**Common name:**	Atlantic cod (Þorskur)	**Stock:**	Cod in ICES Division 5a (Iceland grounds)
	Latin name:	*Gadus morhua*		
Geographical Area(s):		Iceland 200 mile EEZ within FAO Fishing Area 27		
Principal Management Authority:		Ministry of Industries and Innovation (Iceland)		
Fishing gear(s):		Demersal trawl Long-line Gillnet Daish Seine Hook and line (Handline) Gears from other Icelandic fisheries legally landing cod* (Nephrops trawl, shrimp trawl, pelagic trawl, purse seine)		

*comprised of gears contributing less than 1% to total landings of target species.

There have been no changes to the Unit of Certification in the past year and the Unit of Certification remains the same for the coming year.

4. Surveillance Meetings

Table 4. Summary of meetings, Icelandic cod commercial fishery. Fishery site visits, 27th -29th November 2018.

Date	Organization, location and representative	Main Topics of Discussion
Tuesday 27th of November 2018	09.00 The Client (opening meeting) Kristján Þórarinsson, Fisheries Iceland Axel Helgason NASBO SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Introduction and audit plan/objectives • Confirm Units of Certification for cod, haddock, saithe and golden redfish including gear used (any changes from previous year?) • Changes in fisheries management • Status of stock under assessment • Current issues • Coastal fisheries and rest of the fleet • Ministry bycatch working group
Tuesday 27th of November 2018	10.00 Marine and Freshwater Research Institute (MFRI) Guðjón Már Sigurðsson; Steinunn Hilma Ólafsdóttir; Bjarki Þór Elvarsson SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Changes in data sources, data preparation and assessment method for any of the stocks - now or since last benchmark. • Plans for revisiting/updating Fishery Management Plans or benchmark assessments. • New information on the genetic structure of cod, haddock, saithe and redfish in Icelandic waters. • Landings and catch weights for un-gutted vs. gutted. • Discards rates for cod, haddock, saithe and redfish • Changes in distribution and migration • New studies on fishing gear selectivity • Area closures • *Redfish* Assessment retro problem • Length based indices from the spring survey • Splitting by species • Faroes in international agreements • 90-10 split between Iceland and Greenland • *Cod* current management plan, stock increases and cod in the catches is getting very large. • Pressure to change the rule to allow different cod exploitation • *Haddock* general issues, recruitment pattern • *Saithe* retro-pattern, • Catches below quotas • implications for transfer between species • Management-industry stakeholder consultation arrangements • Short term closures (e.g. 2 week closures) implemented in Icelandic waters to protect juveniles of cod, haddock, saithe and redfish, • Skippers logbooks accounting by MFRI • New studies/reports on bycatch related to the fisheries catching cod, haddock, saithe and redfish • Spotted wolffish in Icelandic waters is caught as bycatch in the bottom trawl and longline fisheries

		• Interactions between the fisheries under assessment and the following: basking sharks and leafscale gulper sharks • Total catch in numbers of Grey skate (*Dipturus flossada*) for the latest available MFRI survey • Catches of Atlantic halibut • Status of Greenland shark and spiny dogfish • Interactions with Blue whales and Northern right whales • New studies or report on Endangered, Threatened and Protected species interactions • Long-liners bycatch reduction devices • Marine mammal and seabird bycatch in the lumpsucker fishery • Bycatch rate in inspector trips was around four times higher than reported by the fleet in 2017 • Bycatch reported in other fisheries (e.g. longliners, gillnetters, bottom trawlers) • Harbour porpoise updates, status and management, • Management objectives set for grey seals • Bycatch recording smartphone app in development by the Directorate of Fisheries • Mortality/survival rate of released marine birds and marine mammals • 2018 towed bottom-fishing gears effort • Bycatch of sponges • Collection of information on non target, non commercial species (e.g. starfish, jellyfish, crabs, tunicates, bivalves, etc..) during the yearly MFRI surveys • Hydrothermal vent chimney areas in Eyjafjord and Southeast Coral closures • Mapping the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances • Multi-species stock assessment/ecosystem based management. Applicability
Tuesday 27th of November 2018	13.00 Fisheries Directorate Þorsteinn Hilmarsson, Head of Services and information Sævar Guðmundsson Department Manager SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Differences on organization, responsibilities, legislation • Changes in technical measures and effort controls • Catch versus TAC for 2017/2018 season. TAC allocation for 2018/2019 season. Deviation from TAC • Current arrangements in terms of quota flexibility • Analysis carried out with the aim of detecting deviations that may occur between actual total catch and TAC • Average inspector coverage % on trawlers, longliners and gillnetters • Shore based monitoring by Directorate's staff • New gear restrictions/technical measures applicable • Short term closures (e.g. 2 week closures) implemented in Icelandic waters to protect juveniles of cod, haddock, saithe and redfish • Closure of coastal areas to bottom trawls • Role of inspectors on board of Icelandic fishing vessels • Changes to the legal and administrative system to improve recording of non-commercial by-catch • Compliance of fishermen recording of such interactions changed in recent years

		• Use of gear modification to prevent encounters with seabirds • Enforcement of, and levels of compliance with, logbook reporting of interactions/bycatch between seabirds and marine mammal • Smartphone app in development by the Directorate of Fisheries, to improve reporting and identification of bycatch • Rules and regulations around marking of static gear and avoid potential gear loss/ghost fishing • Additional considerations or plans for additional coral *Lophelia pertusa* closures in Icelandic waters.
Tuesday 27th of November 2018	15.00 Fish Auction Örn Smárason Branch Manager SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• How catches are reported electronically and sold through the Auction system • System in place to track purchase and sale of fish • Selling the juvenile portion of catches • Treatment of species under species ban in relation to discard ban. • Marketable species, changed in recent years
Wednesday 28th of November 2018	10.00 Coastguard Auðunn F. Kristinsson Project manager, Icelandic Coast Guard SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Enforcement Laws and Regulations. Have there been important amendments or changes to the Icelandic enforcement laws? • Type of vessels boarded (Gears: Trawl, longline, gillnet etc. and Vessel type: wetfish, freezer trawler, small boat etc.). Foreign vessels boarded. • Boardings rate and type/ number of violations recorded • Most commonly occurring violations • Airborne fisheries patrol hours conducted over the last fishing season • Level of resources and monitoring effort • Prosecutions and reprimands made against skippers • Violations of fishermen fishing over their TAC • Changes in violation/compliance rate • What is checked when the vessels are boarded (gear, catch composition) • Changes to the range of monetary and operational penalties for serious infractions to fisheries regulations • Any instances of IUU fishing by Icelandic or foreign vessels • Enforcement of, and levels of compliance with, logbook reporting of interactions/bycatch between seabirds and marine mammal. Any prosecutions for failing to report? Any changes from previous years?
Wednesday 28th of November 2018	13.00 HB Grandi hf Torfi Þorsteinsson General Manager - Groundfish Ingimundur Ingimundarson, Pelagic Fleet Manager	• Updates on HB Grandi's efforts towards fisheries and environmental sustainability • Percentage of catches do HB Grandi's trawlers take on average as a proportion of total catches for the species under assessment • The FMRI 2017 Advice on harbour seals mentions that 86 harbour seals were estimated to have been caught in bottom trawls in 2015. Relevance to HB Grandi's fleet

	SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Technical or management measures are there in place to minimise bycatch and interactions between trawl vessels and marine mammals and seabirds • Measures are there in place to improve fishing selectivity of target species and to exclude/minimise non target catches • Measures are in use by trawl vessels to minimize the impacts of bottom trawl gear on the seabed and sensitive habitats
Wednesday 28th of November 2018	14.30 Kristján Þórarinsson Fisheries Iceland Finnur Garðarsson Iceland Responsible Fisheries Foundation (IRFF) SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Brief review of the 2017/2018 cod, haddock, saithe and golden redfish fishing seasons. Key issues or updates etc. • Any recent changes in the management system, key laws or regulations • Any key changes to management of small boat coastal fisheries or allocations • Plans for revisiting/updating Fishery Management Plans • Updates on the Iceland Responsible Fisheries Programme. • Fisheries interactions with marine mammals and seabirds recording and management efforts. Recent improvements, issues and updates • Initiatives to improve the fishing industry in Iceland and promote the utilisation of a greater proportion of catches • Interactions between small vessels and larges vessels. Recent improvements, issues and updates
Thursday 29th of November 2018	10.00 BirdLife International Erpur Snær Hanssen SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Birdlife International work/projects in Iceland • Icelandic fisheries (especially longliners and gillnetters) interactions with seabirds • Long-liners in Iceland reportedly use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. Use of such practices (e.g. tori lines, night settings, acoustic devices) or equivalent practices within the industry • Other measures in place to improve fishing selectivity of target species and to exclude/minimise non target catches and interactions • Interaction between the fisheries under assessment and ETP seabird species • New projects, studies or other relevant updates
Thursday 29th of November 2018	11.00 Vísir hf. Pétur Pálsson, General Manager Erla Pétursdóttir SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Updates on Visir HF efforts toward fisheries and environmental sustainability • Percentage of catches Visir HF longliners take on average as a proportion of total catches for the species under assessment • Long-liners are reported to use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. Are there specific regulations for the use of use mitigation measures on longline fisheries (e.g. tori lines, night settings, acoustic devices) or equivalent practices? • What other management measures (e.g. communication, move away from hotspot type rules) are there in place to

		minimise interactions between longliners and marine mammals and seabirds • What measures are there in place to improve fishing selectivity of target species and to exclude/minimise non target catches • To what extent are such bycatch reduction devices / practices used in the fisheries under assessment by industry
Thursday 29th of November 2018	13.00 The Client (closing meeting) Kristján Þórarinsson, Fisheries Iceland Axel Helgason NASBO SAIG Assessment Team: Vito Romito Conor Donnelly Dankert Skagen Gisli Svan Einarsson	• Summary of people met • Key findings from various stakeholders • Issues about marine mammals and seabird bycatch recording in logbooks • Assessment timelines for redfish, cod, haddock and saithe

5. Assessment Outcome Summary

Section 1: Fishery Management

Iceland has a well-established marine policy, specified in legislation, on the structure of fisheries management and in practical implementation. The Ministry of Industries and Innovation is the principal management organization responsible for Icelandic fisheries. The Directorate of Fisheries is responsible for the implementation of Fishery Regulations on behalf of the Ministry. The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine and Freshwater Research Institute (MFRI) and Ministry of Industries and Innovation. The Marine and Freshwater Research Institute conducts a wide range of marine research and provides the Ministry with scientific advice. The cod stock is managed according to a management plan, approved by the International Council for Exploration of the Sea (ICES) that has been in place since 2010. The main management measures include TACs in an ITQ system, area closures to protect undersized fish and mesh size regulations.

There is an established assessment method (ADCAM) for Icelandic cod, developed by MRI and approved following a benchmark assessment by ICES. The assessment is based on catch numbers at age and the results of two extensive bottom trawl surveys. Catch numbers at age are obtained by combining landings statistics with samples from the landings, obtained through an organized sampling regime. The assessment of the stock is done by the ICES North Western Working Group (NWWG) where all relevant nations are represented. ICES reviews the NWWG report and provides advice based on the report. TACs are set according to scientific advice from ICES and MFRI. The Minister of Fisheries and Agriculture decides on the TAC of the cod stock for each fishing year (Sept – Aug) in accordance to law (Fisheries Management Act 116), based on the advice by MFRI. ICES also evaluates management plans at the request of fisheries managers; this was done with the cod management plan in 2009 and again in 2015. The 2015 evaluation of the management plan did not recommend any changes and advised that management continue to follow the current plan. A new benchmark process is being planned for 2021.

Within the fishery management plan a limit reference point for the spawning stock biomass and a target reference point for fishing mortality are defined as part of a harvest control rule. The harvest control rule also has a trigger biomass below which the harvest rate is reduced. The harvest control rule is considered precautionary and is expected to give near maximum long term yield. A limit fishing mortality is not included in the management plan, and is considered redundant as the existing rules, together with strong mechanisms for implementation and enforcement, are regarded as sufficient to protect against overfishing.

Cod in Icelandic waters are considered to be a local stock, with some drift at early life stages out of the area and occasional immigration from Greenland. Some diversity in stock structure has been suggested in the past, but this was not confirmed by more recent studies and presently, the stock is managed as a single unit. There is an extensive system of closures to protect spawning grounds for cod. To avoid fishing undersized cod and to reduce the incentive for discarding, there are area closures (permanent and temporary in real time), mesh size regulations and special arrangements for payment of undersized cod that is landed.

Section 2: Compliance and Monitoring

An effective legal and administrative framework has been established through various fisheries management acts. Compliance is ensured through strict monitoring, control and enforcement carried out by the Directorate and the Icelandic Coastguard.

Vessels must weigh catch within two hours of landing on the quay. The system is developed to standardize weights and tares for ice and tubs (a standard tub is used throughout Iceland for fresh fish that has a capacity of 280 – 300 kg). The weight registration document for each vessel is transmitted to the Fisheries Directorate, which also receives the e-logbook information. These two sets of information are then compared and the appropriate reduction is made to the vessel quota. Weighed recorded landings are the main source of catch documentation. Logbook data is used as a secondary source to cross check landings. Any transfer under the ITQ system for each vessel is also monitored to ensure that any additional quota requirements are rented from other vessels within a 3 day period.

There is an integrated system for monitoring, control and surveillance (MCS) in Iceland. The Icelandic Coastguard administers the VMS for all Icelandic vessels and for all foreign vessels (including fishing vessels) that enter Icelandic waters as part of an integrated MCS system. The purposes of the MCS system are numerous including maritime traffic control, marine search and rescue and fisheries enforcement. The importance of the fisheries sector to the Icelandic economy and the need for greater efficiency, due to the relatively small size of the institutions involved, has led to high levels of collaboration and integration resulting in creative and dedicated approaches to fisheries management and enforcement. The fisheries MCS system in Iceland has at its core the effective use of available technology meaning relatively small staff numbers are able to achieve extensive monitoring of the Icelandic fishing industry.

In order to facilitate the matching of the species composition of the catch and the quota portfolio for individual fishing vessels or companies, and also to reduce incentives for discard, a variety of flexibility provisions are in place. Current quota share, allocation and remaining quota can be obtained from the Fisheries Directorate's website for any vessel. The system is very transparent. Rules are enforced by the Directorate and the MFRI. There are penalties for serious infractions.

Catch analysis includes the comparison of catch amount with figures for the amounts of sold or exported products in order to ensure independent checking of the accuracy of information about the fish that is brought ashore. If analysis reveals discrepancies between the information stated in the reports and the information received from the harbour weighing, corrective measures are taken as appropriate.

Section 3: Ecosystem considerations

The MFRI is leading in marine and freshwater research in Icelandic territories and the arctic, providing advice on sustainable use and protection of the environment with an ecosystem approach by monitoring marine and freshwater ecosystems. The main research priorities are research on marine and freshwater ecosystems, sustainable exploitation of main stocks, ecosystem approach to fisheries management, research on fishing technology and seafloor and habitat mapping. In the waters to the north and east of Iceland, available information suggests the existence of a simple bottom-up controlled food chain from phytoplankton through *Calanus spp.*, capelin and to cod. Less is known about the structure of the more complex southern part of the ecosystem. The Icelandic marine ecosystem is highly sensitive to climate variations as demonstrated by abundance and distribution changes of many species during the warm period in the 1930s, the cold period in the late 1960s and warming observed during the recent years.

The Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species; as such the effects of bottom contact fishing gears are not separable by species and thus are generally attributed to the fishery as a whole rather than to any species in particular. With regards to retained catches, most commercially fished species in Iceland are now part of the ITQ system. Discarding is prohibited and comparison between observer measured catch compositions and self-reporting by fishers ensures that a high level of compliance with the ban on discarding is maintained. Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty (400,000 to 8,000,000 ISK or about 3,000 to 60,000 EUR). In a practical sense, if vessels do not have sufficient quota to cover the species they have caught they are required to attain quota through the quota transfer system.

The electronic logbook system designed by TrackWell allows for marine mammal and seabirds to be recorded along with normal catch. In total there are 171 marine mammal and seabird species pre-programmed into the e-log system that are selectable by fishers. Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/catches is a legal requirement (Reg. 126/2014). A smartphone app is in development by the Directorate of Fisheries to make both reporting and identification of bycatch easier for operators in the fishery. In relation to the quality of by-catch data, it is important to note that Directorate's inspector coverage of all gear types is limited, and that the sampling is not focused on documenting seabird and marine mammal by-catch.

The Directorate has placed extra effort in monitoring gillnet fisheries for lumpfish and for cod in 2017/2018 due to bycatch issues. Bycatch of seabirds, small cetaceans, and seals is known to occur in bottom setnets, particularly in Breidafjordur (western Iceland) and in the north. Harbour porpoise *Phocoena phocoena* is the most commonly bycaught marine mammal, but seals are also caught, especially in the lumpsucker *Cyclopterus lumpus* fishery. The 2017 ICES Ecosystem Overview on the Icelandic Ecoregion reports that the main bycaught seabird species are northern fulmar *Fulmarus glacialis*, common murre *Uria aalge*, northern gannet *Sula bassana*, black guillemot *Cepphus grylle*, and common eider *Somateria mollissima*, all caught in bottom setnets. Bycatches in gillnets targeting cod have decreased, associated with a large decrease in effort.

Further to the associated bycatch species to the Icelandic cod fishery there are other vulnerable and /or ETP species occurring in Icelandic waters according to the Convention for the Protection of the Marine Environment of the North-East Atlantic or OSPAR Convention.

Interactions between fishing gears and the seabed are highly dependent on gear type with towed bottom gears such as demersal trawls and dredges having a greater impact than static gear such as longlines, set nets or pots. The 2017 ICES Report on the Icelandic Ecoregion Ecosystem highlights that based on analysis of electronic logbook data a total area of about 79 000 km^2 was fished with towed bottom-fishing gears in 2013 in Iceland, composing 10% of the ecoregion. Based on recent data from the MFRI Ecosystem Overview report it is possible to see that bottom trawl effort has decreased from 2013 (just above 150 thous. hours) to 2017 (to about 125 thous. hours) by about 17%. Although bottom trawl effort does not necessarily equate to trawled area it is possible that an area less than 10% of the Iceland ecoregion was disturbed by bottom trawls in 2017.

In a long-term mapping project, albeit opportunistic in nature, the MFRI collects data to describe habitat types and ecosystems of the sea-floor around Iceland, including VME's. The data is collected with underwater cameras with high spatial accuracy. Benthic fauna and sediment are also recorded. Vulnerable habitats, according to FAO, OSPAR and ICES, are identified when observed. It is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs; sponge communities, coldwater corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. Large areas within the Icelandic EEZ are closed, either temporarily or permanently, to fishing for a variety of reasons; these include the protection of juveniles, spawning fish and VMEs. Cumulatively, a large portion of Icelandic shelf area within which fishing activities occur is closed to bottom trawling. Furthermore, not all the fishable shelf areas outside closed areas are trawlable, as some parts of the seabed are unsuitable for trawl gear.

Other measures to minimize or mitigate ecosystem issues identified include technical measures such as the use of night settings, trailing balloons, scare lines and weighted lines in longline fisheries, the trial of bycatch reduction devices in gillnet fisheries, the use of flying doors and rock hoppers on bottom trawlers, and, where appropriate, the specific consideration of predation in some stock assessments as is the case in the assessment of capelin which considers the cod-capelin predator-prey relationship.

6. Conformity statement

The assessment team recommends that the management system of the applicant fisheries, the Icelandic cod (*Gadus morhua*) commercial fisheries under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl, long-line, gill net, Danish seine net, and hook and line by small vessel gear, and indirectly by Nephrops trawls, shrimp trawls, pelagic trawls and purse seines, are granted continued certification. SAI Global duly confirms that continued certification is granted.

7. Conformance Criteria Fundamental Clauses for Surveillance Reporting

7.1. Section 1: Fishery Management

Clause 1.1 – Fisheries Management System and Plan for Stock Assessment, Research, Advice and Harvest Controls

Supporting Clauses:	1.1.1, 1.1.2, 1.1.3, 1.1.4, **1.1.5, 1.1.6**, 1.1.7, 1.1.8 and sub-clauses, 1.1.9 and sub-clauses, 1.1.10 and sub-clauses			
Important Note:	Clause 1.1.5 and Clause 1.1.6 are new to IRFM Standard v2.0 and are scored separately in Appendix 2. Text added to 1.1.10.5 in IRFM Standard v2.0: ***"…and relevant authorities."*** Clause 1.1.10.5 (minor change) – wording change only no change to intent of Clause.			
Clause Guidance:	***There shall be a structured and effective fisheries management system, with objectives including the limiting of total annual catches for the stock under consideration. Accordingly, appropriate management measures for the conservation and management of the stock shall be adopted and effectively implemented by the competent authorities. Fishing for the "stock under consideration "shall be managed by the competent authorities in accordance with a documented and publicly available Fisheries Management Plan.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Iceland has a well-established marine policy, specified in legislation, on the structure of fisheries management and in practical implementation. The Ministry of Industries and Innovation is the principal management organization responsible for Icelandic fisheries. The Directorate of Fisheries is responsible for the implementation of Fishery Regulations on behalf of the Ministry. The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine and Freshwater Research Institute and Ministry of Industries and Innovation. The Marine and Freshwater Research Institute conducts a wide range of marine research and provides the Ministry with scientific advice. The stock is managed according to a management plan, approved by ICES, that has been in place since 2010. The main management measures include TACs in an ITQ system, area closures to protect undersized and spawning fish and mesh size regulations.

EVIDENCE

Iceland has an established Marine Policy[5]. There is a principal Act *(last amendment No 116/2006)* and a number of supporting Acts and Regulations for the management of the fishery[6]. Article 1 in the principal act states the overall objective for Icelandic fisheries management: *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 utilisation, thereby ensuring stable employment and settlement throughout Iceland.*

There is a structured fisheries management system adopted within Iceland for the management of fish species including cod[7]. There are a number of inter-related government agencies within the system under

5 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/

6 An updated collection (in Icelandic) is issued yearly at http://vefbirting.oddi.is/raduneyti/fiskveidar2018/108/

7 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management /

the direction of the Ministry of Industries and Innovation which has ultimate responsibility. Policies incorporate a number of International Agreements, including; UN Convention of the Law of the Sea, Agenda 21 of the Rio Declaration, FAO Code of Conduct for Responsible Fisheries and the International Plan of Action to prevent, deter and eliminate Illegal, Unregulated and Unreported Fishing[8].

The Ministry of Industries and Innovation[9] in Iceland is the principal management organization responsible for Icelandic fisheries and has the ultimate responsibility for fisheries management. They act according to law issued by the parliament (Althingi), and according to advice from the MFRI. Overall responsibilities include:

- Fisheries management, research, conservation and utilization of fish stocks, other living marine resources of the ocean and the seabed and management of areas where these resources can be harvested.
- Research and control of production and import of fisheries products.
- Mariculture of marine species.
- Supporting the research, development and innovation in the fisheries sector.

The executive body is the Fisheries Directorate (Fiskistofa)[10]. The Icelandic Coast Guard (ICG)[11] is responsible for control at sea, both of the catches and the quality of the vessels. It performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine and Freshwater Research Institute and Ministry of Industries and Innovation. The MFRI conducts a wide range of marine research and provides the Ministry with scientific advice. MFRI was established on July 1, 2016 as a result of a merger of two Icelandic research institutes, the Institute of Freshwater Fisheries (founded in 1946), and the Marine Research Institute (founded in 1965).[12]

Limiting the total annual catch of cod is achieved primarily by an annual TAC. This TAC is distributed on vessels as individual transferable quotas (ITQ), managed by the Directorate. In addition, there are area closures (temporary and permanent), and gear restrictions in place. There is extensive control and monitoring of landings. Discards are prohibited, and studies by MFRI have indicated that discards of cod are small. The estimated discard rate has increased recently and was about 7% by number in the 2014/2015 season in the trawl fishery and slightly lower in the long line fishery. [13]

The Ministry sets the overall TAC for each species, including cod. The TAC is set taking advice from MFRI, which is responsible for collecting and analysing scientific data on the stock. The MFRI advice is based on calculations done within the framework of ICES. ICES provides advice, which normally, but not necessarily, is followed by MFRI and subsequently by the Ministry. Management also includes fora for consultation with stakeholders.

8 https://www.government.is/news/article/2018/05/15/Fisheries/
9 http://eng.atvinnuvegaraduneyti.is/
10 http://www.fiskistofa.is/english
11 http://www.lhg.is/english
12 https://www.hafogvatn.is/en/about/mfri
13 Communicated by MFRI at site visit 27/11-2018, see also https://www.hafogvatn.is/static/research/files/hafogvatn2016_003pdf

There is a management plan in place for cod. The current plan was introduced in 2009, examined and approved by ICES in 2010[14], and revised in 2015[15]. The plan is publicly available [16]. Almost similar rules have been in effect since the 1995/1996 season, and the history of harvest rules for Icelandic cod goes back to 1976.

2018 Update

The Client group representative highlighted during the 2018 site visits that there is an ongoing effort to revise and integrate Icelandic fisheries regulations to facilitate understanding by fishermen and applicability by the management organisations. The official Icelandic committee report on the revision of Icelandic fisheries regulations is titled (and roughly translated as):
Conclusions of a working group on the comprehensive revision of regulations on the use of fishing gear, fishing areas and protected areas in Icelandic waters – final report to the minister of fisheries and agriculture[17].

14 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf
15 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf
16 https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
17 https://www.stjornarradid.is/lisalib/getfile.aspx?itemid=0b53db18-ba77-11e8-942c-005056bc530c

Clause 1.2 – Research and Assessment

Supporting Clauses:	1.2.1, 1.2.2, 1.2.3, 1.2.4 and sub-clauses, 1.2.5, 1.2.6, 1.2.7			
Important Note:	Clause 1.2.1: Text added (**Bold**) in IRFM Standard v2.0: "*A competent research institute or arrangement shall collect and/or compile the necessary data and carry out scientific research and assessment of the state of fish stocks and the condition of the ecosystem.* ***Research results shall be made public in a timely and readily understood fashion."*** Minor change – Dissemination of research results addressed specifically below.			
Clause Guidance:	***The relevant data collected/compiled by the relevant authorities shall be appropriate to the chosen method of stock assessment and sufficient for its execution, in line with assessing the size and/or productivity of the fish stock(s) under consideration. The determination of suitable conservation and management measures shall include or take account of total fishing mortality from all sources (including discards, incidental mortality and catches in other fisheries). Furthermore, there shall be active collaboration with international scientific organizations for stock assessment activities and review, and, in cases where the stock under consideration is a shared stock or a straddling stock or a highly migratory stock, there shall be scientific cooperation at the relevant bilateral, regional or international level for obtaining data and/or conducting stock assessments and/or providing advice, as appropriate.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

There is an established assessment method (ADCAM) for Icelandic cod, which is approved by ICES. The assessment is based on catch numbers at age and the results of two extensive bottom trawl surveys. Catch numbers at age are obtained by combining landings statistics with samples from the landings, obtained through an organized sampling regime. The assessment is done within ICES by the North-Western Working Group, with a method that was developed by the MFRI and approved in a benchmark by ICES. International review is through ICES. Iceland also has a broad international cooperation on matters relevant to the fishery with several other organisations.

EVIDENCE

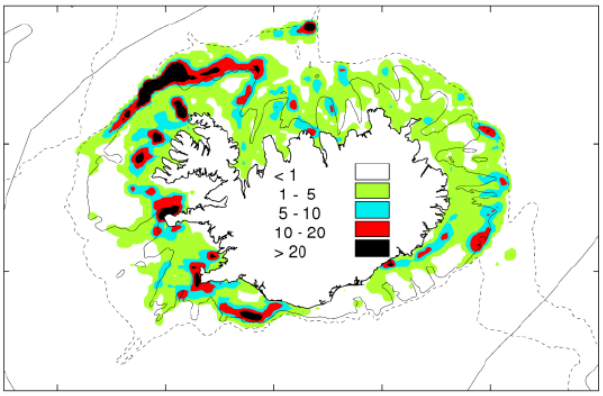
Assessment method

The method for assessing the abundance and exploitation of the cod in Iceland has evolved over many years. It is a forward running statistical catch-at-age model (ADCAM) where fishing mortality-at-age is allowed to change gradually in time (random walk). The model operates on the commercial catches disaggregated by age, and two bottom trawl surveys, in spring and autumn. ICES revised the method in a benchmark process in 2015. It noted points that might be considered further, in particular a discrepancy between the two surveys, but did not recommend changes[18]. A full re-evaluation of the assessment method and procedures is scheduled for 2021.

18 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf

Catch data

The catch data in numbers at age are obtained by combining landings data with age distributions from samples. The vast majority (234 649 t of 237 644 t in 2016/2017) of the catches are taken by Icelandic vessels in Icelandic waters. Cod is caught all around the island (Figure below) primarily by demersal trawlers (49%) and longliners (32%) Catches by gillnet has gone down since 2000 and is now 7%, Danish seine and jiggers take 6% each. Landings in Iceland are restricted to authorised ports where the amounts landed are recorded by certified weighers[19]. The landings data are managed by the Directorate of Fisheries and used as landings data in the assessment.



Þorskur. Veiðisvæði árið 2017 (t/sjm²)
Cod. *Fishing grounds in 2017 (t/nmi²)*

Figure 1. Icelandic cod catch distribution in 2017 (tonnes/nmi²).

The sampling of catches[20] is fully computerised and directly linked to the daily landings statistics available from the Directorate of Fisheries. For each species, each fleet/gear and each landing strata there is a specific target of landings value; once the cumulative daily landings value pass the target value an automatic request is made to the sampling team for a sample to be taken. Catch numbers-at-age are calculated using length distributions and age-length keys. Weights at age are calculated from weight-length relationships with parameters estimated for each area, season and fleet. The method has remained consistent for many years.

Discards

Discarding is prohibited[21] and is regularly monitored by comparing size distributions in self-reported catches and those taken by onboard Directorate inspectors; this method insures against high-grading, but not necessarily against discarding for other reasons. The most recent estimates for discards of cod were 1.76% of landings by weight in the long line fishery and 2.43% (approximately 7% by numbers) in the trawl fishery.

19 http://vefbirting.oddi.is/raduneyti/fiskveidar2018/22/
20 Annex 6 (pages 84 ff) in ICES. 2015: Report of the Benchmark Workshop on Icelandic Stocks (WKICE), 26 – 30 January 2015, Copenhagen, Denmark. ICES CM 2015/ACOM: 31. 325 pp: http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf
21 Act concerning the Treatment of Commercial Marine Stocks No. 57, 3 June 1996: https://www.althingi.is/lagas/nuna/1996057.html

Both percentages, although low, are the highest in 10 years or more[22] (Figure below). In the stock assessment, discards are considered negligible and are not included.

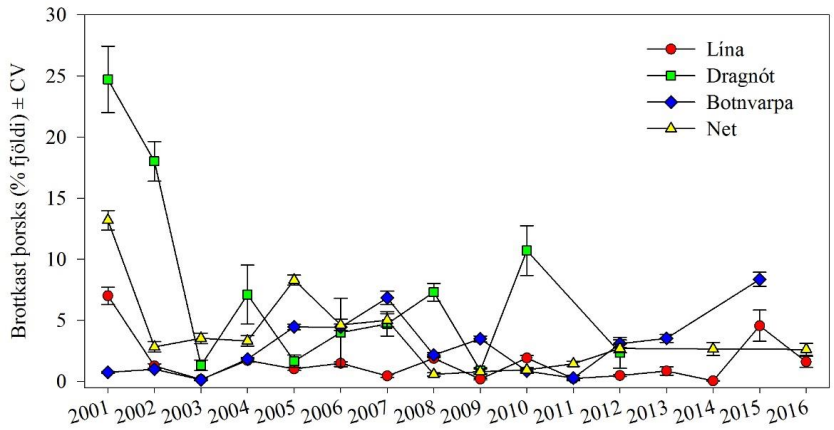


Figure 2. Discards of cod by gear type, in percent by numbers from 2001 to 2016

Survey data

There is a spring groundfish survey and an autumn groundfish survey, both covering the whole Icelandic EEZ. These surveys are more extensive than most surveys that are used for routine assessments (530 stations in the spring survey, 380 stations in the autumn survey) (Figure below)[23]. There are only minor changes from year to year in the coverage. An extensive survey protocol is available[24].

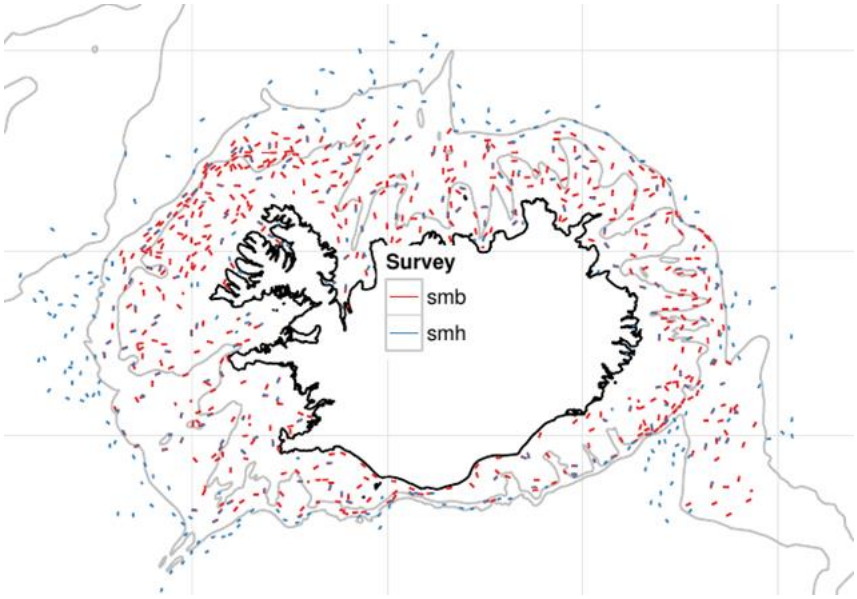


Figure 3. Stations in the bottom trawl surveys. Red: Spring survey. Blue: Autumn survey.

22 Guðjón Már Sigurðsson & al. Mælingar á brottkasti þorsks og ýsu 2014-2015, available at: https://www.hafogvatn.is/static/research/files/hafogvatn2016_003pdf

23 WD17 (pp 259-313) in ICES. 2015: Report of the Benchmark Workshop on Icelandic Stocks (WKICE), 26–30 January 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:31. 325 pp: http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf

24 http://www.hafro.is/Bokasafn/Timarit/fjolrit-156.pdf

Stock Status

Estimated spawning stock biomass (SSB) has increased in recent years and has not been larger in 50 years. Harvest rate has declined and is at its lowest value in the assessment period. Recruitment since 1988 (mean = 140) is lower than the average recruitment in the period 1955–1985 (mean = 205). The increase in SSB is therefore primarily the result of lower harvest rate. The 2013 year class is estimated small, but the sizes of the 2014 and 2015 year classes are near the long-term average.

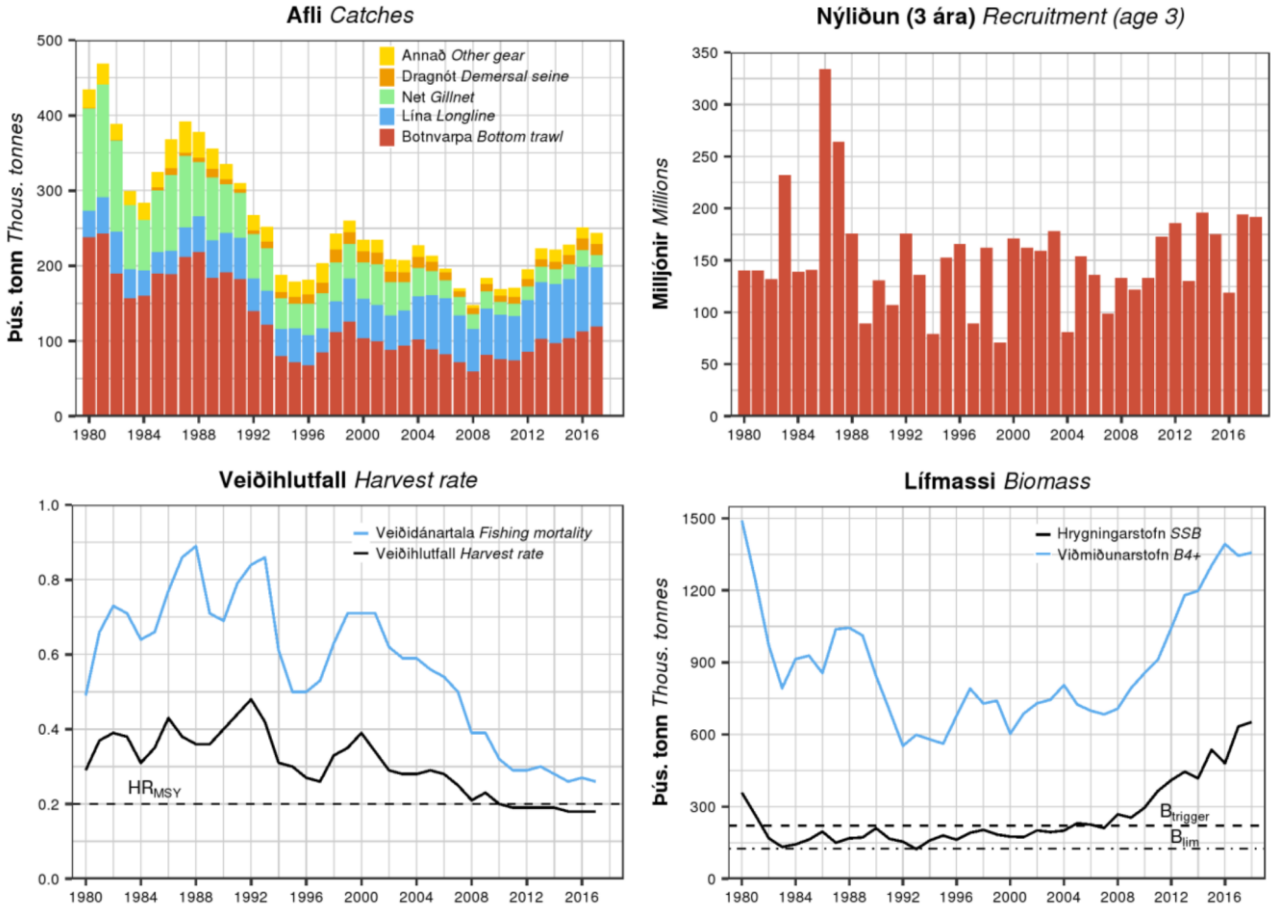


Figure 4. Icelandic Catch by gear type, recruitment at age 3, fishing mortality and harvest rate, reference stock biomass (B4+) and spawning stock biomass (SSB).

International cooperation and review

The assessment is conducted by the ICES North-Western Working Group, where stakeholder nations participate. In a benchmark-process, at the most recent evaluation in ICES in 2015, the assessment method was approved without changes. ICES advices on catches based on the assessment of the NWWG.

The harvest rule in the current management plan was evaluated and approved by ICES in 2009[25]. A new evaluation using substantially the same method, was presented to the benchmark workshop in 2015[26]. The benchmark study concluded that the developments of the stock dynamics from 2009 onward were as expected at that time and confirmed the conclusion from 2009 that the HCR is in accordance with the precautionary approach and the ICES MSY approach.

Iceland has broad international scientific cooperation through organisations such as the Northeast Atlantic Fisheries Commission (NEAFC), the Northwest Atlantic Fisheries Organization (NAFO), and the North Atlantic Marine Mammal Commission (NAMMCO). Icelandic scientists have been involved in many international projects arranged by these organizations and in co-operative projects with research institutes and universities.

Cod is considered to be a local Icelandic stock and not a migratory or straddling stock. There is a link to cod in East Greenland, where cod occasionally migrates from Greenland to Iceland. Such events are unpredictable. Management does not assume such events, but take them as a bonus in terms of increased future stock abundance when it happens. The other way there may be drift of larvae, while emigration of adult Icelandic cod occurs only rarely[27].

Research results are made public in a timely and readily understood fashion

The assessment is done by the ICES NWWG[28]. ICES provides advice based on the results from NWWG[29]. Once released, the advice and the NWWG report are available at the ICES website. The final advice to Icelandic authorities is provided by MFRI. The MFRI advice follows the advice for ICES unless there is good reasons to deviate from it. MFRI provides an overview of the state and the advice for all major Icelandic stocks on its website[30].

25 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2009/AGICOD/AGICOD%20Report%202009.pdf; Report of the Ad hoc Group on Icelandic Cod HCR Evaluation (AGICOD), 24–26 November 2009 ICES, Copenhagen, Denmark. ICES CM 2009\ACOM:56. 89 pp.

26 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf; Section 6.

27 as above

28 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/NWWG/11%20NWWG%20Report%202018_Sec%2009_Icelandic%20cod%20in%205.a.pdf

29 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/cod.27.5a.pdf

30 https://www.hafogvatn.is/is/veidiradgjof

Clause 1.3 – Stock under Consideration, Harvesting Policy and the Precautionary Approach

Clause 1.3.1 – The Precautionary Approach

Supporting Clauses:	1.3.1.1, 1.3.1.2, 1.3.1.3, 1.3.1.4, 1.3.1.5, 1.3.1.6			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***The precautionary approach shall be implemented, as specified in the Fisheries Management Plan, to effectively protect the stock under consideration. Accordingly, relevant uncertainties shall be taken into account through a suitable method of risk assessment, appropriate reference points shall be determined, and specified remedial actions shall be taken if reference points are approached or exceeded.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

A limit reference point is defined for the spawning stock biomass. As part of a harvest rule, a target harvest rate is defined as a proxy for a target reference fishing mortality. The harvest rule has a trigger biomass below which the harvest rate is reduced. The harvest rule is considered precautionary and expected to give a near maximum long term yield.

EVIDENCE

ICES has defined precautionary reference points for Icelandic cod, as well as reference points related to MSY (Table 5). The list was revised and extended by ICES in 2016. The revisions have no impact on the management of cod.

Table 5. Cod in Division 5a (Iceland grounds). Present reference points, values and their technical basis (ICES, 2017[31]).

Framework	Reference point	Value	Technical basis
MSY approach	MSY $B_{trigger}$	220 000 t	Trigger point in HCR considered consistent with ICES MSY framework.
	HR_{MSY}	20%	Stochastic HCR evaluation. Percentage of age 4+ biomass.
Precautionary approach	B_{lim}	125 000 t	B_{loss}
	B_{pa}	160 000 t	$B_{pa} = B_{lim} \times \exp(1.645\sigma_B)$, $\sigma_B = 0.15$
	F_{lim}	0.74	Equilibrium F which will maintain the stock above B_{lim} with a 50% probability.
	F_{pa}	0.58	5% probability that true F has been above F_{lim}. $F_{pa} = F_{lim} \times \exp(-1.645\sigma_F)$ and $\sigma_F = 0.15$.
Management plan	MGT $B_{trigger}$	220 000 t	The 5th percentile on the distribution of SSB when the TAC is based on HR_{MGT}.
	HR_{MGT}	20%	Percentage of age 4+ biomass. Leads to long-term MSY.

The biomass limit reference point (B_{lim}) is based on the lowest observed spawning biomass (B_{loss}), as is common practise when there is no clear relation between SSB and recruitment (Figure below). B_{lim} was set at 125,000 the lowest SSB on record which occurred in 1993, according to the 2010 assessment. The most recent assessment has a slightly lower B_{loss} (123,000 t). At the time the present management plan was developed, the objective was to have a high probability (95%) of bringing SSB above the 2009-level, which

31 http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/cod.27.5a.pdf

was estimated at 220,000 t. In the later revision, this rebuilding target became a trigger point below which the rule prescribes a reduction in the harvest rate. ICES found that this former rebuilding target would be an adequate trigger in the MSY context. A precautionary biomass reference point (B_{pa}) was set by ICES in 2016, but has no impact on the management as the management plan does not prescribe any particular action if that level is passed. It was set according to ICES standard practise as a safety margin around the limit reference point, assuming a CV of 15% on the assessment biomass[32].

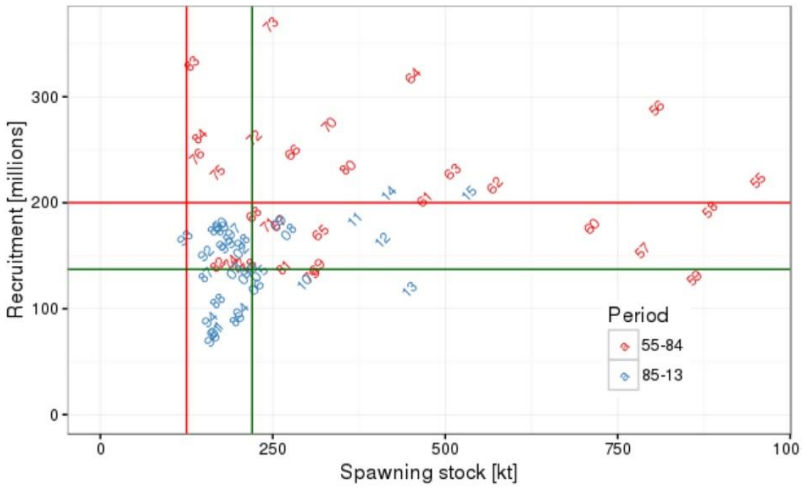


Figure 5. Spawning stock biomass and corresponding recruitment at age 3. Numerical values refer to recruitment year while the horizontal lines refer to geometric mean recruitment in years 1954 – 1984 (red line) and 1985 – 2016 (green line). Vertical lines refer to B_{lim} (B_{loss}, red) and $B_{trigger}$ (green) (Source: NWWG 2016[33]).

ICES has set (in 2016) a limit fishing mortality (F_{lim}) at 0.74 and a precautionary fishing mortality (F_{pa}) at 0.58. The limit is the fishing mortality that will lead to SSB at B_{lim} in equilibrium, and the F_{pa} represents a safety margin to that assuming a CV of the assessment error of 15%.

The effective implementation of the precautionary approach is through the management plan, which has a harvest rate corresponding to a fishing mortality (approximately 0.3) well below the F_{pa} and F_{lim}, and is expected, according to simulations that took all relevant uncertainties into account[34], to keep the SSB above the trigger biomass (and the far lower limit biomass) with a high probability. In 2015, the plan was extended until 2020. The plan, aimed at providing maximum sustainable yield, has been evaluated by ICES and is considered to be precautionary. According to the management plan, the TAC for the fishing year Y/Y+1 (September 1 of year Y to August 31 of year Y+1) is calculated as follows:

$$TAC_{Y/Y+1} = \frac{\min\left(\frac{SSB_Y}{MGT\ B_{trigger}}, 1\right) 0.2\ B_{4+,Y} + TAC_{Y-1/Y}}{2}$$

where $B_{4+,Y}$ is the biomass of cod aged 4 and older in year Y and MGT $B_{trigger}$ = 220,000 t. A new benchmark assessment and revision of the harvest rule is planned for 2021.

32 Same as above.
33 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2016/NWWG/11%20NWWG%20Report%20-%20Sec%2009%20Icelandic%20cod.pdf
34 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf

Clause 1.3.2 – Management targets and limits

Clause 1.3.2.1 – Harvesting rate and fishing mortality

Supporting Clauses:	1.3.2.1.1, 1.3.2.1.2			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***The management target for fishing mortality (or its proxy) and the associated limit reference point, as well as the management action to be taken when the limit reference point is exceeded, shall be stated in the Fisheries Management Plan. If fishing mortality (or its proxy) is above the limit reference point, management actions shall be taken to decrease the fishing mortality (or its proxy) below the limit reference point.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The management plan has a target harvest rate, a trigger biomass and a rule to reduce the harvest rate if SSB falls below the trigger biomass. A limit fishing mortality is not included in the management plan, and is considered redundant as the existing rules, together with strong mechanisms for implementation and enforcement, are regarded as sufficient to protect against overfishing.

EVIDENCE

There is a target harvest rate (20% of age 4+ biomass) in the management plan, which is equivalent to a target fishing mortality. This harvest rate is associated with a low (<5%) probability of bringing the spawning biomass below the trigger level of 220,000 t, which is still well above the limit biomass of 125,000 t.

No limit fishing mortality has been included in the plan. The existing rules, together with strong mechanisms for implementation and enforcement, are regarded as sufficient to protect against overfishing. In addition there are supportive measures (area closures, gear restrictions, discard ban, strict landings control and control at sea) that contribute to keeping exploitation under control.

The limit fishing mortality set by ICES (0.74) is far above the expected fishing mortality in the management plan. The target harvest rate (0.20) corresponds to an average fishing mortality of approximately 0.30. ICES has adopted the target harvest rate in the management plan as an MSY reference point (Table 5 in Clause 1.3.1).

Clause 1.3.2.2 – Stock biomass

Supporting Clauses:	1.3.2.2.1, 1.3.2.2.2, 1.3.2.2.3, 1.3.2.2.4			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***The long term management target for stock size (biomass), either explicit or implicit depending on management approach, and limit reference points consistent with the objective of promoting optimum utilization, shall be specified. Furthermore, limits or directions for stock size (or its proxy), consistent with avoiding recruitment overfishing shall be specified and should the estimated stock size approach B_{lim} (or its proxy), then appropriate management action shall be taken with the objective of restoring stock size to levels above B_{lim} (or its proxy) with high probability within a reasonable time frame.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The harvest rule in the management plan has a trigger biomass, below which the exploitation will be reduced. There is also a limit biomass defined. With the current rule and stock dynamics, the probability of reaching the trigger biomass is low, and reaching the limit is highly unlikely. If needed, there is the legal framework and a suite of control measures available to management to take further action. A target biomass has not been defined, as the primary management tool is a harvest rate, which should lead to near maximum catches in the long term.

EVIDENCE

The harvest rule has no specific biomass target, but a trigger spawning biomass at 220 000 tonnes, below which the harvest rate shall be reduced, as described under Clause 1.3.1. When the current plan was adopted in 2009, this biomass value was a rebuilding target. A limit spawning biomass is defined at 125 000 tonnes. This is the lowest value in the historical time series, and there is no indication of reduced recruitment at that level.

According to simulation studies taking relevant sources of uncertainty into account and assuming the current stock dynamics, the target harvest rate (20% of age 4+ biomass) in the management plan is associated with a near maximum ling term yield and a low (<5%) probability of bringing the spawning biomass below the trigger level of 220,000 t, which is still well above the limit biomass of 125,000 t. The existing rules, together with strong mechanisms for implementation and enforcement, are regarded as sufficient to protect against overfishing. In addition there are supportive measures (area closures, gear restrictions, discard ban, strict landings control and control at sea) that contribute to keeping exploitation under control.

Clause 1.3.2.3 – Stock biology and life-cycle (Structure and resilience)

Supporting Clauses:	1.3.2.3.1, 1.3.2.3.2, 1.3.2.3.3			
Important Note:	Old Clause 1.3.2.3.3 removed from Standard in IRFM Standard v2.0.			
Clause Guidance:	***Information on the biology, life-cycle and structure of the stock shall be taken into account and consideration shall be given to measures designed to avoid excessive exploitation of spawning components at spawning time, as appropriate, especially at times when biomass (SSB) may approach the level of the limit reference point (B_{lim}). Relevant gear selectivity properties for the protection of juvenile fish shall be specified, as appropriate. Consideration shall also be given to measures designed to limit fishing mortality of juvenile fish, e.g. through temporary closures to fishing of areas containing a high proportion of juveniles of stock under consideration, with the objective of reducing the likelihood of growth overfishing and increasing the contribution of year classes to the spawning stock.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Cod in Icelandic waters are considered to be a local stock, with some drift at early life stages out of the area and occasional immigration of adult cod from Greenland. Some diversity in stock structure has been suggested, but is not confirmed in more recent studies. Presently, the stock is managed as a single unit.

There is an extensive system of closures to protect spawning grounds for cod. To avoid fishing undersized cod and to reduce the incentive for discarding, there are area closures (permanent and temporary in real time), mesh size regulations and special arrangements for payment of undersized cod that is landed.

EVIDENCE

The cod in Icelandic waters is regarded as a local stock, with minor exchange with other cod stocks. Its distribution is confined to the Icelandic shelf. Some offspring may drift over to East Greenland waters, and occasional year classes may occasionally be supplemented by fish migrating back to Iceland from Greenland. The last such event was in 2009. The stock assessment takes such events into account. The management does not make assumptions about migration events. When it happens, it is taken as a bonus.

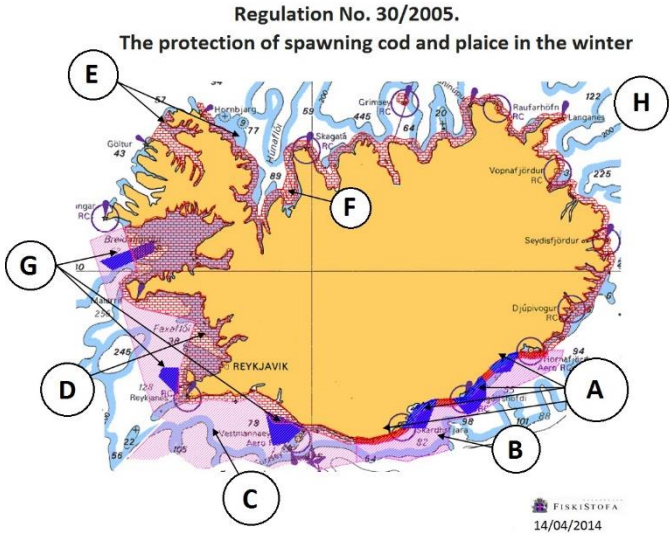
Some diversity in stock structure has been suggested. A slight but significant genetic difference was reported between the cod spawning in the northern waters vs cod spawning in the southern waters (Pampoulie *et al*., 2007)[35] and there are indications that different behavioural type (shallow vs. deep migration) may be found within cod spawning in the same areas (Pampoulie *et al*., 2008).[36] Both these information indicate that

35 Pampoulie, C., Ruzzante, D. E., Chosson, V., Þóra Dögg Jörundsdóttir, Þ. D., Taylor, L., Þorsteinsson, V., Daníelsdóttir, A. K., Marteinsdóttir, G., 2007. The genetic structure of Atlantic cod (*Gadus morhua*) around Iceland: insight from microsatellites, the *Pan* I locus, and tagging experiments. Canadian journal of Fisheries and Aquatic Sciences 63: 2660-2674.

36 Pampoulie, C., Jakobsdóttir, K. B., Marteinsdóttir, G., and Thorsteinsson, V., (2008). Are Vertical Behaviour Patterns Related to the Pantophysin Locus in the Atlantic Cod (*Gadus morhua* L.)? Behavior Genetics 38: 76-81

management measures operating on a finer scale may be warranted (WKICE 2015[37]). However, more recent studies indicate high levels of gene flow in cod around Iceland, contradicting the previous proposals (Eriksson, 2015)[38]. Hence, although the issue is yet to be fully resolved, the present practice which manages the cod as a single homogeneous stock is probably adequate.

There is an extensive system of areal closures that are, to a large extent, designed to avoid exploitation of cod at the spawning grounds in the spawning season, and to avoid catching juvenile fish (Figure below). Closures can be permanent or temporary. Permanent closures are according to regulations by the Ministry and can be valid for parts of the year or the whole year. They are intended to protect spawning grounds, nursery areas, vulnerable habitats etc. For cod, spawning grounds are off the South-West coast but smaller, variable regional spawning components have also been observed all around Iceland. Furthermore, there are mesh size regulations in place to protect juveniles; the minimum mesh size in trawl is 135 mm. If undersized fish are caught, they have to be landed. Special rules apply for payment to encourage landing, but discourage catching of undersized fish.



A. Regulation No. 30/2005. Eastern Region Article 1. 1 and 2. April 8th through April 16th

B. Regulation No. 30/2005. Eastern Region Article 1.3. Amended by Regulation No. 225/2007. April 17th to 10:00 April 28th

C. Regulation No. 30/2005. Western Article 2.4. Amended by Regulation No. 225/2007. April 12th to 10:00 April 21st

D. Regulation No. 30/2005. Western Article 2. Paragraphs 1, 2 and 3. April 1st through April 11th

E. Regulation No. 30/2005 Northern and Eastern Regions, Article 3. A, B and C amended by Regulation No. 380/2008 from April 15th to 10:00 April 30th (A, B and C).

F. Regulation No. 30/2005. Northern and Eastern Regions, Article 3. D amended by Rgl. 380/2008 from 15th April to time 10:00 April 30th (D).

G. Regulation No. 30/2005. Article 4 Plaice Area. Closures April 1st to April 30th

H. Regulation No. 30/2005. Article 5 exemptions. Article worded so that notwithstanding the provisions of Articles 1 to 4 fishing sea cucumbers, lumpfish, inshore shrimp, scallops, sea urchins, whelk, ocean quahog and rearing of cod is permitted provided requisite licenses for the relevant area are obtained. (Amended by Regulation No. 289/2010)

Figure 6. Permanent closures to protect spawning grounds for cod and plaice[39].

The following figure shows the short term closures (e.g. 2-3 week closures) implemented in Icelandic waters to protect juveniles of cod, haddock, saithe and redfish from 2012 to 2017. Short term closures are decide upon by Directorate's inspectors by measuring juvenile fish on board of fishing vessels or through the dockside monitoring program. If an area is closed via temporary closures more than 3 times, MFRI may decide to make it a permanent closure. The juvenile thresholds for closing areas are: cod 25% under 55 cm, haddock 30% under 45 cm, saithe 30% under 55 cm, redfish 20% under 33 cm.

37 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf

38 Eriksson, G. M., (2015) Population genetic structure in gadoid fish with focus on Atlantic cod *Gadus morhua*. Dissertation for Ph.D. University of Iceland, Faculty of Life and Environmental Sciences. Reykjavik October 2015.

39 http://www.fiskistofa.is/media/veidisvaedi/Hrygningarstopp_2.pdf

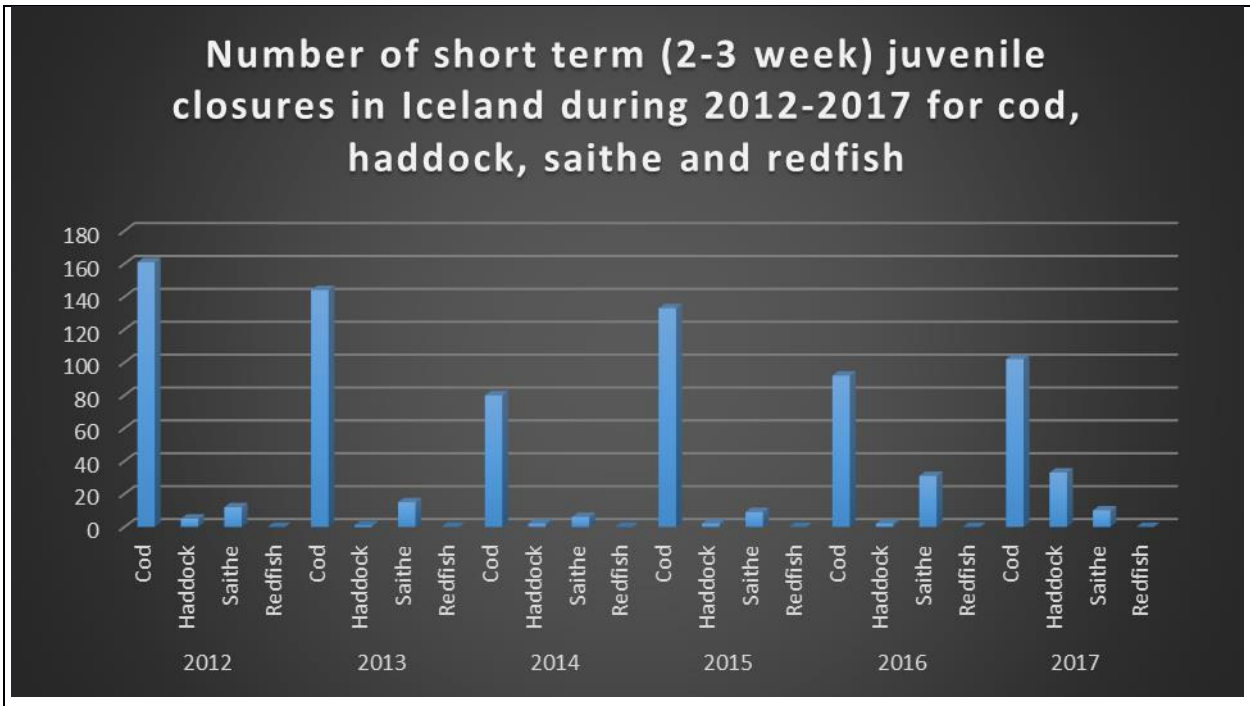


Figure 7. Short term closures (e.g. 2-3 week closures) implemented in Icelandic waters to protect juveniles of cod, haddock, saithe and redfish from 2012 to 2017. Source MFRI, provided during the 2018 site visits.

Clause 1.4 – External Scientific Review

Supporting Clauses:	1.4.1, 1.4.2			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***For the stock under consideration the harvesting policy (including its consistency with the precautionary approach), stock assessments and advice shall be reviewed, by request from the fisheries management authorities at appropriate, regular intervals as well as when substantive changes are made in harvesting policy by an appropriate international scientific body or committee. Following external scientific review, the competent fisheries management authority shall review and/or revise the harvesting policy, taking into consideration the external review, as appropriate.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Stock assessments are regularly supervised by ICES, which is considered to be the appropriate international scientific body. ICES evaluate management plans at the request of relevant fisheries managers; this was done with the cod management plan in 2009. In 2015 the plan was re-evaluated within the ICES benchmark process. No changes were recommended, and ICES advices to follow the plan. A new benchmark process is being planned in 2021.

EVIDENCE

ICES[40] is considered to be the appropriate international scientific body. The annual stock assessments and short term predictions are performed by the ICES North-Western Working Group, and reviewed routinely as part of the ICES advisory process. This is done according to the Memorandum of Understanding between ICES and NEAFC. ICES have developed routines for more in-depth review of assessment methods and data that go into the assessment (benchmark assessments). Ideally, this should be done approximately every 5 years, or if there are reasons to alter the assessment practises. Iceland cod was benchmarked in 2015[41], where the assessment procedures that have been practised in recent years were endorsed. A new benchmark is being planned for 2021.

ICES evaluates management plans at the request of responsible managers. In many cases, including for Icelandic stocks, the work is done outside ICES and reviewed and endorsed by ICES. The evaluation work for the current management plan for Icelandic cod was done by MRI, and reviewed by ICES through an Ad hoc Group on Icelandic cod[42] (AGICOD) in 2009. ICES' Advisory Committee on Management (ACOM) provided the advice based on the work by MRI and AGICOD[43]. The reviews of the plan were undertaken with respect to its

40 http://www.ices.dk/Pages/default.aspx
41 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf
42 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2009/AGICOD/AGICOD%20Report%202009.pdf
43 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf

consistency with the precautionary approach, its consistency with the MSY approach and its ability to reach the target biomass in 2015 as the main objectives.

A new evaluation using substantially the same method, was presented to the benchmark workshop in 2015. That study concluded that the developments of the stock dynamics from 2009 onward were as expected at that time and confirmed the conclusion from 2009 that the HCR is in accordance with the precautionary approach and the ICES MSY approach[44]. ICES continues to advice to follow the plan[45]. The plan will be revisited at the planned benchmark in 2021.

44http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf
45 http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/cod.27.5a.pdf

Clause 1.5 – Advice and Decisions on TAC

Supporting Clauses:	1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.5.10			
Important Note:	Clause 1.5.1: Text added (**Bold**) in IRFM Standard v2.0: "*A competent scientific body, research institute, designated advisory body or arrangement shall provide the competent fisheries management authority with fisheries advice on the harvesting of the stock under consideration, **in a timely manner**.*" Minor change – Timeliness of fisheries advice addressed specifically below. Clause 1.5.9: Minor change to wording and text added (**Bold**). IRFM Standard v1.1: *Management agreements reached in the competent Regional Fisheries Management Organization(s) or arrangements, relevant to the stock under consideration, shall be implemented by states and effectively and uniformly executed.* IRFM Standard v2.0: *The competent fisheries management authorities **shall cooperate and actively participate** in competent Regional Fisheries Management Organisation(s) (RFMOs) or arrangement(s), relevant to the stock under consideration and management agreements reached shall be implemented by fisheries authority and effectively and uniformly executed.* Minor change – Management authorities' cooperation and participation in RFMOs or arrangements addressed specifically below.			
Clause Guidance:	***Appropriate scientific advice shall be provided to the competent fisheries management authority including on the appropriate value(s) for precautionary reference points. For shared stocks the setting of TAC shall take into consideration international agreements and scientific advice. Decisions on TAC shall be made and implemented in such a way as to ensure that the actual catch is as close to the intended catch as practically possible.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The Minister of Fisheries and Agriculture decides on the TAC of the cod stock for each fishing year (Sept – Aug) in accordance to law (Fisheries Management Act 116), based on the advice by MFRI. The MFRI advice is based on work and advice by ICES.

EVIDENCE

Stock assessment and advice, including advice on harvest rules, TACs and reference points is provided by ICES. The process involves all relevant nations and the advice is for all areas. The advice is taken over by local authorities. The Icelandic cod stock is almost entirely a national stock, more than 98% of the catches are taken by Iceland in Icelandic waters.

The Minister of Fisheries and Agriculture decides on the TAC of the cod stock for each fishing year (Sept – Aug) in accordance to law (Fisheries Management Act 116), based on HCR and the advice mentioned below. Since the introduction of the HCR in the fishing year 2010 – 2011, the scientific advice has been according to the rule, and the TAC set equal to the advice (Table below). The actual catch has been higher than the TAC

(3-8%) except in 2016/2017 where catch was slightly below the TAC (Figure below). This is further discussed in Section 2.

Table 6. TACs and actual catches, according to MFRI.

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli Íslendinga *Catches Iceland*	Afli annarra þjóða *Catches others*	Afli alls *Total catch*
2010/11	160000[1)]	160000	165000	2000	167000
2011/12	177000[1)]	177000	183000	2000	185000
2012/13	196000[1)]	195000	210000	2000	215000
2013/14	215000[1)]	214000	224000	2000	226000
2014/15	218000[1)]	216000	221000	2000	223000
2015/16	239000[1)]	239000	249000	2000	251000
2016/17	244000[1)]	244000	234 649	2995	237 644
2017/18	257572[1)]	255172			
2018/19	264 437[1)]				

[1)] 20% aflaregla. *20% harvest control rule.*

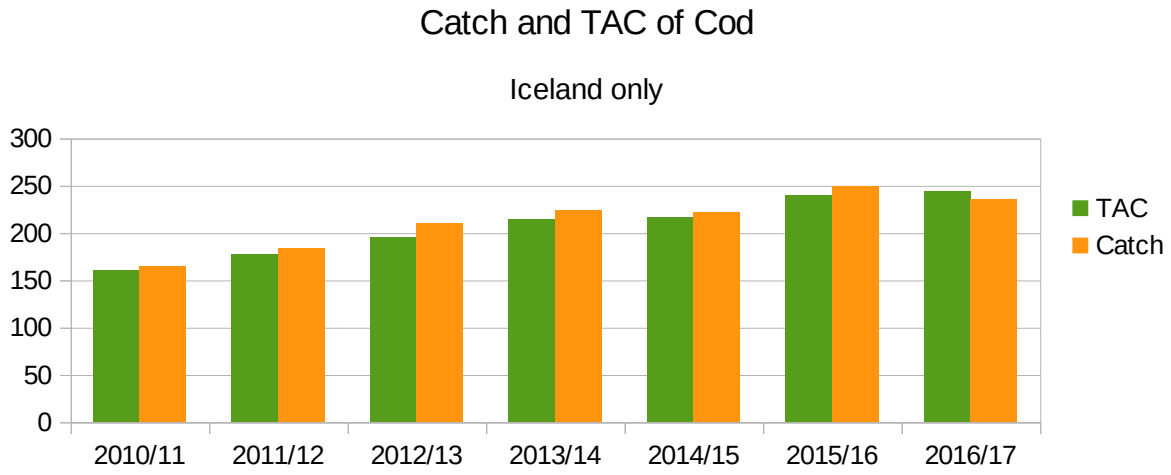


Figure 8. Icelandic TAC and catch of Icelandic cod.

The MFRI advises the Minister of Industry and Innovation on the exploitation of the cod stock in June each year; ICES also provide advice. Both ICES and the MFRI advise on research and harvesting policy in general. The recommendation given by the MFRI is peer reviewed by the Advisory Committee (ACOM) of ICES every year.

Fisheries advice is provided in a timely manner

Fishing seasons in Iceland runs from the 1st September in year y to the 31st August in year y+1. Surveys and ICES and MFRI assessments are conducted early in the year so as to allow advice books to be published in May/June[46]. Following the publication of fisheries advice regulations on quotas are enacted in July[47], well in advance of the commencement of the fishing season on the 1st September.

46https://www.hafogvatn.is/is/veidiradgjof/thorskur

47https://www.stjornartidindi.is/Advert.aspx?RecordID=4819cdde-0a89-4f80-b21a-46bb071dd15f

Management authorities' cooperation and participation in RFMOs or arrangements

Some of Iceland´s commercially important fish stocks extend beyond its 200 nm EEZ and as a result are shared between countries/states; these shared stocks have necessitated the development of international cooperation. The major shared fish stocks in Iceland are golden redfish (*Sebastes marinus*), deep sea redfish (*Sebastes mentella*), Greenland halibut (*Reinhardtius hippoglossoides*), capelin (*Mallotus villosus*), blue whiting (*Micromesistius poutassou*), Atlantic mackerel (*Scomber scombrus*) and Norwegian spring spawning herring (*Claupea harengus*). Being a local stock, cod is solely managed by Iceland.

Other examples of Iceland's fisheries management authorities cooperating internationally include:

- An agreement on the management of the capelin stock between Iceland, Greenland and Norway.
- A consensus reached between the EU coastal states, the Faeroe Islands, Iceland and Norway on the management of the blue whiting stocks.
- An agreement on quota sharing between the coastal states for Norwegian spring spawning herring.

In addition, Iceland participates in other fisheries and non-fisheries organisations/arrangements in the North Atlantic region such as:

- The North East Atlantic Fisheries Commission (NEAFC[48])
- The Northwest Atlantic Fisheries Organisation (NAFO[49])
- The International Council for the Exploration of the Sea (ICES[50])
- The North Atlantic Marine Mammal Commission (NAMMCO[51]).

48 http://www.neafc.org/
49 http://www.nafo.int/
50 http://www.ices.dk/Pages/default.aspx
51 http://www.nammco.no/

7.2. Section 2: Compliance and Monitoring

Clause 2.1 – Implementation, Compliance, Monitoring, Surveillance and Control

Supporting Clauses:	2.1.1, 2.1.2			
Important Note:	Clause 2.1.2 is new to IRFM Standard v2.0 and is scored separately in Appendix 2.			
Clause Guidance:	***An effective legal and administrative framework at the local, national or regional level, as appropriate, shall be established for the fishery, and compliance shall be ensured through effective mechanisms for monitoring, surveillance, control and enforcement.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

An effective legal and administrative framework has been established through various fisheries management acts. Compliance is ensured through strict monitoring, control and enforcement carried out by the Directorate and the Icelandic Coastguard. Laws and regulations concerning conservation and management measures are publicly available on the Ministry of Industries and Innovation website and are effectively disseminated through an online law gazette.

EVIDENCE

The Icelandic Directorate of Fisheries is an independent administrative body responsible to the Fisheries Minister, responsible for the day to day implementation of the Act on Fisheries Management and related legislation, for day-to-day management of fisheries and for supervising the enforcement of fisheries management rules. More Specifically, the Directorate of Fisheries works in accordance with the following Acts, the Directorate of Fisheries Act (no. 36/1992)[52], the Fisheries Management Act (no. 116/2006) and the Act on Fishing in Iceland's Exclusive Economic Zone (no. 79/1997). Accordingly, it issues fishing permits to vessels and allocates catch quotas, imposes penalties for illegal catches, supervises the transfer of quotas and quota shares between fishing vessels, controls the reporting of data on the landings of individual vessels and monitors the weighing of catches. It also provides supervision on board fishing vessels and in ports of landing (i.e. shore based monitoring), which involves inspecting the composition of catches, fishing equipment and handling methods. Its counterpart, the Icelandic Coast Guard, carries out fisheries inspection at sea, monitors the EEZ and receives required notifications from vessels[53].

The primary legislative instrument relating to fisheries management in Iceland and the basis for the ITQ system is the Fisheries Management Act No.116/2006[54]. It superseded the Fisheries Management Act 1990 and established allocation harvest rights and permit requirements for all participating commercial fishing vessels.

These permit requirements represent the initial legal requirement without which a vessel may not obtain the quota necessary to fish for Icelandic quota stocks, such as cod. General fishing permits are of two types, namely a general fishing permit with a catch quota and a general fishing permit with a hook-and-line catch

[52] https://www.althingi.is/lagas/149a/1992036.html

[53] https://www.government.is/news/article/?newsid=e747dac7-fb88-11e7-9423-005056bc4d74

[54] https://www.ecolex.org/details/legislation/fisheries-management-act-1990-lex-faoc003455/

quota. A vessel may only hold one type of fishing permit each fishing year. Commercial fishing permits are cancelled if a fishing vessel has not been fishing commercially for 12 months (Article 4, Act No.116/2006).

A register of all vessels permitted to fish in Icelandic waters is administered by the Maritime Division of the Icelandic Transport Authority (ICETRA)[55].

The Act governing fishing activities within the Icelandic EEZ (Act No. 79/1997[56]) specifies the Icelandic EEZ and prohibits foreign vessels from fishing within Iceland's EEZ (unless by prior agreement). It sets out the areas vessels are permitted to fish within the EEZ according to fishing vessel size and power index category (Article 5 of Act No. 79/1997). It grants powers to the Minister to limit fishing to prevent localised overfishing of a specific stock or excessive by-catch of non-target species (Article 7) and requires the Minister to take measures to prevent harmful fishing practices and to preserve sensitive areas (Article 9). It requires the MFRI to be notified of harmful fishing, particularly where the proportion of undersized fish in the catch exceeds advised reference levels, grants powers to the MFRI to declare temporary closures and sets out how these should be implemented (Articles 10 and 11). It grants powers to the Minister to set rules on the minimum size of marine animals which can be caught (Article 14) and sets out penalties for violation of the provisions of the Act (Articles 15-17) which include the power to confiscate fishing gear and catch in the case of major or repeated violations. The Act stipulates that fines assessed in accordance with the Act as well as the value of any confiscated catch and fishing gear, shall accrue to the Icelandic Coast Guard Fund.

The Directorate of Fisheries issues reprimands and can suspend the commercial fishing permits of vessels violating the Fisheries Act or rules adopted by virtue of it, as provided for in detail in the Act Concerning the Treatment of Commercial Marine Stocks (Act No. 57 1996[57]). Penalties for violation of the Fisheries Management Act No.116/2006 provisions include the following:

- Fines for first offences shall not exceed ISK 4,000,000, (~ € 30,000) depending upon the nature and scope of the violation.
- Fines for repeated offences shall amount to a minimum of ISK 400,000 (~ € 3,000) and a maximum of ISK 8,000,000, (~ € 60,000) again, depending upon the nature and scope of the violation.
- Provisions of the Act on a Special Fee for Illegal Marine Catch[58] are also applied, in the case of violations.
- Cases of serious or repeated deliberate violation shall furthermore be liable to imprisonment for up to six years (Article 24 and 25 of Act No.116/2006).

Furthermore, fines assessed in accordance with the Act on Fishing in Iceland's Exclusive Fishing Zone No. 79/1997, as well as the value of any confiscated catch and fishing gear, shall accrue to the Icelandic Coast Guard Fund[59].

Control of discarding of fish is provided for by the Treatment of Commercial Marine Stocks Act No. 57 1996, which prohibits discarding and fishing without sufficient quota. Furthermore, the Act stipulates that all fish caught within the Icelandic EEZ, or during trips where a proportion of fishing activities take place in the EEZ,

[55] https://www.icetra.is/maritime/ships-and-cargoes/
[56] extwprlegs1.fao.org/docs/texts/ice89476.doc
[57] https://www.althingi.is/lagas/149a/1996057.html
[58] https://www.althingi.is/lagas/149a/1992037.html
[59] extwprlegs1.fao.org/docs/texts/ice89476.doc

must be landed in an officially recognised ports. Some of the recognised ports are outside Iceland (i.e. Faroese).

Within two hours of landing, catches are officially separated, weighed and recorded by accredited weighing stations and reported against the appropriate quota allocation following provisions outlined in the Act No 57, 1996 concerning the Treatment of Commercial Stocks, and Regulation No. 745/2016 on Weighing and Recording of Marine Resources[60]. The Fishery Management Act[61] also makes provisions for processing at sea, weighing by auction houses and the transfer of quotas to cover landings.

During the surveillance on the 27thNovember 2018, the site visit assessors visited a fish market auction in Reykjavik that handles 4-5% of all fish landed in Iceland. The auction receives fish from large and smaller vessels that land daily. The team were shown the landed fish, weighing scales and the information recorded on the system which goes to the Port Authority who then submit it to the Fisheries Directorate's catch registration system. Both the weighing scales and their operators are licensed and audited by the Directorate. The system is developed to standardise weights and tares for ice and tubs (a standard tub is used throughout Iceland for fresh fish such as cod and has a capacity of 280-300 kg). The tubs are labelled for the purposes of traceability. We were also shown the equipment used to measure ice.

As required by Article 10 of Regulation No. 745/2016, each landing generates a weighing receipt[62] [63] recording:

- Vessel name, registration number and district number;
- Landing port and date of landing;
- Name of seller, buyer and recipient of the catch;
- Official weight by species of catch;
- Proportion of undersize fish in catch;
- Number, type and weight of tubs/boxes/barrels;
- Fishing gear used;
- Total number of pallets of platforms;
- Registration number and tare of transport vehicle;
- Whether catch is to be re-weighed;
- Whether any of the catch is un-gutted and needs to be either weighed after gutting or converted to a gutted weight using coefficients provided by Directorate.

As mentioned earlier, the Directorate of Fisheries is responsible for the day-to-day implementation of Fishery Regulations; however, at sea surveillance is primarily the remit of the Icelandic Coast Guard. The Directorate has 61 staff (2017) located at 6 offices throughout the country with its headquarters in Akureyri**Error! Bookmark not defined.** (**Error! Reference source not found.**).

[60] https://www.stjornartidindi.is/Advert.aspx?RecordID=884be309-64a5-4367-9e4d-f5e7216b6f40

[61] https://www.ecolex.org/details/legislation/fisheries-management-act-1990-lex-faoc003455/

[62] https://www.fmis.is/blank

[63] http://www.unuftp.is/static/fellows/document/pan09prf.pdf

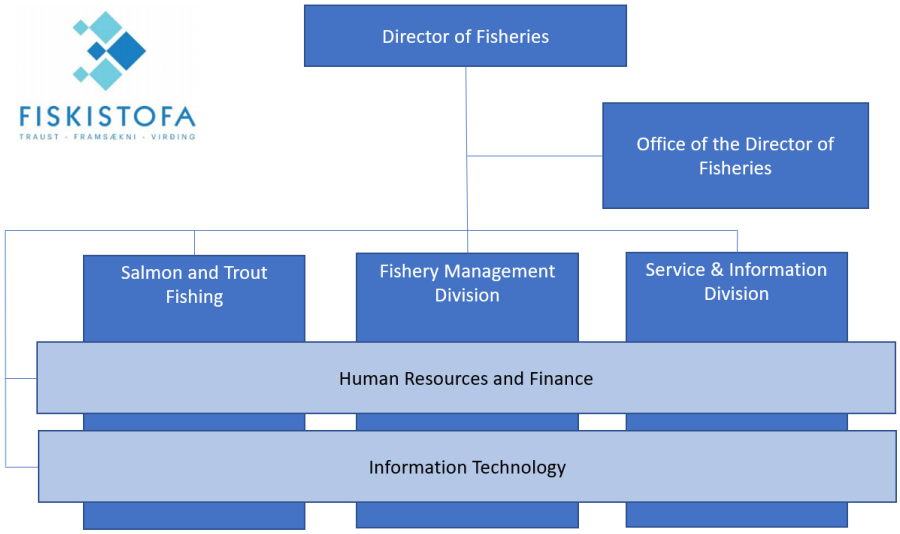


Figure 9. Directorate of Fisheries organisational chart and staff Directorate of Fisheries organisational chart and staff (Source: SAIG, modified from http://www.fiskistofa.is/umfiskistofu/skipurit/).

The Icelandic Coast Guard monitors commercial fishing vessels in Iceland's EEZ on a continuous basis. There are requirements surrounding the reporting of vessel position (manually or using VMS systems) and the reporting of catch on entering or leaving Icelandic waters. In 2017, the Coast Guard conducted 155 vessel boardings, a decrease on the corresponding number of 216 in 2016. The Coast Guard also undertake aerial surveillance, amounting to 166 hours in 2017 which is lower than 2015-2016 when over 200 hours were flown. The main reasons for the generation of remarks during Coast Guard inspections have largely remained consistent in recent years or declined (Figure below**Error! Reference source not found.**). The most significant numbers of infringements relate to manning lists (lögskráningar) and seaworthiness (Haffæri).

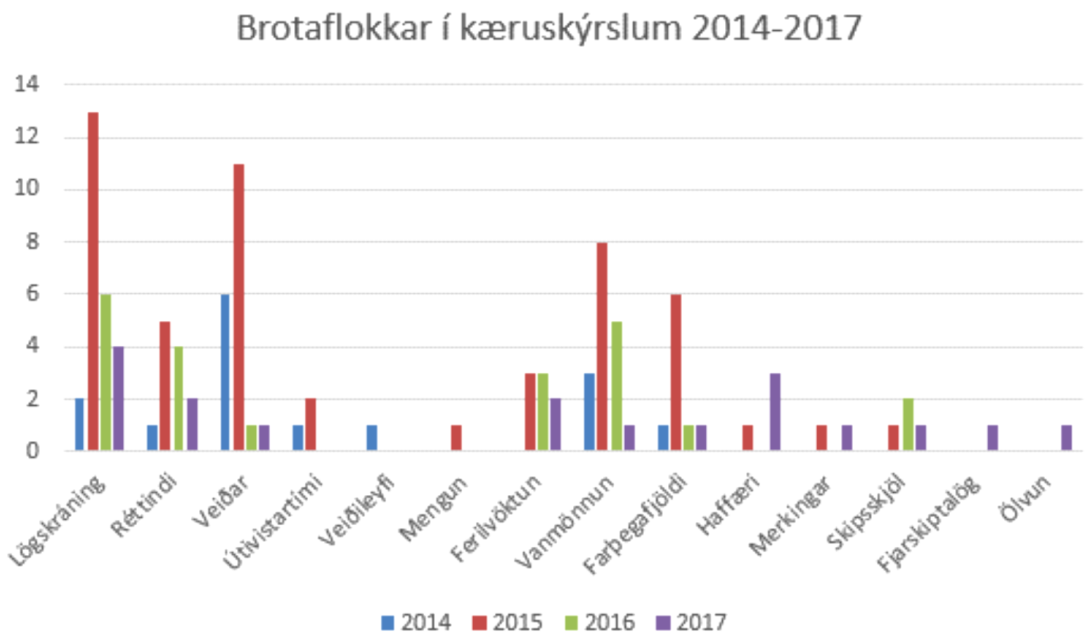


Figure 10. Reasons for the generation of remarks, by no. of remarks generated, during Coast Guard inspections in 2014-2017; Lögskráningar – Manning list, Réttindi – License, Veiðar – Fishing, Útivistartími – Time limits , Veiðileyfi – Fishing permit, Mengun – Pollution, Ferilvöktun – VMS, Vanmönnun – Manning,

Farþegafjöldi – Passengers, Haffæri – Sea worthiness, Merkingar – Marking, Skipsskjöl – Ship's papers, Fjarskiptalög – telecommunications, Ölvun - intoxication (Source: presentation provided to the assessment team by the Coast Guard).

Vessel logbooks are inspected during random unannounced boardings both at sea and on the quayside by the Coast Guard and the Directorate fishery inspectors which may include a comparison of catch and logbook entries and measuring fish caught to determine the percentage of juveniles in catches which may trigger temporary area closures. The following table shows the Directorate's inspector days at seas inspecting vessels as a proportion of total fishing effort.

Table 7. Directorate inspector days on fishing vessels (Source: Directorate of Fisheries, Nov. 2018 site visit).

Fishery type	Bottom Trawl	Longline	Gillnet (include lumpfish fishery and cod fishery)
2017/2018 days	570	202	152
2017/2018 coverage %	1.93%	0.64%	3.64%

Acts/Laws and Regulations may be accessed by searching by Act/Law/Regulation No./Year (e.g. 116/2006) at http://www.althingi.is/lagasafn/ (for Acts/Laws) or https://www.reglugerd.is/ (for Regulations).

The latest 2018 fishing laws are made available in a booklet form by the Icelandic authorities and effectively disseminated through an online law gazette[64].

The Fisheries Directorate website also prominently displays announcements relating to the management of the fishery including, for example, in relation to allocation of quota, opening and closure of fisheries, license revocations, reminders about legal requirements etc.[65]

All scientific advice is available online[66]. Harvest control rules are scrutinised on request by an independent scientific body (ICES) with reports being published online.

Up-to-date maps of fisheries closures are available on-line on the Fisheries Directorate website[67]. Temporary closures are announced by the Coastguard on VHF radio on a specified wavelength and also on the radio before the news and weather (Fisheries Directorate pers. com. site visit November, 2018). They are also published on the MFRI website[68].

[64] http://vefbirting.oddi.is/raduneyti/fiskveidar2018/108/

[65] http://www.fiskistofa.is/

[66] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/cod.27.5a.pdf

[67] http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/

[68] https://www.hafogvatn.is/is/skyndilokanir

Clause 2.2 – Concordance between actual Catch and allowable Catch

Supporting Clauses:	2.2.1, 2.2.2, 2.2.3, 2.2.4 and sub-clauses			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***Concordance between the Total Allowable Catch (TAC) and actual total catch from the stock under consideration shall be ensured through monitoring, control, enforcement, documentation and correction and verification activities. Accordingly, all participating companies engaged in fishing operations shall take responsibility and operate in compliance with the relevant rules and regulations.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Catch must be weighed by an official licensed weigher within 2 hours of landing. Standardised weights and tares for ice and tubs (with a capacity of 208 – 300kg) are used throughout the fishery. The registered weight for each landing is sent to the Fisheries Directorate, where it is compared to the e-logbook data for the fishing trip, before the appropriate amount is subtracted from the vessels quota. The official weights used are the standardised registered landing weight with logbook records being used as a supplementary source to cross-check landings. ITQ transfers are also monitored to ensure that in cases where vessels do not have sufficient quota to cover the entirety of their catch additional quota is rented in from other sources within 3 days of the landing date.

EVIDENCE

Catches and landings in Iceland are monitored and recorded in a number of complementary ways. Logbooks, either electronic (e-logs) or standard paper based, depending on the vessel, record landings at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland.

The Fisheries Directorate have at their disposal a number of IT based monitoring, reporting and recording systems developed and serviced by TrackWell, an Icelandic electronic systems based service company; these include satellite Vessel Monitoring Systems (VMS), e-log systems and electronic reporting systems both of which are legal requirements and generate mandatory reports to the Directorate. Data on catches and landings is available in near real-time providing a valuable management reporting system for fleet management. The vessel log book system requires that the operator of a vessel reports information for each haul of the fishing gear to the Directorate including; haul number, date, time, latitude, longitude, catch by species, zone, water depth, seafloor, wind direction, wind speed, gear used, as well as other information. There are also other elements of the system which allow fishing companies to compile the data from their vessel(s) in order to facilitate better targeting of fishing activity in terms of area, species or size class of product dependent on the market demands at the time and also to ensure better traceability of product.

Information is fed from a secure central server to a shared database that is accessible by both the Directorate (for management/enforcement purposes) and the MFRI (for scientific purposes). Information from fresh fish landings is collected through the portside official weighing system which is carried out by official staff and calibrated systems.

Landings must be weighed within 2 hours of landing by an official weigher using calibrated scales. Following allowances for ice the official weight is forwarded to the Directorate where it is compared with the relevant e-logbook entry before an appropriate deduction is made to that vessels remaining quota. The officially weighed catches are the official catch of record with e-log information being used as a secondary source to ensure accuracy. If a vessel does not have sufficient quota to cover it has a number of options available to it such as renting in additional quota or transferring quota between species; however, the landings must be fully covered within 3 days. The time restrictions attached to landing, recording and rationalising catch and quota mean that while the system is very close to real time (circa. 24 hours)[69].

Fishing seasons in Iceland run from 1st September to 31st August the following year. Seasonal Total Allowable Catches (TACs) are set by the Minister of Fisheries and Agriculture, based on the recommendations from the Marine & Freshwater Research Institute (MFRI); the International Council for the Exploration of the Sea (ICES) also provides advice on important Icelandic stocks, such as cod, haddock, saithe and golden redfish. Following the setting of the overall TAC each vessel is allocated a certain share of the overall TAC based on the number of shares in the Icelandic system of Individual Transferrable Quotas (ITQs) it possesses. Before catch is allocated proportions of the TAC of some species is removed for various reasons such as for the coastal fisheries which any small boat in possession of a licence may access, for research purposes or for chartered angling vessels.

MFRI and ICES advised that when the Icelandic management plan is applied, catches in the fishing year 2018/2019 should be no more than 264,437 tonnes. The TAC has been set in line with this advice (262,000 tonnes), as set out in the Regulation on fishing for the year 2018/2019 (No. 674/2018)[70]. Catches of Icelandic cod in Icelandic waters in the 2016/2017 season were 237,644 t, slightly less than the 244,000 t TAC.

Table 8. Recommended TAC, national TAC, and catches (tonnes) of Icelandic cod. Note that catch in Icelandic waters is based on the Icelandic fishing year whereas catch in other areas and total catch is on calendar year (Source: https://www.hafogvatn.is/static/extras/images/%C3%9Eorskur_2018729230.pdf).

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli Íslendinga *Catches Iceland*	Afli annarra þjóða *Catches others*	Afli alls *Total catch*
2010/11	160 000[1)]	160 000	165 000	2000	167 000
2011/12	177 000[1)]	177 000	183 000	2000	185 000
2012/13	196 000[1)]	195 000	210 000	2000	215 000
2013/14	215 000[1)]	214 000	224 000	2000	226 000
2014/15	218 000[1)]	216 000	221 000	2000	223 000
2015/16	239 000[1)]	239 000	249 000	2000	251 000
2016/17	244 000[1)]	244 000	234 649	2995	237 644
2017/18	257 572[1)]	255 172			
2018/19	264 437[1)]				

[1)] 20% aflaregla. *20% harvest control rule.*

Evidence presented by the Fisheries Directorate and the Icelandic Coast Guard shows that vessel operators and companies are compliant with the relevant legislation and ensure catches by their vessels are in accordance with their catch quota.

[69] https://www.stjornartidindi.is/Advert.aspx?RecordID=884be309-64a5-4367-9e4d-f5e7216b6f40

[70] https://www.stjornartidindi.is/Advert.aspx?RecordID=4819cdde-0a89-4f80-b21a-46bb071dd15f

Clause 2.3 – Monitoring and Control

Clause 2.3.1 – Vessel registration and catch quotas

Supporting Clauses:	2.3.1.1, 2.3.1.2, 2.3.1.3, 2.3.1.4			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***Allocated catch quotas by species to registered vessels are assigned in such a way that the combined quotas conform to the currently effective decision on TAC. Accordingly, information on the size and composition of the fleet of fishing vessels shall be available and documented, and the catch quota of each vessel or vessel group for each fish species and fishing year shall be recorded in the official central database in a transparent manner.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

As the share of the TAC allocated to vessels is based on the number of shares for that particular species that the vessel owns the overall value of quota allocated cannot in the first instance exceed the TAC set by the Icelandic authorities; additional transfers either between years or between species may cause the amount vessels are allowed to catch to increase (but note that cod is an exception in that there is no species from which quota may be converted into cod).

EVIDENCE

Quotas conform to the overall decision on TAC, through the individual vessel quota share. Catches of Icelandic cod in Icelandic waters in the 2016/2017 season were 237,644 t, slightly less than the 244,000 t TAC. Catches by vessel are monitored and recorded in near real-time in a central database curated by the Fisheries Directorate[71]. The official weight of the catch is subtracted from that vessels individual quota share for a particular species. Should a vessel not have sufficient quota to cover its landings it may rent in quota, transfer quota between species based on the cod equivalent values of each species, keep 20% of the value of the overage while forfeiting the remainder to scientific research or transfer a limited amount to the following fishing season where it is taken off that vessels individual quota share for that species.

Only vessels in possession of a valid permit from the Directorate of Fisheries are eligible to fish commercially. A register of all vessels permitted to fish in Icelandic waters is administered by the Maritime Division of the Icelandic Transport Authority (ICETRA)[72]. By regulation only Icelandic licensed vessels (with some exceptions) are permitted to fish in Iceland EEZ. For illustrative purposes Table **9** table below shows the first 20 lines of the publicly available data on individual vessels' quota allocations of Icelandic cod in the 2017/2018 fishing season.

Table 9. First 20 lines of the online register showing the Icelandic cod fleet TAC allocation, transfer, balances and catches for the 2017/2018 fishing season (Source: [73]).

[71] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/

[72] https://www.icetra.is/maritime/ships-and-cargoes/

[73] http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/

Reg. no.	Vessel	Class	Alloc. quota	Compensations	Trfr. prev. year	Trfr. b / t vessels	Allowed catch	Catch	Balance	overfished
78	Ísborg ÍS 250	A	0	-2.772	0	2.772	0	0	0	0
89	Grímsnes GK 555	A	53.633	0	0	646.393	700.026	700.026	0	0
173	Sigurður Ólafsson SF 44	A	595.354	0	1,182	-47.047	549.489	551.384	-1.895	0
177	Phonix ST 177	A	7,500	16.194	0	-12.759	10.935	5.663	5.272	0
182	Western BA 63	A	494.964	-9.511	0	-13.268	472.185	491.818	-19.633	0
233	Erling KE 140	A	1,197,271	153.256	311.300	-407.283	1,254,544	1,128,021	126.523	0
253	Hammer SH 224	A	609.925	20.409	0	32.983	663.317	672.235	-8.918	0
264	Hörður Björnsson ÞH 260	A	487.323	328.524	133.607	734.834	1,684,288	1,695,882	-11.594	0
288	Glacier SK 16	A	0	13.443	0	-13.443	0	0	0	0
363	Maron GK 522	A	11.153	0	-533	690.857	701.477	702.154	-677	119
530	Ocean rim HU 12	A	18.602	75.443	0	59.317	153.362	154.143	-781	0
741	Grímsey ST 2	A	66.873	19.972	14.509	-36.702	64.652	64.652	0	0
795	Hurry GK 100	A	0	0	0	0	0	0	0	0
926	Þorsteinn ÞH 115	A	185.103	35.320	31.006	14.738	266.167	239.632	26.535	0
967	Þórsnes SH 198	0	0	0	0	0	0	0	0	0
968	Sleipnir VE 83	A	480.530	0	137.754	126.170	744.454	743.952	502	0
972	Kristín GK 457	A	2,119,967	-1.111	-7.878	-98.222	2,012,756	2,052,437	-39.681	0
975	Sighvatur GK 357	0	2,084,344	0	-10.039	6,026	2,080,331	2,080,331	0	0
1006	Krummi GK 10	0	1,687,807	0	0	-582.385	1,105,422	1,105,422	0	0
1019	Sigurborg SH 12	A	232.843	8.564	39.582	-120.016	160.973	159.867	1.106	0

Accordingly, information on the size and composition of the fleet of fishing vessels is available and documented, and the catch quota of each vessel or vessel group, along with the fishing year is recorded in the official central database in a transparent manner and is publically accessible.

Registered catches are based on information from ports of landing and information on catcher exported unprocessed. The catch statistics are published, subject to change once they have been compared to submitted reports from buyers, and are available on the Fiskistofa website[74].

[74] http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/aflastodulisti.jsp?lang=en

Clause 2.3.2 – Fishing vessel monitoring and control systems

Supporting Clauses:	2.3.2.1, 2.3.2.2, 2.3.2.3, 2.3.2.4, 2.3.2.5, 2.3.2.6, 2.3.2.7, 2.3.2.8, 2.3.2.9, 2.3.2.10, 2.3.2.11, 2.3.2.12, 2.3.2.13, 2.3.2.14, 2.3.2.15, 2.3.2.16, **2.3.2.17**			
Important Note:	Clause 2.3.2.17 represents a new Clause in IRFM Standard v2.0 and is scored separately in Appendix 2.			
Clause Guidance:	***A program for the monitoring and control of fishing vessel activities shall be operated and enforcement shall be in place to prevent fishing by unauthorised vessels. Closed areas shall be monitored, the fishing gear and fishing logbooks shall be subject to inspection, as well as the composition of the catch and its handling onboard the fishing vessels. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels. Discarding of catch from the stock under consideration shall be prohibited, those that may occur shall be monitored and all catches shall be landed in authorised fishing ports where harbour officials and fisheries inspectors shall monitor the correct weighing and registration of the catch. Accordingly, vessels must comply with all relevant National Fishery Management measures. Although required by legislation, there is some evidence of under-reporting of seabirds and marine mammal bycatch in fishing vessels logbooks. Consequently, the Assessment Team raised a Minor Non-conformance related to this issue.***			
Evidence Rating:	Low ☐	**Medium ☑**		High ☐
Non-conformance:	Critical ☐	Major ☐	**Minor (clause 2.3.2.4 only) ☑**	None ☐

SUMMARY EVIDENCE

The Icelandic Coastguard administers the VMS for all Icelandic vessels and for all foreign vessels (including fishing vessels) that enter Icelandic waters as part of an integrated monitoring, control and surveillance (MCS) system. The purposes of the MCS system are numerous including maritime traffic control, marine search and rescue and fisheries enforcement. The importance of the fisheries sector to the Icelandic economy and the need for greater efficiency, due to the relatively small size of the institutions involved, has led to high levels of collaboration and integration resulting in creative and dedicated approaches to fisheries management and enforcement. The fisheries MCS system in Iceland has at its core the effective use of available technology meaning relatively small staff numbers are able to achieve extensive monitoring of the Icelandic fishing industry.

EVIDENCE

The Icelandic Coast Guard (ICG) administers the VMS for all Icelandic vessels and for all foreign vessels (including fishing vessels) that enter Icelandic waters as part of an integrated monitoring, control and surveillance (MCS) system. The purposes of the MCS system are numerous and it incorporates several related services including maritime traffic control, marine search and rescue, fisheries enforcement, coastal radio and border control in a single Operations Centre[75]. The importance of the fisheries sector to the Icelandic economy and the need for greater efficiency, due to the relatively small size of the institutions involved, has led to high levels of collaboration and integration resulting in creative and dedicated approaches to fisheries management and enforcement. For example, the Directorate of Fisheries produce a risk analysis for the Coast Guard, enabling a strategic, risk-led approach to surveillance and best use of available resources over the large area monitored. The fisheries MCS system in Iceland has at its core the effective use of available

[75] http://www.lhg.is/media/LHG80/Landhelgisgasla_Islands_enska2_.pdf

technology meaning relatively small staff numbers are able to achieve extensive monitoring of the Icelandic fishing industry.

The integrated system uses all available data such as identification of the vessel, its movements, illegal, unreported and unregulated (IUU) lists, notifications, reports, fishing licenses, permits, port State control reports, etc. and has proved to be effective in combating and eliminating IUU fishing in the Icelandic EEZ and the North Atlantic Ocean. Bilateral tracking agreements are in place with Greenland, Faroe Islands, Norway and Russia whose vessels must follow automatic procedures and report catches daily. The ICG uses several different but complementary electronic vessel monitoring systems including satellite-based systems including VMS and satellite radar images, the monitoring of coastal activity through a dedicated land-based very high frequency (VHF) system and the use of the Automatic Identification System (AIS).

The VHF and AIS systems have a range of 30 – 60 nautical miles while the satellite-based VMSs can be used anywhere in the world. The use of complementary systems ensures that the limitations that arise when any one system is used in a standalone capacity are mitigated. These electronic MCS systems are further backed up by more traditional methods of surveillance such as patrol vessels and aircraft; indeed the use of electronic systems in the effective targeting of traditional surveillance methods increases the efficiency of these systems. Recently satellite imagery has been added to the list of surveillance methods (80 images are taken each month) which can be used for example in detection of the uncommon occurrence of vessels not using VMS (Coast Guard personal comm., site visit, November 2018). The schematic below outlines the inputs which make up the integrated MCS system in Iceland (Figure below).

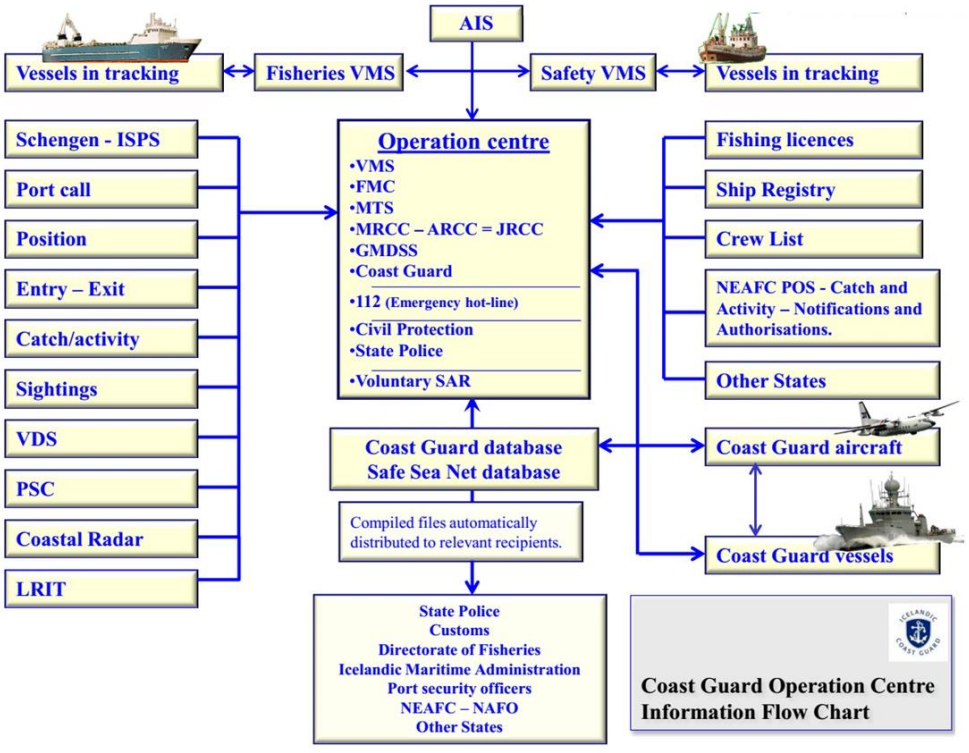


Figure 11. Schematic outlining the inputs which make up the integrated Monitoring, Control and Surveillance (MCS) system in Iceland (Source: presentation entitled Iceland's application for membership of the EU. Chapter 13, 28 February Icelandic Coast Guard ERS/VMS/AIS[76]).

[76] https://slideplayer.com/slide/4644333/

The Coastguard conduct unannounced at-sea vessel boarding's in order to inspect gear, catch and catch records including logbooks as well as inspections of mandatory safety equipment while logbooks may be subjected to in-port inspections by inspectors from the Fisheries Directorate. Data on coastguard enforcement activity in the past year has been provided in Clause 2.1. Directorate inspector days spent at seas inspecting vessels (for gear, mesh sizes, catch composition, fishing permits, landings, juveniles, etc…) as a proportion of total fishing effort in the 2017/18 fishing season were presented in an earlier clause (i.e. 1.93% for bottom trawl, 0.64% for longline and 3.64% for gillnet including cod and lumpfish).

Fisheries Directorate Inspectors also measure the length of the fish caught and if the percentage of fish below the minimum legal size in the catch exceeds a specified threshold, a proposal is submitted to the MFRI to temporarily close the fishing grounds with immediate effect. This closures generally lasts for two weeks. The decision to temporarily close an area does not require Ministerial approval. If there is considered to be sufficient reason to close the fishing grounds for a longer period such as three temporary closures in the same area, the Minister may issue a regulation to this effect. Both short and long term closures are primarily monitored and enforced by the Icelandic Coast Guard using the VMS system; while the main role of VMS tracking is geared towards safety the spatial nature of the available data allows closed areas to be monitored remotely. Vessels fishing in proximity to closed areas are monitored at the Coast Guard operation centre and vessels are directly contacted if the encroach on prohibited areas; this is the first point at which the Coast Guard operator may issue a warning to the vessel and decide to escalate if necessary.

Discarding of commercial species is prohibited by law in Iceland (Article 2 of the Act Concerning the Treatment of Commercial Marine Fish, No. 57/1996) and this includes cod. This means that if vessels do not have sufficient quota to cover the species they have caught they are required to attain quota through the quota transfer system. Consequently, if vessels do not have sufficient catch quotas for their probable catches they must suspend all fishing activities. As noted, catches are monitored and should the composition of the catch (species, size) or its quality differ from other vessels fishing in the vicinity the Fisheries Directorate has powers to place the vessel under closer surveillance by placing an inspector on board for one day or fishing trip. The vessel must pay the Directorate's costs (e.g. inspector wages) if this occurs more than once in a fishing year.

All catches from Icelandic waters must be landed and weighed in an Icelandic port (Treatment of Commercial Marine Fish, Act No. 57/1996). Within two hours of landing catches are officially separated and weighed on official port scales certified by the Fisheries Directorate and operated by individuals authorised by the Directorate. Weighing may also occur on one of the other approved systems such as private companies or Fish markets authorised by the Fisheries Directorate. The Directorate maintains a list, organised by port, of all official Icelandic weighing license holders that they audit and the type of weighing license held on their website[77]. During the site visit in November 2018 the assessment team visited a fish market and were shown the landed fish, licensed weighing scales and the information recorded on the system which goes to the Port Authority who then submit it to the Fisheries Directorate's catch registration system. The Fisheries Directorate compares information on catches from the portside official weighing system with the corresponding logbook entry for that landing before the appropriate reduction is made to the vessel's quota

[77] http://www.fiskistofa.is/fiskveidistjorn/vigtunafla/

Logbook data recording

Vessel operators are required by law to up-date catch information through logbooks and transmit data on fishing activity after each haul (i.e. a fishing event occasion). The Assessment Team has identified a Minor Non Conformance against clause 2.3.2.4 of the IRFM Standard.

Clause 2.3.2.4. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels

Rationale: The recording of marine mammals and seabirds by number and species is required by Icelandic regulation[78]. Despite the implementation of new mandatory logbook reporting procedures for seabird and marine mammal bycatch, available evidence suggests that far fewer incidences of seabird and marine mammal bycatch are reported via the electronic logbook system than would be expected given the levels reported by onboard observers. This suggests significant levels of under-reporting and/or non-reporting of seabird and marine mammal bycatch. Examples of available evidence to support this conclusion include the findings of Pálsson et al. 2015[79] and the March 2018 MFRI report titled: "Bycatch of Seabirds and Marine Mammals in lumpsucker gillnets 2014-2017".

Pálsson et al. 2015 highlighted the fact that their bycatch estimates were based on limited data that needed to be increased and improved with a functioning reporting system for the fishery and better follow up.

The MFRI 2018 report found that although reported bycatch in E-logbooks by the fleet has increased (suggesting better compliance with reporting requirements) the overall bycatch rates are still much lower than observed in the trips by inspectors. Overall, the marine mammal and seabird bycatch rate during inspector trips was around 4 times higher than reported by the fleet in 2017[80].

Furthermore according to a 2017 presentation to NAMMCO's Working group on bycatch of marine mammals in Iceland; "logbooks have unfortunately proven unreliable" and "bycatch of birds and marine mammals [is] 18x higher when observer is present vs logbook records".[81]

While much of the evidence related to non-compliance with reporting requirements may relate to the lumpsucker fishery, this fishery is still part of the management system under review and in addition there is insufficient evidence to show that compliance in the fisheries under assessment here is better. Therefore, the Assessment Team have deemed a **Minor Non-conformance** to be appropriate in this instance. As this represents the first non-conformances raised in this assessment, this non-conformance will be termed Non-conformance #1.

Non-conformance #1 (Clause 2.3.2.4: Minor Non-conformance)
Although required by legislation, there is some evidence of non-reporting/under-reporting of seabirds and marine mammals bycatch such that the Assessment Team cannot be fully confident that catch amounts by species and fishing area (of marine mammals and seabirds) are estimated and continually recorded in fishing logbooks.

[78] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[79] https://www.hafogvatn.is/static/research/files/fjolrit-178.pdf
[80] https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf
[81] https://nammco.no/wp-content/uploads/2017/04/nammco-meeting-iceland-gms.pptx

Status: Open. Corrective Actions in place to be reviewed annually at surveillance audits (See Section 9 for further details).

Clause 2.3.3 – Catches are subtracted from relevant quotas

Supporting Clauses:	2.3.3.1, 2.3.3.2, 2.3.3.3, 2.3.3.4, 2.3.3.5			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***Landed catches shall be subtracted from the relevant quotas (allowable catch) of the vessel or vessel group. Limited allowance may be made for the use of quota for one species to count against landings of another species, with the objective of providing the necessary minimum flexibility and discouraging discards. Transfer of quota between vessels shall take effect only after it has been authorised and recorded to the official central data base and information on each vessels catch quota and quota use shall be updated regularly and made public and accessible to all on the official website, thus ensuring transparency.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

As the Icelandic groundfish fishery is a mixed fishery it is necessary to incorporate a degree of flexibility in the quota management system so that the species composition of catches may be matched with the quota portfolio available to individual fishing vessels. There are a variety of provisions in place to facilitate flexibility and reduce any potential incentives relating to the discarding of fish. Current quota share ad TAC allocations by species as well as running catch totals and remaining quota for the season for each vessel are freely available on the Directorates website meaning the system is very transparent.

EVIDENCE

As the Icelandic groundfish fishery is a mixed fishery it is necessary to incorporate a degree of flexibility in the quota management system so that the species composition of catches may be matched with the quota portfolio available to individual fishing vessels. There are a variety of provisions in place to facilitate flexibility and reduce any potential incentives relating to the discarding of fish.

A vessel is allowed to exceed its allocation for a particular species in a fishing season by up to but not exceeding 5%; the excess is then deducted from that vessels allocation for that species in the following fishing season. Additionally, a decision may be taken to postpone fishing up to 15% of a vessel's quota for a particular species in a fishing season and transfer the balance to the following season; this measure may be particularly beneficial to the growth of long-lived species in maximising the return from strong year classes. The results of some of inter-vessel and inter-seasonal transfers aimed at balancing catches and quotas may be seen in the table provided under Clause 2.3.1.

In addition to within-species quota transfers between vessels and/or fishing seasons the systems also makes provision for some limited quota transfer between different species; note that it is not possible to convert quota of other species for cod quota (e.g. cod quota may be exchanged for other species quota but other species quota may not be exchanged for cod). Interspecies transfers of quota are based on cod-equivalents a nominal value based around the market value of cod which is set annually by the Ministry as set out in Article 19 of Act No. 116/2006[82].

[82] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/thorskigildisstudlar/

The cod-equivalent values of a number of representative species during the 2012/2013 to 2018/2019 season are presented in the following table. As can be seen the cod-equivalent value for more commercially valuable species is consistently higher across seasons. Cod equivalent values change seasonally, as shown below.

Table 10. Cod-equivalent values of representative species during recent fishing seasons (Source: http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/thorskigildisstudlar/).

Species	Cod Equivalents						
Season	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**
Cod (Þorskur)	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Haddock (Ýsa)	0.92	1.15	1.30	1.23	1.04	1.07	1.05
Saithe (Ufsi)	0.73	0.82	0.81	0.77	0.79	0.72	0.62
Golden redfish (Gullkarfi)	0.82	0.89	0.85	0.79	0.69	0.60	0.63
Norway lobster (Humar)	4.70	6.46	5.98	5.98	6.10	8.12	9.54
Greenland halibut (Grálúða)	2.47	2.67	2.59	2.48	2.65	2.61	2.43
Anglerfish (Skötuselur)	1.74	1.98	2.27	2.05	2.17	2.1	1.76
Ling (Langa)	0.59	0.73	0.76	0.68	0.68	0.73	0.74
Tusk (Keila)	0.39	0.52	0.51	0.47	0.42	0.38	0.40

Current quota share and TAC allocations by species as well as running catch totals and remaining quota for the season for each vessel are freely available on the Directorates website. The system is quite transparent[83].

All transfers of quota must be authorised by the Fisheries Directorate. Application forms for the transfer of quota are available online and must be transmitted directly to the Directorate for authorisation of the transfer. If a fishing company wishes to transfer quota between two or more of its own vessels they may do so within all the relevant laws and regulations. All the necessary application forms for transfer of quota are available online[84].

[83] http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/aflastodulisti.jsp?lang=en

[84] http://www.fiskistofa.is/eydublod/flutningurveidiheimilda/

Clause 2.3.4 – Rules are enforced

Supporting Clauses:	2.3.4.1			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	**Surveillance and enforcement of rules are carried out by the Icelandic Coastguard, the Marine Research Institute and the Fisheries Directorate. There are various penalties for serious infractions depending on the nature of the infraction and the number of times the offender has contravened the regulations.**			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Surveillance and enforcement of rules are carried out by the Icelandic Coastguard, the Fisheries Directorate and to some degree by the MFRI. There are various penalties for serious infractions depending on the nature of the infraction and the number of times the offender has contravened the regulations.

EVIDENCE

There is a clearly established legal framework which sets out rules and regulations relating to fishing activity within Icelandic waters and gives powers to the Ministry, the Fisheries Directorate, the Coast Guard and the MFRI to monitor fishing activities and enforce these rules.

On a day-to-day basis rules are primarily enforced by the Directorate through powers to collect levies, monitor, inspect, report and gather evidence for prosecution purposes where violations are suspected. All prosecutions resulting from enforcement activities are conducted via the Icelandic legal process (Ministry of Justice). In addition, within the remit of the overall Ministry of Industries and innovation, the MFRI also has the legal power to enact temporary spatial closures.

A breakdown of enforcement activities in 2017, including the number of vessel inspections carried out, was submitted by the Icelandic Coast Guard and is presented in the supporting evidence for Clause 2.1.

Clause 2.3.5 – Analysis is carried out

Supporting Clauses:	2.3.5.1, 2.3.5.2, 2.3.5.3			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***Analysis shall be carried out with the aim of detecting any deviations that may occur of the actual total catch from the Total Allowable Catch (TAC). Measures are available and are adopted when indicated. Anyone purchasing and/or selling catches shall be obligated to present reports to the appropriate authorities, containing information on the purchase, sale and other disposition of fish catches.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Analysis of catches includes the comparison of reported catches with the amount of sold or exported products to verify independently that reported landings aligned accurately with those reported. If comparison reveals discrepancies in reported and actual landings received from quayside weighing by registered weighers corrective action is taken as appropriate.

EVIDENCE

Sale and export documentation provides an independent comparative check on catch quantities for different species. Analysis of catches includes the comparison of reported catches with the amount of sold or exported products to verify independently that reported landings aligned accurately with those reported. If comparison reveals discrepancies in reported and actual landings received from quayside weighing by registered weighers corrective action is taken as appropriate. All processors purchasing fish, be it directly or at auction, are obliged to submit monthly reports to the Directorate. In addition, the fish auction[85] reports all sales of fish directly to the Directorate.

There are effective systems in place to ensure the traceability of catch. The detailed spatial information available for each fishing trip means catch may be traced directly from when it was caught through subsequent processing, export and delivery to final market. Information relating to the provenance of the catch is communicated both to the Directorate's website and directly to the purchaser.

The official registration of landings contains a unique vessel identifier relating to the fishing vessel that landed the catch allowing traceability to individual vessels. In most cases, the unique vessel identifier remains with the batch throughout production and often on the final pack. For wet fish sales, from the auction, a vessel unique number is registered within the central e-auction for tracking purposes. This was verified during the November 2018 site visits.

Full traceability is possible using all the tools within the system, however, not all buyers require full traceability from fishing vessel to the final product.

[85] https://www.fmis.is/blank

7.3. Section 3: Ecosystem Considerations

Clause 3.1 – Guiding Principle

Supporting Clauses:	3.1.1, 3.1.2			
Important Note:	Clause 3.1.1: Text added (**Bold**) in IRFM Standard v2.0: *Adverse impacts of the fishery on the ecosystem shall be considered and appropriately assessed and effectively addressed, **consistent with the precautionary approach**[86].* Clause 3.1.1 (minor change) – consistency with precautionary approach specifically addressed below.			
Clause Guidance:	***Adverse impacts of the fishery on the ecosystem (e.g. bycatch, ETP species interactions, habitat and foodweb interactions etc.) shall be considered, appropriately assessed and effectively addressed. Those impacts that are likely to have serious consequences shall be addressed. This may take the form of an immediate management response or further analysis of the identified risk.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The main research priorities of the MFRI, which provides advice on sustainable use and protection of the environment with an ecosystem approach by monitoring marine and freshwater ecosystems are research on marine and freshwater ecosystems in Iceland is sustainable exploitation of main stocks, ecosystem approach to fisheries management, research on fishing technology and seafloor and habitat mapping.

Since the Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species, the effects of bottom contact fishing gears are generally attributed to the fishery as a whole rather than to any species in particular. Most commercially fished species in Iceland, target or non target, are now part of the ITQ system and as such they are retained and accounted for within the catch accounting system operated by Fiskistofa. Discarding is prohibited. There are vulnerable and /or ETP species occurring in Icelandic waters according to the OSPAR Convention.

Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/ catches is a legal requirement (Reg. 126/2014). A smartphone app is in development by the Directorate of Fisheries to make both reporting and identification of bycatch easier for operators in the fishery.

Interactions between fishing gears and the seabed are highly dependent on gear type with towed bottom gears such as demersal trawls and dredges having a greater impact than static gear such as longlines, set nets or pots. The 2017 ICES Report on the Icelandic Ecoregion Ecosystem highlights that based on analysis

86In this context refer to 2009 FAO Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries, Article 31: Adverse impacts of the fishery on the ecosystem should be appropriately addressed. Much greater scientific uncertainty is to be expected in assessing possible adverse ecosystem impacts of fisheries than in assessing the state of target stocks. This issue can be addressed by taking a "risk assessment/risk management approach". For the purpose of development of ecolabelling schemes, the most probable adverse impacts should be considered, taking into account available scientific information, and traditional, fisher or community knowledge provided that its validity can be objectively verified. Those impacts that are likely to have serious consequences should be addressed. This may take the form of an immediate management response or further analysis of the identified risk....

of electronic logbook data a total area of about 79 000 km^2 was fished with towed bottom-fishing gears in 2013 in Iceland, composing 10% of the ecoregion.
It is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs; cold-water corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. Large areas within the Icelandic EEZ are closed either temporarily or permanently, to fishing for a variety of reasons; these include the protection of juveniles, spawning fish and VMEs. Cumulatively, a large portion of Icelandic shelf area within which fishing activities occur is closed to bottom trawling.

EVIDENCE

The MFRI is leading in marine and freshwater research in Icelandic territories and the arctic, providing advice on sustainable use and protection of the environment with an ecosystem approach by monitoring marine and freshwater ecosystems. The main research priorities are research on marine and freshwater ecosystems, sustainable exploitation of main stocks, ecosystem approach to fisheries management, research on fishing technology and seafloor and habitat mapping. The institute employs around 190 staff, operates 2 research vessels and 10 branches around the country, including an aquaculture experimental station. MFRI was established on July 1, 2016 as a result of a merger of two Icelandic research institutes, the Institute of Freshwater Fisheries (founded in 1946), and the Marine Research Institute (founded in 1965)[87].

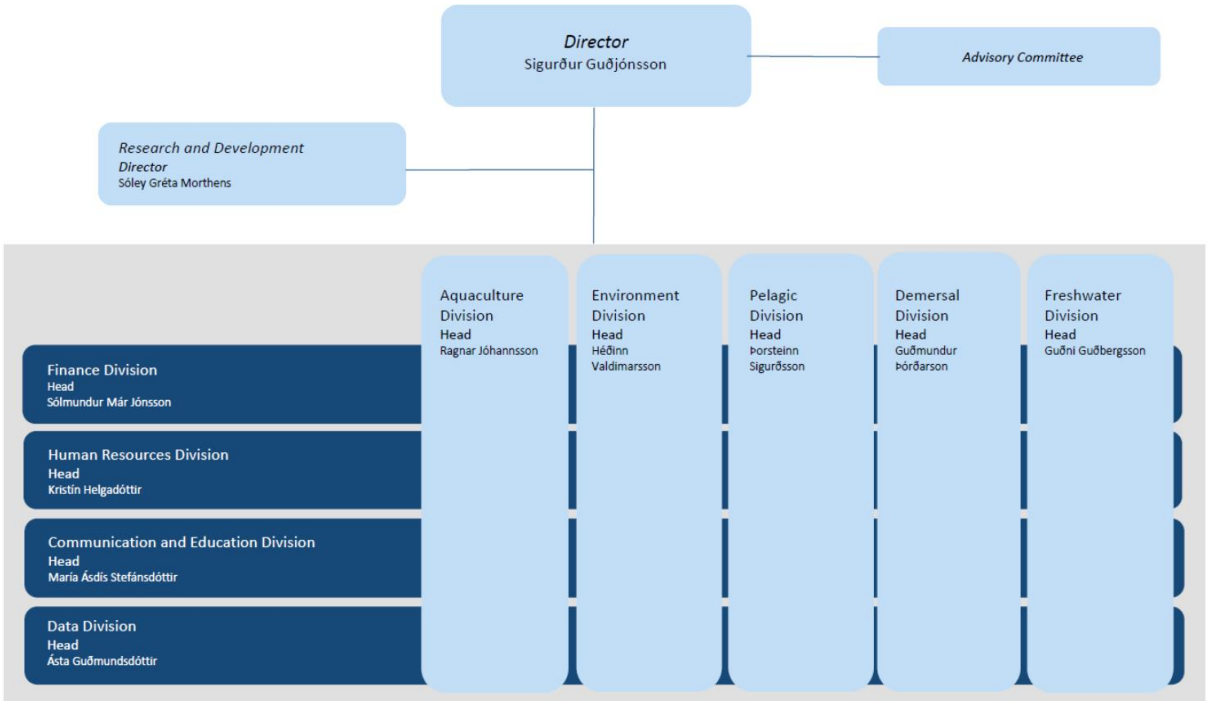


Figure 12. MFRI Organisational Chart[88].

Collectively, the various Sections and Divisions within MFRI work together to determine the status of commercial species in Icelandic waters and enable managers to make informed decisions as to their sustainable exploitation. However, the remit of the MFRI goes beyond species specific research to include:

- monitoring of the wider marine ecosystem,
- collection and analysis of oceanographic and physical data,

[87] https://www.hafogvatn.is/en/about/mfri

[88] https://www.hafogvatn.is/static/files/enska/skipurit_hafrannsoknastofnun_enska.pdf

- measurement of catches and interactions between non-commercial species and commercial fisheries, fishing gears and seabed habitats, and,
- assessment of commercial fisheries interactions in the ecosystem (e.g. impacts of fisheries on predator-prey dynamics).

Icelandic Waters ecoregion – Ecosystem Overview

Environmental conditions

In the Icelandic Waters ecoregion, water masses of different origin mix. Relatively warm and saline Atlantic water enters the area, both in the southwest as a branch of the Irminger Current and in the east from the Norwegian Sea and over the Jan Mayen Ridge. The East Greenland Current carries cold, low salinity water from the Greenland Sea in the north into the Icelandic Waters ecoregion. The variable location of the fronts between the colder and fresher waters of Arctic origin and the warmer and more saline waters of Atlantic origin result in variable local conditions, especially on the northern part of the shelf. During the last two decades, the Atlantic water mass has been dominating, in contrast to the Arctic domination in the previous three decades.

Key ecosystem and environmental signals in Icelandic waters in 2018[89]

- Zooplankton biomass on the northern shelf has fluctuated in the past, cycling on a five- to ten-year periodicity, with a period of generally low biomass from the 1960s to the 1990s.
- From the mid-2000s, Atlantic mackerel *Scomber scombrus* extended its feeding grounds from the Norwegian Sea to Icelandic Waters ecoregion, while the summer feeding grounds of capelin *Mallotus villosus* moved westwards from Icelandic into Greenland waters. Norwegian spring-spawning herring *Clupea harengus* has, since the early 2000s, reappeared at its traditional feeding grounds east and north of Iceland. These major changes in migration patterns have been linked to prey availability, oceanographic conditions, and stock density.
- Increased temperature in the lower water column on the western and northern part of the Icelandic shelf has resulted in changes in spatial distribution for a number of demersal species. Species like haddock *Melanogrammus aeglefinus*, anglerfish *Lophius piscatorius*, ling *Molva molva,* tusk *Brosme brosme*, dab *Limanda limanda*, and witch *Glyptocephalus cynoglossus* that have previously had Icelandic waters as their northern boundary of distribution and have mainly been recorded in the warm waters south and west of Iceland, are now showing a northward clockwise trend in their distribution along the shelf, and in some cases a distributional shift. Warming waters has led to a decline in the stock abundance and distribution of many cold-water species, while the previously rare occurrence of warm-water species in the ecoregion has increased in recent years.
- The stocks of northern shrimp *Pandalus borealis* collapsed around the year 2000 and the driving factors are thought to be increased predation by gadoids, increasing temperature, and high fishing mortality.
- Improved management measures for most of the major stocks (cod *Gadus morhua*, haddock, saithe *Pollachius virens*, redfish *Sebastes* sp., herring) have resulted in decreased fishing mortality, close to or at FMSY, and increased SSBs. This has furthermore resulted in decrease in effort and less pressure on benthic habitats.
- A recruitment failure of sandeel (Ammodytidae) was recorded in 2005 and 2006, and, with the exception of the 2007 cohort, recruitment has been at a low level since then. Fish stomach content

89 https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf

data suggest that the decline in the sandeel population may even have started as early as around year 2000.

- The abundance of minke whales *Balaenoptera acutorostrata* has decreased on the Icelandic shelf in recent years, following changes in prey distribution. Abundance of other species, in particular fin whales *Balaenoptera physalus* and humpback whales *Megaptera novaeangliae*, have increased over the last 20 to 30 years.
- In recent decades, the breeding success of many seabird species has been poor in south and west Iceland, accompanied by declines in their breeding population sizes. These trends may be influenced by changes in density, composition, and spatial distribution of their main fish prey (i.e. sandeel).

Icelandic marine ecosystem food chain

In the waters to the north and east of Iceland, available information suggests the existence of a simple bottom-up controlled food chain from phytoplankton through *Calanus spp.*, capelin and to cod. Less is known about the structure of the more complex southern part of the ecosystem.

Capelin Status

According to the 2018 acoustic autumn survey, the SSB is estimated 238 000 tonnes. The harvest control rule (HCR) aims at leaving with 95% probability at least 150 000 tonnes (Blim) of mature capelin at the time of spawning in March. Model projections show that even with no catch during the fishing season 2018/2019 the HCR expectations (of 150K t) will be achieved. The juvenile index was very low and has been in recent years[90].

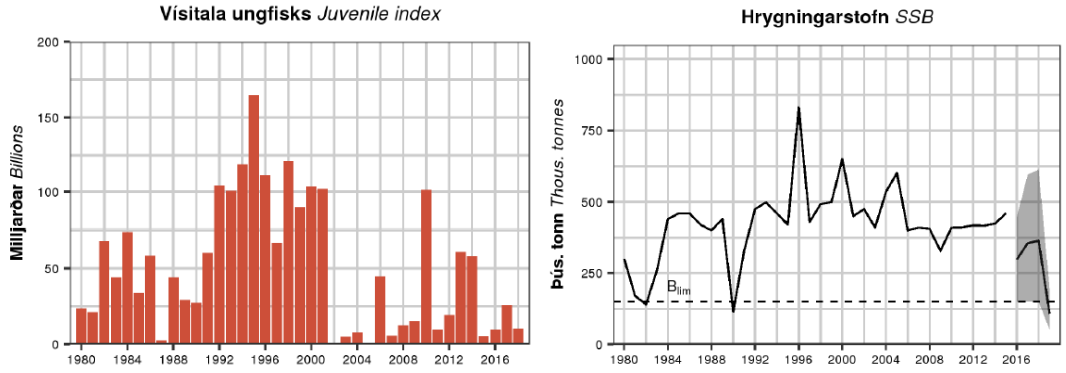


Figure 13. Capelin Catches, acoustic index for immatures from autumn surveys, and SSB at spawning time (with 90% confidence limits since 2016). The SSB value for 2016 and onwards is not directly comparable to historical values because it is based on different assumptions about natural mortality.

Associated species catch and bycatch

The Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species. With regards to retained catches, most commercially fished species in Iceland are now part of the ITQ system. Discarding is prohibited and comparison between observer measured catch compositions and self-reporting by fishers ensures that a high level of compliance with the ban on discarding is maintained. Discards are not included in the fisheries assessments as they are generally considered to be negligible; however, should the situation change and discards increase then these changes should be detectable within the system.

[90] https://www.hafogvatn.is/static/extras/images/LodnaHaust20181100274.pdf

Catches of cod have increased in recent years. Proportion of the catch taken by longline has increased since 2000, but the share of gillnets decreased. 2017 cod catches were caught in the following proportions:

Afli 2017 (tonn) *Catches 2017 (tonnes)*	Botnvarpa *Bottom trawl*	Lína *Longline*	Net *Gillnets*	Dragnót *Demersal seine*	Handfæri *Jiggers*
243 990	49%	32%	7%	6%	6%

Retained species accounting for > 0.5% of the cumulative total for each of these gear types are presented below. Information in the following tables were downloaded from the Directorate's website at http://www.fiskistofa.is/veidar/aflaupplysingar/bradabirgdatolur/. The catches include ungutted weights of the species as well as cod catches from the Barents Sea (about 10,000 tonnes caught in the 2017-18 season with different gear types, and about 3.5% of the overall cod catches)[91]. Also note that fishing vessels typically land gutted fish, but the quota allotted to the vessels is in terms of ungutted weight. The ungutted weight is derived from gutted weight by raising landings based on the species specific scalars listed in the Directorate website[92].

Table 11. Break down of associated species (i.e. > 0.5% of the overall catch) in bottom trawl fisheries that targeted cod in the 2017/18 season.

Gear	Species	Total Catches (t)	% Contribution to total catches
Bottom Trawl	Þorskur /cod	142,639	47.24%
	Ufsi /saithe	54,330	17.99%
	Gullkarfi / Golden redfish	47,314	15.67%
	Ýsa /haddock	23,701	7.85%
	Djúpkarfi / beaked redfish	10,536	3.49%
	Grálúða / Greenland halibut	8,716	2.89%
	Gulllax / greater silver smelt	4,966	1.64%
	Skarkoli / plaice	2,247	0.74%
	Steinbítur / Atlantic wolffish	1,662	0.55%
	Langa / ling	1,538	0.51%

Table 12. Break down of associated species (i.e. > 0.5% of the overall catch) in longline fisheries that targeted cod in the 2017/18 season.

Gear	Species	Total Catches (t)	% Contribution to total catches
Longline	Þorskur /cod	81,177	72.72%
	Ýsa /haddock	14,391	12.89%
	Steinbítur / Atlantic wolffish	5,588	5.01%
	Langa / ling	4,384	3.93%
	Keila / tusk	2,123	1.90%
	Gullkarfi / Golden redfish	1,208	1.08%
	Hlýri / spotted wolffish	873	0.78%
	Ufsi /saithe	653	0.58%

[91] http://www.fiskistofa.is/english/quotas-and-catches/total-catch-and-quota-status/?timabil=1718&fyrirsp=4&lang=en&landhelgi=U

[92] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/slaegingarstudlar/

Table 13. Break down of associated species (i.e. > 0.5% of the overall catch) in gillnet fisheries that targeted cod in the 2017/18 season.

Gear	Species	Total Catches (t)	% Contribution to total catches
Gillnet	Þorskur /cod	18960	89.02%
	Ufsi /saithe	1318	5.58%
	Langa / ling	370	1.66%
	Ýsa /haddock	313	1.43%
	Skarkoli / plaice	182	0.84%

Table 14. Break down of associated species (i.e. > 0.5% of the overall catch) in demersal seine fisheries that targeted cod in the 2017/18 season.

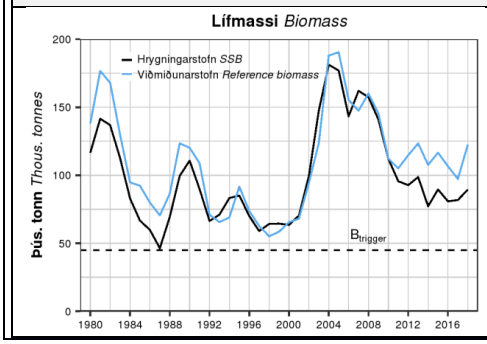
Gear	**Species**	**Total Catches (t)**	**% Contribution to total catches**
Demersal Seine	Þorskur /cod	15715	48.39%
	Skarkoli / plaice	5602	11.38%
	Ýsa /haddock	4920	11.27%
	Steinbítur / Atlantic wolffish	2145	5.54%
	Þykkvalúra / Sólkoli / lemon sole	1197	3.27%
	Ufsi /saithe	1047	2.96%
	Gullkarfi / Golden redfish	586	1.71%
	Langlúra / witch	473	1.40%
	Sandkoli/ dab	392	1.18%
	Langa / ling	172	0.52%

Table 15. Break down of associated species (i.e. > 0.5% of the overall catch) in handline fisheries that targeted cod in the 2017/18 season.

Gear	Species	Total Catches (t)	% Contribution to total catches
Handlines	Þorskur /cod	15993	74.10%
	Makríll / mackerel	4313	15.87%
	Ufsi /saithe	1059	4.63%
	Gullkarfi / Golden redfish	122	0.56%

Retained species in the cod target and non-target fisheries in the 2017/2018 season and their status

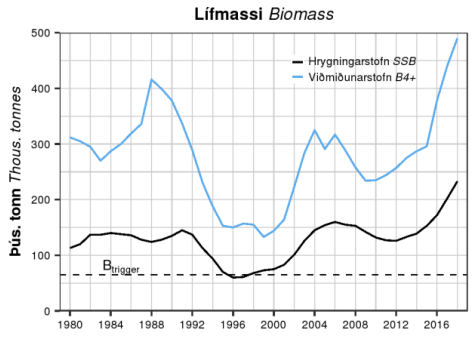
ÝSA – HADDOCK (*Melanogrammus aeglefinus*)[93]

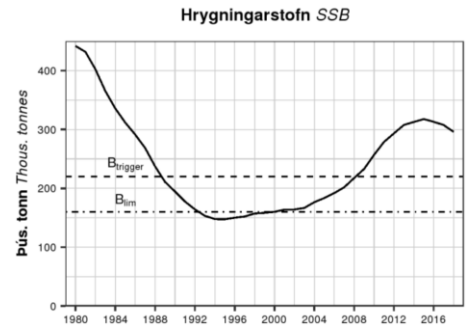


MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2018/2019 should be no more than 57 982 tonnes. SSB increased from 2001–2004, after several strong year classes, and was large until 2008. Since 2008, the SSB has decreased but in recent years has stabilised above MGT Btrigger. Harvest rate in 2015–2017 is estimated close to its lowest level in the assessment period and is currently close to HRMGT. Recruitment of 2 year old haddock in 2010–2015 was

[93] https://www.hafogvatn.is/static/extras/images/Ysa_2018729280.pdf

	low, but is estimated high for 2016 and close to average for the last two years. **The cod fishery does not appear to have any significant negative effects on the haddock stock.**

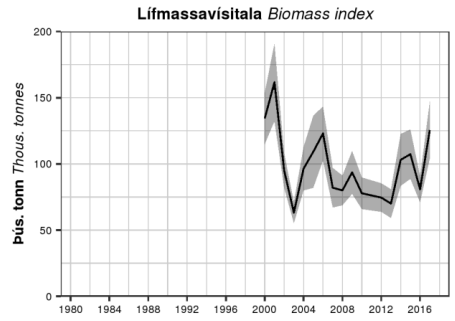
UFSI – SAITHE (*Pollachius virens*)[94]	
	MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2018/2019 should be no more than 79 092 tonnes. The spawning-stock biomass (SSB) is currently at the time-series maximum. The harvest rate has declined from 2009 and is presently estimated below HR_{MGT}. Recruitment in the last decade has been high. The reference biomass (B4+) has increased since 2015 due to the large 2012 cohort and the cohorts from 2013 and 2014 are estimated to be above average. **The cod fishery does not appear to have any significant negative effects on the saithe stock.**

GULLKARFI – GOLDEN REDFISH (*Sebastes norvegicus*)[95]	
	MFRI and ICES advise that when the management plan is applied, catches in the fishing year 2018/2019 in the East Greenland/ Iceland/Faroe Islands area should be no more than 43 600 tonnes. According to an agreement between Iceland and Greenland, 90% of the TAC is allocated to Iceland. The 2000–2005 year classes accounted for most of the catches in 2017. The 2008–2014 year classes are estimated to be below average. Fishing mortality has decreased in the past two decades but is above FMSY. Spawning-stock biomass (SSB) has steadily increased for the past 20 years and is well above MSY Btrigger. Golden redfish in the East Greenland/Iceland/Faroe Islands area are considered as one management unit. For the past two decades, 90–98% of the total catches have been taken in Icelandic waters. A substantial increase in landings from East Greenland has occurred since 2010, and is now the highest since early 1990s. Very little redfish is caught in Faroese waters. **The cod fishery does not appear to have any significant negative effects on the golden redfish stock.**

[94] https://www.hafogvatn.is/static/extras/images/Ufsi_2018729281.pdf

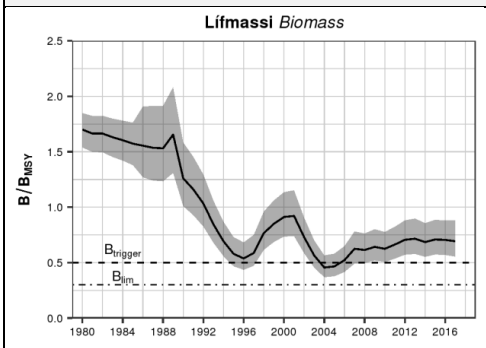
[95] https://www.hafogvatn.is/static/extras/images/Gullkarfi_2018729282.pdf

DJÚPKARFI – DEMERSAL BEAKED REDFISH (*Sebastes mentella*)[96]



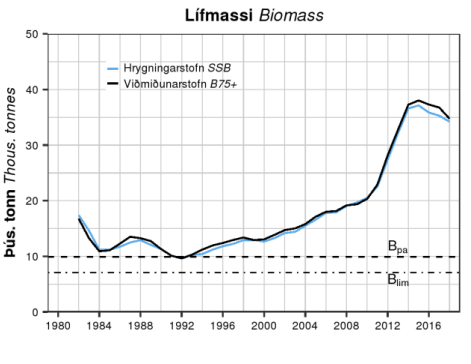
MFRI and ICES advise that when the precautionary approach is applied, catches in the fishing year 2018/2019 should be no more than 13 012 tonnes. The IS-SMH biomass index declined from 2001–2003 and has since been fluctuating without a trend. Since 2007, survey estimates have consistently shown very low estimates for juveniles (<30 cm). Catches in the past five years have been the lowest since 1980. **The cod fishery does not appear to have any significant negative effects on the Beaked redfish stock.**

GRÁLÚÐA – GREENLAND HALIBUT *(Reinhardtius hippoglossoides)*[97]



MFRI and ICES advise that when the MSY approach is applied, catches in the 2018/2019 fishing year should be no more than 24 150 tonnes. According to an agreement between Iceland and Greenland, 56.4% of the TAC is allocated to Iceland. The stock was well above MSY $B_{trigger}$ in the early part of the time-series. After dropping below the MSY $B_{trigger}$ in 2004 and 2005, it has steadily increased and is currently above MSY $B_{trigger}$. Fishing mortality has decreased in recent years, and is estimated to be close to F_{MSY}. **The cod fishery does not appear to have any significant negative effects on the Greenland halibut stock.**

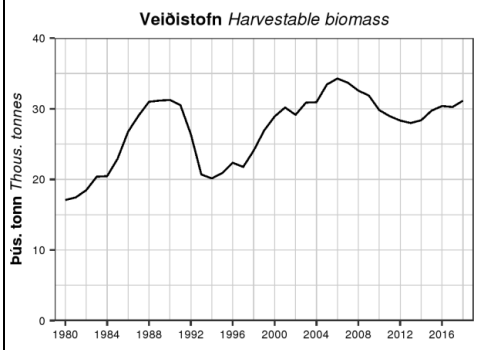
LANGA – LING (*Molva molva*)[98]



MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2018/2019 should be no more than 6255 tonnes. Recruitment was high from 2004 to 2011 but has declined to the levels of the 1980s and 1990s. The spawning-stock biomass (SSB) and the reference biomass (ling >75 cm) in 2017 are among the highest in the time-series. Harvest rate (HR) has decreased since 2008 and is now the lowest in the time series, but above HRMGT. **The cod fishery does not appear to have any significant negative effects on the ling stock.**

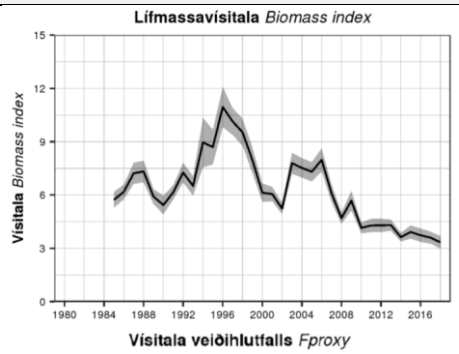
[96] https://www.hafogvatn.is/static/extras/images/Djupkarfi_2018729474.pdf
[97] https://www.hafogvatn.is/static/extras/images/Graluda_2018729471.pdf
[98] https://www.hafogvatn.is/static/extras/images/Langa_2018729172.pdf

STEINBÍTUR–ATLANTIC WOLFFISH (*Anarhichas lupus*)[99]



MFRI advises that when the MSY approach is applied, catches in the fishing year 2018/2019 should be no more than 9020 tonnes. MFRI recommended a continued closure of the spawning area off West Iceland during the spawning and incubation season in autumn and winter. Fishing mortality has been below F_{MSY} since 2014. Recruitment has been low since 2006, as compared to the two preceding decades. Harvestable biomass declined from 2006–2013, but has increased since then and is now close to the highest level in the assessment history. **The cod fishery does not appear to have any significant negative effects on the Atlantic wolffish stock.**

HLÝRI – SPOTTED WOLFFISH (*Anarhichas minor*)[100]



Spotted wolffish. Recommended TAC, national TAC, and catches (tonnes).

Fiskveiðiár *Fishing year*	Tillaga *Recommended TAC*	Aflamark *National TAC*	Afli *Catches*
2012/13	900	-	2042
2013/14	900	-	2250
2014/15	900	-	1655
2015/16	900	-	1913
2016/17	1128	-	1587
2017/18	1080	-	
2018/19	1001		

Spotted wolffish in Icelandic waters is caught as bycatch in the bottom trawl and longline fisheries. MFRI advises that when the precautionary approach is applied, catches in the fishing year 2018/2019 should be no more than 1001 tonnes. Biomass and juvenile indices are at their lowest levels in the time series. Fproxy has been high since 2000. This advice follows the ICES framework for stocks where reliable stock biomass indices are available, but analytical age-length based assessments is not possible (Category 3 stocks; ICES, 2012). IS-SMB biomass index of spotted wolffish, along with catch, is used to calculate Fproxy (catch/survey biomass). The target Fproxy was defined as 70% of the mean Fproxy from the reference period of 2001–2015 based on simulation studies. The catch advice is based on multiplying the most recent index value with the target Fproxy value. The advice is constrained by an uncertainty cap of 20% compared to the previous advice. In the 2017-2018 fishing season Icelandic vessels caught 1571 t[101] of spotted Wolffish. This is the 6th year in a row where fishing for this species occurs above the recommended TAC levels. During the site visits the Audit Team queried about the sustainability and risks to this stock. Based on MFRI communication, during the November 2018 site visits, the MFRI stated that "recommended TAC" is not a binding TAC and as such, a well monitored official TAC. However, recognising the issue the MFRI notes that this species was formally introduced into the quota system for the 2018/2019 fishing year to maintain

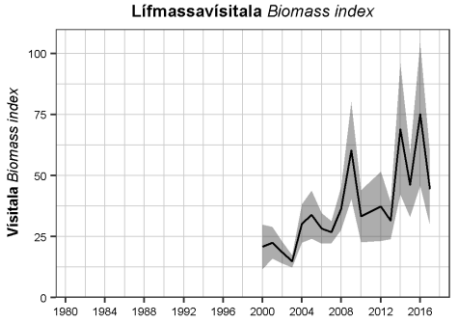
[99] https://www.hafogvatn.is/static/extras/images/Steinbitur_2018729531.pdf

[100] https://www.hafogvatn.is/static/extras/images/Hlyri_2018729533.pdf

[101] http://www.fiskistofa.is/english/quotas-and-catches/catches-in-individual-species/

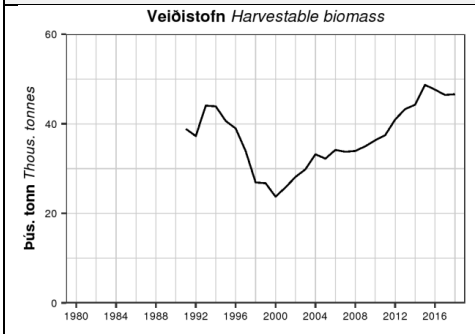
	catches within TAC limits. This species is classified as Near Threatened under the IUCN Red List[102]. **The status of this stock will be verified again by next year's assessment team to ensure an official TAC has been set and implemented.**

GULLLAX – GREATER SILVER SMELT (*Argentina silus*)[103]



Greater silver smelt is only caught in bottom trawl. Landings increased from about 800 tonnes in 1996 to over 15 thous. tonnes in 1998 and in 1999–2007 landings were 2700–6700 tonnes. Considerable increase occurred in 2008–2010 when landings peaked at about 16 thous. tonnes. Since then, landings have decreased, partly due to increased management measures. MFRI and ICES advise that when the precautionary approach is applied, catches in the fishing year 2018/2019 should be no more than 7603 tonnes. The survey index has been high since 2014, but has fluctuated greatly. The F_{proxy} has decreased since 2010 and has been below the target F_{proxy} since 2014. **The cod fishery does not appear to have any significant negative effects on the Greater silver smelt stock.**

SKARKOLI – PLAICE (*Pleuronectes platessa*)[104]



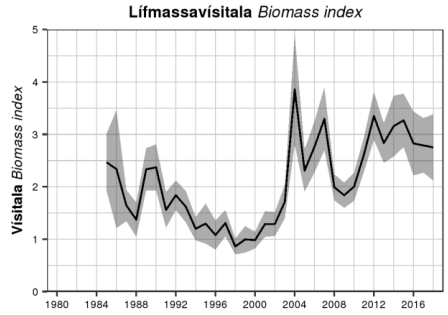
Demersal seine is the main fishing gear for plaice. In 1992, around half of the catch was caught in bottom trawl, but since 1996 that proportion has been 24–38%. Fishing effort has decreased and CPUE as increased, both in demersal seine and bottom trawl. MFRI advises that when the MSY approach is applied, catches in the fishing year 2018/2019 should be no more than 7132 tonnes. In addition, the MFRI recommended that regulations regarding area closures on spawning grounds remain in effect. The harvestable biomass has increased since 2000 and has never been larger in the assessment period 1991–2017. Fishing mortality has declined since 1997 and has been around FMSY since 2011. Recruitment has been stable since 1994. **The cod fishery does not appear to have any significant negative effects on the plaice stock.**

[102] https://www.iucnredlist.org/species/18263655/44739959#population

[103] https://www.hafogvatn.is/static/extras/images/Gulllax_2018729229.pdf

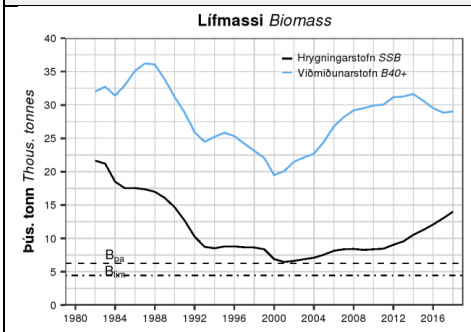
[104] https://www.hafogvatn.is/static/extras/images/Skarkoli_2018729536.pdf

LANGLÚRA – *WITCH (Glyptocephalus cynoglossus)*[105]



MFRI advises that when the precautionary approach is applied, catches in the 2018/2019 fishing year should be no more than 1100 tonnes. IS-SMB biomass index has been high since 2004. The recruitment index has, however, declined since 2009, and reached an all-time low in 2016. F_{proxy} has remained relatively low and stable over the last six years. Since 2010, the catch of witch has remained around 900–1300 tonnes. Witch is mainly caught in demersal seine and Nephrops trawl off the south and southwest coast. **The cod fishery does not appear to have any significant negative effects on the witch stock.**

KEILA – TUSK (*Brosme brosme*)[106]



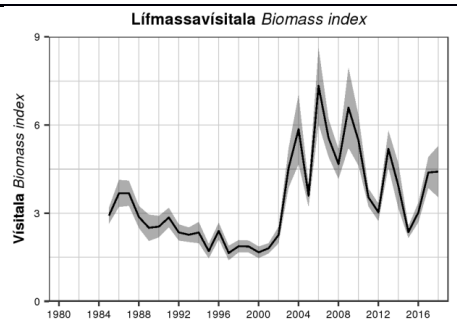
Since 1991, Icelandic vessels have caught 75–80% of the tusk catches in Icelandic waters, but Faroe Islands and Norway the rest. In 2004–2010 catches doubled and peaked around 7000 tonnes in 2008–2010. Icelandic catches amounted to 1833 tonnes in 2017, total catches were 2541 tonnes. Tusk is primarily caught by longliners. Recruitment in 2012-2015 was low, but has increased since then. Harvest rate has declined in recent years and is below HR_{MGT}. SSB has increased in recent years while the reference biomass (tusk >40 cm) has declined but remains at a high level. MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2018/2019 should be no more than 3776 tonnes. In addition, continued closure of the nursery areas off the southeast and southern coast should be maintained. **The cod fishery does not appear to have any significant negative effects on this stock.**

ÞYKKVALÚRA – LEMON SOLE (*Microstomus kitt*)[107]

[105] https://www.hafogvatn.is/static/extras/images/Langlura_2018729538.pdf

[106] https://www.hafogvatn.is/static/extras/images/Keila_2018729226.pdf

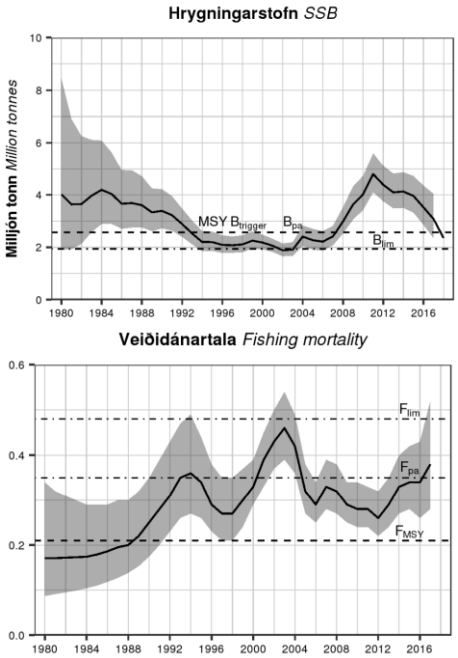
[107] https://www.hafogvatn.is/static/extras/images/Tylura_2018729537.pdf



Lemon sole is mostly caught in demersal seine and bottom trawl. Annual catches reached a maximum of 2500–2700 tonnes in 2005–2009, but have since been 1200–2000 tonnes. The main fishing grounds are located south and southwest of Iceland.

The IS-SMB biomass index has been relatively high but variable since 2003 compared to the period 1992–2002. F_{proxy} has been highly variable for two decades. IS-SMB recruitment index has been high since 2002. MFRI advises that when the precautionary approach is applied, catches in the fishing year 2018/2019 should be no more than 1565 tonnes. **The cod fishery does not appear to have any significant negative effects on this stock.**

MAKRÍLL – Mackerel (*Scomber scombrus*)[108]

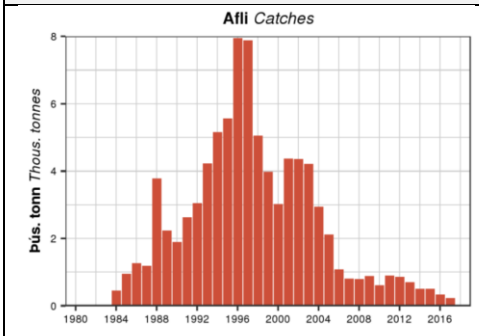


Since the mid-2000´s, mackerel have annually migrated to into the Icelandic EEZ to feed during the summer months. Results from an annual international research trawl survey in Nordic seas during summer indicate that abundance of mackerel in Icelandic waters was lower in 2018 than in the six years before. The reasons for sudden decline in mackerel migration into Icelandic exclusive economic zone are poorly know. There is no agreement between the coastal states on catch allocation, which has resulted in catches exceeding the advice given by ICES. ICES advised that when the MSY approach is applied, catches in 2019 should be no more than 318 403 tonnes. The spawning-stock biomass (SSB) is estimated to have increased in the late 2000s to reach a maximum in 2011 and has been declining since then. The stock is estimated to be below MSY Btrigger in 2018, for the first time since 2007. The fishing mortality (F) has declined from high levels in the mid-2000s, but increased again after 2012, and remains above FMSY. There has been a succession of large year classes since the early 2000s, but the 2015 and 2016 year classes are estimated to be below average. The high fishing pressure (nearly twice FMSY and above Fpa in recent years) combined with low recruitments in 2015 and 2016 have resulted in SSB going below MSY Btrigger in 2018. Short-term projections show that this will remain the case in 2019 and 2020 even if catches are taken in agreement with the ICES advice. Maintaining the current level of catches or fishing mortality would result in SSB falling below Blim in 2020. About 63% of the catches were taken inside the Icelandic EEZ, 35% in international waters, 1% inside the Greenland EEZ, and <1% in Faroese EEZ. Total catch by all nations in 2017 was 1 155 944 tonnes. Icelandic catches of mackerel in

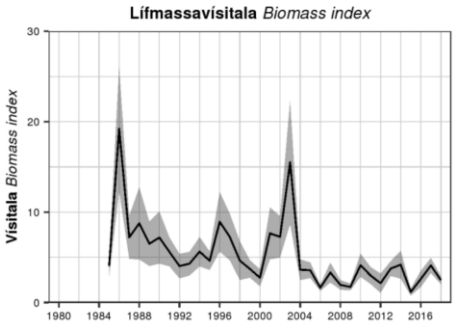
[108] https://www.hafogvatn.is/static/extras/images/Makrill1097054.pdf

	2017 were 167 367 tonnes. Most of the catches was caught in pelagic trawl (97%) but 3% were caught by jiggers. **As such, the cod fishery is not likely to be of significant influence to the mackerel stock.**

SANDKOLI – DAB (*Limanda limanda*)[109]



Sandkoli. Afli og lífmassavísitala (≥25 cm) úr SMB .
Dab. *Catches and IS-SMB biomass (≥25 cm) index.*



MFRI recommended a TAC no higher than 500 tonnes for the 2018/2019 fishing year. The MFRI also recommended that the defined quota area from Snæfellsnes to Stokksnes will be abolished, and all dab fishing grounds be under TAC limits. IS-SMB biomass index has remained low since 2004, as compared to the years 1985–2003. Data on age-structure of catches is available from 1993–2017. Catches in 2017 consisted mostly of 4–7 year-old fish. Considerable uncertainty exists about the 2018 stock status as the level of incoming recruitment (cohorts 2013 and 2014) is unknown. Landings of dab peaked at 8000 tonnes in 1996–1997.

Catches have been relatively low since 2007, or under 1000 tonnes annually. Dab is mostly fished along the south and west coasts. Around 95% of the catch is caught in demersal seine. Recent catches have been well within the National TAC. **As such, the cod fishery is not likely to be of significant influence to this stock.**

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli aflamarkssvæði *Catch quota area*	Afli alls *Total catch*
2010/11	500[1)]	900	596	814
2011/12	500[1)]	900	711	890
2012/13	500[1)]	800	587	781
2013/14	500[1)]	500	403	594
2014/15	1000	1000	334	546
2015/16	500	500	334	443
2016/17	500	500	181	206
2017/18	500	500		
2018/19	500			

[1)] Engar beinar veiðar. Aflamark sem nemi áætluðum aukaafla við aðrar veiðar.
[1)] *No directed fishery. TAC set no higher than would result from dab bycatch in other fisheries.*

Vulnerable and ETP species Interactions

Further to the Icelandic cod fishery associated catches and bycatch listed and analysed above, there are other vulnerable and /or ETP species occurring in Icelandic waters according to the Convention for the Protection of the Marine Environment of the North-East Atlantic or OSPAR Convention, as reported in the 2017 ICES Ecosystem report of the Icelandic Ecoregion[110].

[109] https://www.hafogvatn.is/static/extras/images/sandkoli_2018729540.pdf

[110] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf

SCIENTIFIC NAME	COMMON NAME
SEABIRDS	
Rissa tridactyla	Black-legged kittiwake
Uria lomvia	Thick-billed murre (or Brünnich's guillemot)
FISH	
Anguilla anguilla	European eel
Centrophorus squamosus	Leafscale gulper shark
Cetorhinus maximus	Basking shark
Dipturus batis	Common skate
Hoplosthethus atlanticus	Orange roughy
Lamna nasus	Porbeagle
Petromyzon marinus	Sea lamprey
Salmo salar	Salmon
Squalus acanthias	[Northeast Atlantic] spurdog
MARINE MAMMALS	
Balaenoptera musculus	Blue whale
Eubalaena glacialis	Northern right whale

OSPAR Contracting Parties are Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom, together with the European Union.

The table below provides catch information for species mentioned in the OSPAR table which have relevance to the Icelandic fisheries. Further below there is additional information about some of these species.

Table 16. Icelandic landings in tonnes of common skate (*Dipturus batis*), Atlantic halibut (*Hippoglossus hippoglossus*), orange roughy (*Hoplosthethus atlanticus*) spiny dogfish (*Squalus acanthias* also known as spurdog), Greenland shark (*Somniosus microcephalus*) and Porbeagle shark (*Lamna nasus*) 2006 – 2017. Data downloaded from the Fiskistofa[111] website.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Common skate	136	123	127	128	117	125	145	153	141	157	132	139
Atlantic halibut	559	516	529	548	557	555	36	39	45	87	123	137
Orange roughy	0.9	3.7	0.1	1	1.5	19	56	13	6	5.8	36.6	18.9
Spiny dogfish	82	43	68	102	62	53	51	6	19	8	8	2
Greenland shark	28	2	35	26	43	18	19	6	26	18	26	10
Porbeagle shark	0.4	0.4	1.1	1	1.1	1	0.8	0.9	0.4	0.8	1.1	1.2

Common skate (Grey skate)

Recent studies have shown that the common skate in the Northeast Atlantic may actually be one of two nominal species; the smaller blue skate or grey skate (*Dipturus flossada*) and the large flapper skate (*Dipturus intermedia*); together they are more commonly referred to as the *D. batis* (listed as Critically Endangered under the IUCN Red list[112]) species-complex (Iglésias, 2009)[113]. Investigation of skates in Icelandic waters have

[111] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/

[112] https://www.iucnredlist.org/species/39397/10198950#assessment-information

[113] https://www.cabdirect.org/cabdirect/abstract/20103147754

shown that the skate currently found in Icelandic waters, and caught as bycatch in Icelandic fisheries, is the smaller grey skate (*D. flossada*) (Jonbjorn Pálsson, unpublished material) with the larger sister species, the flapper skate (*D. intermedia*), believed to be almost extinct in the Atlantic.

The grey skate used to be fairly common in Icelandic waters, but has been overfished and catches are now only about 10% of what they were 50 years ago. Total catch of skate in Icelandic waters in 2017/18 was 139 tonnes. No TAC is available for this species because there is no directed fishery for it. It is caught as bycatch in mainly longline, bottom trawl and Danish seine gear. No assessment is carried out for grey skate and indices of abundance are uncertain as only limited survey data exists. Recent survey trends indicate some increase in the scientific groundfish survey (Figure below).

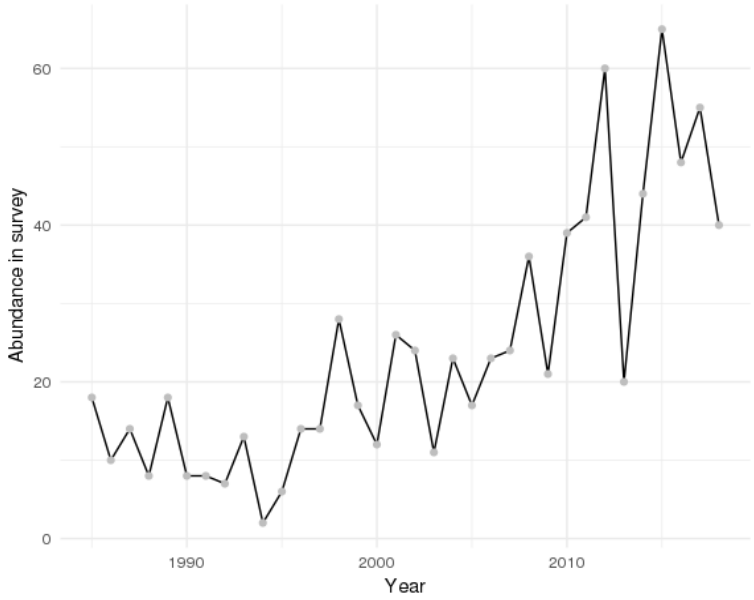


Figure 14. Total catch in numbers of Grey skate (Dipturus flossada) in MFRI spring survey (1985 – 2018) (Source: MFRI data provided to assessment team during Nov. 2018 site visits).

MFRI will continue to report on incidences of capture and distribution of skate during the spring bottom trawl survey as they have been doing since the survey began in 1985. In addition, catches in commercial fisheries will continue to be collected and the MFRI will monitor whether significant changes either the survey results or the level of landed catches occur. Misidentification of species is an issue and can lead to some moderate errors in landings data.

Atlantic halibut (*Hippoglossus hippoglossus*)

Atlantic halibut is classified as Endangered on the IUCN Red list[114]. Around 2000 tonnes of Atlantic halibut were landed annually from Icelandic waters in 1984–1991, but the catch declined to 500–800 tonnes in 1997–2011. Atlantic halibut is now only caught as bycatch in bottom gear all around the island.

Annual landings of Atlantic halibut were 36–119 tonnes in 2012–2017, which are the lowest landings since the beginning of the fishery. The decrease is due to management decisions. The IS-SMB only covers the fishing grounds of juvenile Atlantic halibut, and there is a lack of information on the adult population. The

[114] https://www.iucnredlist.org/species/10097/3162182

survey indices have been relatively stable between years, and uncertainties around them are low. A committee established in 2010 by the minister of fisheries due to the poor state of the Atlantic halibut stock, concluded that the most effective way to rebuild the stock would be to ban all targeted fishing.

The Marine Research Institute followed up on these conclusions, by consulting with experienced captains on what would be the best course of action to protect the stock, resulting in advice to ban targeted fishing, and to make it mandatory to release all viable Atlantic halibut caught as bycatch in other fisheries. In 2012, a regulation was issued to ban all targeted fishing for Atlantic halibut[115] and stipulating that all viable halibut in other fisheries must be released. In 2018, MFRI's advice is that these regulations remain in effect[116].

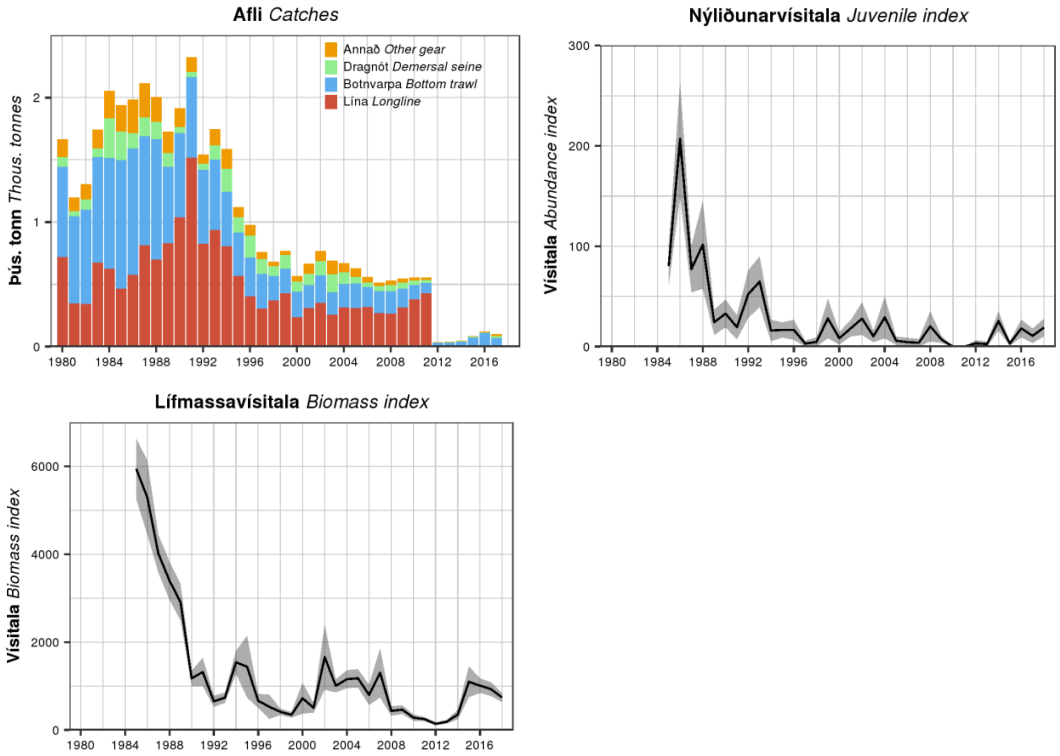


Figure 15. Catch by gear type, IS-SMB juvenile (<30 cm) and biomass (≥20 cm) indices.

Orange roughy (*Hoplostethus islandicus*)

Recent catches of orange roughy in Iceland have been quite small, ranging 1-56 tonnes. These catches are unlikely to significantly affect the status of the stock. During the November 2018 on site visits, the MFRI stated that there is limited overlap between bottom trawl fisheries and the orange roughy stock because it occurs in deeper water than other species.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Orange roughy	0.9	3.7	0.1	1	1.5	19	56	13	6	5.8	36.6	18.9

[115] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/18302

[116] https://www.hafogvatn.is/static/extras/images/luda_2018729535.pdf

Ban on fishing for spiny dogfish, Porbeagle sharks and Basking shark.

Regulation 456/2017 states that there is a ban on fishing for Porbeagle sharks, Basking shark and spiny dogfish. Any incidental catches of these species are to be landed and sold on an approved auction market for marine products according to the provisions of Act no. 37/1992, on a special fee for illegal fishing, with subsequent amendments. [117] This is the same mechanism adopted (i.e. VS catches) for Atlantic halibut catches, for which directed fishing is banned. During the 2018 November site visits, the Assessment Team visited the Fish Auction in Reykjavik. One Atlantic halibut was in temporary store there. The director of the fish auction confirmed that catches of banned species are sold and 80% of the value goes to a MFRI research fund and only 20% to the fishermen. These VS catches measures are meant to facilitate the landing of every species, discourage potential targeting and avoid discarding.

During the site visits, the MFRI also reported that few basking sharks have been reported as bycatch in logbooks, so some interactions have been documented in the past. They seem however to be very rare and far between. Leafscale gulper sharks are usually only found in waters deeper than fisheries for cod, haddock, saithe and redfish operate in.

Spiny dogfish / spurdog (*Squalus acanthias*)

When foreign fleets operated in Iceland, hundreds of tonnes of spiny dogfishes were fished annually. However, Icelandic catches have always been low, less than 100 tonnes, in recent years. Catches in 2015, 2016, and 2017 were 8, 8 and 2 tonnes respectively.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Spiny dogfish	82	43	68	102	62	53	51	6	19	8	8	2

As spiny dogfish are an aggregating species, landings can be dominated by relatively few large hauls leading to large fluctuations in annual landings and/or survey results. There is no directed fishery for spiny dogfish and current catches are solely bycatch in other fisheries, primarily gillnet fisheries off the southern coast during the summer months. Recent catches of spiny dogfish appear to be unlikely to significantly affect the status of the stock or its rebuilding.

Porbeagle shark (*Lamna nasus*)

Recorded catches of Porbeagle shark in Iceland are very small (in the region of 1 tonne or less a year) and unlikely to negatively affect the stock or its recovery.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Porbeagle shark	0.4	0.4	1.1	1	1.1	1	0.8	0.9	0.4	0.8	1.1	1.2

Greenland shark (*Somniosus microcephalus)*

Historically, Greenland sharks were fished in Icelandic waters with the fishery reaching its peak in 1867 when 13,100 barrels of shark oil were exported. Later, whale and then fuel oil became more available and commercial fisheries for Greenland shark ceased by about 1910. Greenland sharks are still targeted in small

[117] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0456-2017

scale artisanal fisheries and is a periodic bycatch in bottom trawl fisheries[118]. National landings in 2017/2018 totalled 18 t with no specific changes or trends apparent in the annual landings[119].

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Greenland shark	28	2	35	26	43	18	19	6	97	28	26	18

Vulnerable Whales

Blue Whale

The Húsavík Research Centre (HRC) in Húsavík continued their long-term photo-identification and sightings studies of blue whales in Skjálfandi bay. Acoustic tags were deployed on two blue whales in Skjálfandi Bay.

Northern Right Whale

No specific monitoring information is available on this species.

No interactions between Blue whales and Northern right whales have been recorded in recent years with Icelandic fisheries. This was confirmed during the November 2018 site visits by the MFRI.

Opportunistic marine mammal observations during the 2018 IESSNS survey[120]

During the 2018 IESSNS survey, opportunistic whale observations were done by M/V "Kings Bay" and M/V "Vendla" from Norway in addition to R/V "Árni Friðriksson" from Iceland in 2018 (see figure below). Overall, more than 600 marine mammals of nine different species were observed, which was a small reduction from last year 700+ observed individuals. This could partly be explained by reduced observation effort on the Icelandic R/V "Árni Friðriksson" as in 2017 dedicated whale observers were onboard which was not the case in 2018. The two Norwegian vessels had practically flat sea and excellent visibility during the entire survey period while the Arni Fridriksson had occasional periods with fog in north of Iceland. Observed species included; fin whales (*Balaenoptera physalus*), minke whales (*Balaenoptera acutorostrata*), humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*), pilot whales (*Globicephala sp.*), killer whales (*Orcinus orca*), sperm whales (*Physeter macrocephalus*), white-sided dolphins (*Lagenorhynchus acutus*) and white beaked dolphins (*Lagenorhynchus albirostris*). Marine mammal observations were north and south of Iceland, at the entrance to the Barents Sea, along the Norwegian coast and in the western outskirts of the Norwegian Sea. The observations were a mix of the species with no single species dominating. There were very few observations of marine mammals in the central Norwegian Sea and east of Iceland, and the spatial overlap between the pelagic fish and marine mammals seem to be low.

[118] https://seaiceland.is/what/fish/sharks-and-skates/greenland-shark

[119] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGEF/26%20WGEF%20Report%202018_Section%2024%20Greenland%20shark_NEA.pdf

[120] https://www.hafogvatn.is/static/files/skjol/wd05_iessns_survey_report_2018.pdf

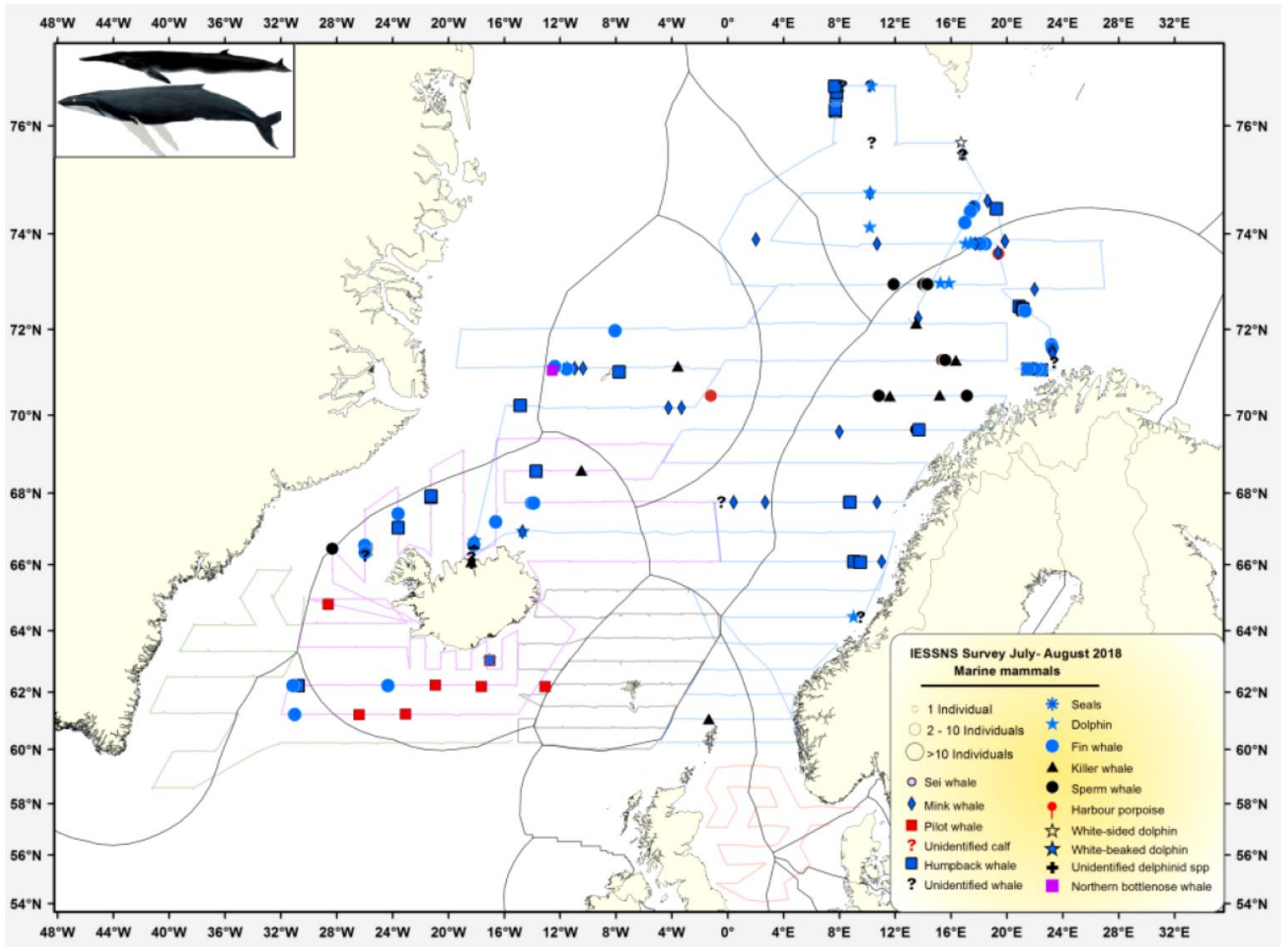


Figure 16. Marine mammal observations during the 2018 IESSNS surveys.

E-logbook seabird and marine mammals recording

The electronic logbook system designed by TrackWell allows for marine mammal and seabirds to be recorded along with normal catch. In total there are 171 marine mammal and seabird species pre-programmed into the e-log system that are selectable by fishers. Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/catches is a legal requirement (Reg. 126/2014)[121].

E-logbook app modifications

A smartphone app is in development by the Directorate of Fisheries, which hopefully will make both reporting and identification of bycatch easier for operators in the fishery. During the 2018 site visits the Directorate reported that this app prioritises the need for recording marine mammals and seabirds interactions/bycatch before fish catches are submitted, to enable more consistent and reliable reporting. The app appears to be ready for implementation but there is a need to change current legislation to ensure it can be nested within legal requirements.

The Assessment Team will check on this development in the next audit.

[121] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967

Quality of marine mammals and seabird interaction data collected by Directorate inspectors

In relation to the quality of by-catch data, it is important to note that the Directorate's inspector coverage of all gear types is limited, and that the sampling is not focused on documenting seabird and marine mammal by-catch (see coverage information below). The Directorate has placed extra effort in monitoring gillnet fisheries for lumpfish and for cod in 2017/2018 due to bycatch issues. All trips are unannounced.

Table 17. Unannounced Directorate inspector days on fishing vessels in the past 3 years.

Season	Fishery type: Bottom Trawl	Fishery type: Longline	Fishery type: Gillnet (include lumpfish and cod)
2015/16 season days	553	NA (likely but not reported)	81 (60 days cod, 21 days lumpsucker)[122]
2016/17 season days	780	230	117 (60 days cod, 57 lumpsucker)[123]
2017/2018 season days	570	202	152
2017/2018 season coverage	1.93%	0.64%	3.64%

As mentioned above, most attention is given to seabird and marine mammal by-catch in the gillnet fisheries, where most of the by-catch is assumed to occur. Less information is available from other fishing gears. It is also important to note that even where observers are present they are not always in a position to document any bycatch. For instance, in the pelagic pair trawl fishery, observers are below deck to monitor the catch, and not in a position to see if a seabird or marine mammal is caught[124]. Since 2014, this has improved with stricter guidelines regarding marine mammal by-catch and supervision of the observers. Prior to this the observer data on marine mammal by-catch is not considered reliable.

The next section provides sources of data post 2014, when the requirement for recording seabird and marine mammal bycatch went into force, showing available observed and raised (i.e. calculated at fleet level) bycatch data for both marine mammals and seabirds in various fisheries before providing a status evaluation for affected species.

2015 data on marine mammals and seabirds from various fisheries (gillnet, demersal trawl)[125]

Monitoring in Icelandic waters during 2015 from Directorate inspectors included 81 days spent on gillnet vessels, as well as 553 days on demersal trawl vessels fishing within the Icelandic EEZ. Target species in the

[122] http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGBYC/wgbyc_2017.pdf

[123] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

[124] Report of the NAMMCO Scientific Committee Working Group on By-catch, 2 - 4 May 2017, Faroes Representation Copenhagen, Denmark. https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf

[125] http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGBYC/wgbyc_2017.pdf

gillnet fisheries were cod (60 days observed) and lumpsucker (*Cyclopterus lumpus*; 21 days observed), while demersal fish (gadoids, redfish and flatfish species) were the target species in the demersal trawl fishery.

Observed marine mammal bycatch in Icelandic fisheries was 20 harbour porpoises, 20 harbour seals, 17 grey seals, six harp seals, two ringed seals and one hooded seal.

Observed seabird bycatch in the fisheries was 92 eider ducks, 43 common guillemots, 40 northern fulmars, 12 black guillemot, 13 cormorants, nine northern gannets, two Atlantic puffins, and two Brünnich's guillemots. The majority of the bycaught animals were taken in gillnets, although one harbour seal and one northern gannet were observed in demersal trawls.

Total estimated bycatch of marine mammals for 2015 in observed Icelandic gillnet and demersal trawl fisheries was approximately 1400 harbour seals, 1200 grey seals, 800 harbour porpoises, 140 ringed seals and 50 hooded seals.

Total estimated bycatch of seabirds for 2015 was approximately 6600 eider ducks, 1900 guillemots, 1700 fulmars, 900 black guillemots, 400 northern gannets, 100 puffins and 80 Brünnich's guillemots (thick-billed murre). These estimates are likely to be biased high, as observed effort was low and the coefficient of variance around those estimates is very high (40–100%).

2016 data on seabirds from various fisheries (longline, gillnets)

Monitoring of Icelandic waters was conducted by the MFRI in 2016. The primary purpose of the monitoring was to have bycatch estimates of seabirds and marine mammals available for fishery certification purposes. This included[126]:

- 57 trips/days on lumpsucker gillnet vessels,
- 60 trips/days on cod gillnet vessels,
- 61 trips/780 days on demersal trawl vessels,
- 72 trips/230 days on longline vessels, and three trips/days in monkfish gillnets, fishing within the Icelandic EEZ.

As part of Iceland becoming part of the ICES Working Group on Bycatch of Protected Species (WGBYC) in 2017, the following information on seabird and marine mammal bycatch for 2016 was submitted to the bycatch working group. This information offers some additional detail in regards to bycatch rate of individuals per days at sea.[127]

126 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

127 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

Table 18. Total number of bycatch specimens (all fisheries) or *number of incidents reported and bycatch rates (number of specimens/days at-sea or *number of incidents per days at-sea) derived from the ICES WGBYC 2016 data call. Bycatch numbers and rates are grouped by ecoregion, taxa, métier and species.

Ecoregion	Taxa	ICES Subarea	Métier3	Species	Total Observed Effort (Days at-sea)	Fishing Effort (Days at-sea)	Total No. Incidents	Total No of Specimens *Incident reported but not No of specimen	Bycatch Rate No of specimen per day at-sea observed *No of incidents per days at-sea	Reported Bycatch Estimate by MS
Iceland Sea	Bird	27.5.a	Longlines	*Fulmarus glacialis*	230	NA	11	11	0.05	NA
Iceland Sea	Bird	27.5.a	Nets	*Cepphus grylle*	120	NA	6	16	0.13	NA
Iceland Sea	Bird	27.5.a	Nets	*Clangula hyemalis*	120	NA	1	1	0.01	NA
Iceland Sea	Bird	27.5.a	Nets	*Fratercula arctica*	120	NA	1	1	0.01	NA
Iceland Sea	Bird	27.5.a	Nets	*Fulmarus glacialis*	120	NA	9	17	0.14	NA
Iceland Sea	Bird	27.5.a	Nets	*Gavia immer*	120	NA	2	3	0.03	NA
Iceland Sea	Bird	27.5.a	Nets	*Phalacrocorax* spp.	120	NA	1	1	0.01	NA
Iceland Sea	Bird	27.5.a	Nets	*Somateria mollissima*	120	NA	11	34	0.28	NA
Iceland Sea	Bird	27.5.a	Nets	*Uria aalge*	120	NA	4	13	0.11	NA
Iceland Sea	Bird	27.5.a	Nets	*Uria lomvia*	120	NA	1	1	0.01	NA
Iceland Sea	Marine mammal	27.5.a	Bottom trawls	*Halichoerus grypus*	780	33	1	1	0.001	NA
Iceland Sea	Marine mammal	27.5.a	Nets	*Erignathus barbatus*	120	NA	2	2	0.02	NA
Iceland Sea	Marine mammal	27.5.a	Nets	*Halichoerus grypus*	120	NA	4	46	0.38	NA
Iceland Sea	Marine mammal	27.5.a	Nets	*Pagophilus groenlandicus*	120	NA	4	4	0.03	NA
Iceland Sea	Marine mammal	27.5.a	Nets	*Phoca vitulina*	120	NA	7	11	0.09	NA
Iceland Sea	Marine mammal	27.5.a	Nets	*Phocoena phocoena*	120	NA	33	44	0.37	NA

Interactions with Seabirds and Marine Mammals

Bycatch of seabirds, small cetaceans, and seals is known to occur in bottom setnets, particularly in Breidafjordur (western Iceland) and in the north. Harbour porpoise (*Phocoena phocoena)* is the most commonly bycaught marine mammal, but seals are also caught, especially in the lumpsucker *Cyclopterus lumpus* fishery.

Harbour porpoises interactions

Harbour porpoises are classified as Least Concern in the IUCN Red List[128] (population trend unknown). Annual estimates of harbour porpoise by-catch have decreased in recent years as gillnet effort has decreased (see figure below), from a high of 7,300 animals in 2003 to about 1600 animals in 2009–2013[129] and down to about 750 animals in 2014-2015.

There was an increase in harbour porpoise by-catch in cod gillnets in 2016. The rate is four times higher compared to 2015 (with the same amount of observer effort), suggesting that harbour porpoise density on the fishing grounds might be changing[130].

[128] https://www.iucnredlist.org/species/17027/6734992

[129] Pálsson ÓK, Gunnlaugsson Th, and Ólafsdóttir D. 2015. By-catch of seabirds and marine mammals in Icelandic Fisheries. Marine Research no 178. https://www.hafogvatn.is/static/research/files/fjolrit-178pdf

[130] https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf

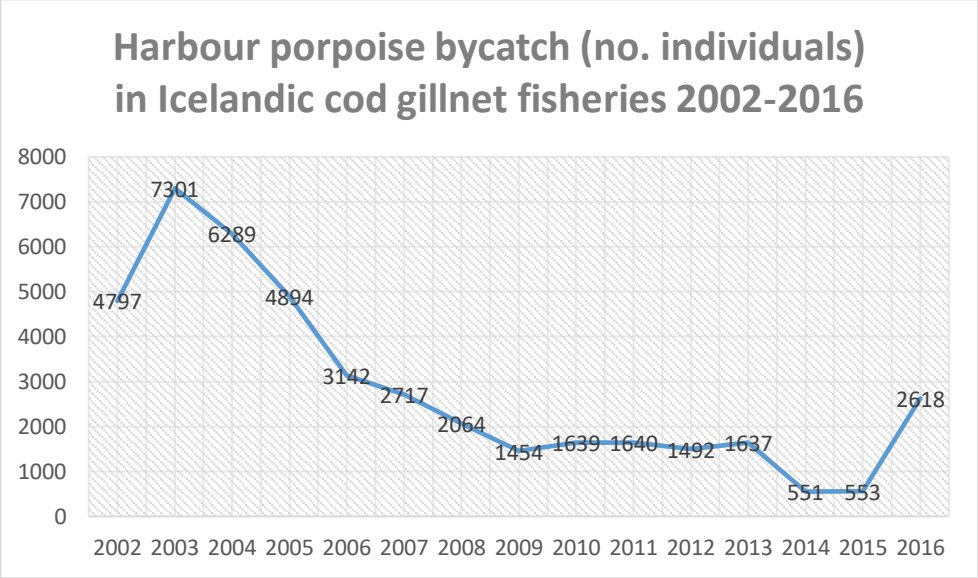


Figure 17. Bycatch of harbour porpoise in the Icelandic cod gill net fishery from 2002 to 2016. Data pulled together from Pálsson et al. 2015 and the 2017 NAMMCO 24th Scientific Committee Meeting Report. Note that these numbers exclude catches in the lumpsucker fishery (see table below for details of 2014-2016 numbers).

It was suggested that Iceland examine trends in commercial effort in the cod fishery over time, because the change in the by-catch estimate (the 2015 estimate went from 553 to 2,618 in 2016) might be influenced by increases in commercial fishing effort, in addition to higher by-catch rates. However, the cod gillnet effort has been more or less stable since 2008 (see figure below).

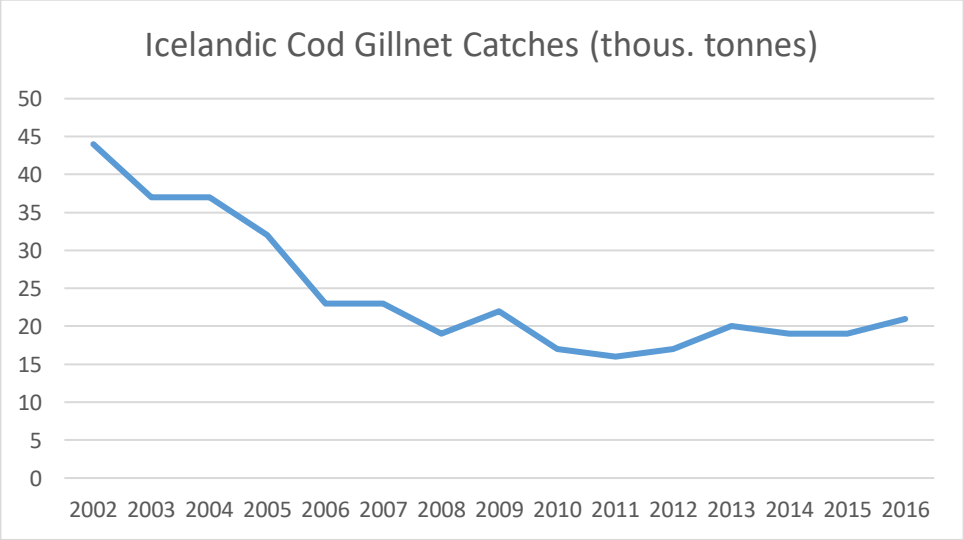


Figure 18. Icelandic cod gillnet catches (thous. tonnes) from 2002 to 2016.[131]

[131] https://www.hafogvatn.is/static/extras/images/%C3%BEorskur%20(5)731728.pdf

The estimated harbour porpoise by-catch in 2016 was ~2-9% of the 2007 abundance estimate of 43,179 (43,179 animals, 95% confidence intervals of 31,755-161,899[132]), but it is important to note that the 2007 estimate is considered to be a minimum estimate based on an incomplete aerial survey.
The WG noted that large ecosystem changes have been observed in the Icelandic ecosystem between 2015 and 2016, which could have affected the abundance and distribution of harbour porpoises. A new estimate based on next of kin genetic analysis is ongoing.

Table 19. Estimated numbers of marine mammal by-catch by species and fishing gear type in Icelandic waters in 2014-2016 from the standard raising methods. Standard deviation of the estimate is shown in the brackets (source: NAMMCO, 2017[133]).

Species	Cod gill nets			Lumpfish nets			Other gear			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016
Harbour porpoise	551 (30)	553 (48)	2618 (77)	139 (61)	215 (75)	374 (153)	0 (0)	0 (0)	0 (0)	690	768	2992
Harbour seal	0 (0)	46 (0.7)	0 (0)	232 (116)	1,288 (1335)	624 (356)	0 (0)	86 (3.3)	0 (0)	232	1,420	624
Gray seal	0 (0)	0 (0)	0 (0)	162 (118)	1,216 (1824)	2870 (9820)	0 (0)	0	0 (0)	162	1,216	2,870
Harp seal	92 (1.5)	212 (7.7)	144 (7.0)	23 (7.5)	72 (61)	187 (42)	0 (0)	0 (0)	0 (0)	115	284	331
Ringed seal	38 (1.0)	0 (0)	0 (0)	46 (7.5)	143 (31)	0 (0)	0 (0)	0 (0)	0 (0)	84	143	0
Hooded seal	0 (0)	46 (0.7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	46	0
Bearded seal	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	124 (23)	0 (0)	0 (0)	0 (0)	0	0	124
Total	681	857	2,762	602	2,934	4179	0	86	0	1,283	3,877	6,941

Annual anthropogenic induced mortality reference point for harbour porpoise

ASCOBANS has advised that the maximum annual anthropogenic induced mortality for harbour porpoise should not exceed 1.7% of the total population size so this threshold is likely to have been met or exceeded in 2016[134]. However, Pálsson *et al*., (2015) suggested that the higher numbers of harbour porpoise occurring in the cod gillnet fishery in recent years could indicate an increase in the porpoise stock as a consequence of reduced fishing effort and perhaps that the replacement potential of the porpoise population may be higher than implied by the precautionary 1.7% reference point.

An alternative explanation may be that, as previously mentioned, the 2007 mean population estimate was a significant under-estimate and the population is bigger than the survey suggested such that it is able to sustain the levels of by-catch observed over the years. It has been suggested that the higher by-catch in 2016 is a result of changing harbour porpoise density on the fishing grounds. The rapid change in by-catch between years does suggest a significant change in distribution (perhaps linked to environmental conditions).

[132] Gilles *et al.* Harbour porpoise *Phocoena phocoena* summer abundance in Icelandic and Faroese waters, based on aerial surveys in 2007 and 2010. http://www.hafro.is/Bokasafn/Greinar/sc_18-AESP11.pdf
[133] NAMMCO 2017. Report of the 24th Scientific Committee meeting, 14-17 November 2017. https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf
[134] OSPAR, 2009. Background Document for Harbour porpoise Phocoena phocoena. OSPAR Commission. http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena

The NAMMCO 2017 Progress report for Iceland[135] highlights that efforts to estimate bycatch of harbour porpoises in fisheries continues at the MFRI.

Marine mammals bycatch reduction devices trials

Pingers were tested for the first time in the Icelandic cod gillnet fishery in April of 2017, but their use showed no reduction in porpoise bycatch, as 7 porpoises were caught in nets with pingers, while 5 porpoises were caught in nearby control nets. A more detailed analysis of this experiment is underway and is due to be published. C-PODS (i.e. continuous porpoise detectors) were also deployed in Skjálfandi Bay (Northern Iceland) for detections of harbour porpoises.

Collaboration of the MFRI with the University of Potsdam on harbour porpoise genetic research is ongoing (Lah et al. 2016). Among the objectives of this study is estimation of population size based on close kin analysis. For all harbour porpoises, the mitochondrial Control Region and a standard set of 15 nuclear microsatellites is genotyped for population/stock assessment and close-kin-based estimation of population size. Furthermore, multiple nuclear Single Nucleotide Polymorphisms (SNPs) are typed in a representative subset of samples. In 2017 fishermen for the first time received a payment for each harbour porpoise DNA tissue sample that they send in to the MFRI, and this is clearly resulting in an increase in samples and in the recording of by-catch. Efforts to estimate bycatch of harbour porpoises in fisheries continues at the MFRI.

Harbour seals interactions

Six pinniped species occur in the Icelandic Waters ecoregion but only two of these breed locally (grey seals and harbour seals). Both species are currently in decline. Harbour seals are classified as Least Concern in the IUCN Red List[136] (population trend is unknown). Bycatch of marine mammals was monitored in all major fisheries in Icelandic waters in 2017, through (limited) logbook submissions, reports from onboard inspectors from the Directorate of Fisheries and in the MFRI annual gillnet survey. A draft report on bycatch in Icelandic fisheries was presented to the NAMMCO Bycatch working group in May 2017.[137]

In 1980, the abundance of harbour seals was estimated at around 33 thous. animals but the population declined rapidly until 1989 to around 15 thous. animals. The latest harbour seal census was conducted in 2016 and the stock was estimated to be 7,652 animals (95% confidence intervals of 4,995–10,310) (Figure below). The current population size is 77% smaller than in the first abundance estimate in 1980 and the population is 36% under the management objective of 12 thous. animals[138].

[135] https://nammco.no/wp-content/uploads/2018/01/2017-iceland_progress_report_final.pdf
[136] https://www.iucnredlist.org/species/17013/45229114
[137] https://nammco.no/wp-content/uploads/2018/01/2017-iceland_progress_report_final.pdf
[138] https://www.hafogvatn.is/static/extras/images/Landselur277.pdf

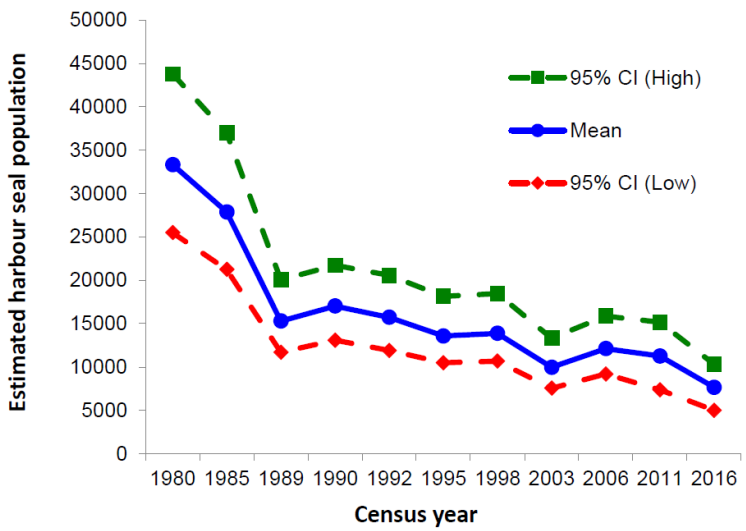


Figure 19. Trends in the Icelandic harbour seal population from 1980 to 2016. The mean values (blue) and 95% confidence intervals are shown.

Traditional sealing using nets has decreased in recent decades, but culling around river mouths to reduce the effect that seals are thought to have on salmon fisheries is still common. Seal bycatch in gillnets is high. In 2013, the number of by-caught harbour seals in Icelandic waters was estimated to be 705 animals in total for all fishing gear (Pálsson et al. 2015). Limited data are available on seal bycatch but data collected by on-board inspectors/observers of the Directorate of Fisheries, and in the MFRI gillnet survey, indicate that 1066 (CV = 1.20) harbour seals were by-caught in lumpfish fishery in 2015 and 160 (CV = 1.80) in 2014. Further, 46 (CV = 0.62) harbour seals were estimated as by-caught in cod gillnet fisheries in 2015, but none in 2014.

- Of the total 2,190 harbour seals estimated to have been caught in the gillnet fisheries for cod and lumpsucker in 2014, 2015 and 2016, the cod gillnet fishery is estimated to have caught just over 2%, while almost 98% of the bycatch was from the lumpsucker fishery.
- Moreover, 86 harbour seals were estimated to have been caught in bottom trawls in 2015.

Although the error margins for the by-catch estimates are very high due to limited observer coverage, and should be interpreted with caution, these total numbers correspond to 2-14.5% of the current harbour seal population size and are largely dependent upon lumpsucker fishery effort[139]. MFRI advices that direct hunt should be prevented and that actions must be taken to reduce bycatch of seals in commercial fisheries. MFRI also advices that a hunting management system should be initiated, and that reporting of all seal hunt should be mandatory[140].

Grey seals interactions

The Icelandic grey seal (*Halichoerus grypus*) population has decreased from an estimated 9000 animals in 1982 to 4200 animals in 2012. They are classified as Least Concern (population increasing) on the IUCN Red List[141]. To estimate the current status of the Icelandic grey seal population, a census was conducted during the pupping period in 2017 and analysis is currently ongoing. A project was initiated in October 2016 where

[139] https://www.hafogvatn.is/static/research/files/hv2017-009pdf

[140] https://www.hafogvatn.is/static/files/Veidiradgjof/tac-taflan_aukatillogur_jun17.pdf

[141] https://www.iucnredlist.org/species/9660/45226042

five grey seal pups were tagged with satellite tags to map habitat use and the analysis is also ongoing. MFRI will release advice based on the management objectives set for grey seals in Iceland only after the grey seal population estimate has been finalized in 2018[142]. Zero gray seals were estimated to have been bycaught by the cod gillnet fishery between 2014 and 2016 (see table 1 of 2017 NAMMCO report[143], therefore the recent effects of this fishery on this species are considered negligible).

The NAMMCO working group on by-catch noted that grey seal estimates in the lumpsucker fishery are extremely high, arising from 3 observed events were 17, 16 and 12 grey seals were caught. Outside of those three events only one grey seal was observed among 57 observed hauls. Based on the latest population estimate of grey seals in Iceland, the estimated by-catch amount represents over 60% of the total population. The working group noted that the estimate is therefore considered inaccurate and requires further analysis. MFRI has undertaken some recent work to compare by-catch estimates in the lumpsucker gillnet fishery made using the existing method with alternative estimates stratified by management area, depth and month[144].

Harp Seals interactions

The harp seal (*Pagophilus groenlandicus*) population 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 cod gillnet fleet appears to have some interactions with harp seals. 92 seals were bycaught in 2014, 212 in 2015 and 144 in 2016. There does not appear to be much information available specific to Iceland but the species is considered Least Concern in the IUCN Red List with increasing population, based on a 2015 assessment[145].

Ringed and hooded seals

The interaction between cod gillnet fisheries and ringed seals and hooded seals appear to be quite limited. 38 ringed seals (*Pusa hispida*) were caught in 2014 (none in 2015 and 2016), while 47 hooded seals (*Cystophora cristata*) where caught in 2015 (none in 2014 and 2016). Ringed seals are considered Least Concern[146] in the IUCN Red List (as well as being marked as non resident or breeding in Iceland), while hooded seals are considered Vulnerable in the IUCN Red List[147]. Hooded seal are native and resident to Canada, Greenland and Iceland, their current estimated population is 340,000 individuals and their population trend is unknown.

[142] https://nammco.no/wp-content/uploads/2018/01/2017-iceland_progress_report_final.pdf

[143] https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf

[144] MRFI (2018b). By-catch of seabirds and marine mammals in lumpsucker gillnets 2014-2017. https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf

[145] https://www.iucnredlist.org/species/41671/45231087#conservation-actions

[146] https://www.iucnredlist.org/species/61382318/61382321

[147] https://www.iucnredlist.org/species/6204/45225150

Comparison to nearby fisheries - 2014-2017 marine mammal bycatch in the lumpsucker gillnet fishery

Extrapolated estimates are available from MFRI monitoring for the lumpsucker fishery based on observations from 2014–2017[148]. These estimates are per year and are stratified by management area.

Estimated raised marine mammal bycatch in the lumpsucker fishery was 3102 (2016– 4188) animals (all mammal species), consisting of 1255 (728–1782) harbour seals, 1091 (502–1680) grey seals, 549 (264–834) harbour porpoises, 132 (15–249) harp seals, 33 (1– 65) ringed seals and 42 (12–72) bearded seals.

Seabirds bycatch

The 2017 ICES Ecosystem Overview on the Icelandic Ecoregion reports that the main bycaught seabird species are northern fulmar *Fulmarus glacialis*, common murre *Uria aalge*, northern gannet *Sula bassana*, black guillemot *Cepphus grylle*, and common eider *Somateria mollissima*, all caught in bottom setnets. Bycatches in gillnets targeting cod have decreased, associated with a large decrease in effort[149]. Pálsson et al. 2015[150] reported that among seabirds the estimated by-catch of the smallest stocks, black guillemot and cormorants, was of concern. They also highlighted that these estimates are based on limited data that needs to be increased and improved with a functioning reporting system for the fishery and better follow up.

Pálsson *et al*. (2015) used data from the annual MFRI cod gill net survey, which mimics fleet effort and represents approximately 2% of the total effort in the fishery, to assess by-catches of seabirds in gillnets (excluding the lumpsucker fishery). The study found that seabird by-catch in gillnets was made up of 13 species (Table below).

148 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

149 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf

150 https://www.hafogvatn.is/static/research/files/fjolrit-178pdf

Table 20. Recorded numbers of sea birds in gill nets. a) MFRI cod gill net survey (SMN), sea birds 2009-2014 (Source: Pálsson et al., 2015)

Sjófuglar *Sea birds*		a) Netarall *Gill net survey*	
Tegund *Species*	Vísindaheiti *Scientific name*	Fjöldi *Numbers*	%
Langvía *Common guillemot*	*Uria aalge*	554	72,1
Stuttnefja *Brunnich's guillemot*	*Uria lomvia*	11	1,4
Svartfugl ógr. *Guillemots*	*Alcidae*	17	2,2
Lundi *Puffin*	*Fratercula arctica*	1	0,1
Álka *Alk*	*Alca torda*	4	0,5
Teista *Black guillemot*	*Cepphus grylle*	1	0,1
Fýll *Fulmar*	*Fulmarus glacialis*	144	18,8
Súla *Northern gannet*	*Morus bassanus*	24	3,1
Æðarfugl *Eider*	*Somateria mollissima*	8	1,0
Himbrimi *Great northern diver*	*Gavia immer*	0	0,0
Lómur *Loom*	*Gavia stellata*	1	0,1
Skarfur ógr. *Cormorants*	*Phalacrocoracidae*	0	0,0
Hávella *Long-tailed duck*	*Clangula hyemalis*	3	0,4
Samtals *Total*		768	100,0

Pálsson *et al.*, (2015) did not record any observations of seabirds in the bottom or pelagic trawl fisheries.

Comparison to nearby fisheries - 2014-2017 seabird bycatch in the lumpsucker fishery

Extrapolated estimates are available from MFRI monitoring for the lumpsucker fishery based on observations from 2014–2017[151]. These estimates are per year and are stratified by management area.
Estimated raised seabird bycatch in the lumpsucker fishery was 7207 (4180–10 234) birds, consisting of 3232 (1616–4848) eider ducks, 1510 (695–2325) black guillemots, 1376 (372–2380) common guillemots, 813 (244–1382) cormorants/shags. 61 (1–122) long-tailed ducks, 59 (1–118) razorbills, and less than 50 Atlantic puffins, Black-legged Kittiwakes (*Rissa tridactyla*), Gannets and Common loons.

Seabird status

Based on Pálsson et al. (2015), Common Guillemot (72% of encounters) and Northern fulmar (19% of encounters) were the species most frequently caught in the cod gillnet MFRI survey and likely to occur in those fisheries too. If the catch rate observed in the cod gill net survey was multiplied to total fleet effort this would represent about 0.66% and 0.03% of their respective populations. Information on these two species as well as others minor bycatch species listed is provided below.

Northern fulmar

The species is covered by the EU Birds Directive as a migratory species. In Europe it occurs within 29 marine Important Bird Areas, including in the Faroe Islands, France, Germany, Iceland, Svalbard (Norway) and the United Kingdom. Within the EU it is listed within 46 Special Protection Areas. Under the EU Marine Strategy Framework Directive it will be monitored for plastic ingestion. Mitigation measures have been developed to reduce bycatch of the species (Løkkeborg and Robertson 2002). Based on a 2018 BirdLife International assessment Northern Fulmar is categorised as Least Concern in the IUCN red list, with 7 million mature individuals and an increasing population trend[152].

Common Guillemot and common Eider duck

The 2018 report on marine mammal and seabird bycatch in the lumpsucker fishery from 2014-2017 [153] highlights that "the population estimates of eider and common guillemots suggest that the populations are large and stable (Skarphéðinsson et al. 2016), and bycatch is therefore unlikely to have any effect on the total populations".

Common Guillemot (*Uria aalge*) is found on Annex I of the EU Birds Directive. With the implementation of bird protection laws, a slow recovery occurred over much of the Atlantic breeding range up to the early 1970s except in north Norway, the Faeroes and probably Iceland (Nettleship et al. 2018). At major colonies, detailed monitoring is needed, particularly in Iceland, which suffered a large decline post-2005 (Nettleship et al. 2018). In 2018, this species is categorised as Least Concern in the IUCN Red List with increasing population. The European population is estimated at 2,350,000-3,060,000 mature individuals (BirdLife International 2015). [154]

Common Eider (*Somateria mollissima*) is listed in the EU Birds Directive Annex II and III. CMS Appendix II. Changes to hunting regulations in Greenland in 2001 shortened the length of the hunting season which is thought to have led to a rapid increase in population size (Burnham et al. 2012). However the hunting regulations have recently changed and the effect on the population is not yet known. Restrictions were also introduced in Denmark in 2004/2005 and 2011/2012 with the aim of reducing the proportion of female birds killed and increasing the population growth rate (Christensen and Hounisen 2014). In 2018, this species is categorised as Near Threatened in the IUCN Red List with an unknown population trend[155].

Northern Gannet

Northern Gannet (*Morus bassanus*) is listed on the African Eurasian Waterbird Agreement. It is covered by the EU Birds Directive as a regularly occurring migratory species. In Europe it is currently listed within 34 marine Important Bird Areas. Within the EU, it is currently listed within nine Special Protection Areas. In 2018, this species is categorised as Least Concern in the IUCN Red List with an increasing population trend ranging between 1.5 and 1.8 million mature individuals[156].

Thick-billed Murre (also called Brunnich's Guillemot)

There are no known current conservation measures for the thick-billed murre (*Uria lomvia*) within its European range. Enhanced monitoring of major colonies is needed, particularly in Iceland, Spitsbergen and the Russian Arctic, where population size and status are inadequately known. Detailed assessment of impacts

151 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

152 https://www.iucnredlist.org/species/22697866/132609419#conservation-actions

153 https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf

154 https://www.iucnredlist.org/species/22694841/132577296#conservation-actions

155 https://www.iucnredlist.org/species/22680405/132525971#conservation-actions

156 https://www.iucnredlist.org/species/22696657/132587285#conservation-actions

of overfishing by commercial fisheries is required, particularly of capelin, cod, herring and sand eels in the Barents Sea and Iceland. In 2018, this species is categorised as Least Concern in the IUCN Red List with an increasing population trend. The European population is estimated at 1,920,000-2,840,000 mature individuals (BirdLife International 2015)[157].

Atlantic Puffin

Atlantic puffin (*Fratercula arctica)* is listed under the African Eurasian Waterbird Agreement. It is included in the Action Plan for Seabirds in Western-Nordic Areas (TemaNord 2010). There are 76 marine Important Bird Areas identified across the European region. Within the EU there are 40 Special Protection Areas which list this species as occurring within its boundaries. In 2018, this species is categorised as Vulnerable in the IUCN Red List with a decreasing population trend. The European population is estimated to be 4,770,000-5,780,000 pairs, which equates to 9,550,000-11,600,000 mature individuals (BirdLife International 2015)[158].

Common loon or great northern diver

The great northern diver (*Gavia immer*) is listed under Appendix II of the Convention on Migratory Species and under the African Eurasian Waterbird Agreement. It is listed in Article I under the EU Birds Directive. In Europe, it occurs in 20 Important Bird and Biodiversity Areas (IBAs), including in Iceland, Norway (Svalbard and mainland Norway), Ireland, the United Kingdom and in Spain. It is a listed species in 83 Special Protection Areas in the EU Natura 2000 network. In 2018, this species is categorised as Least Concern in the IUCN Red List with a stable population trend. Wetlands International (2016) estimated the population at 612,000-640,000 individuals. In Europe the breeding population is estimated at 700-1,300 pairs, which equates to 1,400-2,600 mature individuals (BirdLife International 2015).[159]

Razorbill

Razorbill (*Alca torda*) is listed on the African-Eurasian Waterbird Agreement. There are 91 Important Bird Areas across the region for this species. Within the EU there are 91 Special Protected Areas for this species, recognised as a regularly occurring migratory species. The species is considered in the Nordic Action Plan for seabirds in Western-Nordic areas (TemaNord 2010). In 2018, this species is categorised as Near Threathened in the IUCN Red List with a decreasing population trend. The European population is estimated at 979,000-1,020,000 mature individuals (BirdLife International 2015). Although a number of populations are increasing within Europe, a recent sharp decline was observed in Iceland (where more than 60% of the European population is found) since 2005 (BirdLife International 2015). Two comprehensive surveys of the species in Iceland suggest that the population declined by 18% between 1983-1986 (Gardarsson 1995) and 2005-2009 (Gardarsson et al. in press) from 378,000 pairs to 313,000 pairs. However, more frequent monitoring of a subset of colonies (every five years) between 1985 and 2005 suggests the population decline only started in 2005 and prior to this the population was stable, demonstrating that the decline has been much more rapid. Evidence of a very rapid decline in the Icelandic population is supported by data from the largest colony of this species in the world, Látrabjarg, which declined by 45% in only three years (160,000 pairs in 2006 to 89,000 pairs in 2009) (G. Gudmundsson in litt. 2015). The 2005 decline occurred around the same time that

[157] https://www.iucnredlist.org/species/22694847/132066134

[158] https://www.iucnredlist.org/species/22694927/132581443#conservation-actions

[159] https://www.iucnredlist.org/species/22697842/132607418#conservation-actions

sandeel stocks crashed around Iceland, suggesting that a lack of food may have influenced the decline (Gardarsson et al. in press). As a result of the reported decline in Iceland, the estimated and projected rate of decline of the European population size over the period 2005-2046 (three generations) is 25-29%[160].

Great Cormorants

Great Cormorant (*Phalacrocorax carbo*) is listed under the African Eurasian Waterbird Agreement. Within its European range the species occurs in 242 Important Bird Areas. Within the EU it is listed in 245 Special Protection Areas. In 2018 it was categorised as Least Concern in the IUCN Red List with an increasing population trend. The European population is estimated at 401,000-512,000 pairs, which equates to 803,000-1,020,000 mature individuals (BirdLife International 2015)[161].

Black guillemots

The 2018 lumpsucker bycatch report reported that "population of black guillemots (*Cepphus grille)* has been declining since the 1980s, and the population is currently estimated at around 20-30.000 birds (Skarphéðinsson et al. 2016)." Hunting of the species was banned in 2017 due to poor population status, and further research needs into whether bycatch in the lumpsucker gillnets could be affecting the population was highlighted.

The species is listed within the African Eurasian Waterbird Agreement. There are 91 marine Important Bird Areas which include this species in Europe. Within the EU, the species is listed within 29 Special Protection Areas. It is listed as Near Threatened by the HELCOM Convention. In 2018, this species is categorised as Least Concern in the IUCN Red List with an unknown population trend and a mature individuals range between 400 thousand and 1.5 million[162].

Black legged kittiwake

The black legged kittiwake (*Rissa tridactyla*) species is listed under the African-Eurasian Waterbird Agreement, but is not listed on the Bern Convention, the Convention of Migratory Species or on the EU Birds Directive Annexes. Population monitoring occurs across much of its breeding range, including Greenland, Norway (Anker-Nilssen et al. 2007), Iceland (Garðarsson 2006) France and the U.K. The species is considered within the Nordic Action Plan for Seabirds and is classified as Vulnerable (population trend decreasing) in the IUCN Redlist. The European population is estimated at 1,730,000-2,200,000 pairs, which equates to 3,460,000-4,410,000 mature individuals (BirdLife International 2015)[163].

Long tailed duck

Long-tailed duck (*Clangula hyemalis*) is listed under the CMS Appendix II and the EU Birds Directive Annex II. Some of the species' habitat is protected. Efforts are on-going to monitor populations of this species in many parts of its range. The AEWA Action Plan adopted in 2015. Working group to oversee implementation

[160] https://www.iucnredlist.org/species/22694852/131932615#population
[161] https://www.iucnredlist.org/species/22696792/132592923#population
[162] https://www.iucnredlist.org/species/22694861/132577878#conservation-actions
[163] https://www.iucnredlist.org/species/22694497/132556442#conservation-actions

is in process of being established. New coordinated survey of Baltic areas was conducted in January 2016 (results expected in 2017), plus development of other surveys, demographic monitoring and migration studies. Some new restrictions on hunting have been introduced recently. Actions to reduce bycatch are ongoing in several countries. Various protected areas have been implemented recently, especially marine SPAs for wintering birds. In 2018 it was categorised as Vulnerable in the IUCN Red List with a decreasing population trend. The global population is estimated to number 3,200,000 to 3,750,000 individuals (Wetlands International 2017). Surveys of the wintering population in the Baltic sea indicate that the species has undergone a precipitous decline there, from c.4,272,000 individuals in 1992-1993 to c.1,486,000 individuals in 2007-2009 (Skov et al. 2011). There is considerable uncertainty over the trends of smaller populations in Europe outside the Baltic sea, in Greenland and Iceland and East Siberia and North America, rendering the estimation of its global trend very difficult. The European wintering population is estimated to be declining by 30-49% (BirdLife International 2015). However, the overall rate of decline is likely to approach 50% over three generations (27 years), from 1993 until 2020[164].

A similar analysis to that done on lumpsucker fishery bycatch in 2014-17 is in the works for the cod gillnets fishery and should be published in 2019 (MFRI, personal communication during site visits).

It is unlikely that Icelandic fisheries for cod, haddock, saithe and redfish are having significant negative impacts on any of the seabird species listed above.

Bycatch data from the lumpsucker fishery and applicability to other fisheries

Of relevance to the fishery under assessment, the 2018 report on marine mammal and seabird bycatch in the lumpsucker fishery during 2014-2017 highlights that although reported bycatch in E-logbooks by the fleet has increased (suggesting better compliance with reporting requirements) the overall bycatch rates are still much lower than observed in the trips by inspectors. Overall, the marine mammal and seabird bycatch rate during inspector trips was around four times higher than reported by the fleet in 2017, which showed the need to use other data in addition to the log books. This difference also warrants an investigation into why fishermen do no report bycatch, and how reporting can be made easier. It is not clear how representative this compliance rate is of other Icelandic fisheries such as cod, haddock, saithe and redfish.

The North Atlantic Marine Mammal Commission (NAMMCO) Scientific Committee Working Group on By-catch noted, in relation to by-catch data from the Iceland lumpsucker gillnet fishery, that logbooks do not provide a reliable source of data to use for estimating by-catch and strongly recommended that logbooks are not used for calculating/assuming by-catch rates, but only used as indicators for raising concerns when by-catch reporting is increasing[165].

A smartphone app is in development by the Directorate of Fisheries, which hopefully will make both reporting and identification of bycatch easier for operators in the fishery. Overall, bycatch of seabirds and marine mammals in the major gear used to target Icelandic cod (i.e. bottom trawls, longline, demersal seine, gillnet) and the effect of this fishery on these animals is not considered to be significant.

[164] https://www.iucnredlist.org/species/22680427/132528200#population

[165] NAMMCO (2018). Report of the NAMMCO Scientific Working Group on By-catch https://nammco.no/wp-content/uploads/2018/05/report-nammco-sc-bycwg-04042018.pdf

Icelandic Committee for Consultation on Responsible Management of Living Marine Resources

The Icelandic Ministry of Industry and Innovation has recently created (i.e. November 2018) a Committee for Consultation on Responsible Management of Living Marine Resources to address matters concerning bycatches in the gillnet fisheries for lumpfish and cod. The document is shown below.

Samstarfsnefnd um bætta umgengni um auðlindir sjávar
Kristján Þórarinsson, formaður

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ATVINNUVEGA- OG NÝSKÖPUNARRÁÐUNEYTIÐ

Ministry of Industries and Innovation

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Reykjavík November 27, 2018
Reference: ANR18030330/11.02.09

Subject: Chariman of the Committee for Consultation on Responsible Management of Living Marine Resources

The Minister of Fisheries has appointed Dr. Kristján Thorarinsson as the chairman of The Committee for Consultation on Responsible Management of Living Marine Resources.

The committee comprises of individuals from main stakeholder organizations in the fishing industry as well as The Marine and Freshwater Institute, The Directorate of Fisheries and The Ministry of Fisheries.

The committee has been tasked by the Minister of Fisheries to address matters concerning bycatches of seabirds and marine mammals in gillnet fisheries in Iceland (lumpfish and codfish).
It has the task of addressing data recording, data availability and reliability as well as possible management measures to reduce bycatch of these species.

On behalf of the Minister of Fisheries and Agriculture

Jóhann Guðmundsson
Director General Department of Fisheries and Aquaculture

Discards

Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty[166] (400,000 to 8,000,000 ISK or about 3,000 to 60,000 EUR). In a practical sense, if vessels do not have sufficient quota to cover the species they have caught they are required to attain quota through the quota transfer system. Consequently if vessels do not have sufficient catch quotas for their probable catches they must suspend all fishing activities; this means that under the ITQ system, the discard policy primarily affects the composition of landings and not the aggregate volume. Cod discards are routinely calculated (MFRI, site visit meeting on the 27th November 2018, personal communication). Discards are not accounted for directly in the stock assessment process.

VS catches to allow flexibility in discard ban measures

One feature of the discard ban is the inbuilt flexibility, as any 5% of demersal catches from a fishing trip (called VS catch), irrespective of fish species or size, may be excluded from quota restriction (which means that VS catches are additional to the TAC).

Article 9 Regulation no. 698/2012 on fishing for commercial fishing year 2012/2013 states that:
"The master may decide that part of the catch is not calculated on the vessel's catch quota. This authorization is limited to 0.5% of pelagic catch and 5% of other catches by the relevant vessels during the fishing year and is subject to the following conditions:
a. The catch is kept separately from the other catch of the ship and he is weighed and registered separately.
b. The catch is sold at auction in an approved auction market for seafood, and its proceeds flow to the Fisheries Fund, cf. law no. 37/1992, with subsequent amendments.
c. The license is divided into four three-month periods during the fishing year. Unused sources may not be transferred between the periods[167].

On sale of VS catches in public fish markets, 20% of the revenue generated is paid to the vessel with the remaining 80% going to a designated research and development fund (the VS fund, under the auspices of the Ministry). A maximum of 20% return on VS catches means that there are limited incentives for fishermen to land such catches. However, having the VS catch provisions within the fisheries management system allows the flexibility for vessels to land small catches which are outside their specific quota, and preventing discard. VS catches of Icelandic cod in 2017/2018 totalled 935 t[168].

Fisheries effects on the habitat (by bottom gears)

The Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species; as such the effects of bottom contact fishing gears are not separable by species and thus are generally attributed to the fishery as a whole rather than to any species in particular. Interactions between fishing gears and the seabed are highly dependent on gear type with towed bottom gears such as demersal

[166] Act concerning the Treatment of Commercial Marine Stocks No. 57-1996: https://www.althingi.is/altext/pdf/131/s/0982.pdf

[167] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp

[168] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp

trawls and dredges having a greater impact than static gear such as longlines, set nets or pots. Of the total catch of cod by the Icelandic fleet in 2017, the following catches were taken by:

Afli 2017 (tonn) *Catches 2017 (tonnes)*	Botnvarpa *Bottom trawl*	Lína *Longline*	Net *Gillnets*	Dragnót *Demersal seine*	Handfæri *Jiggers*
243 990	49%	32%	7%	6%	6%

Potential habitat effects of the cod fishery can be mainly attributed to bottom trawling.

Trawling distribution and effort[169]

Main habitat type in the Icelandic marine ecosystem

Different oceanic conditions north and south of Iceland have a major impact on the distribution patterns of marine habitats, and the Greenland-Scotland Ridge acts as a barrier to the spread of species. The main substrates around Iceland are clay, sand, gravel and lava. These are shown in the figure below.

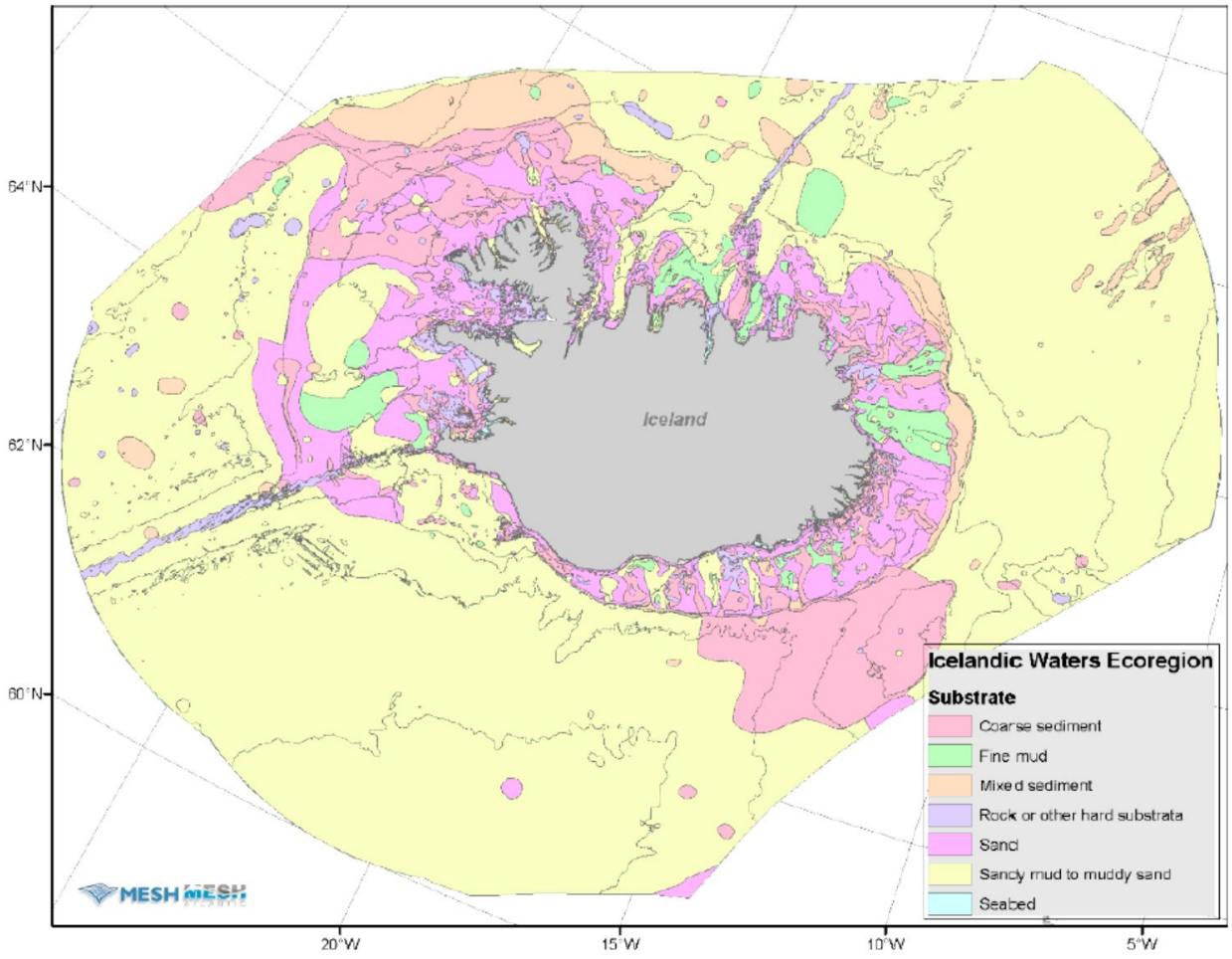


Figure 20. Major substrates in the Icelandic Waters ecoregion (compiled by EMODnet Seabed Habitats; www.emodnet-seabedhabitats.eu).

[169] https://www.hafogvatn.is/static/files/Veidiradgjof/2018/vistkerfi_2018.pdf

Trawl Spatial Distribution and Effort in Icelandic waters by gear type and region (i.e. North/South, Shelf/Deep)

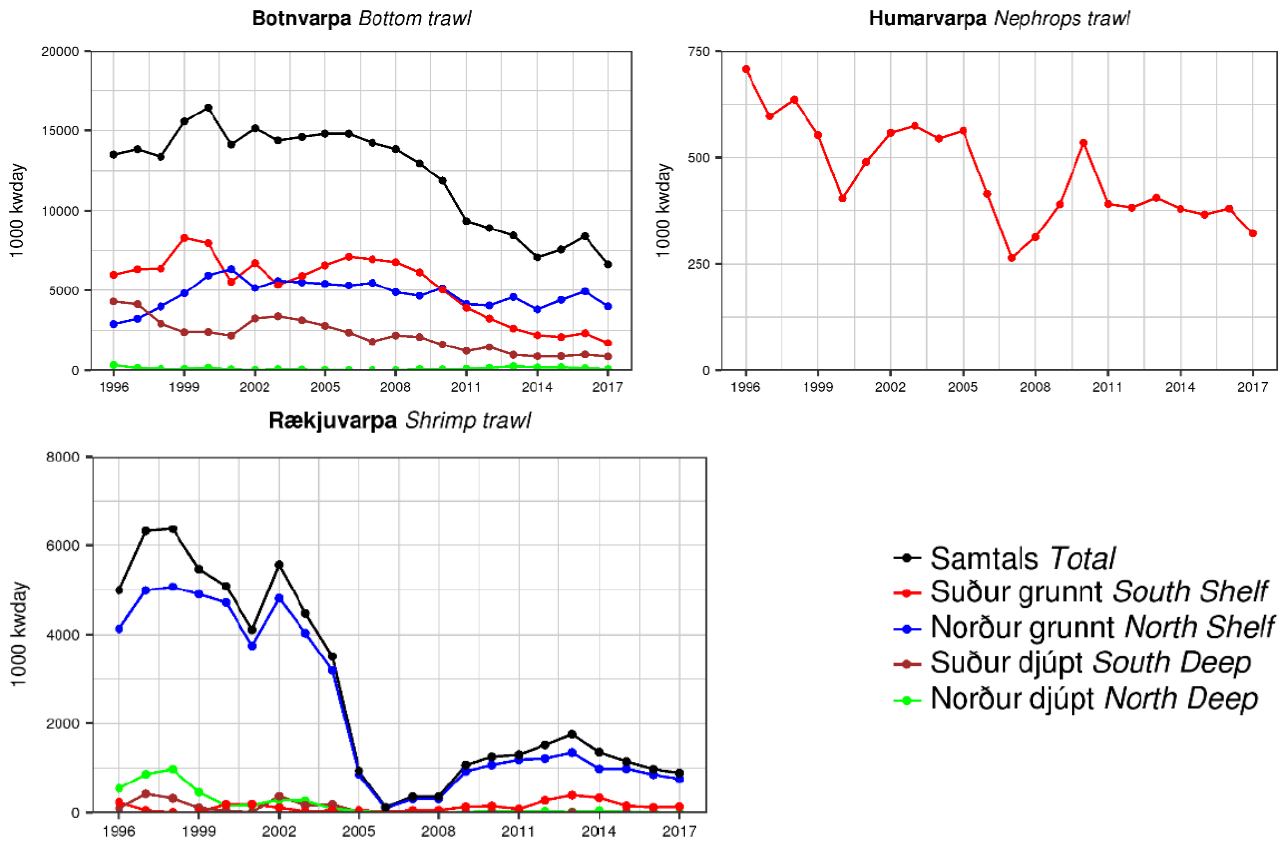
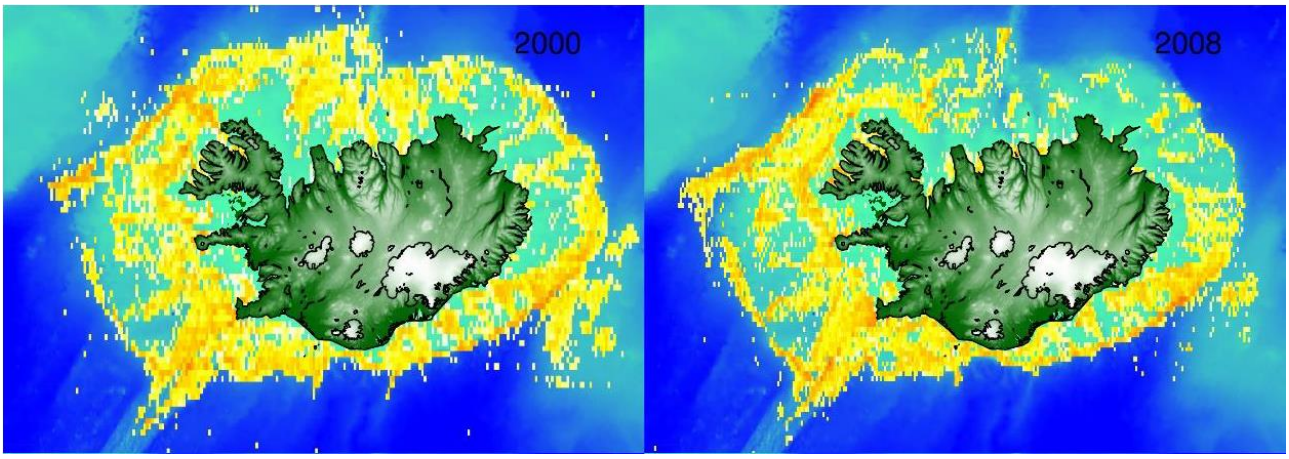


Figure 21. Annual total bottom-trawl fishing effort (1000 kW days) based on logbooks from trawl fisheries targeting a) demersal fish, b) Norway lobster and c) shrimp in the Icelandic ecoregion from 1996 to 2017. Bottom trawl effort in 2017 is about 50% of what it was in 2007.

Bottom Trawl footprint in Iceland



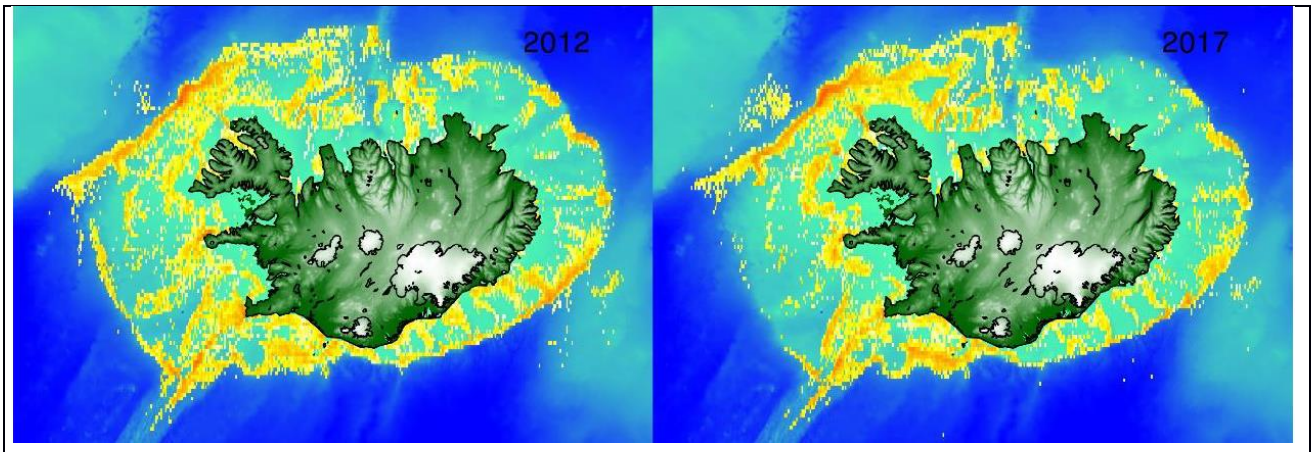


Figure 22. Spatial distribution of bottom-trawl effort (1000 kW) days based on logbooks from trawl fisheries in 2000, 2008, 2012 and 2017, targeting demersal fish, shrimp and Norway lobster.

Effects of bottom trawling

The main abrasive pressure in the Icelandic Waters ecoregion is caused by mobile bottom-fishing gears targeting demersal fish, shrimp, and Norway lobster *Nephrops norvegicus*.

The 2017 ICES Report on the Icelandic Ecoregion Ecosystem[170] highlights that based on analysis of electronic logbook data a total area of about 79 000 km^2 was fished with towed bottom-fishing gears in 2013 in Iceland, composing 10% of the ecoregion. The total fishing effort by bottom trawls targeting fish and shrimp has decreased by around 40% in 2000–2014; in the same period the *Nephrops* trawling effort remained at the same level, although limited. The decrease in fishing effort varied locally, with decreases mainly being noted on the southern shelf and at typical shrimp trawling grounds on the northern shelf.

Within the ecoregion, abrasion caused by bottom trawls has been shown to impact fragile three-dimensional biogenic habitats in particular (e.g. sponge aggregations, coral gardens, and coral reefs), with impacts happening mainly in deeper waters (> 200 m). Effects of bottom trawling on soft substrates in shallow waters have been shown to be minor. Other impacts involve overturning boulders, scouring the seabed, and direct removal of and/or damage to epifaunal organisms. Effects on large emergent epifauna are more significant than on smaller encrusting organisms with areas subject to regular hydrodynamic disturbance, such as winter storms in shallower areas also being more naturally resilient to fishing disturbance.

Based on recent data from the MFRI Ecosystem Overview report[171] it is possible to see that bottom trawl effort has decreased from 2013 (just above 150 thous. hours) to 2017 (to about 125 thous. hours) by about 17%. Although bottom trawl effort does not necessarily equate to trawled area it is possible that an area less than 10% of the Iceland ecoregion was disturbed by bottom trawls in 2017.

During the Nov. 2018 site visits HB Grandi stated that all of their trawlers (4 wetfish and 2 freezer trawlers), as well other trawlers in the industry[172], use pelagic flying doors because they do not drag on the seafloor

[170] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf

[171] https://www.hafogvatn.is/static/files/Veidiradgjof/vistkerfi.pdf

[172] http://www.hampidjan.is/news/news-article/clear-advantages-of-flying-doors

and more importantly, because they save on fuel costs and decrease gear damage. Common use of "T90 bottom trawls" (30% lesser net) with pelagic doors (not dragged on the bottom) in Iceland[173], has resulted in considerable fuel savings without sacrificing fishing efficiency. Bottom trawlers in Iceland are also reported to use rock hoppers.

Protection of Vulnerable Marine Ecosystems (VMEs)

It is the policy of the Icelandic government to protect vulnerable marine ecosystems (i.e. corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. Large areas within the Icelandic EEZ are closed, either temporarily or permanently, to fishing for a variety of reasons; these include the protection of juveniles, spawning fish and VMEs. Cumulatively, a large portion of Icelandic shelf area within which fishing activities occur is closed to bottom trawling. Furthermore, not all the fishable shelf areas outside closed areas are trawlable, as some parts of the seabed are unsuitable for trawl gear.

Closures

The use of bottom trawl and pelagic trawl is not permitted inside a 12-mile limit measured from low-water line along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels[174].

Off Northwest and North coast of Iceland, fishing by bottom trawl, midwater trawl and Danish seine is not allowed within 12 miles from a line drawn across the mouth of fjords and bays.

Off the East, South and West coast, bottom trawling is permitted according to vessel size and engine power, with larger vessels (over 42 m) not having access within 12 miles, but the smaller vessels (less than 29 m) in some areas up to 4 miles. These openings are both area - and time based[175]. The ships are divided into 3 groups depending on their length and power.

These closures, in particular those of a permanent nature, provide wider ecological benefits over and above their intended fisheries management objective by offering *de facto* protection from fishing activity to other elements of the marine environment. Please see the map below indicating most of the current closures in Icelandic waters.

[173] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/

[174] https://www.government.is/news/article/?newsid=e747dac7-fb88-11e7-9423-005056bc4d74

[175] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/domsmalaraduneyti/nr/1154

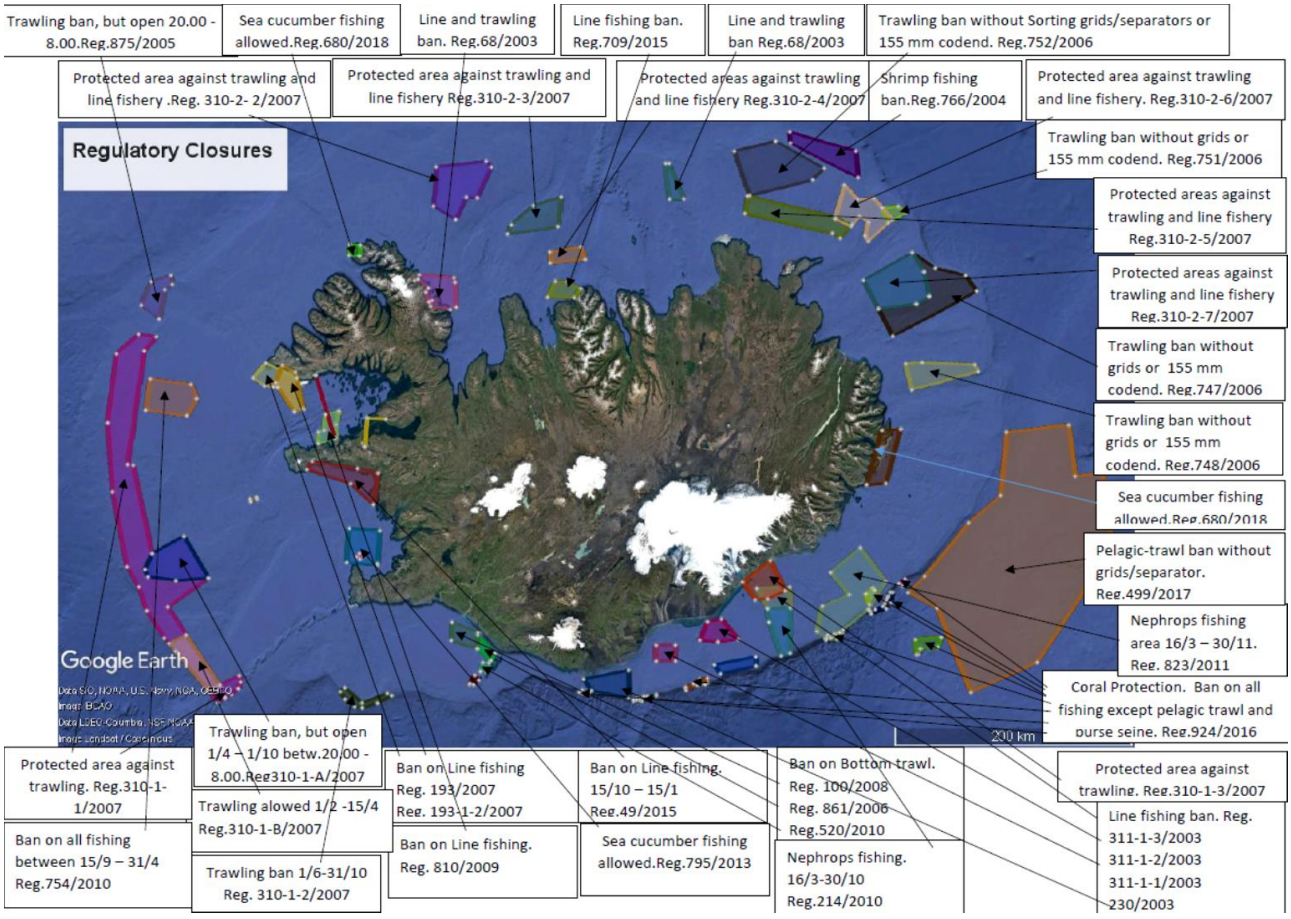


Figure 23. Regulatory Closures in Icelandic waters as of November 2018.

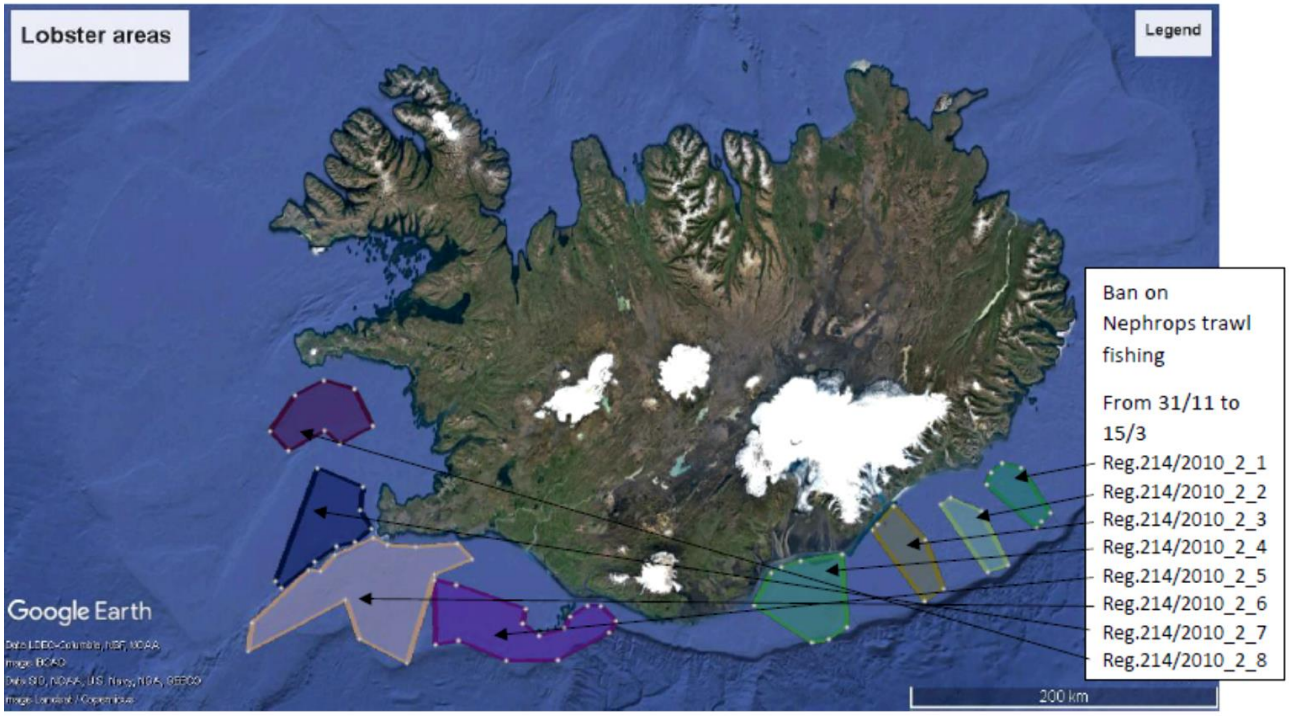


Figure 24. Temporary Nephrops fishing closures (3.5 months a year) in Icelandic waters as of November 2018.

Benthic organisms

The database of the BIOICE programme provides information on the spatial distribution of benthic organisms within the Icelandic territorial waters based on samples collected from 579 locations, including horny corals (*Gorgonacea)* and seapens (*Pennatulacea*) that are considered sensitive to fishing[176].

Seabed Mapping

In a long-term mapping project, albeit opportunistic in nature, the MFRI collects data to describe habitat types and ecosystems of the sea-floor around Iceland, including VME's. The data is collected with underwater cameras with high spatial accuracy. Benthic fauna and sediment are also recorded. Vulnerable habitats according to FAO, OSPAR and ICES, are identified when observed (MFRI, site visits Nov. 2018, pers. comm).

Seabed mapping is a key aspect of this policy and is the remit of the MFRI. During the summer of 2017 a 9 day habitat mapping cruise was conducted including a total 61 dives in four areas[177]. The combination of data relating to the distribution of sensitive habitats and fishing effort is important in order to predict species and habitats at risk from fishing activity.

MFRI is currently participating in the Norwegian Institute of Marine Research-led NovasArc project, together with the Faroe Marine Research Institute[178]. The three year project running from 2016-2018 aims to map the distribution of VMEs in Arctic and Sub-Arctic waters including those around Iceland. It also aims to map the distribution of commercial fisheries and other human activities and identify possible conflict areas. The most recent meeting was in Tórshavn, Faroes on November 20-24, 2017. The key task for the workshop was to develop and test the analysis chain for the VME/impact analysis including:

- Making a habitat suitability model for one or two VMEs based on observations of occurrence and available abiotic setting e.g. temperature, substratum, current, topography. An example of the model output is shown in the figure below**Error! Reference source not found.**.
- Produce a VME distribution map for the larger study area based on the habitat suitability model and environmental settings.
- Produce fishing pressure map based on trawling data for the larger area.
- Making impact estimates based on GIS analysis of overlap between the VME distribution and fishing intensity.

176 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2013/NWWG/Sec%2007%20Overview%20on%20Ecosystem,%20fisheries%20and%20their%20management%20in%20Icelandic%20waters.pdf

177 https://hafsbotninn.wordpress.com

178 http://novasarc.hafogvatn.is/

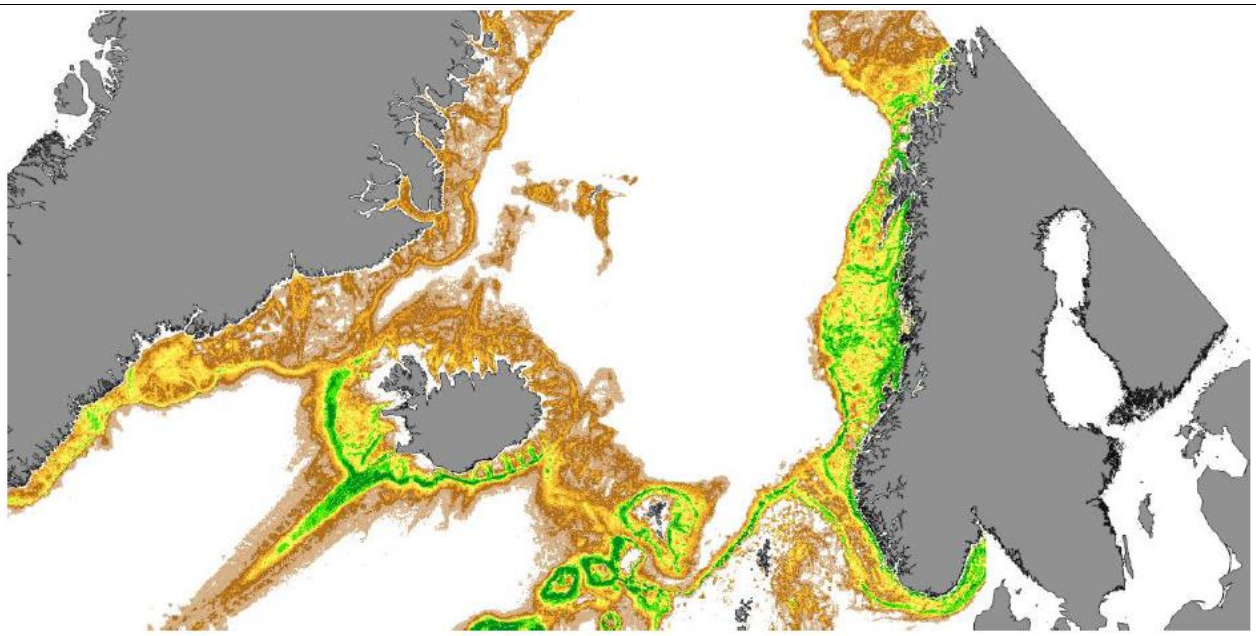


Figure 25. Distribution of the VME shallow sea pen based on first test run of the habitat suitability model. Green is 1 and white is zero probability of occurrence (Source: Report of NovasArc workshop, Tórshavn, Faroes, November 20-24, 2017[179]).

Benthos recording in annual MFRI Survey

Benthos (e.g. sponges, starfish, jellyfish, crabs, tunicates, bivalves, etc..) bycatch is recorded in the annual MFRI ground fish survey by identifying the species, measuring weight to track biodiversity and biomass over time (MFRI, Nov. 2018 site visits, pers. comm.).

Further information on VMEs management is provided below.

Sponge communities

Aggregation of large sponges (ostur or sponge grounds) is known to occur off Iceland (Klittgard and Tendal 2004). North of Iceland, particularly in the Denmark Strait, ostur was found at several locations at depths of 300-750 m, which some are classified as sponge grounds. Significant ostur and sponge grounds occur off south Iceland, especially around the Reykjanes Ridge[180].

Bycatch of sponges are recorded during annual groundfish surveys allowing managers to estimate the distribution of mass sponge occurrences. Deep-sea sponges fall within the VME habitat category. Suggestions for conservation of deep-sea sponge aggregations by the MFRI will be based on research measurements. Likely areas will be mapped and evaluated prior to conservation suggestions (MFRI, Nov. 2018 site visits, pers. comm.).

Currently, there are no strategic conservation plans in place for sponges; however, there are a number of different closures which while not designed specifically for the protection of sponge communities, provide *de facto* protection for benthic organisms including sponges. These include:

1. Closure of coastal areas within 4 – 12 nm to bottom trawls.

2. Several permanent regulatory fisheries closures outside of 12nm in which otter trawls, and in most cases long-lines, are banned.
3. Cold water coral protection areas, some of which have considerable abundance of sponges.

Sea-pen fields

In some locations with soft sediments sea pens can be found in high densities. Norway lobster *Nephrops norvegicus*, squat lobster *Munida sarsi* and sea cucumber *Stichopus tremulus* are commonly associated with them. Like sponges there are no strategic conservation plans in place for sea-pen communities; however, they derive de facto protection from other closures[181].

Cold water coral communities

The coral water coral closures protect *Lophelia pertusa,* a species of cold-water coral which is extremely slow growing, associated with diverse communities and may be harmed by destructive fishing practices. In 2004 a research project mapped coral areas off Iceland and as a result 10 areas in to the southeast of Iceland were permanently closed to fishing.

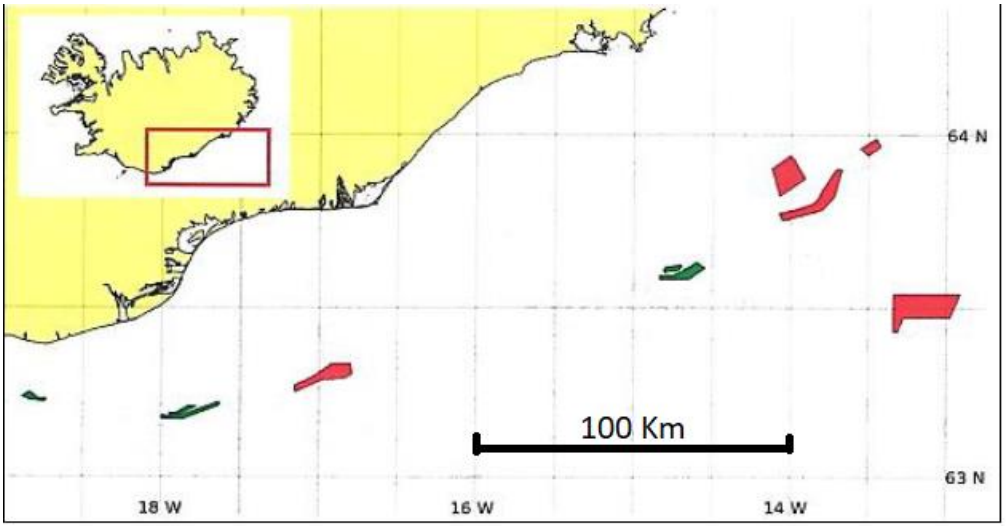


Figure 26. 10 coral closures in South East Iceland, current as of November 2018. Maps can be viewed by downloading Google Earth and clicking on the following kml file produced by the Directorate of Fisheries http://uv.fiskistofa.is/uv.kml

Hydrothermal vent areas

There are two known hydrothermal vent areas with series of chimneys and fissures on the Icelandic continental shelf. Both are inside Eyafjörður to the north of the island (see map below) and are fully protected

[179] http://novasarc.hafogvatn.is/docs/NovasArc_report_workshop_4.pdf

[180] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2005/may/Iceland%20and%20East%20Greenland.pdf

[181] http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGDEC/wgdec_2017.pdf

by environmental law nr 249/2001 and 510/2007[182]. There are additional known hydrothermal vents in deeper waters to north, south and southwest of Iceland. These are in more remote areas and have less surface structure and are not been considered threatened by fishing activities.

Figure 27. Coordinates and location of protected natural resources (i.e. hydrothermal vent) at Arnarnesstrýtur in Eyjafjörður north of the Arnarnes river[183].

Consistency of management of the fishery's ecosystem impacts with the precautionary approach.

As outlined above the most probable adverse impacts of the Icelandic cod fishery are considered and those impacts likely to have serious consequences (e.g. bycatch, ETP species interaction, habitats effects, and wider ecosystem interactions) are addressed either by an immediate management response or further analysis of the identified risk. Consideration of the adverse impacts of the fishery on the ecosystem and resulting management actions are demonstrably consistent with the precautionary approach.

[182] https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/hverastrytur_eyjafirdi_249_2001.pdf

[183] https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/Hverastrytur_Arnarnesnofum_kort.pdf

Clause 3.2 – Specific Criteria

Clause 3.2.1 – Information gathering and advice

Supporting Clauses:	3.2.1.1, 3.2.1.2			
Important Note:	Clause 3.2.1.2 is new to IRFM Standard v2.0 and is scored separately in Appendix 2.			
Clause Guidance:	***Information shall be available on fishing gear used in the fishery, including the fishing gears' selectivity and its potential impact on the ecosystem. Stocks of non-target species commonly caught in the fisheries for the stock under consideration may be monitored and their state assessed as appropriate.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Information is available on the legal specification of fishing gear in the Icelandic groundfish fishery. The primary aim of fishing gear regulations is size selectivity with a secondary aim being species selectivity. Gears are regulated in several ways to regulate both size and species selectivity. The MFRI provide advice for 40 fish stocks in Iceland as well as advice for harvest of marine mammal species (e.g. fin whale and common minke whale). Their most recent advice, which include routine monitoring and assessment efforts is available online.

EVIDENCE

Information is available on the legal specification of fishing gear in the Icelandic groundfish fishery. The primary aim of fishing gear regulations is size selectivity with a secondary aim being species selectivity. Gears are regulated in several ways to regulate both size and species selectivity.

Fish size regulations

There is a minimum reference size for Icelandic cod (55cm). The percentage of juvenile cod in catches that triggers closed areas to protect juveniles is 25% under 55 cm. As discarding is prohibited it is mandatory to land all specimens below these lengths. Where an area closure has been triggered, it remains closed for a minimum of two weeks and is subject to periodic monitoring. About 100 three-week short term closures have been triggered for cod in 2017.

Mesh size regulations.

The mesh size in the codend in the Icelandic trawl fishery was increased from 120 mm to 155 mm in 1977. Since 1998 the minimum codend mesh size allowed is 135 mm[184] [185], provided that a so-called Polish cover (a net protecting the belly of the fishing net) is not used. In the Nephrops fishery, the use of two large (200 mm) mesh escape panels is mandatory (*Reg. 543/2002 on mesh sizes and trawls for fishing of demersal species, shrimp and nephrops)*[186].

[184] https://www.reglugerd.is/reglugerdir/allar/nr/543-2002

[185] https://www.icefish.is/news101/better-redfish-selectivity-with-four-panel-codend

[186] https://www.reglugerd.is/reglugerdir/allar/nr/543-2002

Mesh size and gear restrictions are also mandated to protect both juvenile stocks (trawl mesh size 135 mm with separator panel) and spawners (gill net mesh size 8 inches/203 mm)[187]. Shrimp (Pandalus) fisheries are associated with by-catches of juvenile finfish species. To minimise such by-catch, the use of sorting grids is mandatory.

Additionally, longliners in Iceland use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. Fishermen tend to use automatic gas guns and night settings (i.e. haul gear at night minimizing seabird interactions). Night setting of longlines is generally done in the winter period but to a lesser degree in the summer when sunlight can be present all day and night in certain areas. The requirement follows Regulation 456 issued in 1994[188].

The MRI routinely conducts selectivity experiments to assess the performance of the main fishing gears and to assess ways in which selectivity might be improved.

T90 trawl net configuration

T90 is a regular net that has been turned 90° and along with lines on the codend ensures that the mesh stays open during trawling. The effect of trawling on fish size and on different quality parameters of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*) was evaluated[189] in 2010 using two trawls in a double rig fitted with a traditional and a T90 codend, respectively. The catch was assessed according to fish size, mortality, external damage, initial white muscle pH and development of rigor mortis. results showed there was no difference between the two types of nets in terms of catch volume, but significantly slightly bigger fish were caught with T90 than with the traditional trawl net ($p<0.05$). Haddock caught with the traditional trawl net had more external injuries related to the trawl gear than haddock caught with the T90 gear ($p<0.05$). The T90 net is being used by HB Grandi trawl vessels, as well as by other trawl vessels in Iceland (Ingimundur Ingim, Fleet Manager, HB Grandi, per. comm.). Furthermore, common use of "T90 bottom trawls" (30% lesser net) with pelagic doors (not dragged on the bottom), has resulted in considerable fuel savings without sacrificing fishing efficiency[190].

Longline gear capture efficiency

A study by the Institute of Marine Research, Norway and the MFRI, on the effects of hook and bait sizes on size selectivity and capture efficiency in Icelandic longline fisheries was also published in 2017[191]. The authors looked at the main species caught by longliners in Iceland, (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), tusk (*Brosme brosme*), ling (*Molva molva*) and wolffish (*Anarhichas lupus*). The study showed that increasing hook size lowered capture efficiency for all species, but had only a minor effect on size selectivity. It also demonstrated that hook size and bait size affect the profitability of longline fisheries, in that smaller hooks improve capture efficiency, while larger baits increase catches of large fish and reduce those of undersized fish.

187 http://www.ices.dk/sites/pub/publication%20reports/forms/marine.aspx?rootfolder=/sites/pub/publication+reports/expert+group+report/acom/2011/nwwg&folderctid=0x0120005daf18eb10daa049bbb066544d790785&view=%7B5c7a53f9-446e-486e-93af-841fc20c1773%7D

188 https://www.stjornartidindi.is/Advert.aspx?RecordID=8bd54700-a433-413f-83ed-48cd60438a4b

189 https://link.springer.com/article/10.1007/s12562-010-0254-2

190 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/

191 https://www.sciencedirect.com/science/article/abs/pii/S0165783617300541

Stocks of non-target species commonly caught in the fisheries for the stock under consideration are monitored and their state assessed as appropriate.

A comprehensive list of species is assessed as associated species catch, bycatch and ETP species interacting with the fishery under assessment (including marine mammals and seabirds) in Clause 3.1. *Please refer to the previous clause for an assessment on their status.*

The MFRI provide advice for 40 fish stocks in Iceland[192] as well as advice for harvest of marine mammal species (e.g. fin whale and common minke whale). Their most recent advice, which include routine monitoring and assessment efforts, is summarised below.

Type	Advice	Tech report	Tables	Pub.date	Archive
Norwegian Spring-Spawning Herring	Advice	Tech report		22. October 2018	Archive
Capelin	Advice	Tech report		17. October 2018	Archive
Mackerel	Advice	Tech report		28. September 2018	Archive
Blue Whiting	Advice	Tech report		28. September 2018	Archive
Northern Shrimp	Advice	Tech report		3. August 2018	Archive
Northern Shrimp - Eldey	Advice	Tech report		3. August 2018	Archive
Cod	Advice	Tech report	Tables	13. June 2018	Archive
Haddock	Advice	Tech report	Tables	13. June 2018	Archive
Saithe	Advice	Tech report	Tables	13. June 2018	Archive
Golden Redfish	Advice	Tech report	Tables	13. June 2018	Archive
Demersal Beaked Redfish	Advice	Tech report	Tables	13. June 2018	Archive
Norway Redfish	Advice	Tech report	Tables	13. June 2018	Archive
Greenland Halibut	Advice	Tech report	Tables	13. June 2018	Archive
Atlantic Halibut	Advice	Tech report	Tables	13. June 2018	Archive
Plaice	Advice	Tech report	Tables	13. June 2018	Archive
Dab	Advice	Tech report	Tables	13. June 2018	Archive
Long Rough Dab	Advice	Tech report	Tables	13. June 2018	Archive
Witch	Advice	Tech report	Tables	13. June 2018	Archive
Lemon Sole	Advice	Tech report	Tables	13. June 2018	Archive
Megrim	Advice	Tech report	Tables	13. June 2018	Archive
Atlantic Wolffish	Advice	Tech report	Tables	13. June 2018	Archive
Spotted Wolffish	Advice	Tech report	Tables	13. June 2018	Archive
Blue Ling	Advice	Tech report	Tables	13. June 2018	Archive
Ling	Advice	Tech report	Tables	13. June 2018	Archive
Tusk	Advice	Tech report	Tables	13. June 2018	Archive
Whiting	Advice	Tech report	Tables	13. June 2018	Archive
Anglerfish	Advice	Tech report	Tables	13. June 2018	Archive
Herring	Advice	Tech report	Tables	13. June 2018	Archive
Greater Silver Smelt	Advice	Tech report	Tables	13. June 2018	Archive
Starry Ray	Advice	Tech report	Tables	13. June 2018	Archive

[192] https://www.hafogvatn.is/en/harvesting-advice

Icelandic Scallop	Advice	Tech report	Tables	13. June 2018	Archive
Ocean Quahog	Advice		Tables	13. June 2018	Archive
Common Whelk	Advice	Tech report	Tables	13. June 2018	Archive
Sea Cucumber	Advice	Tech report	Tables	13. June 2018	Archive
Sea Urchin	Advice	Tech report	Tables	13. June 2018	Archive
Northern Shrimp - Snæfellsnes	Advice	Tech report	Tables	25. April 2018	Archive
Common Minke Whale	Advice	Tech report	Tables	12. April 2018	
Lumpfish	Advice	Tech report	Tables	4. April 2018	Archive
Northern Shrimp in Ísafjarðardjúp	Advice	Tech report	Tables	8. March 2018	Archive
Rockweed	Advice	Tech report	Tables	29. January 2018	
Northern Shrimp in Arnarfjörður	Advice	Tech report	Tables	16. November 2017	
Norway Lobster	Advice	Tech report	Tables	13. June 2017	
Fin Whale	Advice	Tech report	Tables	13. June 2017	
Harbour Seal	Advice	Tech report	Tables	13. June 2017	

Additional species/stocks monitored by the Directorate of Fisheries

The Directorate of Fisheries monitors catches of a larger suite of species (many of them non-target species) including starry ray/thorny skate, common skate, dogfish, Greenland shark, Porbeagle shark, Atlantic halibut, orange roughy, shagreen ray etc.. These records can be retrieved on the Directorate's website.[193]

[193] http://www.fiskistofa.is/english/quotas-and-catches/catches-in-individual-species/

Clause 3.2.2 – By-catch and discards

Supporting Clauses:	3.2.2.1, 3.2.2.2, 3.2.2.3, 3.2.2.4, 3.2.2.5			
Important Note:	Clause 3.2.2.4 and Clause 3.2.2.5 are new to IRFM Standard v2.0 and are scored separately in Appendix 2.			
Clause Guidance:	***Discarding, including discarding of catches from non-target commercial stocks, is prohibited. Where relevant, appropriate steps shall be taken to avoid, minimize or mitigate encounters with seabirds and marine mammals. Accordingly, non-target catches, including discards, of stocks other than the "stock under consideration" should not threaten these non-target stocks with serious risk of extinction; if serious risks of extinction arise, effective remedial action shall be taken.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty (400K to 8M ISK). Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/catches is a legal requirement since 2014. Bycatch of marine mammals was monitored in all major fisheries in Icelandic waters in 2017, through logbook submissions, reports from onboard inspectors from the Directorate of Fisheries and in the MFRI annual gillnet survey. A smartphone app is in development by the Directorate of Fisheries to make reporting and identification of bycatch easier for operators in the fishery.

EVIDENCE

Discards are prohibited

Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty[194] (400K to 8M ISK).

- According to section 2 of Act no. 57/1996, concerning the treatment of commercial marine stocks, discard of catches is prohibited
- Minor exceptions:
  (1) Non-value catches (e.g starfish, jellyfish etc..)
  (2) Heads and other refuse from working or processing

In a practical sense, if vessels do not have sufficient quota to cover the species they have caught they are required to attain quota through the quota transfer system. Consequently if vessels do not have sufficient catch quotas for their probable catches they must suspend all fishing activities; this means that under the ITQ system, the discard policy primarily affects the composition of landings and not the aggregate volume[195].

[194] Act concerning the Treatment of Commercial Marine Stocks No. 57-1996: https://www.althingi.is/altext/pdf/131/s/0982.pdf

[195] http://www.nwwac.org/_fileupload/Image/Iceland%20fisheries%20directorate%202007%20presentation%20re%20discards%20to%20EU%20delegation.ppt

One feature of this ban is that it has some inbuilt flexibility, as any 5% of demersal catches from a fishing trip (called VS catch), irrespective of fish species or size, may be excluded from quota restriction (which means that VS catches are additional to the TAC).

Article 9 Regulation no. 698/2012 on fishing for commercial fishing year 2012/2013 states that:
"The master may decide that part of the catch is not calculated on the vessel's catch quota. This authorization is limited to 0.5% of pelagic catch and 5% of other catches by the relevant vessels during the fishing year and is subject to the following conditions:
a. The catch is kept separately from the other catch of the ship and he is weighed and registered separately.
b. The catch is sold at auction in an approved auction market for seafood, and its proceeds flow to the Fisheries Fund, cf. law no. 37/1992, with subsequent amendments.
c. The license is divided into four three-month periods during the fishing year. Unused sources may not be transferred between the periods[196].

On sale of VS catches in public fish markets 20% of the revenue generated is paid to the vessel with the remaining 80% going to a designated research and development fund (the VS fund, under the auspices of the Ministry). A maximum of 20% return on VS catches means that there are limited incentives for fishermen to land such catches. However, having the VS catch provisions within the fisheries management system allows the flexibility for vessels to land small catches which are outside their specific quota, and preventing discard. VS catches of Icelandic cod in 2017/2018 totalled 935 t[197].

Bycatch reporting

The electronic logbook system used in Icelandic fisheries as designed by TrackWell, allows for marine mammal and seabirds to be recorded along with normal catches (and including bycatch amounts of non target fish species, all of which are landed). In total there are 171 marine mammal and seabird species pre-programmed into the e-log system that are selectable by fishers. Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/catches is a legal requirement since 2014 (Reg. 126/2014) [198].

Bycatch of marine mammals was monitored in all major fisheries in Icelandic waters in 2017, through logbook submissions, reports from onboard inspectors from the Directorate of Fisheries and in the MFRI annual gillnet survey. A smartphone app is in development by the Directorate of Fisheries to make reporting and identification of bycatch easier for operators in the fishery. During the 2018 site visits the Directorate reported that this app prioritises the need for recording marine mammals and seabirds interactions/bycatch before fish catches are submitted, to enable more consistent and reliable reporting. The app appears to be ready for implementation but there is a need to change current legislation to ensure the app can be nested within legal requirements.

[196] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp
[197] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp
[198] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967

Iceland has joined the ICES Working Group on Bycatch of Protected Species (WGBYC) in 2017 and has provided a summary of its Protected, Endangered and Threatened Species (PETS) monitoring and bycatch in 2018[199].

Detailed information on seabird and marine mammal bycatch is provided in clause 3.1 and is not repeated here.

Non-target catches, including discards, of stocks other than cod do not threaten these non-target stocks with serious risk of extinction.

Minimising seabirds interactions and bycatch in longline gear

The Directorate of Fisheries require longliners to take all reasonable measures to avoid seabirds taking bait or catch because it is an offence in Iceland to catch a seabird with hooks (Reg. 456, 1994). There are technical measures/mechanisms in place in Icelandic longliners to mitigate adverse impacts on these seabirds. These include the use of acoustic cannons, balloons towed at the end of the vessel to scare-off of diving birds, and night settings to minimise interactions with seabirds. Setting longlines at night (between the end of nautical twilight and before nautical dawn) is effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are diurnal foragers. The Directorate also highlighted that laser lights are being used widely as a deterrent.

However, during the winter months, some measures are rarely necessary as the lines are shot and hauled in the dark (when it's dark at night and through most of/all of the day) and when few if any diving birds are active.[200] This, however, being an advantage in winter, become a challenge In the summer when daylight hours exceed hours of darkness.

Visir HF, a specialised longline fishing company in Iceland (with about 5% of the cod and 6% of the haddock quota in 2018) stated during site visits meetings in Nov. 2018 that it is in the interest of skippers to avoid catching seabirds because when seabirds get hooked, they float and pull up the longlines, decreasing the effectiveness of the gear from catching demersal fish. Furthermore, they reported that every hook in a longline (average 40,000 hooks per longline) has an iron sink to help the longline sink fast to the bottom, further decreasing the risk of diving birds catching on to hooks. Visir HF has reported that similar gear modifications and practices are in use across Iceland (i.e. night setting, bird scaring balloons, acoustic cannons, weighted longlines).

Information from Birdlife International communications point to available advice for demersal longline, pelagic longline and trawl fisheries - ACAP (the Agreement on the Conservation of Albatrosses and Petrels), which has established best practice mitigation advice for reducing seabird bycatch, reviewed every 18-24 months by experts. It is based on published literature and it is the key resource for assessing the efficacy of

199 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

200 https://abcbirds.org/wp-content/uploads/2015/05/ABC_Analysis_of_MSC_Certification_on_Seabird_Bycatch_Pt_2_Fishery_Analyses.pdf

bycatch mitigation measures[201] [202]. Based on ACAP advice, the key technical bycatch reduction measures for longlines are: line weighting, bird-scaring lines and night-setting. In comparison, Iceland uses night settings, trailing balloons instead of bird scaring lines (at least to some degree), and some form of weighted lines.

While night settings and acoustic cannons seem to be widely used in Iceland, it is not clear if weighted longlines are set up in the same way consistent with 2017 ACAP Advice, and if/to what degree tori lines are used across the industry. However, variants of scare lines, i.e. trailing balloons and laser lights have been reported to be in use in Icelandic fisheries (Directorate, Visir HF, pers. comm, Nov. 2019).

All of these measures are implemented voluntarily by industry. Currently, there are no regulations in Iceland that direct on the use of explicit bycatch reduction devices/methods within longline or gillnet fisheries.

Minimising marine mammal interactions and bycatch in gillnet gear

In Iceland**,** banana pingers (from Fishtek Marine) were tested in April 2017 to try to reduce porpoise bycatch in the cod gillnet fishery. Three commercial vessels were used for the experiment, one in Breidafjordur in west Iceland, one in Hunafloi to the north of Iceland and one off the southeast coast. These areas were selected as they are sampled in the annual MFRI cod gillnet survey, and have historically had high cetacean bycatch, especially the north and southeast areas.

In each area, 3–4 paired sets of 12 nets were set, where half of the sets were set with banana pingers according to manufacturer's description (one pinger every 200 meters of net), and the other half without pingers. Two nautical miles were between the paired sets to avoid interaction from the pingers on the control sets. A total of 152 sets were hauled over a week.

Eleven cetaceans, nine harbour porpoises and two white beaked dolphins were caught in the experiment. Six of those animals, five harbour porpoises and one white beaked dolphin were caught in the sets equipped with banana pingers, while five animals, four harbour porpoises and one white beaked dolphin were caught in the control sets. No significant difference was therefore observed between the pinger and control sets. Interestingly, two harbour porpoises were caught in a net right beside a pinger. The size and gender composition of the bycaught animals was similar between the two treatments. No difference in catch or species composition of fish was observed between the pinger and control sets.

Porpoise alert devices (PALs) were tested in April 2018 in the cod gillnet fishery, and as with the trials using banana pingers, these were also unsuccessful. PAL technology is based on a synthetic porpoise click train, created from recordings of aggressive interactions between harbour porpoises in captivity, which is played back in the field. Two commercial vessels were used for the experiment, one in Hunafloi in northern Iceland, and one on the southeast coast, known hot spots for cetacean bycatch. In each area, three paired sets of 12 nets were set, where half of the sets were set with PALs according to the manufacturer's description (four PALs per set). One nautical mile was between the paired sets to avoid interaction from the devices on the control sets. A total of 98 sets were hauled over a week. A total of 23 porpoises were caught in the trial.

[201] https://www.iattc.org/Meetings/Meetings2018/SAC-09/BYC-08/PDFs/Docs/_Spanish/BYC-08-INF-J(b)-ENO_ACAP-Review-and-best-practice-advice-for-reducing-the-impact-of-pelagic-longline-fisheries-on-seabirds.pdf

[202] https://www.iattc.org/Meetings/Meetings2018/SAC-09/BYC-08/PDFs/Docs/_Spanish/BYC-08-INF-J(b)-ENO_ACAP-Review-and-best-practice-advice-for-reducing-the-impact-of-pelagic-longline-fisheries-on-seabirds.pdf

Twelve of those animals were caught in the sets with PALs, and eleven in the control sets. No significant difference was therefore observed between the PAL and control sets. Almost all the by-caught porpoises in the PAL sets (eleven out of twelve) were large adult males, while the gender ratio was seven males and four females in the control sets. Eight of the twelve porpoises caught in the PAL sets were found right by the PAL device, suggesting possible attraction of adult males towards the PAL devices.

Green lights (longline lights) were tested in April 2018 in the cod gillnet fishery, with the aim to reduce both bycatch of seabirds and marine mammals. One commercial vessel, Saxhamar SH, was used in the trial in Breidafjordur, West Iceland. In this area, three paired sets of 12 nets were set, with a light on each net in half of the set, and the other half without lights. Half a nautical mile was between the paired sets to avoid interaction from the lights on the control set. A total of 42 sets were hauled over a week. No marine mammals were caught in the trial, but five diving birds were caught. Two gannets, two common guillemots, and one Brünnich's guillemot were caught; all in the light sets. No birds were caught in the control, apart from two Northern fulmars that were caught when hauling in the gear and were subsequently released alive. The lights therefore seemed to attract the birds. The effect on marine mammals remains unknown.

Overall, little progress in mitigation of bycatch in gillnet fisheries have been obtained and results have been inconsistent and ambiguous[203]. MFRI is planning to continue to test bigger pingers and acrilics beads in gillnets to discourage marine mammals (MFRI, personal communication during site visits).

Bycatch of seabirds and marine mammals in the major gears used in the fishery under assessment does not appear to be significant. Non-target catches, including discards, of stocks other than cod do not threaten these non-target stocks with serious risk of extinction.

203 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf

Clause 3.2.3 – Habitat Considerations

Supporting Clauses:	3.2.3.1, 3.2.3.2, 3.2.3.3, 3.2.3.4			
Important Note:	No changes to Clauses in IRFM Standard v2.0.			
Clause Guidance:	***If studies show that the spawning or nursery areas or other essential habitats in the fishing area are at risk and highly vulnerable to negative impacts of particular fishing gear, such impacts shall be limited in range relative to the full spatial range of the habitat or else action is taken to avoid, minimise or mitigate such impacts. Management measures must take into account and protect through closures significant continuous stony coral areas, identified through scientific and formal methods. Known thermal vents shall be protected through area closures to fishing activities with gear that has significant bottom impact during normal operation.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Cod spawns all around Iceland by smaller regional spawning components, however the main spawning areas are situated in the south, southwest and west of Iceland. Large areas within the Icelandic EEZ are closed for fishing, either temporarily or permanently. These closures are aimed at protecting juveniles and spawning fish and protecting vulnerable marine ecosystems. Restrictions on the use of gear are also in effect. Thus the use of bottom trawl and pelagic trawl is not permitted inside a 12-mile limit measured from low-water line along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels. Hydrothermal vents and cold water corals are protected via area closures.

EVIDENCE

Cod is widely dispersed in Icelandic waters, with higher abundance in north-western, northern and Northeastern part of the shelf. Cod is considered demersal with moderately wide depth distribution which can vary from depths of few meters down to 600 m, occasionally even deeper. Adult cod has not much of preference regarding bottom structure and can be found on various substrates, however, a large share of the cod juveniles prefer moderately sheltered, shallow kelp and seagrass environments. The ideal sea temperature for cod is around 4-7°C, nevertheless the temperature limits for this species are somewhat wider, and a significant proportion of the catch is taken where temperature is less than 2 degrees.

Cod spawns all around Iceland by smaller regional spawning components[204], however the main spawning areas are situated in the south, southwest and west of Iceland. Spawning starts early in the spring (March-April) on main spawning grounds in the warmer waters in the south. Spawning used to start later on in the colder waters in the north, but in recent years spawning time in the north has advanced significantly. North and eastward pelagic egg and larval drift mainly occurs clockwise to the nursery grounds situated in the north and northeastern area. The adult stock takes feeding migrations to the deeper waters in the north-west and south-east, but part stays in the shallow domains to feed.

[204] https://www.hafogvatn.is/static/extras/images/%C3%BEorskur%20(5)731728.pdf

Closures

Large areas within the Icelandic EEZ are closed for fishing, either temporarily or permanently. These closures are aimed at protecting juveniles and spawning fish and protecting vulnerable marine ecosystems. Restrictions on the use of gear are also in effect. Thus the use of bottom trawl and pelagic trawl is not permitted inside a 12-mile limit measured from low-water line along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels[205].

Off Northwest and North coast of Iceland, fishing by bottom trawl, midwater trawl and Danish seine is not allowed within 12 miles from a line drawn across the mouth of fjords and bays.

Off the East, South and West coast, bottom trawling is permitted according to vessel size and engine power, with larger vessels (over 42 m) not having access within 12 miles, but the smaller vessels (less than 29 m) in some areas up to 4 miles. These openings are both area - and time based[206]. The ships are divided into 3 groups depending on their length and power. Group 1 are the largest ships. The green area represents the temporal allowance for fishing.

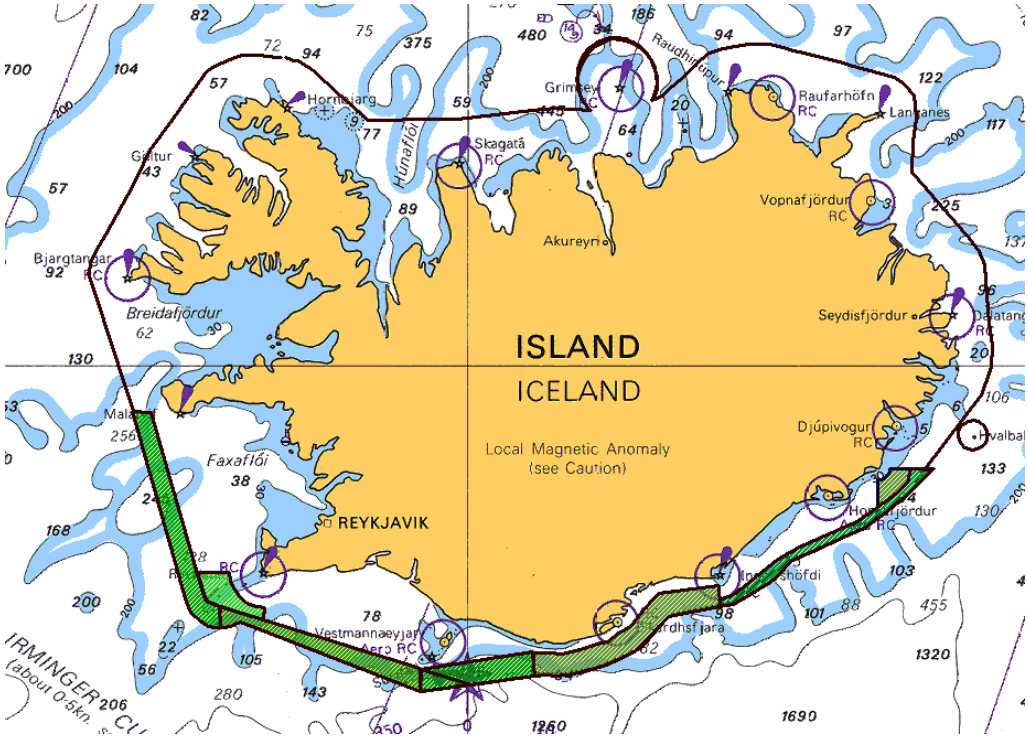


Figure 28. Temporary fishing areas for group 1, large-size vessels.

[205] https://www.government.is/news/article/?newsid=e747dac7-fb88-11e7-9423-005056bc4d74

[206] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/domsmalaraduneyti/nr/1154

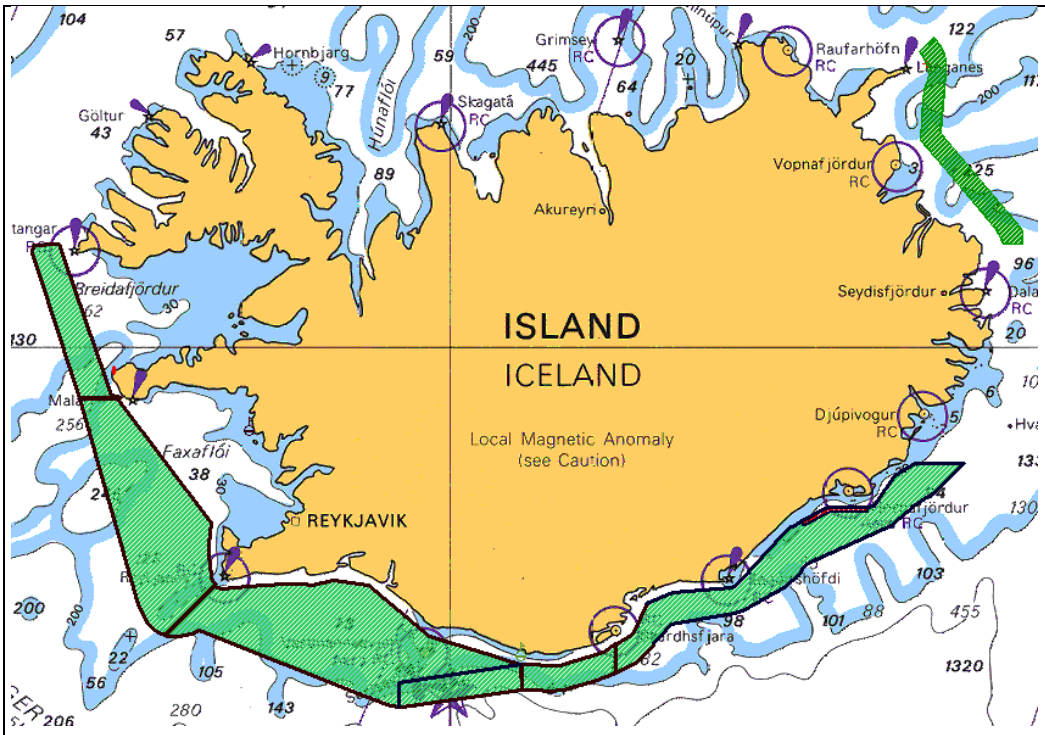


Figure 29. Temporary fishing areas for group 2, mid-size vessels.

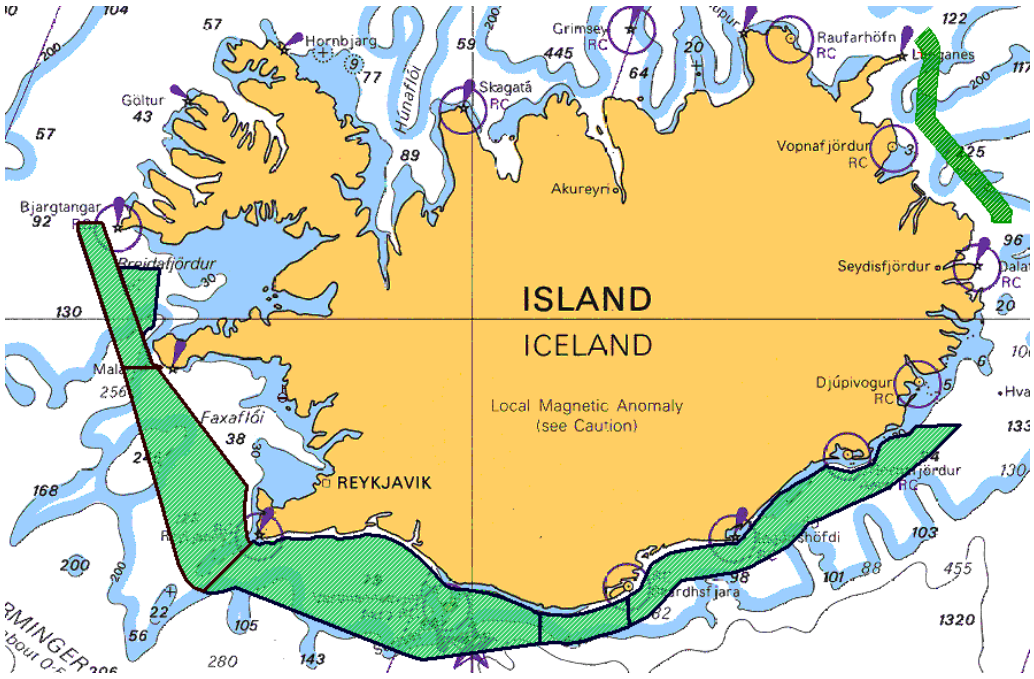


Figure 30. Temporary fishing areas for group 3, small-size vessels.

These closures, in particular those of a permanent nature, provide wider ecological benefits over and above their intended fisheries management objective by offering *de facto* protection from fishing activity to other elements of the marine environment. The majority of temporary closures are aimed for the protection of cod, haddock and saithe juveniles.

Hydrothermal vents and cold water corals are protected via area closures.

All the other closures are listed in Clause 3.1.

The 2017 ICES Report on the Icelandic Ecoregion Ecosystem highlights that based on analysis of electronic logbook data a total area of about 79 000 km^2 was fished with towed bottom-fishing gears in 2013 in Iceland, composing 10% of the ecoregion. Based on recent data from the MFRI Ecosystem Overview report[207] it is possible to see that bottom trawl effort has decreased from 2013 (just above 150 thous. hours) to 2017 (to about 125 thous. hours) by about 17%. Although bottom trawl effort does not necessarily equate to trawled area it is possible that an area less than 10% of the Iceland ecoregion, including essential fish habitats, was disturbed by bottom trawls in 2017.

[207] https://www.hafogvatn.is/static/files/Veidiradgjof/vistkerfi.pdf

Clause 3.2.4 – Foodweb Considerations

Supporting Clauses:	3.2.4.1			
Important Note:	Old Clause "3.2.4 Considerations" has been split into "3.2.4 Foodweb Considerations" and "3.2.5 Precautionary Considerations" in IRFM Standard v2.0 – Clause 3.2.4 Foodweb Considerations addressed separately here.			
Clause Guidance:	***If the stock under consideration is a key prey species in the ecosystem, the harvesting policy and management measures shall be directed to avoid severe adverse impacts on dependent predators.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

In the waters to the north and east of Iceland, available information suggests the existence of a simple bottom-up controlled food chain from phytoplankton through *Calanus spp.*, capelin and to cod. Less is known about the structure of the more complex southern part of the ecosystem. Icelandic cod appears to be reasonably well connected to other key fish species as both prey and predator but it does not appear to be a key prey species in the Icelandic marine ecosystem so it is not necessary that harvesting policy and management measures are specifically directed to avoid severe adverse impacts on dependent predators.

EVIDENCE

The MRI has studied Icelandic cod and its place/relationship in the ecosystem. Extensive studies on the feeding ecology of a large number of demersal fish species including cod, marine mammals and seabirds have shown that capelin is a key prey species in the Icelandic ecoregion ecosystems.

In the waters to the north and east of Iceland, available information suggests the existence of a simple bottom-up controlled food chain from phytoplankton through *Calanus spp.*, capelin and to cod. Less is known about the structure of the more complex southern part of the ecosystem.

Cod is an opportunistic predator that forages mainly at dawn and dusk[208]. Larvae feed mainly on zooplankton while juveniles prey predominantly on benthic crustaceans; adults feed mainly on zoobenthos and fish including juvenile cod. Fish prey becomes more common in the diet with increasing body size. Adults may cover large distances during the feeding period. Young cod are also preyed upon by different fish species and octopus. Adult cod are prey items of top predators like sharks, rays, whales, dolphins, seals, and sea birds.

Cod's trophic level tends to be above 4 in both fished and unfished populations[209].

208 https://www.fishbase.se/Ecology/FishEcologySummary.php?StockCode=79&GenusName=Gadus&SpeciesName=morhua

209 https://www.fishbase.se/references/FBRefSummary.php?id=26813

A June 2018 publication by Sturludottir *et. al.*[210] described the results of an ecological end-to-end model built using the Atlantic framework for the Icelandic marine ecosystem. Atlantis is a spatially resolved deterministic end-to-end model designed for exploited marine ecosystems.

The modeling framework consists of four sub-models: biophysical, fisheries, management and socio-economic. It has been used to explore major processes and responses in systems and it has been used for management strategy evaluations.

Study results indicated that predators in Icelandic waters were feeding on the correct groups, but they were relying too much on zooplankton and benthic invertebrates in the model than what the stomach data indicated (Figure below). The zooplankton could however be under-represented in the stomach content data because of differences in digestion rates (Hyslop, 1980). Sandeel were not as large a component of the diet of its predators as they should have been.

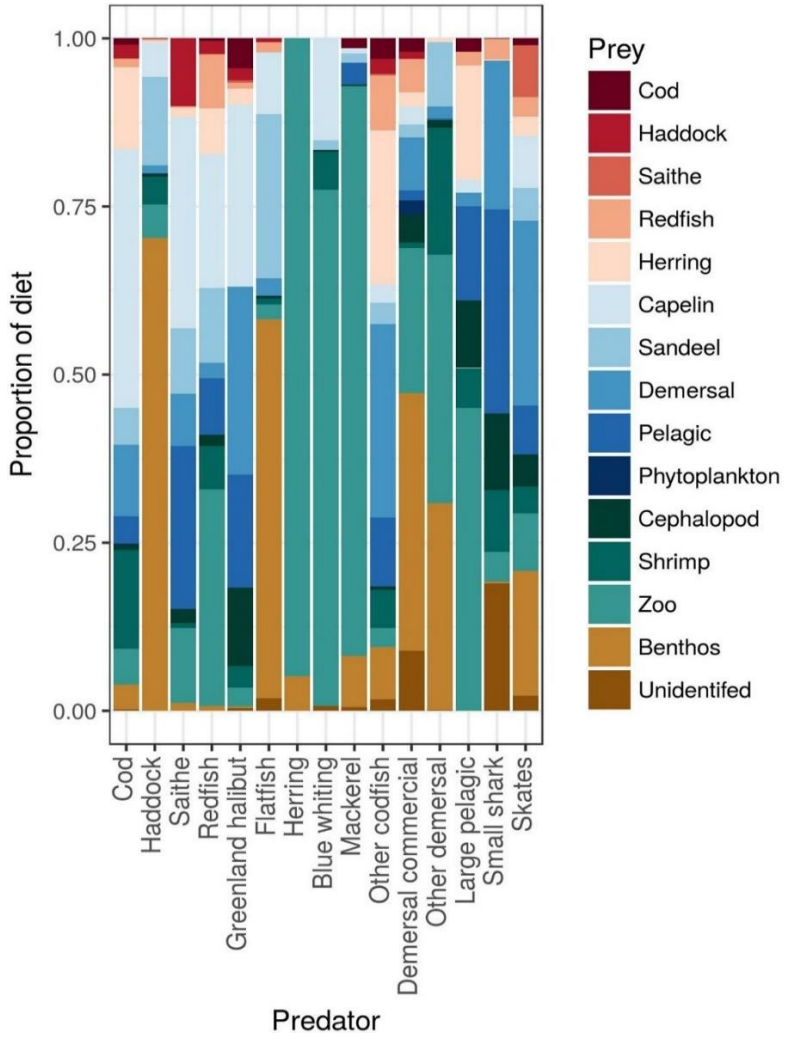


Figure 31. Average diet composition from stomach content data that was available for 15 of the 20 fish groups.

210 https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2018/01%20WGSAM%20-%20Report%20of%20the%20Working%20Group%20on%20Multispecies%20Assessment%20Methods.pdf

Data from the MFRI on stomach content and information from the literature (Gunnarsson et al., 1998; Jónsson and Pálsson, 2013) was used as a guideline when tuning the availability of each prey. The resulting modeled food web in the study was quite complex and presented below.

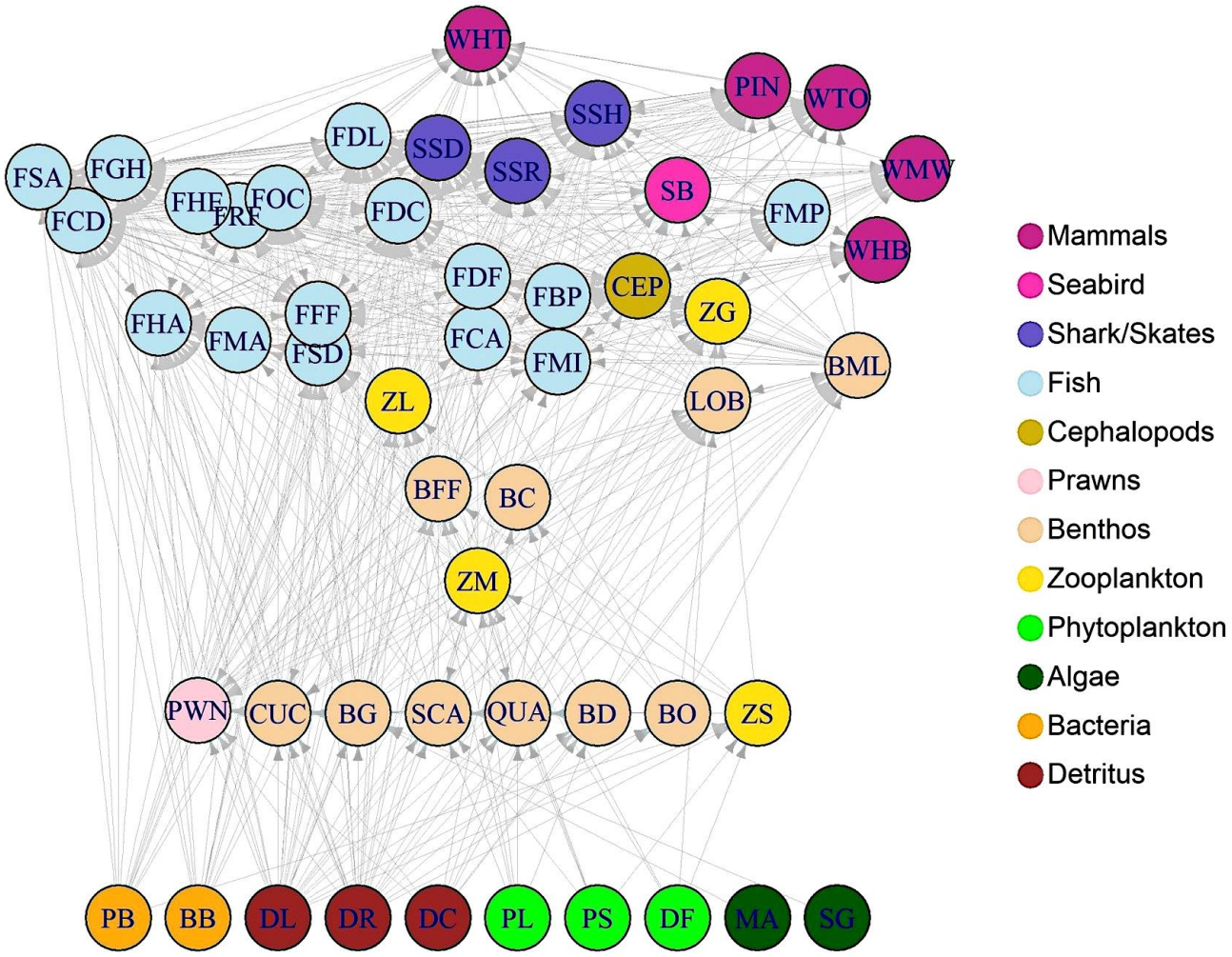


Figure 32. Food web connections between the modeled functional groups. Important fish species codes: FCD is Cod (Gadus morhua); FHA is Haddock (Melanogrammus aeglefinus); FSA is Saithe (Pollachius virens), FRF is Redfish (Sebastes sp); FGH is Greenland halibut (Reinhardtius hippoglossoides), FFF is Flatfish, FHE is Herring (Clupea harengus); FCA is Capelin (Mallotus villosus), FMI is Blue whiting (Micromesistius poutassou), FMA is Mackerel (Scomber scombrus).

Icelandic cod appears to be reasonably well connected to other key fish species as both prey and predator but it does not appear to be a key prey species in the Icelandic marine ecosystem so it is not necessary that harvesting policy and management measures are specifically directed to avoid severe adverse impacts on dependent predators.

Clause 3.2.5 – Precautionary Considerations

Supporting Clauses:	3.2.5.1			
Important Note:	Old Clause "3.2.4 Considerations" has been split into "3.2.4 Foodweb Considerations" and "3.2.5 Precautionary Considerations" in IRFM Standard v2.0 – Clause 3.2.5 Precautionary Considerations addressed separately here. Clause 3.2.5.1: Text added (**Bold**) in IRFM Standard v2.0: "*Management plans shall be developed and implemented in a timely fashion for avoiding, minimizing or mitigating any ecosystem issues properly identified. These shall be based on risk analysis and scientific advice,* ***consistent with the precautionary approach,*** *as being of serious concern in the fishery in question."* Clause 3.2.5.1 (minor change) – consistency with precautionary approach specifically addressed below.			
Clause Guidance:	***Management plans shall be developed and implemented in a timely fashion for avoiding, minimizing or mitigating any ecosystem issues properly identified. These shall be based on risk analysis and scientific advice, consistent with the precautionary approach, as being of serious concern in the fishery in question.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Icelandic government policy aims to protect vulnerable marine ecosystems from significant adverse impact from bottom contacting gear and legislation exists to provide for the prohibition of fishing activities with bottom-contacting gear in areas where vulnerable ecosystems occur. MFRI Advice includes a specific section on the ecosystem impacts of Icelandic fisheries. Measures to minimize or mitigate ecosystem issues identified include technical measures such as the use of night settings, trailing balloons, scare lines and weighted lines in longline fisheries, the trial of bycatch reduction devices in gillnet fisheries, the use of flying doors and rock hoppers on bottom trawlers, and real time, temporary and permanent areal closures, and, where appropriate, the specific consideration of predation in some stock assessments as is the case in the assessment of capelin which considers the cod-capelin predator-prey relationship.

EVIDENCE

Icelandic government policy aims to protect vulnerable marine ecosystems from significant adverse impact from bottom contacting gear and legislation exists to provide for the prohibition of fishing activities with bottom-contacting gear in areas where vulnerable ecosystems occur. MFRI Advice includes a specific section on the ecosystem impacts of Icelandic fisheries[211]. The document identifies the major regional pressures for the ecoregion (Figure below).

[211] https://www.hafogvatn.is/static/files/Veidiradgjof/vistkerfi.pdf

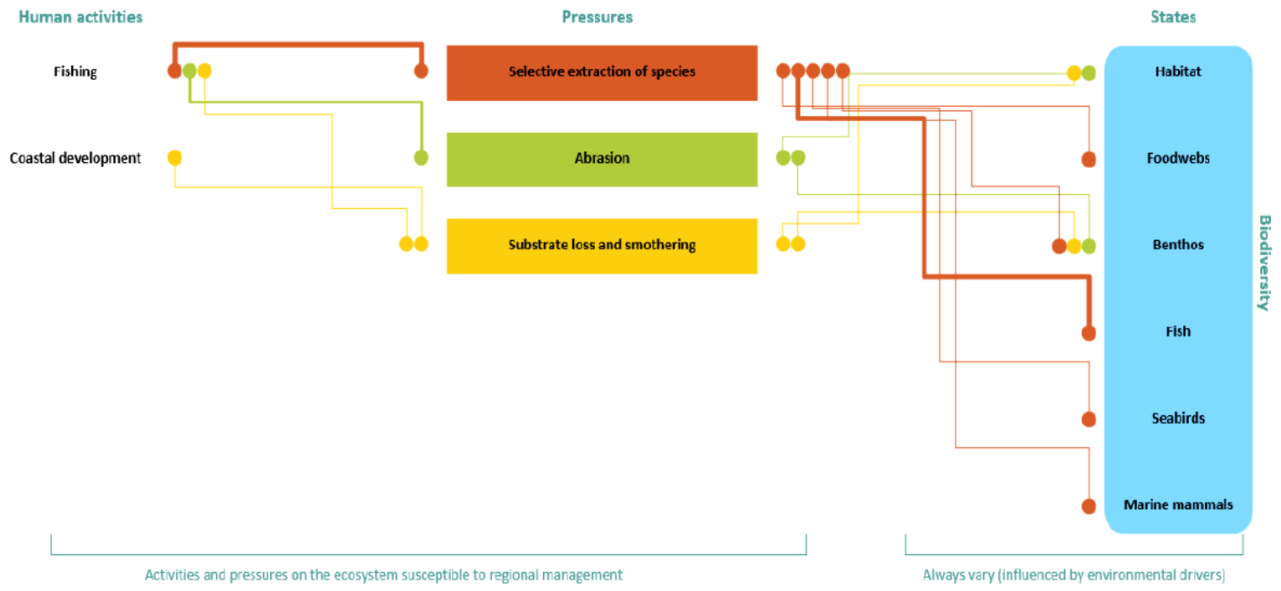


Figure 33. Icelandic Waters ecoregion overview with the major regional pressures, human activities, and state of the ecosystem components. The width of lines indicates the relative importance of individual links (the scaled strength of pressures should be understood as a relevant strength between the human activities listed and not as an assessment of the actual pressure on the ecosystem).

Measures to minimize or mitigate ecosystem issues identified include technical measures such as the use of night settings, trailing balloons, scare lines and weighted lines in longline fisheries, the trial of bycatch reduction devices in gillnet fisheries, the use of T90 nets, flying pelagic doors[212] and rock hoppers on bottom trawlers, and real time, temporary and permanent areal closures (see clause 3.2.3.1 for details), and, where appropriate, the specific consideration of predation in some stock assessments as is the case in the assessment of capelin which considers the cod-capelin predator-prey relationship.

There is a fishery management plan in place for cod. The current plan was introduced in 2009, examined and approved by ICES in 2010[213,] and revised in 2015[214]. The plan is publicly available [215]. Icelandic Fishery Management Plans summarize general measure in place relevant to ecosystem effects. Overall, these management measures are designed to ensure the Icelandic marine ecosystem remains healthy and productive and to allow for the future conservation and sustainable harvest of fish stocks.

[212] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/

213 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf

214 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKICE%202015/wkice_2015_final.pdf

215 https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74

8. Performance specific to agreed corrective action plans

This fishery did not have past corrective action plans active at the time of this 2018 assessment but a new minor non-conformance has been assigned. The relative corrective action plan is presented below.

9. Unclosed, new non-conformances and new corrective action plans

The Assessment Team has identified a Minor Non Conformance against clause 2.3.2.4 for the IRFM Standard.

Clause 2.3.2.4. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels.

Rationale: The recording of marine mammals and seabirds by number and species is required by Icelandic regulation[216]. Despite the implementation of new mandatory logbook reporting procedures for seabird and marine mammal bycatch, available evidence suggests that far fewer incidences of seabird and marine mammal bycatch are reported via the electronic logbook system than would be expected given the levels reported by onboard observers. This suggests significant levels of under-reporting and/or non-reporting of seabird and marine mammal bycatch. Examples of available evidence to support this conclusion include the findings of Pálsson et al. 2015[217] and the March 2018 MFRI report titled: "Bycatch of Seabirds and Marine Mammals in lumpsucker gillnets 2014-2017".

Pálsson et al. 2015 highlighted the fact that their bycatch estimates were based on limited data that needed to be increased and improved with a functioning reporting system for the fishery and better follow up.

The MFRI 2018 report found that although reported bycatch in E-logbooks by the fleet has increased (suggesting better compliance with reporting requirements) the overall bycatch rates are still much lower than observed in the trips by inspectors. Overall, the marine mammal and seabird bycatch rate during inspector trips was around four times higher than reported by the fleet in 2017[218].

Furthermore according to a 2017 presentation to NAMMCO's Working group on bycatch of marine mammals; "logbooks have unfortunately proven unreliable" and "bycatch of birds and marine mammals [is] 18x higher when observer is present vs logbook records".[219]

While much of the evidence related to non-compliance with reporting requirements may relate to the lumpsucker fishery, this fishery is still part of the management system under review. In addition, there is insufficient evidence to show that compliance in the fisheries under assessment is better.

Non-conformance #1 (Clause 2.3.2.4: Minor Non-conformance). Although required by legislation, there is some evidence of non-reporting/under-reporting of seabirds and marine mammals bycatch such that the Assessment Team cannot be fully confident that catch amounts by species and fishing area (of marine mammals and seabirds) are estimated and continually recorded in fishing logbooks.

[216] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[217] https://www.hafogvatn.is/static/research/files/fjolrit-178.pdf
[218] https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf
[219] https://nammco.no/wp-content/uploads/2017/04/nammco-meeting-iceland-gms.pptx

The Client has provided the following corrective action letter and plan.

To whom it may concern

ATVINNUVEGA- OG
NÝSKÖPUNARRÁÐUNEYTIÐ

Ministry of Industries and Innovation

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anr.is

Reykjavík February 15, 2019
Reference: ANR18030330/11.02.09

The Icelandic fisheries management system is based on responsible conservation and sustainable use of living marine resources and an integral part of the system is to manage ecosystem effects of fishing, including bycatches of commercial and non-commercial species. All management decisions are taken based on the best available science.

Effective control and enforcement is a pivotal element of a responsible fisheries management system. The Directorate of Fisheries monitors fisheries to ensure that rules are being followed. Real-time status of landings is delivered to a live database through a synchronized weight control system at all landing ports. The Directorate also carries out surveillance and inspections of the fishing operations, landing of catches and processing plants in close collaboration with the Icelandic Coast Guard, the Food and Veterinary Authority as well as accredited municipal harbor officials responsible for proper recording of the weight of the landed catch.

Icelandic law explicitly prohibits discards of commercial species, i.e. bycatches of unwanted species or undersized fish. There are certain flexibility options and incentives for compliance incorporated into the system, to make it function well in practice.
Incidental catch of non-commercial species such as seabirds and marine mammals is monitored by mandatory recordings in electronic logbooks. These measures are meant to maintain the delicate balance between effective harvesting and good environmental health to support sustainable fisheries.

The Marine and Freshwater Institute in Iceland issues reports on incidental bycatches of non-commercial species. One issue that is currently being addressed as a result of the recommendations of these reports is the need for further measures to encourage the reporting of these catches in logbooks to prevent the transition from paper-logbooks to electronic reporting from resulting in lower levels of reporting. According to the reports from the MFRI, bycatch of marine mammals and seabirds are most frequent in gillnet fisheries.

The Minister of Fisheries recently received a response to his request to the Committee for consultation on responsible management of living marine resources regarding addressing

non-commercial bycatches. On the basis of the conclusions of this committee, work has commenced to improve data recording, data availability and reliability and explore certain management measures to reduce bycatch of these species.

The committee comprises individuals from main stakeholder organizations in the fishing industry as well as the Marine and Freshwater Research Institute and the Ministry of Fisheries.

The Ministry will be working with the MFRI, the Directorate and the fishing industry in the next months with the aim of acquiring accurate and more detailed information on frequency of non-commercial bycatches, by fishing-gear, area and time. This information is essential for the MFRI as basis for recommendation on management actions to address any significant adverse impacts of fisheries on these species in question and the ecosystem health in general. These actions could include time and area closures and fishing gear amendments.

On behalf of the Minister of Fisheries and Agriculture

Brynhildur Benediktsdóttir

9.1. Audit Team Response to the Corrective Action Plan

The Audit Team commends the client and the Ministry of Industries and Innovation for providing a Corrective Action Plan relative to the identified minor non-conformance against clause 2.3.2.4 of the IRFF Standard (V2).

Accordingly, the Team acknowledges that work has commenced from the Committee on Consultation on Responsible Management of Living Marine Resources towards addressing the non-commercial bycatches issue. This work is focused around improvement of data recording, data availability and reliability and to explore management options. We also note, through the Committee, the stated collective commitment of Icelandic industry and fishery management authorities, in the next months, to acquire better and more detailed data on bycatch frequency, by fishing gear, area and time, and that resulting action recommended by the MFRI could include time and area closures and fishing gear amendments.

The Audit Team has determined that the corrective action plan is a step in the right direction to address the identified bycatch issue in a general sense, and more specifically, the minor non-conformance identified.

In addition to the corrective action letter provided, the client also clarified that the Committee has recommended the following to the Ministry of Industries and Innovation:

1. Improvement of information collection and monitoring activities to gather reliable seabird and marine mammal bycatch information from vessel e-logbooks (and directly addressing the non-conformance) through technology development (e.g. mobile app in development by the Directorate), a species identification training program for fishermen and observers, and a general improvement in the quality of bycatch data (i.e. narrower confidence limits) and depth of information recorded (e.g. catch information on area, time, depth etc.) to help design mitigation measures that will result in appropriate industry acceptance and buy in;
2. Measures to reduce bycatch (e.g. potential spatial/temporal closures at sensitive times such as around seal pupping or bird breeding season); and
3. US Marine Mammal Protection Act importing requirements collectively dealt with through improvements in the previous two points (i.e. information gathering and management measures).

Accordingly, the Ministry is now considering further action with a view to determine what arrangements are realistically achievable and by when, potentially resulting in the following corrective action timelines:

Year 1 (late 2019/early 2020): Ongoing work to further refine the actions identified above in terms of specific deliverables with their accompanying timeline;
Year 2: Initiate deliverable x, y, z identified in Year 1;
Year 3: Fully implement and report on progress;
Year 4: Continued implementation and reporting.

The Assessment Team has accepted the Corrective Action Plan provided by the Client for the fishery under assessment.

10. Future Surveillance Actions

The following table details the projected future surveillance actions.

Table 21. Key future surveillance actions.

Clause No.	Surveillance Action
2.3.2.4. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels	According to the corrective action plan stating that such work will be carried out in the "next (coming) months", and considering that clause 2.3.2.4 is a Fishing Vessel Monitoring and Control System clause dealing with the continuous recording of catch amounts by species and fishing area in logbooks (as opposed to data collection generated by research programs), the Client shall provide, in time for the next audit, measurable evidence of corrective action towards the appropriate recording of marine mammal and seabirds catches in fishing logbooks on-board of fishing vessels, as per regulation no.126/2014[220].

11. Client signed acceptance of the action plan

The signed letter and actions plan has been provided in the previous section.

11.1 Recommendations

Further to the non-conformance identified two recommendations have been noted.

Recommendation #1 (relating to clause 3.2.2.3)
The assessment team recommends that the population and status of harbour porpoise (*Phocoena phocoena)* and that of harbour seal (*Phoca vitulina*) in Iceland are appropriately monitored due to risk of significant depletion to both populations, specifically in regards to their performance in relation to current targets (i.e. FMRI management objective of 12,000 harbour seals) and annual replacement potential (e.g. ASCOBANS threshold of 1.7% for harbour porpoises [221]).

Recommendation #2 (relating to clause 3.1.1 and 3.1.2)
Several fisheries management plans (e.g. those for cod, haddock, saithe and redfish) state that it is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs). VMEs of particular importance within Iceland include cold water coral communities and hydrothermal vent areas, but also deep sea sponge aggregations (a threatened and declining habitat, according to OSPAR[222]) and sea-pen fields[223]. Currently, there are explicit conservation measures for cold water corals and hydrothermal vents (i.e. area closures) but nothing explicit for either deep sea sponge aggregations or sea pen fields. The assessment team recommends that more formal conservation plans/measures are formulated for these VMEs.

The issues highlighted in these recommendations will be reviewed in subsequent assessment audits.

[220] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[221] http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena
[222] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf
[223] https://novasarc.hafogvatn.is/project/

12. Recommendation and Determination

The assessment team recommends that the management system of the applicant fisheries, the Icelandic cod (*Gadus morhua*) commercial fisheries under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl, long-line, gill net, Danish seine net, (and hook and line by small vessel gear) and indirectly by Nephrops trawls, shrimp trawls, pelagic trawls and purse seines, are granted continued certification. SAI Global duly confirms continued certification.

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Stjornartidindi. 2018. Regulation on fishing for commercial fishing year 2017/2018.	https://www.stjornartidindi.is/Advert.aspx?RecordID=9874e782-c577-4248-b835-845bd0fa1806
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14. Appendix 1.

Based on the technical expertise required to carry out the above fishery assessment, SAI Global is pleased to confirm the Surveillance Assessment team members for the fishery as follows.

Vito Romito (Lead Assessor)

Vito is an ISO14001 Certified Lead Auditor and MSC approved Fisheries Team Leader for SAI Global – with extensive experience in ecosystems effects of fisheries. Vito received a BSc (Honours) in Ecology and a MSc in Tropical Coastal Management from Newcastle University (U.K.), in between which he spent a year in Tanzania, carrying out biodiversity assessments and monitoring studies of pristine and dynamited coral reef and seagrass ecosystems around the Mafia Island Marine Park. For five years he worked at Global Trust Certification/ later SAI Global as Lead Assessor for all the fisheries assessments in Alaska, Iceland and Louisiana. Vito has also carried out several International Fishmeal and Fishoil Organisation (IFFO) forage fisheries assessments in Chile, Peru, Europe and other various pre-assessments in Atlantic and Pacific Canada. To date, Vito has headed and conducted dozens of fishery assessments involving 40+ different species including salmonid, groundfish, pelagic, flatfish, crustacean and cephalopod species in Europe, North and South America, and SE Asia while managing expert teams. For 3 years, as a senior fishery consultant and then manager with RS Standards Ltd., Vito was involved in various work that included fishery reviews, development and testing of a Data Deficient Fisheries framework and coordination of V2 fisheries standard development for the ASMI Alaska RFM Scheme, and work on IFFO RS Improver/FIP projects related to South East Asia multispecies bottom trawl fisheries. Vito re-joined the SAI Global Fisheries Team in Q4 of 2018.

Conor Donnelly (Assessor)

Conor is an experienced marine ecologist and environmental manager with a background of over 17 years at the UK statutory nature conservation body, Natural England, where he was Senior Marine Adviser responsible for marine delivery across the East Midlands, Norfolk and Suffolk. He has a BSc. in Environmental Science from King's College, University of London and an M.Res. in Marine and Coastal Ecology and Environmental Management from the University of York. Conor is also an MSC approved Fisheries Team Leader. Conor has extensive experience of working with fisheries managers, the fishing sector, local communities and eNGOs, particularly from assessing the environmental impacts of mussel, cockle and shrimp fisheries in The Wash, UK and providing advice on their management. He was Natural England's representative on the Eastern Inshore Fisheries and Conservation Authority and its predecessor. He also advised and supported the UK's Department for Environment, Food and Rural Affairs (Defra) on fisheries casework in the southern North Sea under the Common Fisheries Policy (CFP) including meetings with other member states. Other experience includes Marine Protected Area designation, conservation advice and condition assessment; conservation legislation and policy; and working with partners and stakeholders to deliver positive environmental outcomes. Conor is certified as a Fisheries Team Leader under MSC FCR versions 1.3 and 2 and a fisheries assessor under the IFFO RS Standard.

Dankert Skagen, (Assessor)

Dankert has recently retired from the Institute of Marine Research (IMR), Bergen, where he worked for 22 years. His responsibilities included stock assessment, multispecies work, in particular in the North Sea, work connected to the introduction of the precautionary approach in fisheries and recently, on development of harvest control rules and management strategies. He was leader of the IMR research program for population dynamics and multispecies investigations in 1996-97 and for the development of new assessment tools for North-East arctic cod in 1998-99 and the assessment package TASACS in 2007-08. In addition, he has developed several programs for simulating harvest control rules that are commonly used in fisheries management today. Within ICES, he has participated in a wide range of working groups and been chairman of several of them, including the Study Group of Management Strategies. He was chairman of the Resource Management Committee for 3 years and member of ACFM for 7 years.

Gisli Svan Eirnasson, (Assessor)

Gísli Svan Einarsson has in depth knowledge of the management system and operational management of Icelandic ground fish fisheries during his previous employment as a Fleet Manager of FISK Seafood for 18 years. Specialist assessor skills stem from his knowledge of quota setting, allocation and monitoring and compliance. Local knowledge of fishery management concerns, current knowledge, fleets, organizations, fleet structure and supply chains. Gísli Svan has been a Project Manager of many Projects concerning the Fishing Industry and a specialist in fish traceability. Gisli is currently employed as Manager by VERID Science Park, Iceland. Qualifications include a BA from the University of Bifröst and Diploma in Administration in Fishing Industry from “Tækniskóli Íslands” now the University of Reykjavík.

15. Appendix 2 – New Clauses in ICE RFM Standard v2.0

15.1. Clause 1.1.5

Clause 1.1.5	Transparency in the fisheries management and related decision-making process shall be ensured.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Management arrangements and decision making processes are organized in such a way so as to ensure transparency.

EVIDENCE

Icelandic fisheries management arrangements and decision making processes are organized in a very transparent manner. The roles, functions and responsibilities of the Ministry of Fisheries and Agriculture, Directorate of Fisheries, Coastguard and MFRI are all set out clearly on their respective websites. Additionally, Iceland's small population ensures short chains of communication that in turn ensure that key issues affecting the fishing community are well understood by all affected parties. The Minister is required by legislation to consult the MFRI before the setting of TAC. There is a consultation forum of utilised fish stock that has the aim of discussing current strategy and harvesting based on MRI's advice and propose necessary changes. Scientific evaluations, including stock assessment and scientific advice are published online on ICES[224] and MFRI[225] websites once they are ready. There are regular meetings between fishery managers and industry representatives, at the individual level, committees, seminars and conferences where all aspects of fisheries management are discussed. Industry are well represented by a number of industry bodies such NASBO[226] and Fisheries Iceland[227].

Information on the catch quota of each vessel for each fish species, including quota transfers between vessels, and remaining quota for the season for each vessel is recorded in the official central database. The publicly accessible nature of information relating to ownership of quota ensures transparency and accountability within the management system. Finally, where disputes arise that necessitate legal intervention these are reviewed in public through the Icelandic civil law legal system, including its district and supreme courts, and all findings are published on the internet.

It is the determination of the Assessment Team that management arrangements and decision making processes are organized in such a way that transparency is ensured; therefore the Icelandic cod fisheries are in full compliance with Clause 1.1.5 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.

Non-Conformance Number (if relevant)	NA

224 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/cod.27.5a.pdf

225 https://www.hafogvatn.is/static/extras/images/%C3%9Eorskur_2018729230.pdf

226 http://smabatar.is/sida/7.shtml

227 http://www.sfs.is/

15.2 Clause 1.1.6

Clause 1.1.6	Fisheries shall be regulated in such a way as to avoid the risk of conflict among fishers using different vessels gear and fishing methods. Where conflict arises appropriate venues and means shall be available for conflict resolution.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Fisheries are regulated in such a way as to avoid the risk of conflict among fishers using different vessels gear and fishing methods. Where conflict arises appropriate legal venues and means are available for conflict resolution.

EVIDENCE

Vessels fishing using longline gear use lights and AIS transmitters on their buoys. These serve to make the location of set longlines more visible to other fleet sectors such as bottom trawlers thereby reducing gear conflict. There also strict rules on the marking of gillnets, pots and traps (see supporting evidence for Clause 2.3.2.17). Other measures such as spatial separation of fishing activities including the exclusion of bottom trawlers from fishing within 12nm of the coast further reduce the changes of conflicts between fleet sectors arising.

Iceland's small population and relatively small fishing community ensures short chains of communication that ensure conflicts can generally be resolved before they arise. There are regular meetings between fishery managers and industry representatives where all aspects of fisheries are discussed.

The Icelandic civil law legal system has strong foundations and long tradition. Its district courts and the supreme court deals with all disputes that arise within the system. Disputes are reviewed in public and all findings are published on the internet.

It is the determination of the Assessment Team that fisheries are regulated in such a way as to avoid the risk of conflict among fishers using different vessels gear and fishing methods and that where conflicts do arise appropriate venues and means are available for conflict resolution; therefore the Icelandic cod fisheries are in full compliance with Clause 1.1.6 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.

Non-Conformance Number (if relevant)	NA

15.3 Clause 2.1.2

Clause 2.1.2	Laws and regulations concerning conservation and management measures shall be publicly available and effectively disseminated.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Laws and regulations concerning conservation and management measures are publicly available on the Directorate of Fisheries and Ministry of Industries and Innovation websites and are effectively disseminated through an online law gazette and via radio.

EVIDENCE

Laws and regulations concerning conservation and management measures are publicly available on the Directorate of Fisheries[228] and Ministry of Industries and Innovation[229] websites. The latest 2018 fishing laws are made available in a booklet form by the Icelandic authorities and effectively disseminated through an online law gazette[230] and via radio.

Furthermore, Icelandic Acts, laws and regulations are readily accessible at the official gazette https://www.stjornartidindi.is/ or at http://www.althingi.is/lagasafn/ (for Acts/Laws) or https://www.reglugerd.is/ (for Regulations). Further information on access to Icelandic Acts and Regulations is available here[231].

Additionally all advice to managers relating to the status of commercial stocks which underpins decisions on TACs and other regulations is available[232]. Harvest control rules are scrutinised on request by an independent scientific body (ICES) with reports being published online.

It is the determination of the Assessment Team that laws and regulations concerning conservation and management measures are publicly available and effectively disseminated; therefore the Icelandic cod fisheries are in full compliance with Clause 2.1.2 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.

Non-Conformance Number (if relevant)	NA

[228] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/
[229] https://www.government.is/ministries/ministry-of-industries-and-innovation/
[230] http://vefbirting.oddi.is/raduneyti/fiskveidar2018/108/
[231] https://www.stjornarradid.is/gogn/log-og-reglugerdir/
[232] https://www.hafogvatn.is/en/harvesting-advice

15.4 Clause 2.3.2.17

Clause 2.3.2.17	In cases of passive fishing gear left unattended at sea, there shall be regulation that requires fishing gear to be marked so that the owner can be identified, where relevant.[233]			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

According to IRFF Standard Revision 2.0: *"This clause is applicable to gillnets, traps and pots."*

In cases of gillnets, traps and pots left unattended at sea, there are regulations requiring that they are marked so that the owner can be identified.

EVIDENCE

In Iceland there are specific gear marking regulations for anchored bottom set nets targeting cod. These provisions are contained in Regulation No. 115 of 13 February 2006[234]. Article 4 states that all anchors for set nets must be marked with the district registration and number of the boat. Buoys must be fixed at both ends of the nets and buoys must be marked clearly with district registrations and the number of the boat. Article 5 states that the buoy attached at the west end of the nets must be marked with a net-ring (a floating ring approximately 20 cm in diameter). If nets are set in an area where bottom trawling also occurs the west end buoy must be marked with one white blinking light.

Other regulations with specific requirements for gear marking include:

- 202/2016, Lumpfish-fishing (Articles 7 and 11)[235]
- 1012/2013, on fishing whelk in traps (Paragraph 5)[236]
- 1070/2015 the fishing of crabs in the inner Faxaflói (Paragraph 4)[237]
- 923/2010, Monkfish-fishing (Paragraph 4)[238]
- 449/2013 Regulation of equipment and nets fishing for trout (Paragraph 6)[239]

Note: Acts/Laws and Regulations referenced herein may be accessed (in Icelandic) by searching by Act/Law/Regulation No./Year (e.g. 116/2006) at the official gazette https://www.stjornartidindi.is/ (Acts/Laws and Regulations) or at http://www.althingi.is/lagasafn/ (for Acts/Laws) or https://www.reglugerd.is/ (for Regulations).

It is the determination of the Assessment Team that in cases of gillnets, traps and pots left unattended at sea, there are regulations requiring that they are marked so that the owner can be identified; therefore the Icelandic cod fisheries are in full compliance with Clause 2.3.2.17 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.

Non-Conformance Number (if relevant)	**NA**

[233] This clause is applicable to gillnets, traps and pots.

[234] http://www.reglugerd.is/reglugerdir/allar/nr/115-2006

[235] http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/20032

[236] https://www.stjornartidindi.is/Advert.aspx?RecordID=024102ac-de04-45ce-99e3-5e83af6d6aae

[237] http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/19883

[238] https://www.stjornartidindi.is/Advert.aspx?RecordID=437308e0-8ad1-4009-98cb-10266317ed3e

[239] http://www.reglugerd.is/reglugerdir/allar/nr/449-2013

15.5 Clause 3.2.1.2

Clause 3.2.1.2	Information shall be available on the potential effect of fishing on endangered, threatened and protected species, as appropriate and relevant in the context of the unit of certification.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The IRFF Standard Revision 2.0 defines endangered, threatened and protected species (ETPs) as:
"Species recognised by Icelandic legislation and/or binding international agreements to which the Icelandic authorities are party. Binding international agreements as applicable in Icelandic jurisdiction."

Other species which might be considered vulnerable such as marine mammal and seabird species are assessed under Clause 3.1.

Information is available on the potential effect of the cod fishery on species designated as ETPs. The current status of most ETPs species is assessed routinely and presented in the MRI advice reports.

EVIDENCE

In the context of the IRFF Standard Revision 2.0 endangered, threatened and protected species (ETPs) are those species recognised by Icelandic legislation and/or binding international agreements to which the Icelandic authorities are party and binding international agreements as applicable in Icelandic jurisdiction.

As discussed previously, discarding of fish species is prohibited and there is a statutory requirement for skippers to record both the capture of fish and non-fish species such as seabirds and marine mammals. The e-logbook system as well as paper logbooks for smaller vessels include provisions for such information to be recorded. Observations are also recorded by Directorate fishery inspectors aboard fishing vessels and during bottom trawl, gillnet and longline surveys undertaken by the MFRI.

Vulnerable and ETP species Interactions

According to the Convention for the Protection of the Marine Environment of the North-East Atlantic or OSPAR Convention, as reported in the 2017 ICES Ecosystem report of the Icelandic Ecoregion[240] there are a number of threatened and declining species in Iceland. Interactions with ETP and vulnerable species are generally limited, these have been assessed and reported in detail in clause 3.1.

It is the determination of the Assessment Team that sufficient information is available to allow the potential effects of the cod fishery on species designated as ETPs to be determined; therefore the Icelandic cod fisheries are in full compliance with Clause 3.2.1.2 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.

Non-Conformance Number (if relevant)	NA

[240] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf

15.6 Clause 3.2.2.4

Clause 3.2.2.4	Suitable steps shall be considered to avoid, minimize or mitigate encounters with endangered, threatened and protected species, as appropriate and relevant in the context of the unit of certification.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The IRFF Standard Revision 2.0 defines endangered, threatened and protected species (ETPs) as:
"Species recognised by Icelandic legislation and/or binding international agreements to which the Icelandic authorities are party. Binding international agreements as applicable in Icelandic jurisdiction."

Suitable steps are considered to avoid, minimize or mitigate encounters with ETP species, as appropriate and relevant in the context of the Icelandic cod commercial fisheries. Examples of mitigation measures include the ban on directed fishing for Atlantic halibut, spiny dogfish, Porbeagle sharks and Basking shark and the creation of permanently closed areas to protect known occurrences of vulnerable cold water corals (*Lophelia pertusa*).

EVIDENCE

Interactions with ETP and vulnerable species are generally limited, these have been assessed and reported in detail in the previous clause as well as clause 3.1. Recording of all marine mammals and seabirds in E-logbooks (by species and numbers) interactions/catches is a legal requirement since 2014 (Reg. 126/2014) [241].

A 2018 report on marine mammal and seabird bycatch in the Icelandic gillnet lumpsucker fishery[242], and of potential relevance to other fisheries, highlights that although reported bycatch in E-logbooks by the fleet has increased (suggesting better compliance with reporting requirements) the overall bycatch rates are still much lower than observed in the trips by inspectors. A smartphone app is in development by the Directorate of Fisheries, which aims to prioritise and make both reporting and identification of bycatch easier for operators in the fishery.

Measures to minimize or mitigate ETP species interactions include the use of night settings, trailing balloons, scare lines and weighted lines in longline fisheries, recent trials of bycatch reduction devices in gillnet fisheries (e.g. banana pingers), the use of T90 nets, flying doors and rock hoppers on bottom trawlers to avoid habitat damage and impact on sensitive benthic biota such as corals, and real time, temporary and permanent areal closures (see clause 3.2.3 for details).

Suitable steps are considered to avoid, minimize or mitigate encounters with ETP species, as appropriate and relevant in the context of the Icelandic cod commercial fisheries. For example, mitigation measures include the ban on directed fishing for Atlantic halibut, spiny dogfish, Porbeagle sharks and Basking shark and the creation of permanently closed areas to protect known occurrences of vulnerable cold water corals (*Lophelia pertusa*) [243].

[241] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967

[242] https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf

[243] https://www.sciencedirect.com/science/article/pii/S0141113617303938

It is the determination of the Assessment Team that, where appropriate and relevant in the context of the Icelandic cod commercial fisheries, suitable steps are considered to avoid, minimize or mitigate encounters with ETP species; therefore the Icelandic cod fisheries are in full compliance with Clause 3.2.2.4 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.	
Non-Conformance Number (if relevant)	**NA**

15.7 Clause 3.2.2.5

Clause 3.2.2.5	Appropriate steps shall be taken to avoid the loss of fishing gear and ghost fishing of lost and abandoned gear.			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Appropriate steps are taken to avoid the loss of fishing gear and ghost fishing of lost and abandoned gear There are a number of initiatives and regulations in place to avoid the loss of fishing gear and subsequent ghost fishing of lost and abandoned gear. Additionally, the Icelandic ITQ system operates in such a way that gear loses are minimised.

EVIDENCE

There are a number of initiatives and regulations in place to avoid the loss of fishing gear and subsequent ghost fishing of lost and abandoned gear. Recycling schemes are in place to encourage fishers to bring old gear ashore and it is illegal to dump old gear at sea. Where Fiskistofa finds and recovers lost or abandoned gear they recover the cost of recovery from the gears' owner. For example, in the 2015 lumpfish season the Directorate contracted two vessels to go out and specifically look for and recover lost gear. The Coastguard also reports any buoys it feels might represent lost or abandoned fishing gear to the Directorate. All regulations relating to fishing gear may be found in the various Articles of Fisheries Management 2018 Laws and regulations[244]. During the November 2018 site visits, the directorate confirmed that gear loss (e.g. longlines, gillnets) and as such ghost fishing is not considered an issue and that reporting lost gear is compulsory.

Another important factor that contributes to low levels of lost fishing gear is the high price of that gear. This means that fishers are careful to avoid losing their gear. In the case of trawls the majority of vessels carry special grapples onboard that allow them to retrieve lost gear even when both towing warps have parted, a quite rare situation.

In the case of gillnets fishers are required to attend their nets at regular intervals and retrieve them before going ashore. According to Article 4 of Act 57/1996, concerning the Treatment of Commercial Marine Stocks (Translated from Icelandic); *"Nets and other gear, which are left in the sea, must be drawn on an appropriate and regular basis as circumstances allow. The Fisheries Directorate may remove, or have removed gears that are not been looked after properly. The same applies to fishing gear remaining in the sea after the end of fishing season, gears that are illegal or gears deployed in areas where their use is prohibited. The Directorate shall demand that the owners of fishing gear, removed from the sea by authority in paragraph 2 pay the costs associated with their removal. If the owner of the fishing gear is not known, the Directorate may sell the gear with profits going to the MFRI."* This means that gear is not left out in inclement weather conditions that might lead to increased gear loses.

The Icelandic ITQ system allows for a slower paced fishery than would be expected if there was only an overall TAC with all vessels fishing against it. The system allows fishers to target their efforts in optimum weather conditions leading to decreased rates of lost fishing gear.

[244] http://vefbirting.oddi.is/raduneyti/fiskveidar2018/108/

It is the determination of the Assessment Team that, appropriate steps are taken to avoid the loss of fishing gear and ghost fishing of lost and abandoned gear; therefore the Icelandic cod fisheries are in full compliance with Clause 3.2.2.5 of Revision 2.0 of the IRFF Responsible Fisheries Management Standard.	
Non-Conformance Number (if relevant)	**NA**

