Iceland Responsible Fisheries (IRF) Certification Programme

Re-assessment Report

For The

Icelandic Saithe Commercial Fisheries

Facilitated By

Iceland Responsible Fisheries Foundation (IRFF)

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ICELAND RESPONSIBLE FISHERIES CERTIFIED

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 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 $B_{trigger}$ ICES MSY framework parameter that 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 saithe (*Pollachius virens*) commercial fishery to the FAO Based Icelandic Responsible Fisheries Management (IRF) Certification Programme. The original Certification was granted the 23rd January 2015. As part of this second re-assessment, the current clients for this fishery are Samtök fyrirtækja í sjávarútvegi (SFS) (Fisheries Iceland) and Landssamband smábátaeigenda (The National Association of Small Boat Owners, Iceland (NASBO)).

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 (IRFF), established in February 2011, owns and operates the brand of Iceland Responsible Fisheries (IRF).

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. Details of the Peer Review Team are provided in Appendix 2.

The unit of certification includes the Icelandic saithe (*Pollachius virens*) commercial fisheries, under state management by the Icelandic Ministry of Industries and Innovation, fished directly with demersal trawls (i.e. main gear), gillnets, Danish seine nets, long-lines, 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 is the 2019/20 Re-Assessment Report of the Icelandic saithe commercial fishery. It comprises a full assessment of the fishery against the requirements of the current IRF standard, to evaluate whether current practices in the management of the Icelandic saithe commercial fishery remain consistent with criteria contained in the IRF Standard. The assessment was conducted according to the Global Trust procedures for FAO-Based IRFM certification using Revision 2.0 of the Icelandic Responsible Fisheries Management (IRFM) Standard (July 2016)[1].

The key outcomes of this Assessment have been summarized in Section 5. Assessment Outcome Summary.

[1] https://www.responsiblefisheries.is/media/1/irfm-standard-revision-2.0-final-2.pdf

1.1.1. Conformance against the IRFF Standard V2

During this re-assessment audit all clauses but two were found to be in full conformance. One minor non-conformance was identified (during the 4th surveillance in 2018/19) against clause 2.3.2.4 of the IRFM Standard (V2), relating to the appropriate recording of marine mammal and seabird bycatch data in fishing logbooks, while a new minor non-conformance was identified during this re-assessment against clause 3.1.1 relative to the bycatch of spotted wolffish and common loon. Corrective Action Evidence and Plans for the two minor NCs is available under the Non Conformances and Corrective Actions section.

The Assessment Team has also issued a number of formal Recommendations for the Client Group to consider.

Recommendation #1 (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[2]) and sea-pen fields[3]. 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.

Recommendation #2 (relating to clause 3.2.2.3)
The assessment team recommends that the population and status of harbour porpoise (*Phocoena phocoena)* in Iceland is appropriately monitored and quantified due to conflicting abundance estimates (e.g. resulting from absolute and relative survey abundance indexes[4] and recent modelling efforts[5]) due to the potential risk of significant depletion to its population, specifically in regard to performance against proposed thresholds (e.g. ASCOBANS annual replacement potential of 1.7% for harbour porpoises[6], or 2018 PBR limit of 3500 porpoises[5]).

It is noted that the issues highlighted in these recommendations will be reviewed in subsequent surveillance audits, and that some of these have the potential to develop into non-conformances if the issues worsen.

[2] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf
[3] https://novasarc.hafogvatn.is/project/
[4] https://nammco.no/wp-content/uploads/2019/11/final-report_aewg-20192.pdf
[5] https://www.ascobans.org/sites/default/files/document/ascobans_ac25_inf.4.3a_joint-imr-nammco-ws-harbour-porpoise.pdf
[6] http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena

1.1.2. Recommendation of the Assessment Team

The assessment team recommends that the management system of the applicant fishery, the Icelandic saithe (*Pollachius virens*) commercial fisheries, under state management by the Icelandic Ministry of Industries and Innovation, fished directly with demersal trawls (i.e. main gear), gillnets, Danish seine nets, long-lines, 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), be granted re-certification to the Icelandic Responsible Fisheries Certification Programme.

1.1.3. Certification Committee Determination

A Certification Committee met on January 17th, 2020 to objectively review the Final Assessment Report and Determination / Recommendation of the Assessment Team. The Certification Committee comprised of two fishery experts and a certification expert, all independent from both the Assessment Team and the Peer Review team. The aim of the Certification Committee was to reach a determination to either award, defer (pending clarification) or reject certification. Upon careful review and consideration of the report, and further clarifications requested and provided, the Committee agreed with all the findings and scores, including the minor non-conformances applied (and related corrective action plan/evidence received from the client) as well as with the Recommendations recorded by the Assessment Team. The Committee also requested some minor clarifications to be made within the report. The Assessment Team agreed and integrated these changes within this final assessment and certification report. The Committee decision was to grant certification.

ii. Schedule of Key Assessment Activities

Assessment Activities	Date
Application date	August 2018
Start of Initial Re-Assessment Review	June 2019
Appointment of Full Assessment Team	July 2019
On Site Visit	October 2019
Draft Full Assessment Report	November 2019
Client Review	December 2019
Peer Review	December 2019
Certification Committee review/decision	January 2020
Final Re-Assessment Report	January 2020

iii. Assessment Team Details

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1. Introduction

This re-assessment of the Icelandic saithe commercial fishery fulfills part of the procedure for the re-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 is the 2019-2020 Re-Assessment report for Icelandic saithe comprising a full assessment of the fishery against the requirements of the IRF standard version V2.0. Ultimately, this assessment evaluates whether current practices in the management of the saithe 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 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:	July 2018
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:	July 2018
Correspondence Address:	Landssamband smábátaeigenda
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City:	101 Reykjavik
Country:	Iceland
Postal Code:	IS-101
Phone:	(354) 552 7922
Web:	www.smabatar.is
E-mail Address:	ls@smabatar.is

3. Background to the Fishery

3.1. Species Biology

Saithe (*Pollachius virens*) is an active, gregarious, pelagic fish occurring in inshore and offshore waters to about 200 m depth. During their first 2-3 years of age, saithe remain in shallow coastal waters. Growth is rapid: at 1 year, ca. 20 cm, 2 years, 35 cm, 3 years, 50 cm, 5 years, 60-65 cm, 10 years, 94-97 cm, 15 years, 108 cm. Their maximum age is 25 years. The size of saithe in the catch is commonly between 60 and 110 cm. The largest individual caught in Icelandic waters measured 132 cm[7]. First maturity is reached between 5 and 10 years of age in the European population and apparently earlier (at 3 years) in the Gulf of Maine. In Iceland, maturation takes place mostly at age 4 – 7; and by age 10 they all are mature. Spawning takes place in shallow water (100–200 m) off the Southeast, South and West coast of Iceland from February–April and the timing of spawning to be variable. Average females lay about 220 000 eggs, but in large fish, the fecundity may reach 4 million eggs per female. Smaller fish in inshore waters feed on small crustaceans (copepods, amphipods, euphausiids) and small fish, while the large saithe prey predominantly upon fishes[8].

3.2. Fishery Location and Method

The largest portion of the saithe catch is taken by trawl, with gillnet fisheries playing a secondary role. The importance of the gillnet fisheries has declined, being between 13-43 % in the period 1974-1995, but only around 10% of the total landings since then) and only about 3.5% in the past 3-4 years. Between 40-80% of the annual bottom trawl landings based on hauls where saithe is reported as catch constitutes 75% or more of the catches. During the 1990's an increasing portion of the total annual saithe trawl landings was taken as bycatch, with the trend somewhat reversing in the since then. The less important gillnet fishery in terms of landings are somewhat more of a mixed species fishery compared with the trawl fishery. As shown below, most of the catch is caught along the Icelandic continental shelf break, off the south and west coast and deep off the Westfjords.

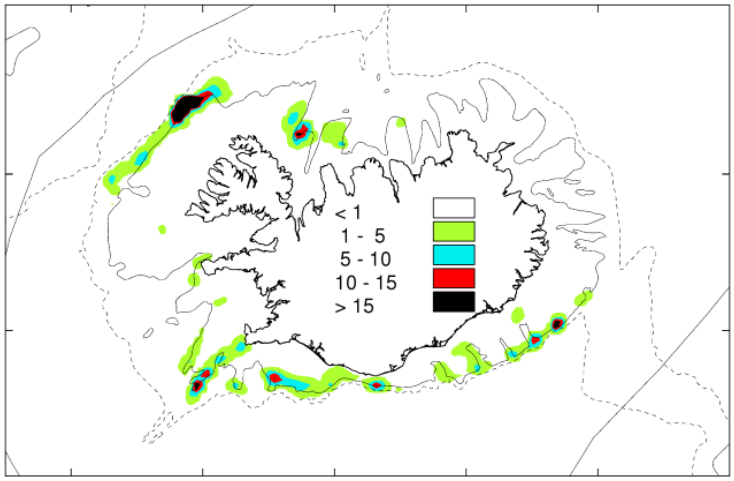


Figure 1. Saithe fishing grounds in 2017 (t/nmi2)[9].

Icelandic saithe in Iceland area 5.a is considered one management unit by ICES (see ICES Statistical Areas below).

[7] https://www.responsiblefisheries.is/origin-of-iceland/species/saithe
[8] http://www.fao.org/fishery/species/3016/en
[9] https://www.hafogvatn.is/static/extras/images/Ufsi_2018729281.pdf

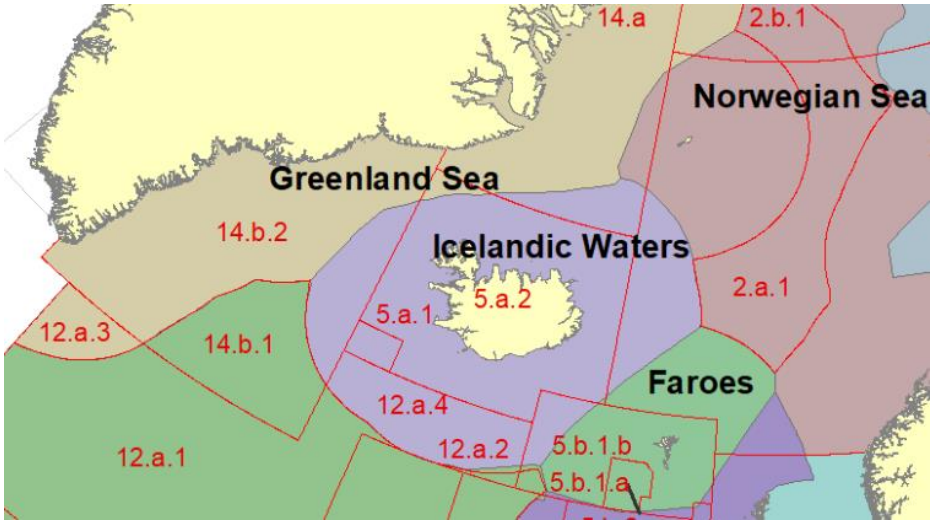


Figure 2. ICES Statistical areas 5.

Catch distribution by gear type

Landings of saithe in Icelandic waters in 2018 are estimated to have been 65 547 t. Of the landings, 60 242 t were caught by trawl, 1259 t by gillnets, and the rest caught by other fishing gear. The domestic as well as ICES advice for the fishing year 2017/2018 was based on the 20% harvest control rule and was 60 237 t. The TAC issued was also 60 237 t but the landings are now estimated to be 59 000 tonnes. Most of the catch is taken by bottom trawl (83% in 2010–2017, 92% in 2018), with gillnet and jiggers taking the majority of the rest.

The share of longlines has though gradually been increasing from 0.8% before 2000 to 2.2% in 2013–2016 reducing to 1.2% in 2018. ICES reports that Icelandic saithe catches from 2015/16 to 2017/18 have been caught in these proportions and with the following gears.

Table 2. Icelandic saithe catches by gear from 2015/16 to 2017/18.

Icelandic saithe total catches		Bottom Trawl	Gillnet	Handline/ Jiggers	Danish Seine	Longline	Nephrops trawl	Total
2017/18	65,360 t[10]	92%	3%	1.8%	1.8%	1.1%	0.7%	
2016/17	49,057 t[11]	90.2%	2.7%	2.3%	1.8%	1.5%	1%	
2015/16	49,223 t[12]	87%	5%	3.2%	2%	1.8%	0.7%	
Average		**89.73%**	**3.56%**	**2.43%**	**1.86%**	**1.46%**	**0.8%**	**99.9%**

Main Fishing Gear Description

Bottom Trawl

The bottom trawl or otter trawl is the most important gear used in the Icelandic fisheries and has been adapted to suit various conditions of different fisheries[13]. It is used at varying depths, ranging from 80 m to 1500 m. Trawls are used throughout the year, but the catch composition may vary depending on the season. The fish species most often caught by bottom trawl are cod, demersal redfish, haddock, saithe and Greenland halibut but trawls also catch large amounts of plaice, Atlantic catfish, spotted catfish, ling, blue ling, tusk, great silver smelt and lemon sole. In the ground fish fisheries, the minimum mesh size is 135 mm and selectivity devices are also required in

[10]
[11] http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pok.27.5a.pdf
[12] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/pok.27.5a.pdf
[13] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/

some fishing areas. In order to overcome by catch issues, a range of selectivity devices have been developed that exclude the by catch from the square part of the trawl. The devices are usually grids that will exclude the by catch which may be either larger than the target species in case of immature small fish in the shrimp fisheries or it may be smaller than the target species such as small fry and immature shrimp in the shrimp fisheries. Various sensors are also attached to the trawl to measure how much fish is entering the trawl and how much is in the cod end (the end of the trawl). Trawling is generally not allowed within 12 nm from the coast, except off the south coast during part of the year, outside the 12 nm limit certain areas are permanently closed to trawlers due to abundance of juvenile cod.

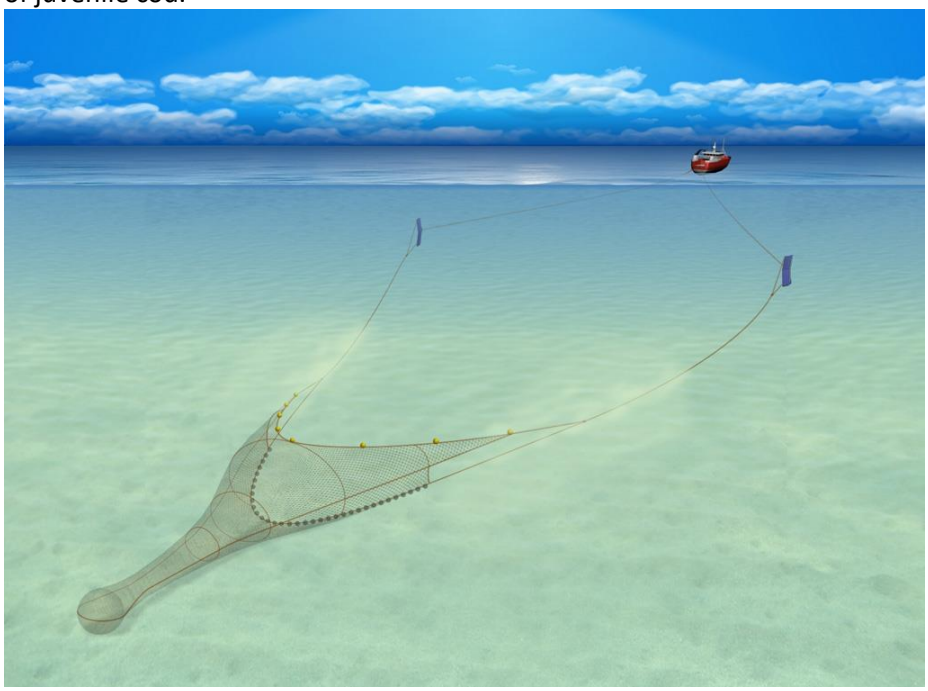


Figure 3. Demersal (bottom) trawl gear graphic with off-bottom semi-pelagic doors (source: Seafish[14]).

Bottom trawls in Iceland operate with pelagic or semi-pelagic "flying" doors that avoid drag on the seafloor. There are several designs and types used in Iceland but common ones are shown below. Common use of "T90 bottom trawls" (i.e. a regular net that has been turned 90° and along with lines on the codend ensuring that the mesh stays open during trawling resulting in 30% lesser net and drag) and pelagic doors[15] has resulted in considerable fuel savings, better selectivity of some species[16] and decreased habit impacts.

[14] https://www.seafish.org/gear/gear/profile/semi-pelagic-trawl
[15] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
[16] https://www.icefish.is/news101/better-redfish-selectivity-with-four-panel-codend

Figure 4. Different trawl doors used for demersal fishing in Iceland (source[17] [18] [19]).

Bottom trawlers in Iceland are also reported to use rock hoppers to decrease the impacts and drag between the gear and the seabed (pers. comm. HB Grandi, Nov. 2018 4th surveillance site visits) (Figure 5).

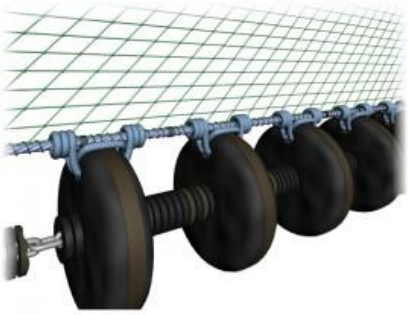


Figure 5. Rock hoppers used for bottom trawl fishing in Iceland.

Gillnets

Gillnets are mainly used by small to intermediate sized boats. Fish are unable to see the net and so get entangled by the gills. Nets are rectangular and kept vertical by floaters on top and lead-weights at the bottom. Each net is approximately 50 m long, but a few nets are tied together and a number of such units placed by each ship. The nets are soaked overnight or longer to maintain the quality of caught fish. Gillnets are fished all around Iceland but particularly in the South and Southwest where the main spawning grounds are. There are nets optimized for haddock (140-150 mm mesh size), but these are not in large scale use. Nylon has made the nets stronger in recent years, thinner and much lighter. New synthetic fibres have also been used recently. Lead weights sinkers were introduced in 1979 which replaced the use of stones.

[17] http://www.polardoors.com/project-type/bottom-trawl-doors/
[18] http://thyboron-trawldoor.dk/products/semipelagic-trawldoors/
[19] https://www.vonin.com/en/fishing/trawl-doors/semi-pelagic-trawl-doors/storm-semi-pelagic-trawl-door/

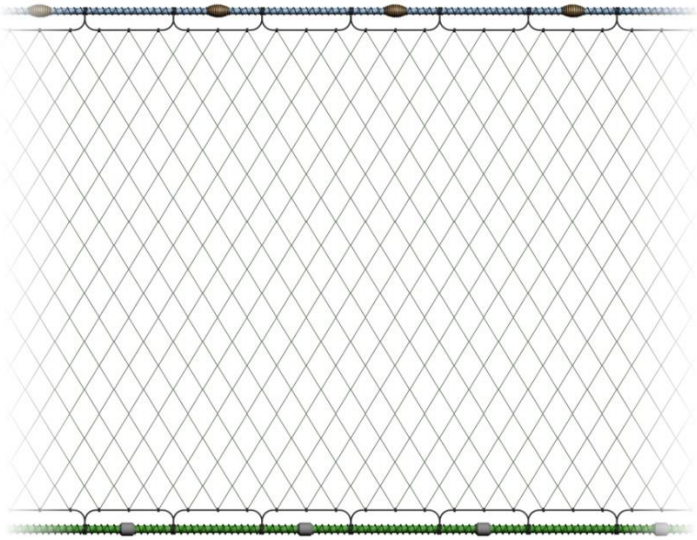


Figure 6. Gillnet (Source: Seafish gear database[20]).

Danish seine

Danish seine is used chiefly to target flatfishes but also to catch large quantities of cod and haddock. It is used in the fisheries all around Iceland, but the bulk of the effort is southwest and west of the country. It is mostly used in shallow waters at depths of 40-60 m. Minimum mesh size for Danish seine is 135-155 mm depending on fishing areas. The boats using Danish seines are similar in size to long-liners and gillnetters. In fact many boats switch between gear types seasonally. Danish seine are similar to bottom trawls and are made up of wings, belly, and a codend, but are operated differently, particularly as trawl doors (otter boards) are not used to keep the Danish seine open. If good navigational equipment is available and the grounds are well known, the seine can be used very efficiently, for example on very rough grounds interspersed with small patches of good grounds, where bottom trawlers cannot operate.

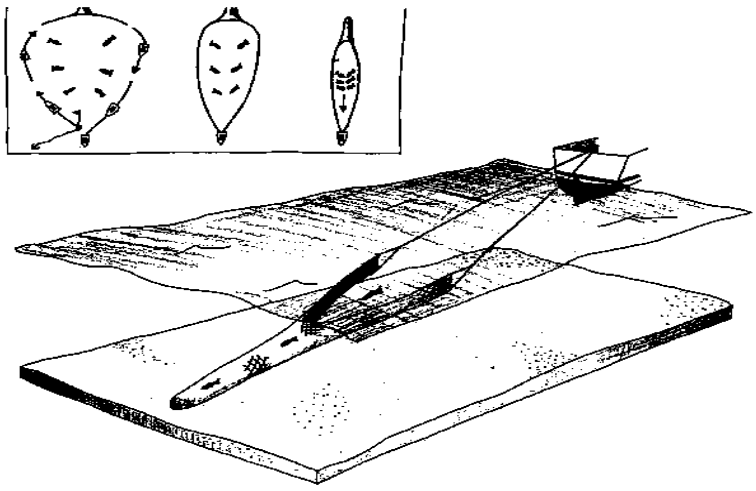


Figure 7. Danish seine with 3 stages of the catches process[21].

[20] https://www.seafish.org/gear/gear/profile/gill-nets
[21] http://www.fao.org/3/i0053e/i0053e.pdf

Longline gear

As for most other fishing gear, the long-line fishery has become increasingly mechanized in recent years. Baiting and other parts of the long-lining process are now commonly done automatically at sea by machines[22]. The long-line fishery can be split into traditional shallow and recent deep-water fisheries. Cod and haddock are the primary targets in shallow water fisheries. The deep-water boats are much fewer, larger and more mechanized than those involved in shallow-water fisheries. The longlines used in Iceland are reported to have an average 40,000 hooks per longline (Visir HF, site visits meetings in Nov. 2018). The long-line is usually left on the bottom for one to four hours. The bait is most often herring, mackerel, capelin, imported saury (*Cololabis saira*), sandeels or squid pieces and lately artificial bait. One of the major benefits of using the long-line is that it can be used on rough ground where other types of fishing gear such as bottom trawl cannot be operated. Another benefit from using long lines versus many other types of fishing gear is that the fish are usually alive when the line is hauled into the boat and delivers a better quality product.

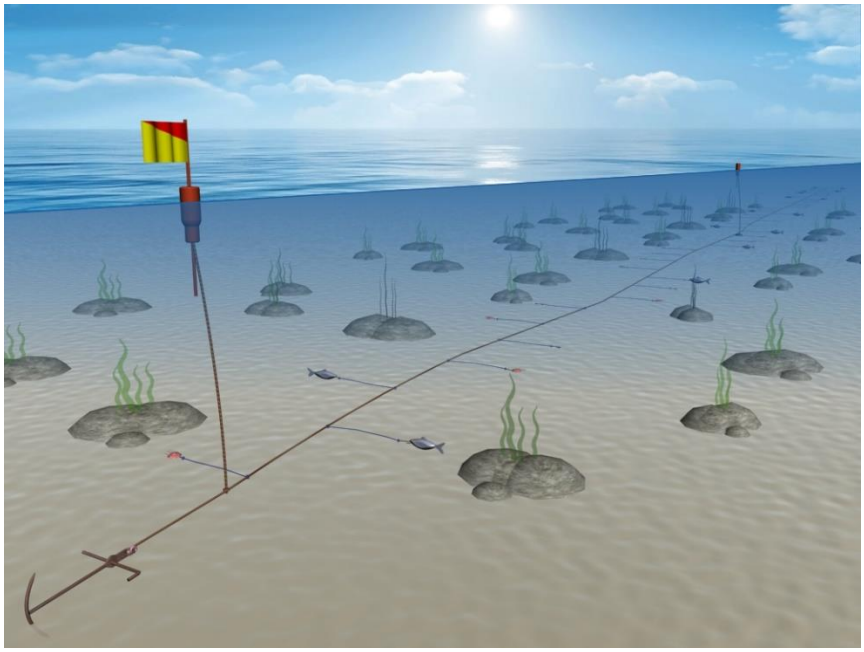


Figure 8. Bottom longline representation. Source: Seafish[23] .

There are technical measures/mechanisms in place in Icelandic longliners to mitigate adverse impacts on 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. This, however, being an advantage in winter, becomes a challenge In the summer when daylight hours exceed hours of darkness. The Directorate also highlighted that laser lights are being used widely as a deterrent.[24]

[22] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
[23] https://www.seafish.org/gear/gear/profile/long-line
[24] https://abcbirds.org/wp-content/uploads/2015/05/ABC_Analysis_of_MSC_Certification_on_Seabird_Bycatch_Pt_2_Fishery_Analyses.pdf

Based on the Agreement on the Conservation of Albatrosses and Petrels (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.

3.3. Fishery Management History and Organization

Fishery resources and their exploitation have shaped the economy and social history of Iceland for centuries. In recent history they have provided valuable export commodities, such as salted cod and shark liver oil in the 19th century and have become the foundation for an economic renaissance and development in Icelandic society. The introduction of motorized vessels, motor-boats and steam-trawlers during the first decade of the 20th century caused rapid expansion and changes in the Icelandic fisheries. The fishing effort was greatly enhanced as were catches. Within a period of two decades Iceland acquired a modern fishing fleet and could undertake harvesting all the year round. The fishing capacity of the new fleet of motor- and steam-vessels was much greater than that of the earlier fleet of rowing boats and decked sailing vessels. For the first time, Icelanders were able to utilize practically *all* fish stocks of the fishing grounds off their coasts (Ministry of Industries and Innovation, Iceland).[25]

In 1901 Iceland declared a fishing limit of three nautical miles which remained in effect until this was extended to four miles in 1952. As scientific knowledge of the fisheries resources increased it became clear that some of the most important fish stocks, most notably the cod stock, were under severe pressure by a multinational fleet and that strict fisheries management was needed and hence Iceland pursued the objective of achieving a 200-mile Exclusive Economic Zone (EEZ).

Important milestones on that path were the extension of Iceland's economic zone to 12 miles in 1958, to 50 miles in 1972 and finally to 200 miles in 1975. The extension of the economic zones was fiercely contested by foreign nations that had fished in Icelandic waters and led to a several "cod-wars", primarily with the UK. The 200 miles EEZ was fully effective from May 1976. A very important landmark in the campaign for jurisdiction was the national law set in 1948 (No.44/1948) for the scientific conservation of the continental shelf fisheries. The law is very brief, stating that the Icelandic Ministry of Fisheries will issue regulations concerning areas protected against fishing within the Icelandic continental shelf. Also, that these areas will be subject to Icelandic control with the main aim of scientifically based protection of fish stocks. All the extensions of the fishing limits after 1948 were based on this law. The United Nations Convention on the Law of the Sea *inter alia* codified the extension of coastal State national jurisdiction. It entered into force in 1994, one year after being ratified by 60 nations. Much earlier, in 1985, Iceland was the first state to ratify this treaty.

In 1975 foreign fleets were catching about half of the total catches of redfish and saithe, a third of the total cod catch, and a quarter of the total haddock catch. It was considered that no effective fisheries management for groundfish would be possible under those circumstances. When the 200 mile EEZ became effective the foreign share of the catches declined rapidly and fishing was strictly controlled by agreements with other nations.

1976-1983 Restrictions in TAC and effort. Soon after gaining control over Iceland's EEZ in 1976, serious concerns were raised that the most valuable fish stocks were being overfished, cod being the most important. The Marine Research Institute (MRI) advised a cod total allowable catch (TAC) of 230,000 tonnes for that year but the catch exceeded that advice and was 350,000 tonnes. From that point, effort restrictions were introduced. Trawlers were at first allowed to fish for 323 days a year, later only 215 days. The system was clearly very uneconomic. By 1983, the spawning stock of cod was estimated at an all-time low, just over 200,000 tonnes and fishing mortality was

[25] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/history-of-fisheries/

very high. Catches were circa 100,000 tonnes in excess of recommendations. The harvesting industry was also experiencing considerable losses. There were thus clear biological and economic reasons for setting a new course for management policy.

1984 Individual vessel quotas. A system of individual vessel quotas with some transfer rights was introduced in 1984. By this law, each fishing vessel 10 gross registered tonnage (GRT) or larger was allocated shares in the TAC was based on the vessel's catches in the three previous years. TACs and individual vessel quotas were imposed for cod, haddock, saithe, redfish, Greenland halibut, plaice and ocean catfish.

1985-1990 Effort option. In 1985 an effort-based option in the demersal fisheries was introduced. More than half of the cod catch, even up to two thirds was effort based at the time and the vessels fishing under that option could periodically re-enter the catch quota system with a new track record. Furthermore, vessels smaller than 10 GRT had free access to the fisheries until 1988 and boats under 6 GRT until 1990. TAC's were still above scientific recommendations in this period and catches were in excess of the TACs.

1990 The Fisheries Management Act. In 1990 a comprehensive and uniform Fisheries Management Act was established. By this Act, the Individual Transfer Quota (ITQ) system was established for most of the commercial fisheries. They were all subject to vessel catch quotas and there was no effort option for trawlers and the larger boats. The fishing year for groundfish stocks was set from Sept 1 to Aug 31 in the following year rather than the calendar year. This was an effort to channel fishing away from the summer months, when quality suffers more quickly and regular factory workers are on vacation.

The management system distinguishes between two kinds of quota in each fishery: quota shares and harvest rights. The former are sometimes called "permanent quotas" and the latter "annual catch entitlements" or "catch shares". Quota shares quantify the holder's entitlement to a percentage of each year's total allowable catch (TAC) in each fishery. They are permanent, perfectly divisible and transferable. Currently, there are two different types of general fishing permits, general fishing permit with a catch quota and a general fishing permit with a hook-and-line quota.

Boats smaller than 6 GRT were banned from using nets and could choose between entering the quota system that applied to all larger vessels, or obtaining a hook and line license. Almost all boat owners opted for the latter. An amendment to the Fisheries Management Act in 1999, provided the operators of the small boats with a choice between effort restrictions with transferable fishing days and a quota system. The effort restriction system was slowly phased out in the ensuing years. By the beginning of the fishing year 2004–2005, 715 out of the 729 vessels smaller than 6 GRT had obtained permanent quotas. Only 14 boats then still remained in the effort restriction system. Two years later, the small open loophole was finally closed. The small vessels were allocated quotas in cod, as well as in haddock, saithe, and catfish based on past fishing history.[26]

Since 1991, a number of amendments have been made to the fisheries management system. In August 2006 the legislation was re-issued as Law no. 116/2006, thus including all the changes made to the original 1990 legislation.

The present comprehensive fisheries management system is still based on Individual Transferable Quotas (ITQs). The objectives are described in the Fisheries Management Act including; to promote the conservation and efficient utilisation of the marine resources and thus to ensure stable employment and economic viability of fishing

[26] Matthiasson, Th. and Agnarsson, S. (2010). Property rights in Icelandic fisheries. In R. Q. Grafton, R. Hilborn, D. Squires, M. Tait and M. Williams (eds.), *Handbook of marine fisheries conservation and management* (pp. 209-309). Oxford/New York: Oxford University Press.

communities. Stated aims are to ensure the sustainability of the fisheries while emphasising the economic benefits of the fisheries sector.

In 2009, a new coastal fishery was set up in order to open up possibilities for new entrants and increase flexibility.[27] All registered boats, including those holding quotas, may join the fishery which runs during May, June, July and August. The fishing grounds off Iceland are divided into four areas and each boat taking part in the fishery allocated 12 fishing days per month.[28] Fishing is only allowed during Mondays-Thursdays, each trip may not exceed 14 hours and catches per trip are limited to 650 kg. Boats may only employ hand-line. The fishery is an open-access fishery and is stopped once the overall catch cap (11 thousand tonnes in 2019) is reached.[29] In 2019, 621 vessels took part in the coastal fishery, registering demersal catches of 10 thousand tonnes.[30]

In addition to the ITQ system, Icelandic fisheries management includes many other management measures such as area restrictions, fishing gear restrictions, and the use of permanent and temporary closed areas to conserve important vulnerable habitats and juvenile fish stocks. Extensive provisions are made for temporary closures of fishing areas to protect spawning fish from all fishing. These measures are all meant to support and secure the sustainability of the fisheries.

Effective control and enforcement is an inseparable part of responsible fisheries management. The Directorate of Fisheries undertakes monitoring of the Icelandic fisheries to ensure that all rules are being followed. Iceland operates a comprehensive enforcement regime, in particular regarding port control and weighing of all catches. According to Icelandic law, discards are prohibited. All catches must be landed.

Organisation of Fishery Management in Iceland

The Icelandic fisheries management system is well organised, with the Ministry of Industries and Innovation, the Directorate of Fisheries, the Marine and Freshwater Research Institute (MFRI) and Icelandic Coast Guard having central functions (Fig. 9). There are other government departments linked to the management system for a range of purposes including the Ministry of Justice responsible for judicial proceedings and Statistics Iceland for collation of fishery statistics supplied by the Directorate. Port Authorities play an important role in monitoring and recording fish landings, overland transported fish and exports. They inspect, record and enter data on landing directly into the Directorate's central database through official Port Controllers. The food safety control of fishery products is under the jurisdiction of the Icelandic Food and Veterinary Authority (MAST), and all fish processing vessels and plants must be approved under the Icelandic Hygiene Regulations.

[27] https://www.althingi.is/altext/stjt/2009.066.html.
[28] https://www.althingi.is/altext/stjt/2019.022.html.
[29] https://www.stjornartidindi.is/Advert.aspx?RecordID=4b8dd7a3-3b51-4950-bbda-9fc767623b1b
[30] http://www.fiskistofa.is/veidar/aflastada/strandveidi/

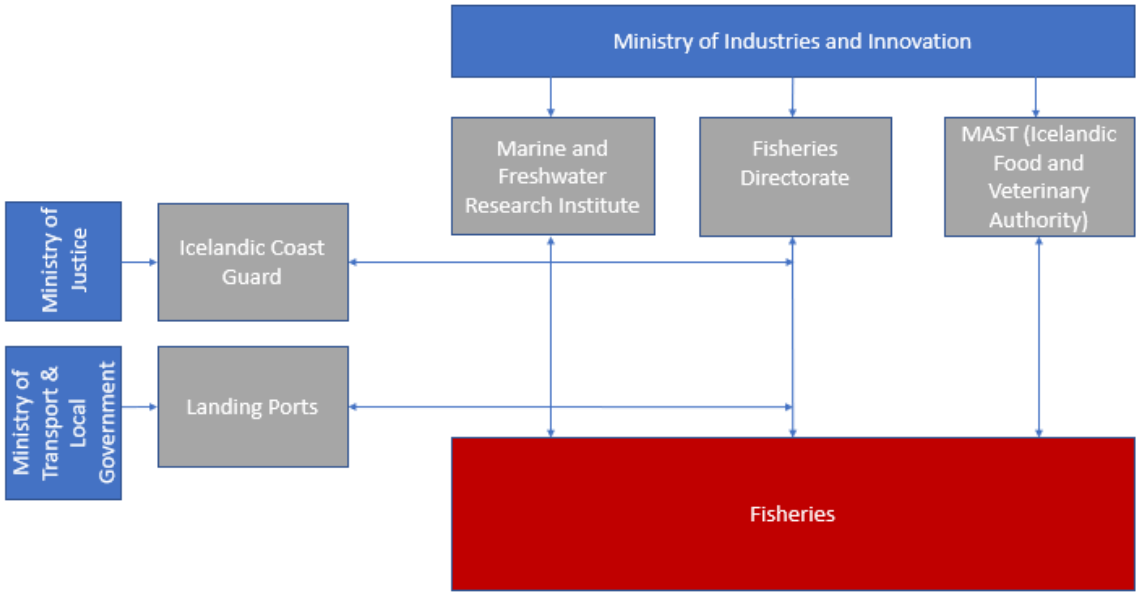


Figure 9. Basic Organizational Structure of Icelandic Fishery Management (Source: SAIG, modified from http://www.fiskistofa.is/fiskveidistjorn/).

Ministry of Industries and Innovation

The Ministry of Industries and Innovation (MII) covers all sectors of ordinary business and economic activity. It was formed on 1 September 2012 following the amalgamation of the Ministry of Industries and Innovation, the Ministry of Industry, Energy and Tourism and part of the Ministry of Economic Affairs. Within the Ministry, the Fisheries and Aquaculture Office is responsible for fisheries and aquaculture, creating an efficient management framework and development of policy. A large part of its work is in international affairs including the conclusion of international fisheries management agreements and participation in the work of international organizations.[31]

The Directorate of Fisheries (Fiskistofa)

The Directorate of Fisheries (DoF), called Fiskistofa in Icelandic, is an independent agency that belongs to the Ministry of Industries and Innovation. It has a staff of 61 (2018) located at 6 offices throughout the country with its headquarters in Akureyri. The Directorate of Fisheries is responsible for the implementation of laws and regulations on the management of fisheries in sea and fresh water on behalf of the Ministry. It also manages and controls fish farming, and collects and disseminates information on fisheries, aquaculture, salmon and trout fishing and whaling. The Directorate has three core divisions: Salmon and Trout Fishing, the Fisheries Inspectorate and the Service and Information division, and two support divisions: Information Technology and Human Resources and Finance[32]. The main functions of the Fisheries Inspectorate are as follows[33]:

- Supervise the fishing of Icelandic and foreign vessels in Iceland's jurisdiction and the fishing of Icelandic vessels outside Icelandic waters.
- All catches of Icelandic fishing vessels must be weighed and recorded at the port of landing by a certified official weigher. The Fisheries Inspectorate is responsible for issuing weighing licenses for the weighing or re-weighing of marine catches and issuing production licenses to vessels that process on board.

[31] https://www.stjornarradid.is/default.aspx?PageID=c2a9c95f-ec71-11e6-9417-005056bc530c
[32] http://www.fiskistofa.is/umfiskistofu/
[33] http://www.fiskistofa.is/umfiskistofu/starfsemi/veidieftirlitssvid/

- Monitor fishing gear and equipment, fishing permits and logbook entries.
- Fisheries inspectors monitor the species and size composition of catches and propose the closure of fishing grounds to protect small fish and prevent harmful fishing.
- Supervise fishing, processing and utilization activities on board processing vessels, and that the products of processing vessels are correctly recorded against catch quotas.
- Monitor export of unprocessed catches in containers and on fishing vessels and surveillance of domestic fish transport.
- Investigate violations and includes a legal department that makes decisions on the application of administrative penalties and / or sending criminal cases to the police.
- Collaborate with the Icelandic Coast Guard, the Marine and Freshwater Research Institute and the Director of Customs, as well as with foreign fisheries authorities and multinational organizations in this field.

All catches of Icelandic fishing vessels must be weighted and recorded at the port of landing by a certified official weigher. This can be done by either Directorate staff at ports or by certified individuals where fish is landed directly to the processing sector. The official record of the catch is recorded on a computer system that is directly linked to a centrally located database at the Directorate of Fisheries. Thus, 60 ports in Iceland send electronic data daily to the Directorate. A total of approximately 50,000 landings are registered in the system every year[34]. The data is processed in the Directorate´s database and catches are subtracted from the vessel´s quotas. The system is designed so that the Directorate can act quickly before vessels overfish their quotas. Excess catches can result in a revocation of fishing licenses and fines. Statistics Iceland then receives copies of the data for the production of statistics regarding the economy.

The Marine and Freshwater Research Institute

The Marine and Freshwater Research Institute (MFRI) is a government institute under the auspices of the Ministry of Industries and Innovation. The institute employs around 190 staff, operates 2 research vessels and 10 branches around the country, including an aquaculture experimental station. MFRI conducts various marine and freshwater research and provides the Ministry with scientific advice based on its research on marine and freshwater resources and the environment. 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/habitat mapping.[35] The MFRI's organisational chart is set out in Fig. 10.

[34] http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/afli-og-aflaverdmaeti/
[35] https://www.hafogvatn.is/en/about/mfri

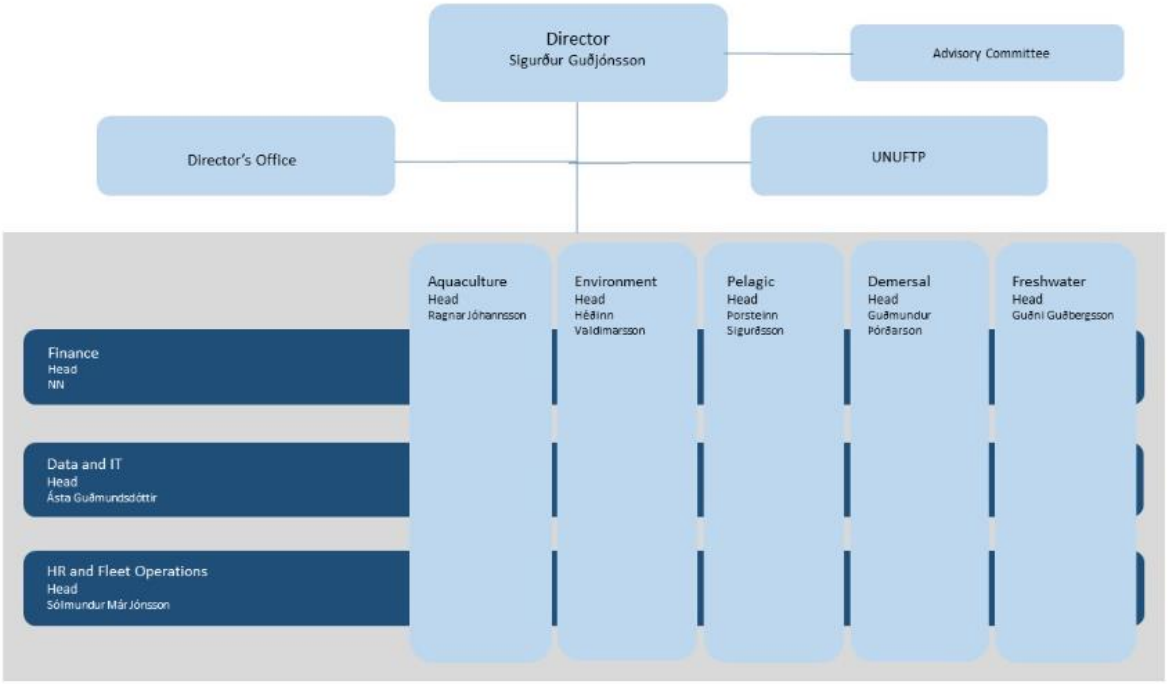


Figure 10. MFRI organizational chart (Source: https://www.hafogvatn.is/en/about/mfri).

The MFRI undertakes research on the exploited stocks of fish, crustaceans, molluscs and marine mammals, prepares stock assessments and formal advice on the total allowable catch (TAC) and sustainable fishing strategies for the government. Two ocean-going research vessels are currently operated by the MRI. The MRI is an active participant in the work of the International Council for the Exploration of the Sea (ICES) and its advisory Committee on Fisheries Management. The stock assessment findings of the MFRI are subject to review by ICES before the TAC recommendations are made. The MFRI is also represented in several other organizations, such as the Northeast Atlantic Fisheries Commission (NEAFC), the Northwest Atlantic Fisheries Organization (NAFO), the North Atlantic Marine Mammal Commission (NAMMCO) and the International Whaling Commission (IWC).

The Icelandic Coast Guard

A large part of the at sea surveillance falls directly under the responsibility of the Icelandic Coast Guard. The Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone (EEZ) and 12-mile territorial waters and monitoring of fishing within the zone in consultation with the MFRI and Ministry of Industries and Innovation. In addition to patrolling the Icelandic EEZ, the Coast Guard performs surveillance and inspection duties in international areas, e.g. the NEAFC Regulatory Area which is the area outside the EEZ towards the South-West, South and East of Iceland. The Coast Guard is also responsible for rescue operations in the Icelandic Search and Rescue Region, more than twice the area of the EEZ. The Coast Guard operates the Icelandic Maritime Traffic Service within its operations centre. This centre is a single point of contact for all maritime related notifications, involving, for example, the Maritime Rescue Co-ordination Centre, the Vessel Monitoring Centre and the Fisheries Monitoring Centre. All hydrographic surveys in Icelandic waters are undertaken by them, including the preparation of nautical charts. The Coast Guard operates rescue helicopters, offshore patrol vessels, coastal vessels, and a maritime surveillance aircraft. [36]

[36] http://www.lhg.is/english

Fishing permits

The primary legislative instrument relating to fisheries management in Iceland is the Fisheries Management Act No.116/2006 which forms the basis for the individual transferrable quota (ITQ) system in Iceland. It supersedes 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.

Allocation of fishing rights

The Directorate of Fisheries issues annual catch quotas (kg) to individual vessels as a share in the total allowable catch (TAC) which the Minister of Fisheries sets every year for each species. The annual catch quota is based on the individual vessels quota share (%). All major commercial stocks are now subject to quotas. The TAC of most of the species is issued for each fishing year, the period being from the 1st of September to the 31st of August the following year. Fishing rights can be either general catch quotas, catch quotas for hook and line boats (max 30 GT) or fishing days. The system has been amended to adapt to new changing circumstances and support the allocation of fishing opportunities on an equitable basis. Of course, there are some disputes and concerns of quota consolidation in the harvesting industry. However, there are fundamental rules such as no one vessel can have more than 12% share of the cod quota. A logbook and landings weight monitoring system is in place to ensure vessels remain within catch allowance.

Note on Transfer of Quota

It is permitted, under given circumstances, to transfer both quota shares and annual catch quotas between vessels. The quota shares can also be fully or partially transferred between vessels. Applications for transfer are submitted to The Directorate which verifies and registers the transfer. There are specific limitations on the size of quota share that can be controlled by one individual, company or legal entity (12%) and related partners. These limitations apply to both quota shares in individual species as well as total quota share. Sharing quota is based on 'cod equivalents'. These are based on weight and use cod, as the most important commercial species, as the common denominator to determine relative value of different fish species on the market. The value of different species in cod equivalents changes and is set by a regulation every year. For vessels with a quota of several species the total quota may be calculated in kg as cod equivalents.

Flexibility in the ITQ system

Flexibility is built into the ITQ system, enabling vessel owners and fishermen to make more efficient use of their quota allocation and fishing opportunities available to them:

- Vessels may fish in excess of their quota for individual species and reduce their quota allocation in other species (except cod) subject to certain restrictions (5% of the total value of demersal quota, 1.5% of individual species). Each vessel may though not exceed its overfishing of each species by more than 30% of its annual quota allocation.
- Vessels may fish in excess of their catch quota to a certain limit (5% for demersal species) and deduct that % from their quota allocation in the following year.
- Vessels may transfer up to 15% of the catch quota allocation from one year to the next.

Vessels may also decide not to include part of the vessels catch in its annual catch quota. This is limited to no more than 0.5% of the vessel's pelagic catch and 5% of other marine catches per fishing year. The bulk (80%) of profit from the sales of this catch (known as 'VS catch') go to a fund for fisheries research and monitoring, with 20% going to cover the operational costs of the vessel. As discarding of commercial species (and also non-viable specimens of protected species) is prohibited, this provision encourages fishers to land all commercial species but actively avoid catching vulnerable fish e.g. undersized fish or protected species.

3.4. Stock Assessment Activities

Saithe in Icelandic waters (ICES Division 5.a) is largely confined to the Icelandic EEZ and is managed as a single unit and a domestic stock. Tagging has shown that both emigration and in particular immigration can occur.[37] In some years, discontinuities in the occurrence of a year classes are marked enough to suggest immigration events. The most prominent example is at age 7 in 1991, where some 35 000 tonnes may have immigrated. This event is taken into account in the assessment. The other potential migrations are smaller and not significant if estimated on "normal scale".

According to available data, approximately 115 thousand saithe were tagged in the NE-Atlantic in the 20th century, most of them in the Barents Sea with total returns just under 20 thousand (Jonsson, 1996). Around 6 000 saithe were tagged in Icelandic waters in 1964–65, the recapture rate being 50% (Jones and Jonsson, 1971). Based on recaptures by area, approximately 1 in 500 of tagged saithe released outside Icelandic waters were recaptured in Icelandic waters, and 1 in 300 released in Icelandic waters were recaptured in distant waters (Jonsson, 1996). For comparison, cod long-term emigration rate from Icelandic waters is 1 in 2000 tagged fish (Jonsson, 1996), a rate almost an order of magnitude lower. A recent tagging program was conducted in Icelandic waters in 2000–2004 from which ~1750 of ~16000 tags released have been returned. The number of returns from areas other than the Icelandic EEZ has now reached 10 or around 2.5% of the recaptures outside the management area of the stock. Most were tagged at eastern localities and recaptured in Faroes waters, with a pulse of tags recovered in early 2006. Other foreign returns have come from areas west of Scotland and east of Greenland[38].

Saithe is both demersal and pelagic. They can be found all around Iceland but has been most common in the warm waters to the South and Southwest of Iceland. In the last decade the distribution has gradually become more northerly and in 2017 and 2018 more than 50% of the catches were taken North-west of Iceland (Figures 11 and 12). Similar shift in distribution has been seen in several stocks (haddock, ling, tusk). The reason is not obvious, but changes in distribution of prey has been suggested. Saithe tends to follow pelagic prey, like herring and blue whiting.

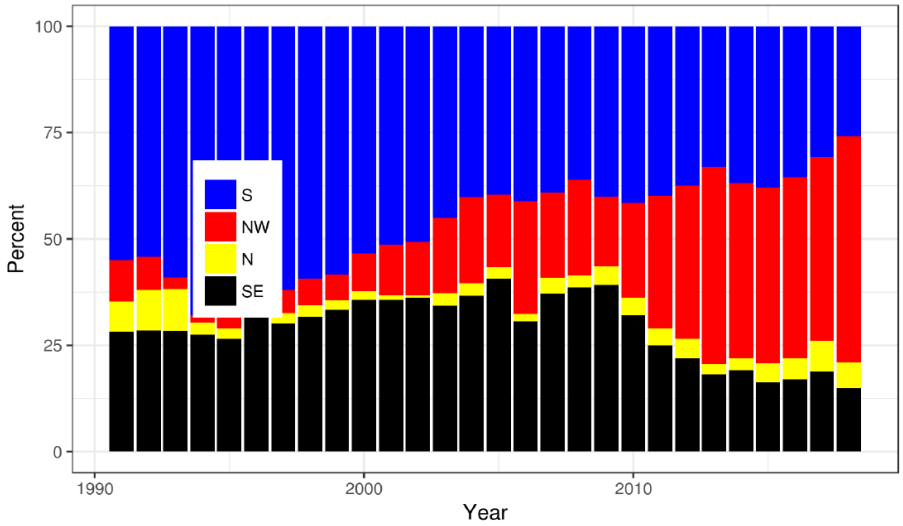


Figure 11. Proportion of catches of saithe by region.

37 Homrum, E. í, Hansen, B., Jónsson, S. Þ., Michalsen, K., Burgos, J., Righton, D., Steingrund, P., Jakobsen, T., Mouritsen, R., Hátún, H., Armannsson, H., and Joensen, J. S. 2013. Migration of saithe (Pollachius virens) in the Northeast Atlantic. – ICES Journal of Marine Science, 70: 782 – 792.

38 http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf

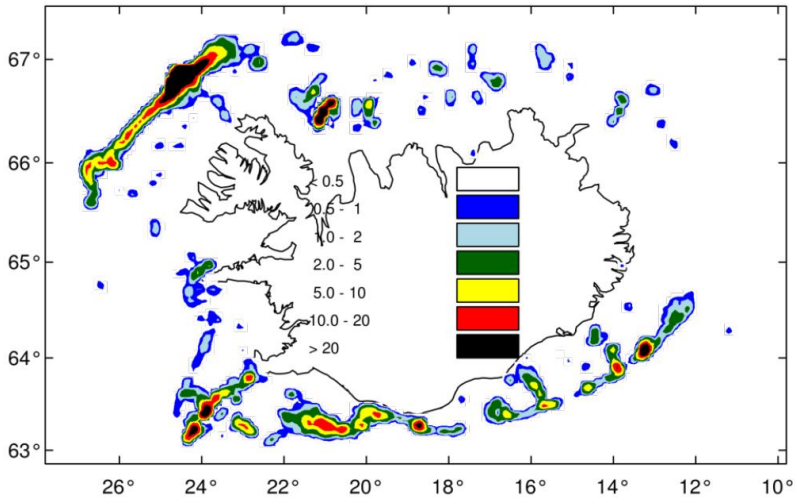


Figure 12. Location of catches of saithe in 2017/18.

Spawning takes place in shallow water (100–200 m) off the Southeast, South and West coast of Iceland. The main spawning area is considered to be South/Southwest of Iceland (Selvogsbanki, Eldeyjarbanki). The spawning seems to take place from February–April and the timing of spawning to be variable. The offspring drifts clockwise around the island, and nursery areas are in bays and coves along the whole coast. Maturation takes place mostly at age 4 – 7; and by age 10 they all are mature.

An analytic assessment of stock abundance and exploitation is done by the ICES North-Western Working Group (NWWG). The assessment method has been used with small adjustments since 2010 and was revisited and approved again in a bench-mark process in ICES in 2019. The assessment uses catch data (yearly total landings and catches in numbers at age) and age structured survey indices from the Spring bottom trawl survey (Figure 14), as well as weights and maturities at age, and covers the period 1980 to present and ages 1-14. No plus group is included. Natural mortality is assumed constant at 0.2.

Landings data (Figure 13) of variable quality are available for saithe since 1905, although data prior to 1955 most likely are misleading. The landings are converted to catch numbers at age by applying length distributions, age length keys and individual weights from samples. These samples are mostly taken by MFRI staff, but some by staff from the Fisheries Directorate (mostly length samples). Most saithe is landed gutted whereas the quota allotted to the vessels is in terms of ungutted weight, as is the assessed biomass. A fixed factor (0.84 for saithe) is used to convert ungutted to gutted[39]. Although the actual ratio may be somewhat different, this factor just acts as a scaling factor, and has no other impact on the assessment.

According to law, all catch has to be landed, and weighed by authorized weighers. Discards is prohibited. Discards are to some extent monitored, and appear to be negligible[40]. This is not unexpected, as the incentive for discarding is small. Saithe quota is cheap to rent as often some quota is not used.

39 http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/slaegingarstudlar/ - saithe is Ufsi.
40 https://www.hafogvatn.is/static/research/files/fjolrit-142.pdf

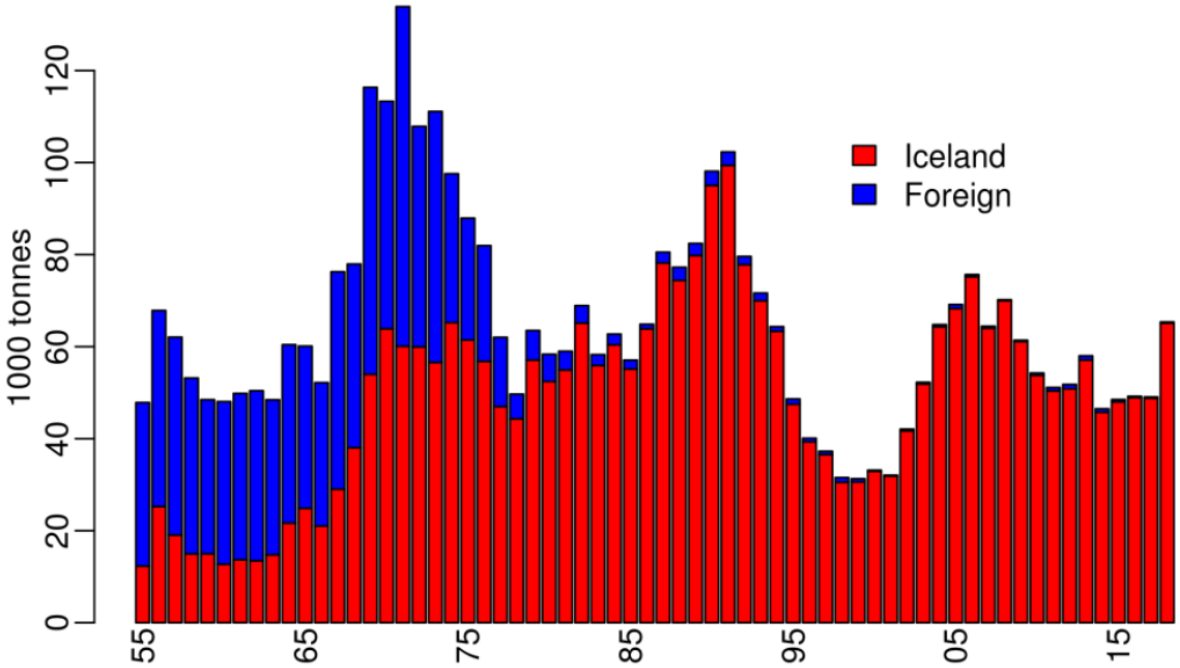


Figure 13. Landings of saithe in Iceland waters since 1955.

The surveys are very extensive, covering the whole shelf (Figure 14). The survey design and participating vessels has remained the same for many years. The spring survey also provides data on weight and maturity for saithe, as it is performed close to the spawning season. One or both of the surveys is used in the assessment of most demersal stocks in Iceland.

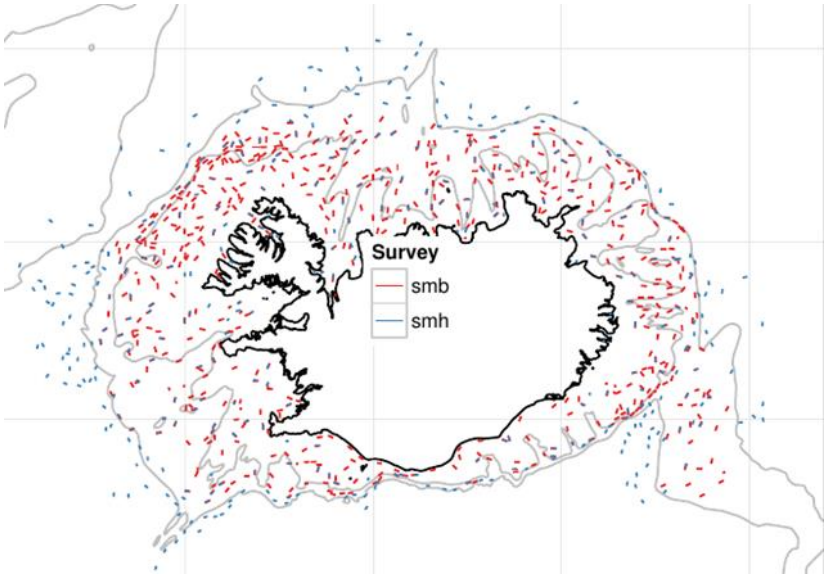


Figure 14. Trawl stations in the bottom trawl survey in the spring (smb) and autumn (smh).

The data that are used in the assessment are regarded as sufficient for the method. Obtaining reliable survey indices for saithe is generally problematic, and this saithe stock is no exception. Only the spring survey is used as it appears more consistent than other surveys. The assessment of saithe has developed gradually over decades, and as late as in 2007 it was too unstable to be accepted. The present method (used since 2010) is quite similar to methods used for other demersal stocks in Iceland, in particular haddock and cod, and is performed with a combined assessment and harvest rule evaluation tool. It is called 'Muppet' and is publicly available.[41] The quality of the assessment is regarded as satisfactory for advice, but it is not as good as for cod, haddock and the like. As shown in Figure 15, there is considerable inconsistencies from year to year. The main reason for this appears to be inconsistencies in the data, in particular in surveys data.

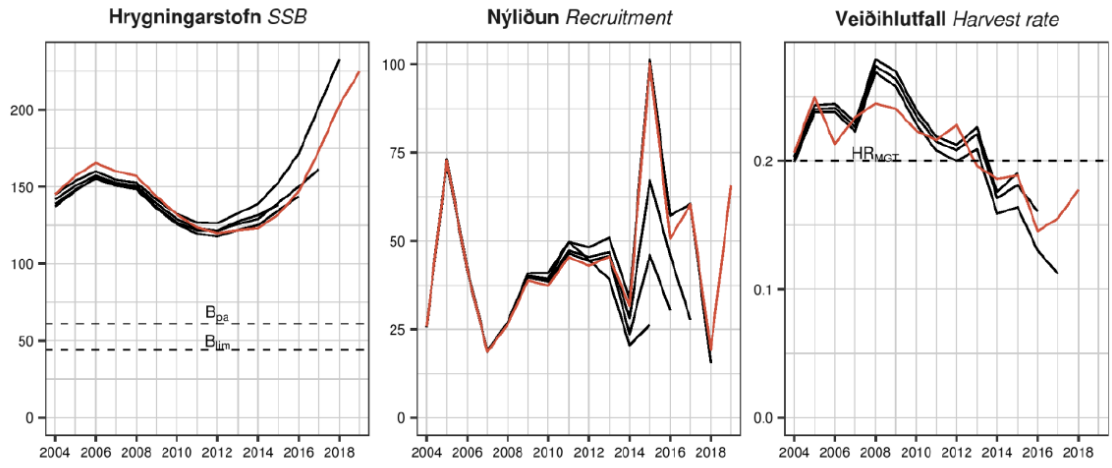


Figure 15. Recent history of SSB, recruitment (age 3) and harvest rate as seen in the 2019 assessment (red lines) and recent previous assessments.

The present management plan was introduced in 2013, and TACs have been set according to that since then. According to the plan, the TAC is primarily set as a fraction (20%) of the fishable stock (4 years and older). If SSB is below a trigger value, the fraction is reduced to 20%*SSB/Btrigger. In all cases, the formula for the final TAC sets it between the value primarily obtained for the coming year and the TAC for the last year, to reduce year-to-year variations. The plan was revisited in 2019, but accepted with a minor change, as it still is considered precautionary and providing long term catches near MSY. The current harvest rule is the following one:

The Icelandic Ministry of Industries and Innovation's fisheries has a management plan for Icelandic saithe (Icelandic MII, 2019). The plan aims at providing long-term maximum sustainable yield and has been evaluated by ICES (ICES, 2019a). The plan is considered to be precautionary. According to the management plan[42], the TAC for the fishing year Y/Y+1 (1 September of year Y to 31 August of year Y+1) is calculated as follows:

41 https://github.co/Hafro/MuppetHCR

42 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

If $SSB_Y \geq MGT\ B_{trigger}$:

$$TAC_{Y/Y+1} = 0.5 \times 0.2\ B_{4+,Y} + 0.5 \times TAC_{Y-1/Y}$$

If $SSB_Y < MGT\ B_{trigger}$:

$$TAC_{Y/Y+1} = \frac{SSB_Y}{MGT\ B_{trigger}} \left\{ \left(1 - 0.5\ \frac{SSB_Y}{MGT\ B_{trigger}}\right) 0.2\ B_{4+,Y} + 0.5\ TAC_{Y-1/Y} \right\}$$

where $B_{4+,Y}$ is the biomass of saithe aged 4 and older in year Y, and MGT $B_{trigger}$ = 61 000 tonnes.

Since the plan was introduced, the stock has increased. Saithe is less attractive than some other species, so in most years after the plan was implemented, the saithe TAC was not fully taken, and some of it is spent to cover catches of other species (legislation allows for transfer of quotas between years and to some extent between species, the latter facilitating the discard ban). Accordingly, the harvest rate is mostly well below the target.

3.5. Historic Biomass and Removals in the Fishery

The development of the fishery since the mid 20th century is shown in Figure 13 in Section 3.4. Large parts of the catches were taken by foreign vessels until the mid 1970ies, when the Icelandic EEZ was established. Catches have been fluctuating throughout this period, and in some periods reached levels well above the present. These fluctuations can probably be attributed to fluctuations in recruitment. Estimates of stock abundance back in time were made by the ICES Coalfish WG in the 1970ies, but the origin of the data is obscure and they have not been possible to reproduce. Based on a VPA model using existing data the dynamic range of SSB since 1980 (which is covered by the present assessment), is within the range observed in the long time series. A peak in the catches around 1970 (Figure 13), appears to be associated with a larger stock at the time.

Saithe is now caught mostly with bottom trawl. Gillnet catches have declined over time. Long line catches of saithe are minor (Figure 16).

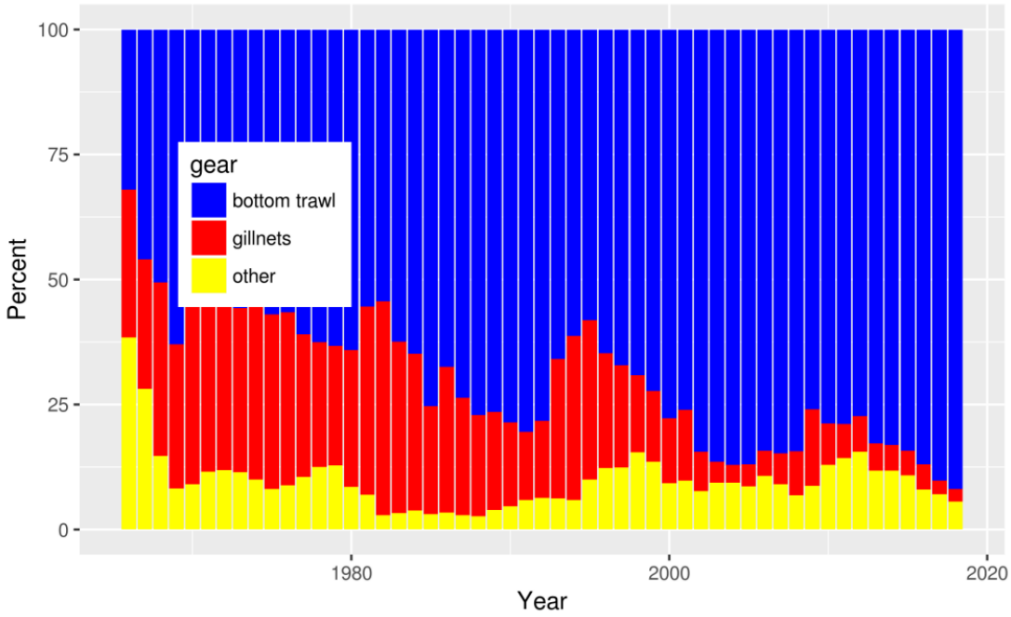


Figure 16. Fractions of landings by gear.

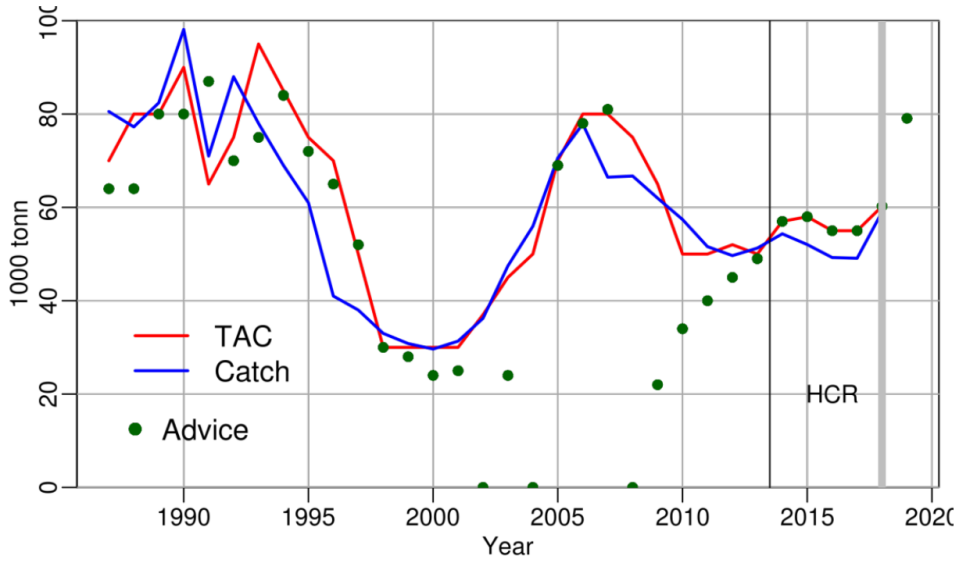


Figure 17. TAC, Advice and actual catch for saithe.

In recent years the fleet has not caught the saithe quota (Figure 17). Before the management plan was introduced in 2013, TACs were sometimes set well above the advice. In some earlier years, no advice was given due to uncertain assessments (marked as zero in the graph). After 2013, the TAC has followed the advice. However, in several periods, including the most recent years, the catch has been well below the TAC. Legislation allows for transfer of quotas between years and to some extent between species. Also, as saithe is less attractive than many other species, the whole quota is not always used. Figure 18 shows the most important deviations.

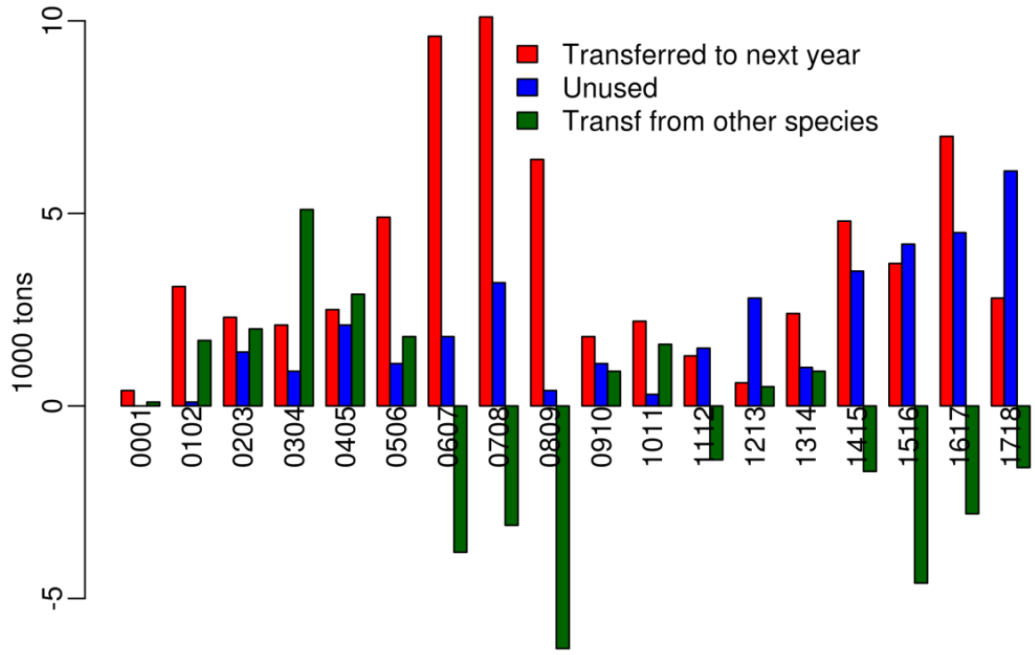


Figure 18. Transfers and utilisation of quotas. Negative transfers means that the saithe quota is spent on other species.

The concepts of specific target and bycatch species are not quite relevant in the fisheries catching saithe. In particular in vessels that land the fish fresh, the captains have a request for certain composition of the catch in each fishing trip and preferably, cod should be caught late to be very fresh when landed. However, saithe is always a target species in the sense that a school of reasonably large saithe without too much bycatch are always accepted.

To protect juveniles, a system of instant area closure is in place for many species, including saithe. For saithe, an area is closed temporarily (for 3 weeks) for fishing if more than 30% of the catch is composed of fish less than 55 cm in length. No minimum landing size of any fish species exist in Icelandic waters, all catch has to be landed. The minimum allowable mesh size is 135 mm in the trawl fisheries, with the exception of targeted shrimp fisheries in waters north of the island.

3.6. Ecosystem and environmental signals

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 (source 2018 ICES Ecosystem Overview[43])

- 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.

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

- 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, 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 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).

3.7. Economic Value of the Fishery

Expansion and development of the fisheries was the driving force behind Iceland's economic transformation during the 20th century[44]. Although the importance of the fisheries has waned in recent years, the fisheries and fish processing sectors still accounted for 5.5% of GDP in 2018[45] and seafood products represented 40% of exported goods in that same year[46].

The fishing industries have enjoyed good profits in recent years, although those dwindled a little in 2017. According to Statistics Iceland, the net profit (corrected for the effect of changes in the exchange rate according to the annuity approach and 6% rate of return) of the fishing and fish processing sectors combined amounted to 6.5% in 2017, down from 14.4% in the previous year. Net profit of fishing for demersal species decreased from 14% to 2.5% and net profit of processing of demersal species decreased from 10.1% to 9.1%. In 2017, total assets (total liabilities and equity) of the fishing and fish processing industries combined amounted to ISK 660 billion (€ 5.2 billion), whereof liabilities ISK 384 billion (€ 3 billion) and equity ISK 276 billion (€2.2 billion).

Saithe is one of the most valuable species caught off the coast of Iceland. In 2018, the value of the saithe catches amounted to ISK 7.9 billion (€ 62 million), or 6.2% of the value of all catches in that year (Fig. 19). Catches of saithe have in recent years been 50-60 thousand tonnes per year, but were slightly higher, or 66 thousand tonnes, in 2018.

[44] http://hhi.hi.is/sites/hhi.hi.is/files/W-series/2003/w0307.pdf.

[45] http://px.hagstofa.is/pxis/pxweb/is/Efnahagur/Efnahagur__thjodhagsreikningar__framluppgj_ISAT2008/THJ08401.px/?rxid=2541d966-3397-41ff-a5d4-208a40fa7114.

[46] http://px.hagstofa.is/pxis/pxweb/is/Efnahagur/Efnahagur__utanrikisverslun__1_voruvidskipti__01_voruskipti/UTA06103.px/?rxid=99bab12c-8dcf-4c61-a6a7-ff575972563b.

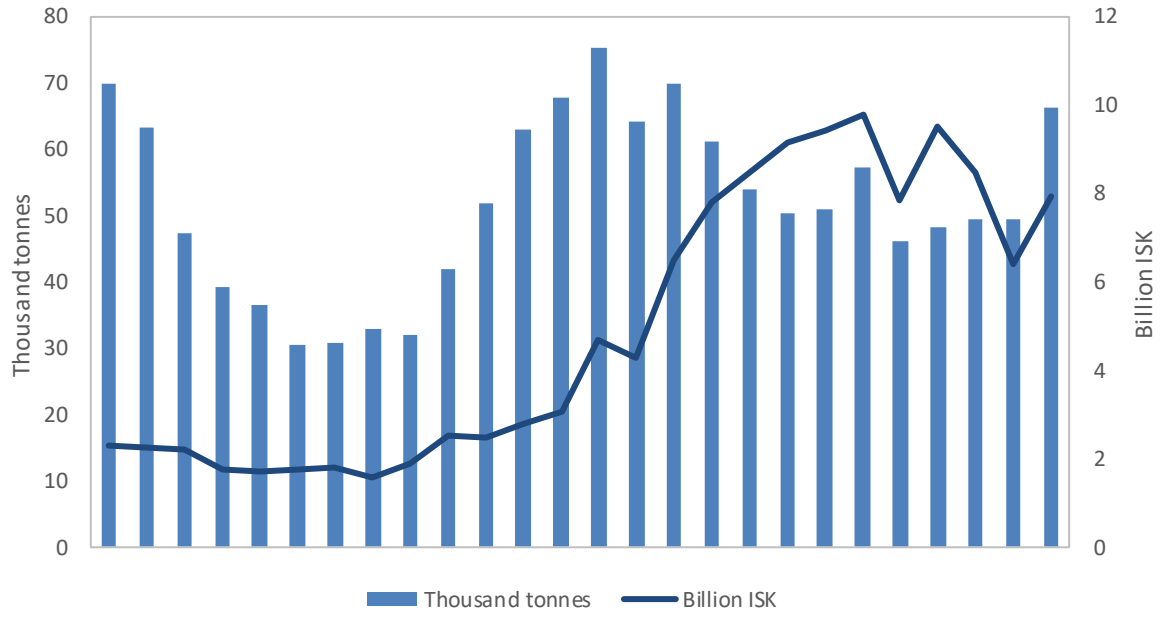


Figure 19. Icelandic saithe catches (thousand tonnes) and catch value (ISK billion) 1993-2018. Source: Statistics Iceland.

4. 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 3. Unit(s) of Assessment (UoA(s)).

Units of Assessment (UoAs)		
Species:	**Common name:**	Icelandic saithe (Ufsi)
	Latin name:	*Pollachius virens*
Geographical Area(s):		Iceland 200 mile EEZ within FAO Fishing Area 27
Stock(s):		Saithe (*Pollachius virens)* in ICES Division 5a (Iceland grounds)
Management System and Principal Management Authority		Ministry of Industries and Innovation (Iceland)
Fishing gears:		Demersal trawl; Gill-net; Longline; Danish Seine; Hook and line (Handline); Gears from other Icelandic fisheries legally landing saithe* (Nephrops trawl, shrimp trawl, pelagic trawl, purse seine).

*comprised of gears legally landing saithe and 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 4. Unit of Certification.

Unit of Certification (UoC)				
Species:	**Common name:**	Icelandic saithe (Ufsi)	**Stock:**	Saithe in ICES Division 5a (Iceland grounds)
	Latin name:	*Pollachius virens*		
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; Gillnet; Longline; Daish Seine; Hook and line (Handline); Gears from other Icelandic fisheries legally landing saithe* (Nephrops trawl, shrimp trawl, pelagic trawl, purse seine).		

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

5. Consultation Meetings

5.1. On-Site Assessment and Consultation Meetings

Table 5. IRF Haddock and Saithe commercial fisheries site visits, meetings discussion points, October 1st-3rd 2019.

Date	Organization	Discussion Points
Tuesday 1st of October 2019	09.00 am. The Client (opening meeting) Kristján Þórarinsson, Fisheries Iceland Axel Helgason, NASBO Finnur Garðarsson, Iceland Responsible Fisheries Foundation (IRFF) SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Any significant changes in the management system, key laws or regulations in the past 12 months? • Non-conformance updates since 4th surveillance activities (under-reporting of seabird and marine mammals bycatch on logbooks as per regulation 126/2014)? • News from the Committee for Consultation on Responsible Management of Living Marine Resources? • What are the main results of the report of the Working group on the comprehensive revision of regulations on the use of fishing gear, fishing areas and protected areas in Icelandic waters? Have suggestions from the WG been implemented? • ICES - Iceland request to evaluate the current management plan for haddock and saithe in Icelandic waters, input data, and stock assessment. Updates and comments from industry. • Transparency in decision processes: involvement of industry reps/fishermen in the decision making process and consultation process with authorities? What's in place? Is this deemed sufficient from an industry perspective (large and smaller vessel owners)? Updates from the past 12 months? • Small boat coastal fisheries fleet. Any relevant updates from the past 12 months? • Potential conflicts among different gear users. In what ways are conflict among fishermen/different fishing gears mitigated or avoided?
	10:00 am. Marine and Freshwater Research Institute (MFRI) Guðmundur Þórðarson, Head of Demersal Division Guðjón Már Sigurðsson, Scientist SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	**Stock Assessment** • ICES Evaluation of the current management plan for haddock and saithe in Icelandic waters, input data, and stock assessment. Have any changes occurred to the Harvest Control Rule or other aspects of the Fishery Management Plan (e.g. specific management measures)? Comments on the benchmark process for saithe and haddock? Satisfactory? Any unsolved problems, or points worth highlighting? • New studies/information on the genetic structure of haddock, saithe in Icelandic waters and their relationships to nearby stocks? • Updated information on spawning or nursery areas / essential habitats for haddock and saithe? • Area closures for juvenile protection. Haw many short term closures have been implemented for haddock and saithe in the 2018-2019 fishing season? Has there been a recent attempt to evaluate the effect of such closures? • What are the discards rates for haddock and saithe in the past 3-5 years? Are they accounted with the overall stock removals? Estimation methods updates? Plans for developments in discard estimation? • How well does the implementation error included in the new Harvest Control Rule (HCR) evaluations cover the whole discrepancy between decided and realized catch? Has this being considered explicitly in the latest benchmark? (cfr. recommendations for cod and redfish) • Confirm measures available if the stocks decreases between set reference points: Revised HCRs cover all SSB-levels down to 0 and limits for key variable

		that would trigger revision - right? Do we have any indication as to how the Ministry and others would handle such a situation? **Ecosystem** • Seabird and marine mammals bycatch data estimates for the past 3 years as collected through MFRI gillnet survey or other sources (e.g. Fiskistofa Inspectors, logbooks) for gillnet and longline gear. • Spotted wolffish status and management. We note the depleted status and catches above TAC. • Any recent interactions/bycatch data (past 3 years) between the fisheries under assessment and the following: basking sharks, leafscale gulper sharks? • Can the assessment team be provided with total catch in numbers of Grey skate (*Dipturus spp.*) for the latest available MFRI survey? What other updates are there on the state of this stock and management activities? Risks to its Endangered status? • Atlantic halibut status and management updates? • Recent updates on the status of Greenland shark and spiny dogfish. Can the assessment team be provided with total catch in numbers from MFRI survey data? • Have there been interactions with Blue whales and Northern right whales for the fisheries under assessment in the past 12 months? • What steps have been taken to monitor the population and status of harbour porpoise (*Phocoena phocoean*) and that of harbour seal (*Phoca vitulina*) in Iceland in the past 12-24 months? We note that in 2016 an aerial survey was performed. Despite the poor coverage in it, the uncorrected harbour porpoise population estimate is at least double that of all previous estimates other than that from 2007, when a specialist harbour porpoise observer was employed and all known biases were corrected. Availability bias is likely substantial for this species but dive profile data from the survey area are lacking (2018 NAMMCO WG on Abundance Estimates). Updates? • The Icelandic Institute of Natural History (IINH) Red list. Since 2018, many marine mammals and seabirds have been re-classified from Least Concern on IUCN Red List to either Vulnerable (e.g. grey seals, common guillemot, Northern gannet, eider duck, black legged kittiwake), Endangered (e.g. Northern fulmar, Brunnich's Guillemot) or Critically Endangered (e.g. harbour seals, puffins) on the IINH Red list. What steps have been taken to manage these species (the ones newly classified by IINH) in relation to their impacts from fisheries bycatch in gillnet and (very likely) longline gear? Is there recent data (i.e. past 3 years) on the bycatch of these species to get an understanding of removals as a fraction of estimated abundance? • The 2018 NAMMCO Scientific Working Group on By-catch reported very unreliable estimates of seal bycatch based on MFRI survey, inspector and logbook data (where an issue with identification of seals seem to be present). The WG did not endorse any of the 2017 by-catch estimates presented for seals in Iceland during the 2018 meeting and stated that the recommended analyses should be presented to the BYCWG at its next meeting before an estimate can be endorsed. What are the updates for 2019 / past 12 months and what new data is available? • Improvement in logbook data collection for seabirds and marine mammals. Updates since the 4th surveillance assessment in 2018 for the past 10 months? We note the issue of logbook underreporting of these species is the subject of

		an active non-conformance for all 7 Icelandic fisheries certified under the IRF scheme. • A smartphone app has been in development by the Directorate of Fisheries, which hopefully will make both reporting and identification of bycatch easier for operators. Updates? • Are there studies or information on the mortality/survival rate of released marine birds and marine mammals following interaction with longline and gillnets gear? • What is the total footprint (km^2) fished with towed bottom-fishing gears in Iceland in 2018? • Vulnerable Marine Habitats. Updates on the NovasArc project and data recorded through MFRI survey? Other management changes or updates (i.e. new plans or closures or other management measures for corals, hydrothermal vents, deep sea sponge aggregations or sea pen communities)? • Mapping the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances. Such information was deemed important in order to predict which species and habitats are at risk of being damaged by fishing activities and for the protection of important marine habitats in the future. Updates on this process and research? What efforts are being implemented to deal with such impact on the seafloor and biogenic structures? • New research info on ecosystem food chains relating to haddock and saithe?
	13:00. Fisheries Directorate Þorsteinn Hilmarsson, Head of Information services SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Management: Any important differences on organization, responsibilities, legislation or management measures in the past 12 months? • Any changes in technical measures and effort controls (powers to spatially / temporally limit gear types and fishing areas, prevent fishing in areas with high catches of undersized fish, minimum legal sizes etc). • Reasons for recent years TAC overshooting in the haddock and saithe fisheries. In particular, all arrangements outside the main ITQ system, to understand the discrepancy between TAC and realized catch. We need to understand the effect of rules for various kinds of small scale fisheries, as well as rules for undersized fish to reduced price, quota addition for hand-baited long-lines and other relevant arrangements. • What analysis is carried out with the aim of detecting deviations that may occur between actual total catch and TAC? What corrective measures are implemented when analysis reveals discrepancy between the information stated in the reports and the information received from harbour weighing? Are there corrective measures at the species level (i.e. for entire TAC) is TAC is exceeded in any one year? • Has the Icelandic TAC deviated from the scientific advice in recent years for saithe or haddock? If so, when and why. Other species where this has happened? • 2018 National Audit Office report: Key findings included: MSC of the Icelandic Act on fisheries must be strengthened, means and inputs must be in place so that MSC can be carried out in an efficient and successful manner, monitoring of weighing, discards and harvesting rights concentration must be improved. A new working group was set up in March 2019 to address the issues raised in the NAU report. A report was scheduled for delivery in the autumn of 2019. How is this work progressing, what measures have been implemented and what measures are likely to be put into place?

		• Update on foreign catches of haddock and saithe in Iceland waters, and fisheries in other waters by Iceland: Quotas, rules, where are the catches landed? • Brief update on mesh size regulations. • Spotted Wolffish, catches are 30% above TAC in 2018/2019. Are there issue with curtailing catches of this species? • How many days have directorate inspectors spent on board of fishing vessels in the last fishing year for which information is available? What is the average inspector coverage % on trawlers, longliners and gillnetters? • What % of annual landings is monitoring by Directorate's staff during port inspections? • Any recent changes (past year) in gear restrictions/technical measures applicable to trawl, longline and gillnet gear? (Mesh sizes, sorting grids?) • How many short term closures (e.g. 2 week closures) were implemented in Icelandic waters to protect juveniles of haddock, saithe in the past 3 years? • Closure of coastal areas to bottom trawls? What the current legislation that regulates this? • Act No. 57/1996 empowers the Fisheries Directorate to monitor all weighing by a weighing license holder for a period of up to six weeks in cases where monitoring of the weighing license holder by the Directorate detects a significant deviation of the percentage of ice in the vessel's catch in a particular fish species, compared to the average ice percentage for that vessel, has this measured been applied in 2018 and 2019? • It has come to our attention that there has been a comprehensive review of the management of closed areas and measures to protect juvenile fish, involving considerable consultation with stakeholders. Is it possible to get some further details e.g. the name of the Project or Committee and a copy of their report / summary of findings & next steps (or link to it) if it is available? • How many and what species of seabirds and marine mammals have been recorded through Fiskistofa inspector effort and through logbook data in the past 3 years? Can the assessment team be provided with data specific to gillnet (but not lumpfish), longline and trawl fisheries? • What measure evidence are there of corrective action having been taken towards the appropriate recording of marine mammal and seabird catches in fishing logbooks on-board of fishing vessels, as per regulation no. 126/2014? Has the compliance of fishermen recording of such interactions changed in the past two years? If so, what are the improvements, challenges and/or general updates? • A smartphone app has been developed by the Directorate of Fisheries, which hopefully will make both reporting and identification of bycatch easier for operators? Updates on legislation or deployment? • Enforcement of, and levels of compliance with, logbook reporting of seabirds and marine mammal bycatch. Infractions of this regulation in the past 12 months? • What are the specific rules and regulations around marking of gillnet and longline gear? Can we have the specific number and year of the relevant regulation? • Long-liners are reported to use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. Any changes in the use of this measures in the past 12 months?

		• Are there additional considerations or plans for additional coral *Lophelia pertusa* closures in Icelandic waters? Additional considerations regarding closures relative to deep sea sponge aggregations or sea pen communities?
	15:30. The Icelandic Institute of Natural History Trausti Baldursson, Head of ecology and advisory units Ester Rut Unnsteinsdóttir, Mammologist SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• The Icelandic Institute of Natural History (IINH) Red list. Since 2018, many marine mammals and seabirds have been re-classified from Least Concern on IUCN Red List to either Vulnerable (e.g. grey seals, common guillemot, Northern gannet, eider duck, black legged kittiwake), Endangered (e.g. Northern fulmar, Brunnich's Guillemot) or Critically Endangered (e.g. harbour seals, puffins) on the IINH Red list. What steps have been taken by Icelandic authorities to manage these species in relation to fisheries impacts (e.g. bycatch in gillnet and (very likely) longline gear)? • Has the IINH had any involvement or input with ICES, OSPAR or other RFMOs like NEAFC, NAFO? • How are the findings of the IINH passed on to Icelandic authorities to enable management action? • What are the plans and consideration to further update the IINH Red List classification of seabirds and marine mammals?
Wednesday 2th of October 2019	10:00 am. Icelandic Coast Guard Auðunn Kristinsson Project manager SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Enforcement Laws and Regulations. Have there been important amendments or changes to the Icelandic enforcement laws? Any changes to the range of monetary and operational penalties for serious infractions to fisheries regulations? • How many airborne fisheries patrol hours have been conducted over the last fishing season? • Has the level of resources and monitoring effort remain the same or has it changed in past 2-3 years? • Have there been changes over 2018/2019 in the systems or patrolling vessels used for enforcement (i.e. new vessels or other)? Electronic reporting systems? • Boardings rate and type/ number of violations recorded (in the past 3 years)? What are the most commonly occurring violations? Can the Assessment team be provided with the relevant data as per previous assessments? • How many prosecutions and reprimands made against skippers did these activities (overall enforcement activities) result in? • Are there many violations of fishermen fishing over their quota share? • What is the overall compliance rate in the haddock and saithe fisheries? • What is checked when the vessels are boarded (gear, catch composition)? • What Law/Regulation specific gear markings for gillnet and longline gear, which are susceptible to potential loss? • How are conflict among fishermen/different fishing gears in common fishing grounds mitigated or avoided? Is this an issue?

		• What are the current consultation arrangements between management authorities and fishery operators / stakeholders? • Any instances of IUU fishing by Icelandic or foreign vessels in the past 12 months? • Figures on enforcement of, and levels of compliance with, logbook reporting requirements for bycatch of seabirds and marine mammal in fisheries (especially gillnet, longline) as per regulation no. 126/2014? Updates for the past 12 months?
	13:00. Brim hf Friðrik Friðriksson, CHRO SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Annual discussions and input in decision making process with Icelandic authorities? • Past 12 months updates on Brim HF's efforts towards fisheries and environmental sustainability? • What percentage of catches do Brim HF's trawlers take on average as a proportion of total catches for the species under assessment? • Recording of seabirds and marine mammals in logbooks on board of fishing vessels. How easy or hard is it to do from a fishermen point of view? Has there been any recent change on the training provided or on the surveillance of these catches by MFRI/Fiskistofa? • What technical or management measures are there in place to minimise bycatch and interactions between trawl vessels 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? • What measures are in use by trawl vessels to minimize the impacts of bottom trawl gear on the seabed and sensitive habitats? Any updates in the past 12 months?
	15:00. Fish Auction Örn Smárason Branch Manager SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Updates on the Auction system (catch recording on board of vessels, selling catches, etc) in the past 12 months? • There have been some recent issues with icing and re-weighing of fish in Iceland requiring Fiskistofa to make some improvements. Any knowledge/comments on it? • It would be useful to have a general discussion on the system in place to track purchase and sale of fish from fishing ground to final buyer. • Selling the juvenile portion of catches • Fiskistofa port inspection of landings • Marketable species, has the number increased in recent years? • Landing of sharks and rays, how common is it? Which species are marketed? • Do vessels ever land non-commercial species (such as coral, sponges or seapens) which are captured along fish species?
Thursday 3th of October 2019	10:00 am. BirdLife International Erpur Snær Hanssen SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson	• Birdlife International work/projects in Iceland. Updates from the past 12 months? • The Icelandic Institute of Natural History (IINH) Red list. Since 2018, many marine mammals and seabirds have been re-classified from Least Concern on IUCN Red List to either Vulnerable (e.g. grey seals, common guillemot, Northern gannet, eider duck, black legged kittiwake), Endangered (e.g. Northern fulmar, Brunnich's Guillemot) or Critically Endangered (e.g. harbour seals, puffins) on the IINH Red list. Any comments on the ramification of these

	Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	new assessments and resulting classifications? Any knowledge of resulting corrective action from the Icelandic authorities? • Any recent information that can be shared with the assessment team regarding 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. How widespread is the use of such practices in Icelandic fisheries? Are there differences between large vessels and smaller coastal vessels? • Does BI know if there are other measures in place to improve fishing selectivity and to exclude/minimise seabird bycatch and interactions?
	11:00 am. Vísir hf Erla Pétursdóttir, Communications Director Pétur Pétursson, Director SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Past 12 months updates on Visir HF efforts toward fisheries and environmental sustainability? • What percentage of catches do Visir HF longliners take on average as a proportion of total catches for the species under assessment? • Longliners use of protective devices/practices to shield baited hooks as gears are shot in order to prevent encounters with seabirds (e.g. tori lines, night settings, acoustic devices). Updates in the past 12 months? • Recording of seabirds and marine mammals in logbooks on board of fishing vessels. How easy or hard is it to do from a fishermen point of view? Has there being any recent change on the training provided to record these or on the surveillance of these catches by MFRI/Fiskistofa? • 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 these fisheries?
	13:00. The Client (closing meeting) Kristján Þórarinsson, Fisheries Iceland Axel Helgason, NASBO Finnur Garðarsson (IRFF) SAIG Assessment Team: Vito Romito Dankert Skagen Sveinn Agnarsson Irish National Accreditation Body (witnessing SAIG's audit): Paul Pearson, Assessment Manager, John Boyd, Fishery Technical Support	• Corrective Action Plan and Measures for the two applicable minor non conformances. • Summary of meetings and key findings. • Next steps in the assessment process. • Timelines.

6. Assessment Outcome Summary

6.1. Fishery Management

Fishery Management System

Iceland has a structured management system that covers all commercial species. There is a principal Act (Lög um stjórn fiskveiða, nr. 116; 10. August 2006) and a number of supporting Acts and Regulations for the management of the fishery. The Ministry of Industries and Innovation is the principal management body responsible for Icelandic fisheries. The practical implementation of management decisions is the task of the Fisheries Directorate (Fiskistofa), which is the executive body that organizes the quota system and monitors catches, the Coast guard which is responsible for surveillance and enforcement at sea and the MFRI which performs assessments and provides advice.

The management strategy objective for Icelandic commercial fish stocks in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term. The key measures for the conservation and sustainable use of the stock include output control through a total allowable catch (TAC) that is distributed on the participating vessels by an ITQ system and a suite of monitoring and control measures in place to keep catches in conformity with allowed amounts. These measures include landings control, discard ban, technical regulations, control at sea by the Coast Guard, temporal and permanent area closures, obligation to land in designated ports where the catch is weighed by authorized weighers, strict control with vessel quotas by the Directorate and an obligation to land undersized fish for a reduced price. Legal instruments are in force which specify legal gears for each method of fishing. Legal gears do not include dynamiting, poisoning and other comparable destructive fishing practices.

Digital tools for publication allow almost real-time publishing of results and decisions, including results of stock assessments, MFRI advice and catches and quota status even for individual vessels. Interested parties participate in decision processes through regular meetings between industry and management authorities. The ITQ system gives fishermen the option and flexibility to target specific species and fishing grounds across the fishing year, minimizing potential conflicts with other operators.

Icelandic saithe is subject to a formal Fishery Management Plan and harvest control rule, revised in 2019. The unit managed by Icelandic authorities is saithe in Icelandic waters. The relevant stock of saithe is generally confined to Icelandic waters and managed by national authorities. The long term harvesting policy is to set annual quotas in accordance with a harvest rule that has been demonstrated by simulations to imply low risk of exceeding limit reference points and to provide a long term average yield close to the maximum sustainable yield. The rule states a fixed harvest rate as a proxy for a target fishing mortality, which is reduced if SSB is below a trigger value. There are limit values for SSB and fishing mortality defined, and simulations have demonstrated a low risk to exceed the limits.

The primary management method is quotas set according to a harvest rule that has been shown to be in accordance with the precautionary approach and lead to near maximum long term yield. The quota regulations are supplemented *inter alia* by area closures, mesh size regulations, sorting grids in selected fisheries, discard ban and surveillance at sea and at landing sites. The quotas are derived from an assessment, performed with approved methodology by the ICES NWWG, and finally decided by the Ministry taking advice from MFRI and the industry.

Research and Assessment

The Marine and Freshwater Research Institute (MFRI) which is the main marine research institute in Iceland, is regarded as the competent research institute. Data collection for assessment purposes, both from the fishery and surveys, is performed by the MFRI in cooperation with the Fisheries directorate. The assessment is done by the ICES North-Western Working Group, where Iceland participates. The report from the underlying stock assessment and the ICES advice are readily accessible on the ICES website. MFRI issues advice on individual stocks on the web once it is ready, based on the ICES advice.

The saithe stock is assessed using a forward running statistical catch-at-age model fitted to total annual landings, catch numbers at age and indices at age from the bottom trawl survey in the spring. Landings data are provided by the Fisheries Directorate. Age distributions and weights and maturities at age are obtained from samples taken by MFRI from catches and in surveys. The survey is extensive and covers the whole Icelandic shelf. As stock abundance is estimated by a full analytic assessment, using generic evidence as a fall back is not necessary. The assessment method was last reviewed and endorsed by ICES in 2019. The quality of the assessment appears satisfactory, as expressed by a moderate retrospective inconsistency. All the signs from commercial catch data and surveys as well as the assessment indicate that saithe in ICES Division 5.a is at present in a good state.

Discards are prohibited. Discards for saithe have to some extent been estimated but have been too small to be measurable. Unobserved and incidental mortality is covered by the assumed natural mortality. The value for that is just assumed at a level that is regarded as sensible for most gadoids, including saithe. The strict control of landings by the Directorate and detailed monitoring of fishing operations by the Coast Guard should make black landings very unlikely.

There is close communication between scientists and the fishing industry, both in formal meetings and through informal contact. There are specific consultation groups between fishermen and the MRFI that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously. Logbooks are compulsory. Their information is not used directly in the stock assessment, but is important fishing information for both managers and scientists.

Iceland is member of ICES, which is a key forum for scientific and management activities and cooperation. Iceland cooperates with several international organisations, in particular NEAFC and NAFO. Furthermore, the Icelandic government has cooperation agreements with Norway, Russia, Greenland, EU and the Faroe Islands.

The Icelandic saithe is regarded as a separate, domestic stock and managed as such by Iceland. Stock assessment and evaluation of the management plan is done in cooperation between interested nations within the NWWG in ICES.

Harvesting Policy and the Precautionary Approach.

The precautionary approach is implemented through defining precautionary reference points for biomass and exploitation, and through a harvest rule that implies low risk of stock depletion.

The lowest biomass in the time period covered by the assessment is set as precautionary biomass Bpa. There is no indications that the recruitment is impaired when the SSB is at that level. Since this level was reached with a relatively low fishing mortality, the biomass limit Blim is set at Bpa/1.4. This is in accordance with ICES standards.

According to simulations taking all relevant uncertainties into account, reaching Blim is unlikely when the harvest rule is applied. Using that as a criterium for accepting the rule as precautionary, is according to standard procedures in ICES. At present the stock is well above the limit.

ICES has defined reference points for Icelandic saithe that have been adopted by MFRI. The harvest rule prescribes a reduction in the harvest rate if SSB goes below a trigger value of 61000 tonnes. With the current stock dynamics

and harvest rule, this situation is unlikely. Further measures if SSB gets too low would depend on the reason why the SSB became reduced. The Icelandic management has the authority to take the necessary action.

The management strategy for Icelandic fish stocks, in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term. This also appears as the objective of the management plan for saithe. The harvest rule was designed to provide a near maximum long-term yield and a stock abundance safely away from the limit. The harvest rate according to the harvest rule of 0.20 implies a low probability of bringing the SSB below Blim, which is the biomass below which recruitment is impaired or stock dynamics unknown. An additional measure is to apply a reduced harvest rate if SSB goes below a trigger level of 61 kt.

The management target for the harvest rate is 0.20. Harvest rate is regarded as a proxy for fishing mortality According to the rule, the target harvest rate shall be reduced if SSB in the assessment year is estimated below Btrigger = 61000 tonnes. There is no explicit measures planned for the event that fishing mortality shall exceed the F limit. The first response would be to apply the target HR once again. The limit is so high that reaching it when setting TACs according to the target is very unlikely.

A long term target for the stock size is considered redundant and not defined. A precautionary limit biomass has been defined as SSB = 44000 tonnes. The procedure applied when setting reference points follows ICES standards and the results were accepted by ICES. The harvest rate is reduced already at an SSB = 61 kt, well above the limit biomass. If that is not sufficient, further measures to be taken should be adapted to the underlying cause.

There is an extensive system of closures to protect both spawners at spawning time and juveniles. The system is primarily for protecting cod, but may offer some protection to saithe as well. There is also a system for protecting juveniles by closing areas temporarily on short notice if there appears too much juveniles in catches. Furthermore, there are mesh size regulations in place to protect juveniles; the standard mesh size in trawl is 135 mm, and fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. Sorting grids in fishing gear are obligatory in certain fisheries to prevent catches of juvenile fish. Undersized saithe has to be sold, but gets a poorer price.

External Scientific Review

ICES is regarded as the relevant scientific body that organizes stock assessments and performs evaluations of management plans. The assessment as well as the management plan were revisited in 2019 and approved with minor changes. The Icelandic management authorities decides the harvesting policy, including the management plan. It takes advice form the MFRI as well as from the industry and fishermen.

Advice and Decisions on TAC

The stock assessment and advice for the TAC in the coming year is provided annually by ICES. The MFRI provides advice to the Ministry, which is the competent fisheries management authority. The advice published by the MFRI has reference points tabulated. These are identical to the reference points defined by ICES, and include the reference values in the harvest rule in the management plan.

The stock of saithe in Iceland is confined to Icelandic waters, thus it is not a shared stock. There are no agreements on its management with neighbouring nations. Decisions on TAC are taken by the Icelandic Ministry of Industries and Innovation after advice from MFRI and consultations with the industry. The Ministry has the legal authority to deviate from the advice, but will only do so if there is strong reasons for that. In practice, where harvest rules are in effect, the advice is set according to the rule and the TAC set according to the advice.

Since the introduction of the management plan in 2013/14, the national TAC for saithe has been set equal to the recommended TAC, which is according to the harvest rule. The total catch has consistently been below the TAC in

these years for various reasons. Some deviations were included in the simulations when the recent management plan was approved.

Iceland participates in other fisheries and non-fisheries organisations/arrangements in the North Atlantic region.

6.2. Compliance and Monitoring

Clause 2.1 Implementation, Compliance, Monitoring, Surveillance and Control

An effective legal and administrative framework exists which is implemented by Directorate of Fisheries (DoF), part of the Ministry of Industries and Innovation (MII). The Directorate works closely with the Coast Guard, Port Authorities and the Marine and Freshwater Research Institute (MFRI). Key legislation underpinning the framework comprises the Fisheries Management Act (No. 116/2006), the Act on Fishing in Iceland's Exclusive Economic Zone (no. 79/1997) and the Act concerning the Treatment of Commercial Marine Fish Stocks (no. 57/1996). Together these provide the legal basis for the Icelandic Individual Transferable Quota (ITQ) system, establish allocation harvest rights and permit requirements for all participating commercial fishing vessels, prohibit discarding of commercial fish, grant powers to implement closures for juvenile fish, put in place strict controls regarding the recording of catch and the landing and weighing of fish and establish penalties for violation of the provisions of these Acts and associated Regulations, amongst other things. The system incorporates a number of important measures to enable flexibility which encourages compliance with the law whilst ensuring sustainable use of the resource.

Effective mechanisms for monitoring, surveillance, control and enforcement exist involving at-sea and land-based monitoring of fishing activity, catches and landings by the Coast Guard and DoF Inspectors, supported by Port Authorities. Offences are recorded and enforcement action is taken, this largely comprises administrative penalties ranging from guidance letters and reprimands to suspension of fishing permits and weighing licenses. More serious cases are sent to the police for prosecution under the criminal system which can result in imprisonment.

Clause 2.2 Concordance between actual catch and allowable catch

Landings must be recorded in logbooks at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland. Registered weights for each landing are sent to the DoF, recorded on their catch registration database (GAFL), and the appropriate amount is subtracted from the vessels quota. ITQ transfers are also monitored to ensure that vessels either have or source sufficient quota to cover the entirety of their catch within 3 days of landing. Compliance is checked through at-sea and on-land monitoring by the Coast Guard and DoF inspectors with enforcement action taken where non-compliance occurs.

Catches of saithe have in recent years generally been lower than the TAC, with the difference in some fishing years quite substantial. 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 size of the vessel, record landings at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland.

Clause 2.3 Monitoring and Control

Clause 2.3.1. Vessel Registration and catch quotas

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 exceed the TAC set by the Icelandic authorities. Note that within fishing seasons additional inter-annual, inter-species and/or inter-vessel transfers may cause the amount a particular vessel is allowed to catch to increase or decrease. Commercial vessels participating in the fishery require a permit issued by the Directorate of Fisheries. Permits are only granted to fishing vessels holding certificates of seaworthiness and registered in the Registry of Vessels.

DoF maintains a catch registration system (GAFL database) which is updated with information on registered catches from ports of landing and information on catches exported unprocessed. The catch statistics are published, subject to change, once they have been compared to submitted logbooks and reports from buyers, and are available on the DoF website. Information on the size and composition of the fleet of fishing vessels is available and documented and includes the official Registry of Vessels maintained by the Icelandic Transport Authority (ICETRA). The allowed catch of saithe for each vessel or vessel group is specified on the Directorate of Fisheries website.

Clause 2.3.2 Fishing vessel monitoring and control systems

The Icelandic Coast Guard, working closely with the Directorate of Fisheries, administers an integrated monitoring, control and surveillance system which covers the activities of Icelandic and foreign fishing vessels. It involves several different but complementary electronic vessel monitoring systems including satellite-based systems, comprising VMS and use of satellite imagery, 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 integrated system uses all available data such as identification of the vessel, its movements, IUU (illegal, unreported and unregulated) lists, notifications, reports, fishing licenses, permits, port State control reports, etc. to detect and prevent unauthorised fishing in the Icelandic Exclusive Economic Zone (EEZ) and the North Atlantic Ocean.

Unannounced at-sea inspections, which cover fishing gear, composition of the catch, correct recording of catch in logbooks amongst other things, are undertaken during boardings by the Coast Guard and on fishing trips accompanied by the inspectors of the DoF. The Directorate's inspectors also undertake unannounced in-port inspections. Surveillance is strategic and risk-based, using information supplied by the DoF to identify highest risk activities where monitoring effort is then concentrated, for example, at present on the gillnet fisheries.

VMS is used by the Coastguard to enforce temporary and long-term fisheries closures. Vessels fishing in proximity to closed areas are monitored at the Coast Guard operation centre and vessels are directly contacted if they 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. Catch amounts by species and fishing area are estimated and continually recorded in fishing logbooks on-board fishing vessels and these data are provided to the competent authorities either by fishing event or fishing trip depending on the size of the vessel.

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.

Therefore, the Assessment Team issued a Minor Non-conformance. Following the issuance of this non-conformance, and in accordance with rules of the IRF Programme, the Client has submitted a Corrective Action Plan (CAP) to address the non-conformance raised within a defined period. Corrective action progress for year 1 has been provided.

The law requires that all catches by Icelandic vessels from Icelandic waters must be landed and weighed in an Icelandic port. Weighing is undertaken on official port scales, or on other approved scales at private companies or Fish Markets, that have been certified by the DoF and operated by individuals authorised by the Directorate. The DoF maintains a list on their website, organised by port, of all official weighing license holders that they audit and the type of weighing license held.

The weights are submitted to the DoF's catch registration system where they are compared against the logbook entries and deducted from the vessel's quota. Any discrepancies/deviations are recorded and investigated. Deviations, where they occur, can sometimes be rectified using the flexibility within the system (e.g. by using inter-annual, inter-vessel or inter-species transfers to cover catches of a species for which the vessel did not already have quota). Excess catches which are not corrected using these flexibility measures can result in a revocation of fishing licenses and fines. In recent years, around 90 % of all saithe catches have been registered by vessels employing bottom trawl, with 2-3% caught by boats using gillnets, Danish seine and handline. There are regulations that require passive fishing gear left unattended at sea to be marked so that the owner can be identified.

Clause 2.3.3. Catches are subtracted from relevant quotas

Landed catches are subtracted from the relevant quotas (allowable catch) of the vessel or vessel group. Vessels must weigh catch within two hours of landing. The official weighed catch for each vessel is then submitted by the Port Authority to the DoF's catch registration system and deducted from the vessel's quota. Comparison of the official weighed catch is made with the vessels' logbook as part of this process. Transfers of quota to meet any shortfall are also monitored to ensure any additional quota required is secured. Processed at sea catch is also monitored, including its conversion to live weights which are then deducted from the vessel's quota.

Some flexibility occurs in the quota management system so that the species composition of catches may be matched with the quota portfolio available to individual fishing vessels and to discourage discarding. This is facilitated by a number of provisions including the ability to use a limited amount of the following season's quota or to transfer a limited amount of unused quota to the following season, or transfer quota between species using 'cod-equivalents'. Where a vessel has exhausted these options, it must transfer quota from other vessels and if unable to do this it must stop fishing.

Clause 2.3.4. Rules are enforced

There is a clearly established legal framework which sets out rules and regulations relating to fishing activity within Icelandic waters and the penalties for violation of these rules. It gives powers to the Ministry, the Directorate of Fisheries, the Coast Guard and the MFRI to monitor fishing activities and enforce these rules. Penalties exist for serious infractions. This largely comprises administrative penalties ranging from guidance letters and reprimands to suspension of fishing permits and weighing licenses. More serious cases are sent to the police for prosecution under the criminal system which can result in imprisonment

Clause 2.3.5. Analysis is carried out

Analysis is 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. All processors purchasing fish, be it directly or at auction, are obliged to submit monthly reports to the Directorate. In addition, the fish auction reports all sales of fish directly to the DoF. Analysis of catches includes the comparison of reported catches with the amount of sold or exported products to verify independently that 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.

6.3. Ecosystem considerations

Clause 3.1. Guiding Principle

The main priorities of the MFRI are research on marine and freshwater ecosystems in Iceland and 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, habitat and bycatch effects 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 Endangered, Threatened and Protected (ETP) species occurring in Icelandic waters. The fishery does not appear to have significant effects on bycatch or ETP species. However, a minor non conformance has been issued relating to spotted wolffish and common loon bycatch. The Client Group has provided a Corrective Action Plan.

E-logbooks recording of all marine mammals and seabirds catches (by species and numbers) 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 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. 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 such as coral and hydrothermal vents. Cumulatively, a large portion of Icelandic shelf area within which fishing activities occur is closed to bottom trawling.

Clause 3.2.1. Information gathering and advice

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.

Clause 3.2.2. By-catch and discards

According to section 2 of Act no. 57/1996, concerning the treatment of commercial marine stocks, discard of catches (although with minor exceptions) is prohibited. Discarding violations are subject to penalty ranging from ISK 400K to 8M.

There are technical measures/mechanisms in place in Icelandic longliners to mitigate adverse impacts on 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. Pingers are being trialled in the gillnet fishery to avoid marine mammal bycatch. 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. Where Fiskistofa finds and recovers lost or abandoned gear they recover the cost of recovery from the gears' owner. The directorate confirmed that gear loss (e.g. longlines, gillnets) and ghost fishing is not considered an issue and that reporting lost gear is compulsory. Additionally, the Icelandic ITQ system operates in such a way (i.e. not Olympic) that gear losses are minimised.

Clause 3.2.3 – Habitat Considerations

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. Furthermore, the Icelandic government has closed 10 areas in South East Iceland where significant coral cover has been identified through scientific research. 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 and are fully protected by environmental law no. 249/2001 and 510/2007.

Clause 3.2.4. Foodweb Considerations

Icelandic saithe 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

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.

7. Conformity statement

The assessment team recommends that the management system of the applicant fishery, the Icelandic saithe (*Pollachius virens*) commercial fisheries, under state management by the Icelandic Ministry of Industries and Innovation, fished directly with demersal trawls (i.e. main gear), gillnets, Danish seine nets, long-lines, 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), be granted re-certification to the Icelandic Responsible Fisheries Certification Programme.

8. Fishery Assessment Evidence

8.1. Section 1: Fishery Management

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

The Fisheries Management System

8.1.1.1. Clause 1.1.1.

A structured fisheries management system shall be adopted and implemented.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Iceland has a structured management system that covers all commercial species. There is a principal Act (Lög um stjórn fiskveiða, nr. 116; 10. August 2006) and a number of supporting Acts and Regulations for the management of the fishery. The Ministry of Industries and Innovation is the principal management body responsible for Icelandic fisheries.

Evidence:
Iceland has a structured management system covering all commercial species, including saithe and an established Marine Policy[47].

Legislation. There is a principal Act (Lög um stjórn fiskveiða, No 116/2006)[48] and a number of supporting Acts and Regulations for the management of the fishery[49]. 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.* Policies incorporate a number of International Agreements and declarations, including; UN Convention of the Law of the Sea,[50] Agenda 21 of the Rio Declaration[51], FAO Code of Conduct for Responsible Fisheries and the International Plan of Action to prevent, deter and eliminate Illegal, Unregulated and Unreported Fishing.

Institutions. There are a number of inter-related government agencies within the system under the direction of the Ministry of Industries and Innovation which has ultimate responsibility.

The Ministry of Industries and Innovation[52] in Iceland is the principal management organization responsible for Icelandic fisheries and has the ultimate responsibility for fisheries management. The Ministry acts according to law issued by the parliament (Althingi), and according to advice from the Marine and Freshwater Research Institute (MFRI). The Ministry of Industries and Innovation opened on 1 September 2012 following the amalgamation of the Ministry of Fisheries and Agriculture, the Ministry of Industry, Energy and Tourism and part of the Ministry of Economic Affairs. Hence, it now covers all sectors of ordinary business and

47 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/
48 https://www.althingi.is/lagas/nuna/2006116.html
49 An updated collection (in Icelandic) is issued yearly at https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/
50 Ratified 1985: https://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm
51 http://www.un.org/documents/ga/conf151/aconf15126-4.htm
52 https://www.government.is/ministries/ministry-of-industries-and-innovation/

economic activity. Two ministers share the responsibilities, one for fisheries and agriculture and one for tourism, industry and innovation. The organisational chart is shown below (Figure 20).

The Ministry of Industries and Innovation is responsible for setting annual total allowable catch. It takes advice from the Marine Research Institute as well as in consultation with stakeholders.

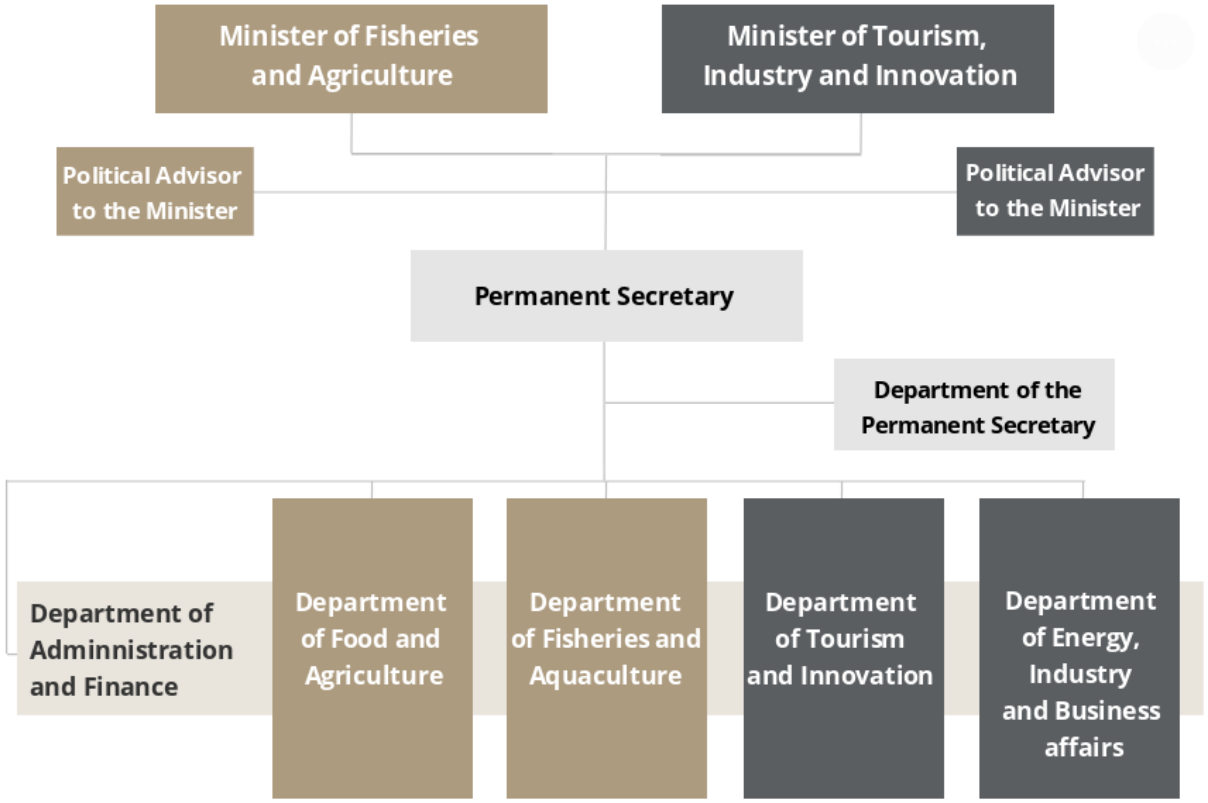


Figure 20. Organisational chart of the Ministry of Industry and innovation.

The executive body is the **Fisheries Directorate (Fiskistofa)**[53] . The Directorate allocates annual catch quotas to each vessel by distributing the total allowable catch according to the quota shares attached to each vessel. The individually transferable quota shares and catch quotas are the cornerstone of the Icelandic fisheries management system. In addition to the individually transferable quota system, Icelandic fisheries management includes management measures such as fishing gear restrictions, area restrictions including the use of closed areas and port control and weighing of all catches. The Directorate of Fisheries is responsible for the daily administration of these measures.

The Icelandic Coast Guard (ICG)[54] is responsible for control at sea, both of the catches and the quality of the vessels. It is a civilian law enforcement agency that is responsible for search and rescue, maritime safety and security surveillance[55], and law enforcement in the seas surrounding Iceland. 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.

53 http://www.fiskistofa.is/english
54 http://www.lhg.is/english
55 http://www.lhg.is/media/leit_og_bjorgun/RESCUE_EN.pdf

The ICG's duties include protection against illegal activities such as illegal migration and illegal drug tracking, fisheries control and enforcement, pollution surveillance and response, natural resource and ecology protection, and salvage and rescue diving. The ICG operates the NATO Iceland Air Defense System and CRC Keflavík and is responsible for Explosive Ordnance Disposal (EOD) in Iceland, hydrographic surveying and nautical charting. It also provides emergency medical transport, assistance to law enforcement on land, and civil protection. The Icelandic Coast Guard operates rescue helicopters, offshore patrol vessels, coastal vessels, and a maritime surveillance aircraft. The ICG's vessels, maritime surveillance aircraft and helicopters are designed and equipped to ensure a rapid response in crisis situations, including rescuing individuals from danger at sea or on land, providing urgent medical transport and assisting boats and ships within the country's jurisdiction.

The **Marine and Freshwater Research Institute (MFRI)**[56] conducts a wide range of marine research and now provides the Ministry with scientific advice as MRI did previously. MFRI was established on July 1, 2016 as a result of a merger of two inveterate Icelandic research institutes, the Institute of Freshwater Fisheries (founded in 1946), and the Marine Research Institute (founded in 1965).[57] The MFRI is responsible for fish stock assessment and scientific advice, and for obtaining the necessary information for that task, in particular sampling of catches, scientific surveys and providing scientific background for advice. MFRI also has the authority to manage short term area closures, which are used extensively to protect juveniles and spawning fish.

The MFRI has two research vessels Árni Friðriksson (LOA 69.9 m) and Bjarni Sæmundsson (LOA 56 m). The former, delivered in 2000, is a modern multi-purpose research vessel designed for fisheries and oceanographic research, principally in the North Atlantic Ocean, temperate and arctic water, and equipped to modern standards for a marine research vessel.

MFRI has wide international cooperation in all major fields of marine science, as indicated by its publication record[58].

References:	As referenced in the text.

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

56 https://www.hafogvatn.is/en
57 http://www.althingi.is/lagas/nuna/2015112.html
58 https://www.hafogvatn.is/is/midlun/utgafa/ritaskra

1.1.1.1. Clause 1.1.2.

The fisheries management system objective shall be to limit the total annual catch from the fish stocks so that catches are in conformity with amounts allowed by the competent authorities.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The management strategy objective for Icelandic commercial fish stocks in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term. The key element in the management is output control through a total allowable catch (TAC) that is distributed on the participating vessels by an ITQ system. There is a suite of monitoring and control measures in place to keep catches in conformity with allowed amounts, including control at sea by the Coast Guard, temporal and permanent area closures, obligation to land in designated ports where the catch is weighed by authorized weighers, strict control with vessel quotas by the Directorate and an obligation to land undersized fish for a reduced price.

Evidence:

Article 1 in the principal Act *(No 116/2006)* 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.*

The government web-pages have statements on the objectives of fisheries management in Iceland:[59]

The management strategy for Icelandic fish stocks, in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term.

Harvest Control Rules (HCR) are set by the managers of the fishery, in the case of Iceland by the Ministry and are based on knowledge on the state of the stock and take account of the managers objectives, the nature of the resource and uncertainties. The main aim HCRs is thus to:

- Decrease the risk of short term interests influencing the level of exploitation.
- Ensure that the available information on the resource are used in the most rigorous manner.
- Long term sustainable yield.
- Ensure that stock is above save biological limits.
- Often (including for saithe) include buffers on the amount of Catch/TAC change between fishing seasons.

The harvest control rule can be summarized as follows[60]:

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

60 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

If $SSB_Y \geq MGT\ B_{trigger}$:

$$TAC_{Y/Y+1} = 0.5 \times 0.2\ B_{4+,Y} + 0.5 \times TAC_{Y-1/Y}$$

If $SSB_Y < MGT\ B_{trigger}$:

$$TAC_{Y/Y+1} = \frac{SSB_Y}{MGT\ B_{trigger}} \left\{ \left(1 - 0.5\ \frac{SSB_Y}{MGT\ B_{trigger}} \right) 0.2\ B_{4+,Y} + 0.5\ TAC_{Y-1/Y} \right\}$$

where $B_{4+,Y}$ is the biomass of saithe aged 4 and older in year Y, and MGT $B_{trigger}$ = 61 000 tonnes.

The key element in the management of Iceland's commercial fish stocks, including saithe, is output control through a total allowable catch (TAC) that is distributed on the participating vessels by an ITQ system. There is a suite of monitoring and control measures in place, to keep catches in conformity with allowed amounts[61]. Some aspects are further discussed in Clause 1.1.3, Clause 1.5.8 and in Section 2. The overall TAC is set according to a harvest control rule. There is some flexibility to transfer quotas between years and in some cases between species. A cod quota can be transferred to other species (including saithe), but quotas on other species cannot be used to cover cod catches. Discards are prohibited by law. Commercial species, including saithe can only be landed in designated ports, where they are weighed and reported by authorized personnel. No fish can be landed without being accounted against a quota. The quota status is strictly monitored and enforced by the Directorate. There are several arrangements in place to reduce the incentive for discarding and black landings, including control at sea by the Coast Guard, temporal and area closures and an obligation/opportunity to land undersized fish for a reduced price.

The total catch of saithe is often not taken. Some is postponed until next year, some is used to cover catches of other species and some is not utilized. This is discussed in more detail in Clause 1.5.8.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

61 https://www.government.is/news/article/2018/05/15/Fisheries/

1.1.1.2. Clause 1.1.3.

Appropriate measures for the conservation and sustainable use of the "stock under consideration" shall be adopted and effectively implemented by the competent authorities.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The key measures for the conservation and sustainable use of the stock include quota regulations in a flexible ITQ system, landings control, discard ban, area closures and technical regulations.

Evidence:
Here the relevant regulations and measures are outlined. A discussion of how efficient the implementation is provided in Clause 1.5.8.

Quota regulation
The main tool for conservation and sustainable use of the fish resources in Iceland, including the saithe stock, is output control in terms of quotas. In addition, there are technical measures, a general discard ban and area closures to support the sustainable use of the resource. There are special quotas for small scale fisheries to support local communities within the quota framework, and arrangements to reduce the incentive for discarding. An outline of the quota system is given here, a more comprehensive discussion is in Clause 2.1.1

All commercial fishing operations are subject to a permit from the Directorate of Fisheries. On average, about 1300 vessels and boats are licensed for commercial fishing. In addition to general fishing permits, special licenses are issued for specified catches, e.g. for fishing on lumpfish and for fishing with seine. General fishing permits are of two types, a general fishing permit with a catch quota and a general fishing permit with a hook-and-line catch quota[62]. The general fishing permit with catch quota sets quotas by species for each vessel, and allows for buying and selling quotas to ensure that the vessel always has quota coverage for the species they catch. The hook and line quota is only available for small vessels less than 15 gross tonnage (GT). Within the hook and line system the vessels can freely transfer the quota between species, but they are only allowed to fish with handlines or longlines. This hook-and-line catch quota system was originally an effort regulation for small scale fisheries, but is now a quota system with somewhat different rules, adapted to smaller vessels. There is also arrangements with community quotas to support selected local communities. In addition an amount is allocated outside the general quota system for a local inshore fishery for vessels that do not have an ordinary quota (strandveiðar). The amounts permitted to catch in this fishery is strictly regulated is time and place, the vessels need a license from the Directorate and have to land their catches in authorized ports. A vessel may only hold one type of fishing permit each fishing year. A commercial fishing permit shall be cancelled if a fishing vessel has not been fishing commercially for 12 months.

An overall national quota is set by the Ministry according to a harvest rule in a management plan that is in place for saithe. The stock was benchmarked in 2019 together with a new management strategy evaluation. Small adjustments were made to reference points, while the assessment method was unchanged.[63] The

62 Law 116/2006 (https://www.althingi.is/lagas/nuna/2006116.html): https://www.sciencedirect.com/science/article/pii/S0308597X16302238
63 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

management plan is consistent with both the Precautionary Approach and ICES MSY approach, and has been adopted by the Ministry of Industries and Innovation for the next five fishing years (2019/2020 to 2023/2024).

The harvest rule is applied to estimates of stock abundance from a stock assessment. The assessment is made by the North-Western Working Group (NWWG) in ICES, where all involved nations participate. ICES formulates an advice based on the harvest rule and the result of the assessment. This advice is taken over by MFRI, modified and extended if necessary and presented as the scientific advice to the Ministry. The Ministry bases its decisions on annual total allowable catch on the recommendations of the MFRI as well as consultation with stakeholders [64].

After setting aside amounts for fisheries outside the ordinary quota system, at most 5.3% for unexpected quota needs and catches by foreign vessels), the overall quota is distributed on individual vessels in an ITQ (Individual Vessel Quota) system that is organized and managed by the Directorate of fisheries.

The ITQ system has evolved gradually in Icelandic fisheries management, and was fully implemented in 1990. The legal basis for the ITQ system is the principal fisheries management act (116/2006). The main elements are:

- Each vessel is assigned a quota share (%) in each stock, initially based primarily on catch history over a reference period.
- The annual allowable catch for each vessel from each stock is obtained by multiplying the TAC of the year and the vessel‘s quota share (as a proportion).
- Quotas can be transferred between vessels; this applies both to quota shares and annual catch allotments, and in some cases between species. Quota transfer is mainly intended to promote rationalisation and thus increase profitability in the industry.
- To reduce the incentive for high-grading, undersized fish that is caught (< 55 cm for saithe) has to be sold, but only part of the catch is subtracted form the quota and the price is lower.
- The vessel owner can also decide not to subtract a catch from the quota. The, he gets only 20% of the value and the surplus goes to a fund to promote scientific work. This is mainly as an alternative to buy quotas for small quantities of unwanted catch, and avoid discarding.
- A coastal fishery (strandveidar) is permitted under quotas aside from the ITQ system: Coastal fishing allocations are[65] not based on vessels’ quota share; have a limited amount and have a series of applicable provisions[66]. These are designed to support local communities.

There is limitations to the permitted quota share for individual owners. Altogether, there is strong emphasis on making the system flexible and to reduce incentives for violations, while maintaining viable local communities and a firm control.

Under Icelandic ITQ system, no fish can be landed without a quota. If a vessel gets fish for which it does not have a quota, it has to buy one, and there is strict control by the Directorate that this is done. There is an efficient system for buying and selling quotas on-line, and for boat owners, trading quotas is a way to optimize their quota portfolio and operations. The quotas for all vessels are listed by the Directorate[67]

64 http://www.fiskistofa.is/english/fisheries-management/
65 http://www.fiskistofa.is/veidar/aflaheimildir/byggdakvoti/
66 http://www.fiskistofa.is/fiskveidistjorn/umfiskveidistjornunarkerfid/strandveidar/
67 http://www.fiskistofa.is/veidar/aflaheimildir/uthlutadaflamark/

The efficiency of this quota system to limit landings to the overall TAC is discussed under Clause 1.5.8.

Discard ban

Discarding is prohibited[68] and is regularly monitored by comparing size distributions in self-reported catches and those taken by onboard Directorate inspectors; this method estimates high-grading, but not necessarily discarding for other reasons. This has not been done for saithe for several years, as previous estimates were neglible (not measurable)[69] and there is no incentive to discard saithe.

Landing and weighing

All fish in Iceland must be landed in authorized ports and weighed by authorized weighers [70] [71]. Special rules apply to caches that are processed on-board. The weighed catch is directly recorded on-line. The landings statistics are managed by the Directorate, and are published on the Directorates web pages almost in real-time[72]. These landings are also used in the stock assessment.

Area closures

Area closures are widely used in Icelandic fisheries management. They can be permanent or temporary. Some closures are designed to avoid exploitation of cod at the spawning grounds in the spawning season. They are permanent according to regulations, but apply only in the spawning season (Figure 21). These closures are primarily for cod and plaice, but may offer some protection to other species as well like saithe, which spawns roughly in the same area but mostly slightly earlier. Other permanent closures are for certain gears, mostly all around the year. Fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. Sorting grids in fishing gear are obligatory in certain fisheries to prevent catches of juvenile fish.

In addition to closures that are permanent or regular, areas can be temporarily closed at short notice if concentrations of juveniles are detected[73]. These closures are triggered by finding too much juveniles in catches (for saithe: more than 30% below 55 cm). They are managed by the MFRI, often at the advice from the Coast Guard or the fishing fleet, applied on few hours notice and normally valid for 2 weeks. They are published in several channels, including on the web[74].

68 Act concerning the Treatment of Commercial Marine Stocks No. 57, 3 June 1996: https://www.althingi.is/lagas/nuna/1996057.html

69 https://www.hafogvatn.is/static/research/files/fjolrit-142.pdf

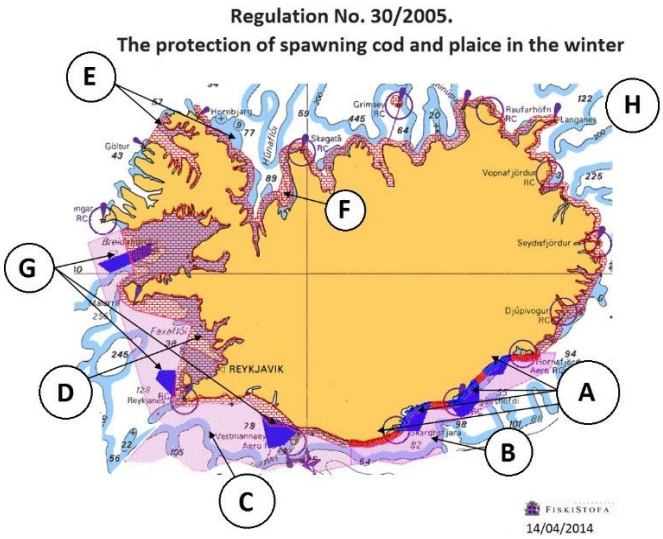
70 Law 57/1996: https://www.althingi.is/lagas/nuna/1996057.html

71 https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/20213

72 http://www.fiskistofa.is/english/quotas-and-catches/

73 http://www.fiskistofa.is/fiskveidistjorn/veidibann has links to webpages for the various kinds of closures.

74 https://www.hafogvatn.is/is/skyndilokanir



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 21. Permanent closures to protect spawning grounds for cod and plaice[75].

Technical regulations:

The general minimum mesh size in demersal trawls is 135 mm[76], with exceptions in for example shrimp fisheries. There are additional rules for the use of protecting mats and other technical details.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

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

76 https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/4032

1.1.1.3. Clause 1.1.4.

The Standard does not recognise fishing practices that are prohibited such as dynamiting, poisoning and other comparable destructive fishing practices.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **Legal Instruments are in force which specify legal gears for each method of fishing. Legal gears do not include dynamiting, poisoning and other comparable destructive fishing practices.**				
Evidence: Only permitted gears (trawls, longlines, seine nets, gillnets) can be used to target saithe and other commercial species in Iceland. The use of dynamiting, poisoning and other comparable destructive fishing practices are prohibited under Icelandic law. Legal Instruments are in force which specifies 'legal gears' for each method of fishing. Article 9 of Act No. 79/1997 states that the Minister shall take the necessary measures to prevent fishing practices which can be regarded as harmful to the efficient utilisation of the commercial stocks and preservation of sensitive ocean areas.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

1.1.1.4. 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:
Digital tools for publication allow almost real-time publishing of results and decisions, including results of stock assessments, MFRI advice and catches and quota status even for individual vessels. Interested parties participate in decisions processes through regular meetings between industry and management authorities.

Evidence:

Several mechanisms exist for ensuring transparency. Digital tools for publication are used extensively, where results and decisions are published once they are ready. The assessment of saithe is done by the ICES North-Western Working Group (NWWG)[77]. ICES provides advice based on the results from NWWG[78]. The advice and the NWWG report are publicly available at the ICES website. The final advice to Icelandic authorities is provided by MFRI. The MFRI advice tends to follow closely the advice for ICES. MFRI provides an overview of the state and the advice for each of all major Icelandic stocks on its website once the advice is ready in June each year [79]. Likewise, the Directorate has a very transparent system for real time publication of catches and quota status even for individual vessels[80]. Furthermore, the Directorate of Fisheries publishes the level and type and infringements recorded in the fisheries annually (see clause 2.1.1 for further details and infringements tables).

Interested parties participate in decisions processes through regular meetings between industry and management. A special consultation group of the MFRI meets every year and reviews different sources and information regarding the main demersal stocks and fisheries in the Icelandic EEZ. The consultation group consists of experts from the MFRI and fleet managers and skippers from many places around the country which conduct fisheries on small and large vessels with different gears. When the advice has been made available the Minister consults with representatives from the main stakeholders before decision is taken and regulation on commercial fisheries is issued.

One of the more important sources of information used by the MFRI in its research is logbooks from skippers which are sent to the MFRI. Account is taken of these sources and information in research, quantification and advice as appropriate. Being a small nation, the Icelandic society is quite transparent. For example, several institutions often emphasize the value of direct communication and of knowing people. That transparency is facilitated by institutions like the Fisheries Directorate, having offices in all parts of the country.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

77 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2019/NWWG/10%20NWWG%20Report%202019_Sec%2008_Icelandic%20Saithe.pdf

78 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

79 For saithe: https://www.hafogvatn.is/is/veidiradgjof/ufsi

80 An English version is found in http://www.fiskistofa.is/english/quotas-and-catches/

1.1.1.5. 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:
The ITQ system gives fishermen the option and flexibility to target specific species and fishing grounds across the fishing year, minimising potential conflicts with other operators.

Evidence:
The ITQ system gives fishermen the option and flexibility to target specific species and fishing grounds across the fishing year, minimizing potential conflicts with other operators. Furthermore, the Ministry can and does close areas for certain gears, a map of these gear specific closures is available under clause 1.1.3. Quota allowances for Coastal fisheries (smallest fishing boats in Iceland) also serve to avoid the potential for conflicts although some competition between smaller and larger vessels about favorable fishing grounds may occur.

The Coast Guard operates the Icelandic Maritime Traffic Service within its operations centre. This centre is a single point of contact for all maritime related notifications, involving, for example, the Maritime Rescue Co-ordination Centre, the Vessel Monitoring Centre and the Fisheries Monitoring Centre. This traffic centre has a key role in ensuring safety at sea, but can also take action if the behaviour of a fishing vessels is unusual. Major conflicts between vessels and gears in Icelandic fishing grounds do not appear to be common.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

The Fisheries Management Plan

1.1.1.6. Clause 1.1.7.

Fishing for the "stock under consideration" shall be managed by the competent authorities in accordance with a documented and publicly available Fisheries Management Plan.[81]

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Icelandic saithe is subject to a formal Fishery Management Plan and harvest control rule, revised in 2019.

Evidence:
Icelandic saithe is subject to a formal Fishery Management Plan[82] and harvest control rule [83] and managed under the overarching responsibility of the Ministry of Industries and Innovation. The plan was revisited as part of a benchmark process in 2019. The plan, which aims at providing maximum sustainable yield, has been evaluated by ICES and is considered to be precautionary[84].

The management of saithe is part of the general fisheries management in Iceland, and rules and regulations that apply in general apply to saithe as well. These elements, as outlined in previous clauses (Clause 1.1.1 - 1.1.3) and in Clauses 1.1.8 - 1.1.10, include:

- A legal basis for relevant management measures
- Organized distribution of authority and responsibility between institutions.
- Support for regular stock assessments, including monitoring of catches, trawl surveys, sampling of biological data and assessments in an international framework.
- Organized advice following assessments according to an agreed harvest rule.
- Quotas in an ITQ system
- Technical regulations of fishing gear, area and season
- Control and enforcement of regulations.

Some elements are specific to saithe, for example the stock assessment and the harvest rule. All these elements are in place, documented and publicly available.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

81 FAO Code of Conduct, art. 7 .3.3.
82 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
83 https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
84 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

1.1.1.7. Clause 1.1.8.

The Fisheries Management Plan developed and adopted by the competent authorities shall be formulated with due consideration to the following:

1.1.8.1 The management unit;

1.1.8.2 Specification of stock or component stocks of "stock under consideration";

1.1.8.3. Jurisdiction areas and the respective competent authorities for the entire range of component stock(s) of "stock under consideration";

1.1.8.4. The long-term harvesting policy, consistent with achieving optimum utilization, including the means for assurance of its consistency with the precautionary approach to fisheries management.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The unit managed by Icelandic authorities is saithe in Icelandic waters. The relevant stock of saithe is confined to Icelandic waters and managed by national authorities. The long term harvesting policy is to set annual quotas in accordance with a harvest rule that has been demonstrated by simulations to imply low risk of exceeding limit reference points and to provide a yield close to the maximum sustainable yield.

Evidence:

Icelandic saithe is subject to a formal Fishery Management Plan[85] and harvest control rule[86]. The unit managed by Icelandic authorities is the Icelandic saithe stock distributed all around Iceland, and in stock assessment and management saithe within Icelandic EEZ waters is assumed to be a single homogeneous unit.

Icelandic saithe (*Pollachius virens*) is fairly abundant in the coastal waters around Iceland and is mostly limited to the Icelandic continental shelf. It spawns in February-April along the coast mostly in the South and West. The 0-group and juveniles drift clockwise around the coast and are found in shallow bays and coves until they migrate to deeper waters at ages 1-2. Saithe can migrate between areas[87]. Saithe stocks in the Northeast Atlantic intermingle as a result of migration among stock areas. The extent of migration has been poorly quantified. Homrum et al., 2013 estimated measures of the migration based on existing tagging data from Icelandic, Faroese and Continental (Scotland, North Sea and Norway) waters. Saithe tagged in Icelandic waters were seldom caught outside Icelandic waters (<1% of tag returns) showing limited evidence of emigration, whereas 42% of adult saithe tagged in Faroese waters were recaptured outside Faroese waters. Of adult saithe tagged in Norwegian waters 6.6% were recaptured outside Continental waters. In broad terms, there was a net migration of saithe towards Icelandic waters. The distance between tagging and recapture increased with increasing size and age, with saithe tagged in Norwegian waters moving the longest distances. The results demonstrate significant, but variable, migration rates of adult saithe in the Northeast Atlantic. More detailed studies are needed to clarify the mechanisms behind the migration and what causes the differences among the areas. Episodes with immigration to Iceland are known, and one (age 7 in 1991) such event has been formally taken into account in the assessment.

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

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

87 Homrum, E. í, Hansen, B., Jónsson, S. Þ., Michalsen, K., Burgos, J., Righton, D., Steingrund, P., Jakobsen, T., Mouritsen, R., Hátún, H., Armannsson, H., and Joensen, J. S. 2013. Migration of saithe (Pollachius virens) in the Northeast Atlantic. – ICES Journal of Marine Science, 70: 782 – 792.

Information about stock structure (metapopulation) of saithe in Icelandic waters is limited, but there is no evidence of sub-stocks. The long term harvesting policy is to set annual quotas in accordance with a harvest rule (see Clause 1.1.3. and 1.1.9 for details) that has been demonstrated by simulations to imply low risk of exceeding limit reference points and provide a yield close to the maximum sustainable yield.	
References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.1.8. Clause 1.1.9.

The Fisheries Management Plan shall specify:

1.1.9.1. The long term objective(s) of the fisheries management, including target(s) for stock biomass and target value(s) or range(s) for fishing mortality or its proxy;

1.1.9.2. Limits with respect to precautionary management, including the limit reference point for stock size or its proxy and the limit reference point for fishing mortality or its proxy (e.g. harvest as a proportion of stock size, etc.)[88], as well as remedial action to be taken if limits are approached or exceeded;

1.1.9.3. The applicable harvest control framework or harvest control rule, as appropriate.

1.1.9.4. The primary approach applied to managing the fisheries {e.g. input controls, output controls, etc.).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The long term objective in the Management plan is to maintain the exploitation rate at the rate which is consistent with the precautionary approach and that generates maximum sustainable yield (MSY) in the long term. This is achieved primarily by setting quotas according to a harvest rule. The rule states a fixed harvest rate as a proxy for a target fishing mortality which is reduced if SSB is below a trigger value. There are limit values for SSB and fishing mortality defined, and simulations have demonstrated a low risk to exceed the limits.

Evidence:

The long term objective is stated in the collection of management plans published by the Ministry. [89]

The management strategy for Icelandic fish stocks in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term.

The general aspects of the plan for saithe are discussed in detail in Clause 1.3. The primary approach to managing the fisheries is through output control in terms of a TAC set according to the state of the stock.

The HCR with these parameters was re-evaluated by ICES in 2019, and still found to be consistent with the Precautionary Approach. The trigger SSB ($MGMT_{Btrigger}$) was changed from 65kt to 61kt, to bring it in conformance with ICES standards. Other rule parameters were unchanged[90]. Associated to the harvest rule are precautionary and MSY reference points, that were also revised in 2019.

The harvest rule has a trigger value for SSB and a standard target harvest rate as a proxy for a target fishing mortality[91]. The final TAC is adapted to the TAC the year before, to reduce year-to-year fluctuations. The TAC according to the management plan is calculated as follows.

When SSB ≥ MGMT $B_{trigger}$, the TAC set in year y equals the average of 0.20 times the current biomass and last year's TAC:

88 F_{lim} can be explicit, or implicit in cases where harvest rate is set annually to a precautionary F_{lim} (or its proxy)]

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

90 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

91 This version of the rule appears in the ICES advice and (in an equivalent form) in the stock annex. The Ministry web page has a different formulation, which most likely is wrong. The discrepancies only have effect if SSB<Btrigger. So far, that has not happened.

$TAC_{y+1/y} = 0.5 \times HR_{MGT} B_{y,4+} + 0.5\ TAC_{y/y-1}$ (Eq. 1)

When SSB is below MGMT $_{Btrigger}$, the harvest rate is reduced below 0.20:

$TAC_{y+1/y} = SSB_y/MGMT\ B_{trigger}\ [\ (1 - 0.5\ SSB_y/MGMT\ B_{trigger})\ HR_{MGT} B_{y,4+}\ ) + 0.5\ TAC_{y/y-1}\ ]$
(Eq. 2)

with the parameters:
MGMT $B_{trigger}$: 61 kt
HR_{MGT}: 0.20

Here, year y is the assessment year, where the stock abundance is estimated at the start of year y. $TAC_{y/y+1}$ is the TAC for the fishing year y/y+1, HR_{MGT} is the standard harvest rate, which is reduced if SSB in the year y+1 is projected to be below $B_{trigger}$. The TAC is a compromise between what is derived from biomass and harvest rate, and the TAC the year before. The formula describes an almost linear reduction of the TAC if SSB becomes low, even when taking the previous TAC into account, implying zero catch at SSB = 0 independent of the previous TAC.

The simulations included in the ICES advice provide the distributions of 4+ biomass, SSB, and realized harvest rate expected to result with the proposed HCR. These distributions may be used in the future to check that realized ranges are compatible with expectations. If future observed values were to go outside the range illustrated, this would indicate that there is a need to re-evaluate the assumptions of the simulations.

References:	As referenced in the text.

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

1.1.1.9. Clause 1.1.10.

The Fisheries Management Plan shall also consider the following:

1.1.10.1. The specific management method/approach or measures, according to fleet or jurisdiction or other relevant variables as appropriate;
1.1.10.2. Any further measures which support meeting the management objectives;
1.1.10.3. The institution(s) or arrangement(s) responsible for providing stock assessment and advice;
1.1.10.4. A description of the process for making decisions on Total Allowable Catch (TAC) - how and on what basis management decisions are made;
1.1.10.5. Provisions for considerations and consultation with the fishing industry and relevant authorities.
1.1.10.6. The means of implementing the management approach, including main provisions for monitoring, control, surveillance and enforcement
1.1.10.7. The objectives and management measures relevant to ecosystem effects of the fishery.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The primary management method is quotas set according to a harvest rule that has been shown to be in accordance with the precautionary approach and lead to near maximum long term yield. The quota regulations are supplemented by area closures, mesh size regulations, sorting grids in selected fisheries, discard ban and surveillance at sea and at landing sites. The quotas are derived from an assessment, performed with approved methodology by the ICES NWWG, and finally decided by the Ministry taking advice from MFRI and the industry.

Evidence:
The primary management method is quotas in an ITQ system set according to harvest control rule[92] that has been shown to be in accordance with the precautionary approach and lead to near maximum long term yield. This is specified in the saithe Fishery Management Plan (FMP).

Furthermore, the FMP details that core ITQ regulations are supplemented by area closures, mesh size regulations, sorting grids in selected fisheries, discard ban and related flexibility measures and surveillance at sea and at landing sites (Clause 1.1.3).

The FMP also explains that quotas are derived by applying the harvest rule to the outcome of the yearly stock assessment, performed with approved methodology by the ICES NWWG (Clause 1.2.2), and finally decided by the Ministry taking advice from MFRI and industry stakeholders (see Clause 1.1.5 for further details).

The Ministry bases its decisions on annual total allowable catch on the recommendations of the MFRI as well as consultation with stakeholders [93]. There are specific consultation groups between fishermen and the MRFI that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously.

Provisions for monitoring, control, surveillance and enforcement are dealt with in Section 2.

92 https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
93 http://www.fiskistofa.is/english/fisheries-management/

The FMP describes management measures and objectives relevant to ecosystem effects of the fishery as follows:

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. Similar restrictions are implemented elsewhere based on engine size and size of vessels and large bottom trawlers are not permitted to fish closer than 12 nautical miles to the shore.

In many areas special rules regarding fishing gear apply, e.g. a requirement of using a sorting grid when fishing for shrimp to avoid juveniles and small fish and an obligation to use bycatch- or juvenile grid when fishing for pelagic species in certain areas to protect other species and juveniles.

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. Known cold-water coral reefs and hydrothermal vents are protected through permanent closures. The MRI provides advice on closures to protect VMEs which are promptly processed within the Ministry Industries and Innovation.

References:	As referenced in the text.

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

1.1.2. Clause 1.2. Research and Assessment

1.1.2.1. Clause 1.2.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The Marine and Freshwater Research Institute (MFRI) which is the main research institute in marine science in Iceland, is regarded as the competent research institute. Data collection for assessment purposes, both from the fishery and surveys, is performed by the MFRI in cooperation with the Fisheries directorate. MFRI issues advice on individual stocks on the web once it is ready. The report from the underlying stock assessment and the ICES advice are readily accessible on the ICES website.

Evidence:

The Marine and Freshwater Research Institute (MFRI)[94] is regarded as the competent institute. It is the main research institute in marine science in Iceland. The MFRI is owned by the Ministry of Industry and Innovation to which it is responsible for the provision of scientific advice. The MFRI covers all major fields in marine science and its remit was recently extended to include inland waters.[95] The MFRI has a staff of about 190 with sections for demersal resources, pelagic resources, aquaculture, freshwater resources and the marine environment, as well as supporting sections, including sampling and computing.

The MFRI has two research vessels Árni Friðriksson (LOA 69.9 m) and Bjarni Sæmundsson (LOA 56 m). The former, delivered in 2000, is a modern multi-purpose research vessel designed for fisheries and oceanographic research, principally in the North Atlantic Ocean, temperate and arctic water, and equipped to modern standards for a marine research vessel.

Data collection for assessment purposes, both from the fishery and surveys, is performed by the MFRI, in cooperation with the Fisheries Directorate. Assessment procedures and the data that are needed for the assessment are discussed in detail together with the assessment method in Clause 1.2.2. Data needed for evaluation of the state of the ecosystem, in addition to those needed for assessments of the range of stocks, come from various sources, both scientific surveys, log books, scientific projects and others as further discussed in Section 3.

MFRI has wide international cooperation in all major fields of marine science, as indicated by its publication record[96].

MFRI participates in providing annual stock assessment and international advice by ICES, which for the saithe is done by the ICES North Western Working Group (NWWG). MFRI issues advice on individual stocks

94 www.hafro.is, www.hafogvatn.is/en
95 http://www.althingi.is/lagas/148a/2015112.html
96 https://www.hafogvatn.is/is/midlun/utgafa/ritaskra

in June each year[97]. On its website, there is also links to publication records and to news form the institute. The report from the underlying stock assessment and the ICES advice are readily accessible on the ICES website[98].	
References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

97 https://www.hafogvatn.is/en/harvesting-advice
98 http://www.ices.dk/publications/library/Pages/default.aspx

1.1.2.2. Clause 1.2.2.

The relevant data collected/compiled shall be appropriate to the chosen method of stock assessment for stock under consideration and sufficient for its execution.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The saithe stock is assessed using a forward running statistical catch-at-age model fitted to total annual landings, catch numbers at age and indices at age from bottom trawl surveys in the spring. Landings data are provided by the Fisheries Directorate. Age distributions and weights and maturities at age are obtained from samples taken by MFRI from catches and in surveys. The survey is extensive and covers the whole Icelandic shelf. The assessment method was last reviewed and endorsed by ICES in 2019.

Evidence:

At the last benchmark in 2019 (WKICEMSE 2019), an assessment software named Muppet was adopted. Essentially the same model has been used for saithe since 2010. The Muppet software integrates the historical assessment with management plan simulation. The management plan that has been in effect for saithe in Division 5.a since 2013 was examined again and accepted based on this assessment at the same meeting, see Clauses 1.1.7 - 1.1.10.

Historical data and stock abundance.

In the early years of ICES assessments, the stock was assessed further back in time. Tabulated annual catch in numbers at age of the Icelandic saithe catches can be found from 1960 onwards in early reports of the Saithe (Coalfish) Working Group. A VPA analysis was done already by the 1973 group and abundance estimates were made with these data until after 2000. However, it seems clear that these data were derived using non-representative samples and fixed weights and that the estimate of the dynamic range in that period depends heavily on what was assumed for weights and the selection of data. Still, in more quantitative terms, the dynamic range of SSB in the period after 1980, which is covered by the present assessment, appears to be within the range in the longer time series[99].

The assessment of saithe has always been difficult, perhaps mostly to noisy supporting (survey) data, and a wide range of methods have been applied. Figure 22 shows some examples of estimates of SSB in assessments in the past, illustrating the divergent perceptions even of historical biomass. This has influenced reference points, leading to far higher Blim and quite restrictive advice in the past.

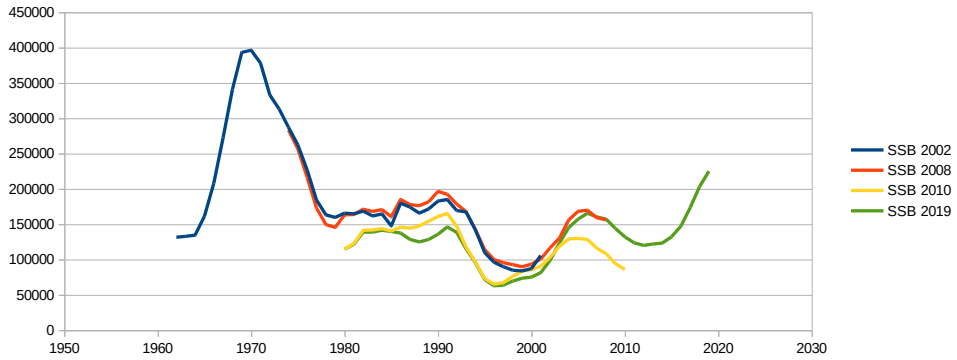


Figure 22. Estimates of SSB in some previous assessments.

99 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

With the method applied since 2010, the assessment is run as a statistical catch–at-age model that covers the years 1980 onward and ages 1 to 14, (catches in numbers from age 3). The data that are used in the assessment are discussed here. The assessment itself is described in more detail in Clause 1.2.3.

Yearly total landings in tonnes. These data come from a complete census of all landings, provided by authorized weighers at each landing site. These data are also used for managing the ITQ system (Clause. 1.1.3) Since 1980, these data are collected and kept by the fisheries directorate or its precursor. Older data are from the Statistical Bulletin, with uncertain accuracy; they are not used in the assessment of saithe. Figure 23 shows the annual landings since 1955, for Icelandic and foreign vessels. Until the late 1970ies, a substantial part of the catches was taken by foreign vessels. After the establishment of the 200 nm EEZ, most catches have been by Icelandic vessel, the only exception being small catches by Norway and Faroes. The landings have some marked peaks, around 1970 and 1990, probably associated with a larger stock.

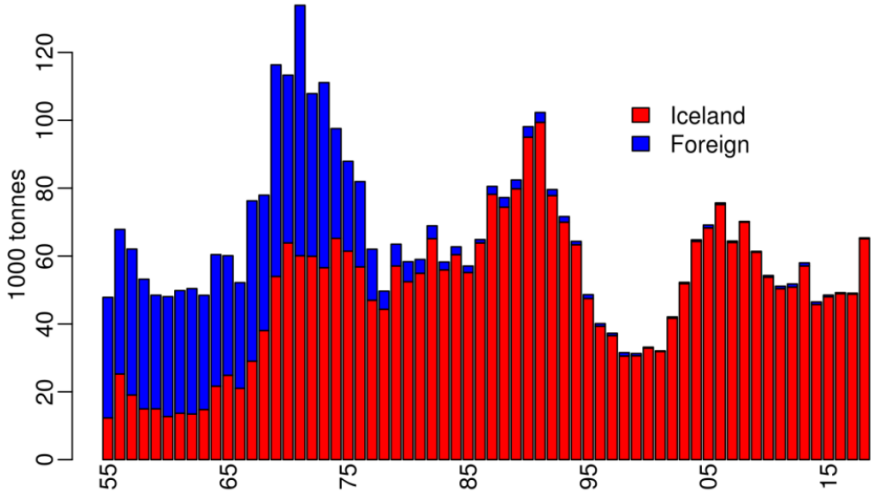


Figure 23. Annual landings of saithe

Most of the catches of saithe are taken by bottom trawl (Figure 24). Previously, gillnet catches were important, but they have been greatly reduced. Saithe is not caught with longline in any significant manner.

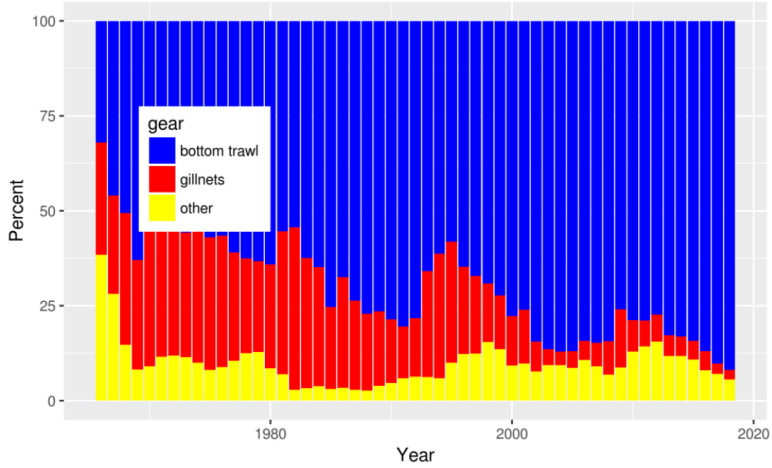


Figure 24. Annual catches in tonnes of saithe by gear.

Saithe is both demersal and pelagic. They can be found all around Iceland, but has been most common in the warm waters south and southwest off Iceland. In last decade the distribution has gradually become more northerly and in 2017 and 2018 more than 50% of the catches were taken north-west of Iceland (Figures 25 and 26). A similar shift in distribution has been seen in several stocks (haddock, ling, tusk). The reason is not obvious, but changes in distribution of prey has been suggested. Saithe tends to follow pelagic prey, like herring and blue whiting.

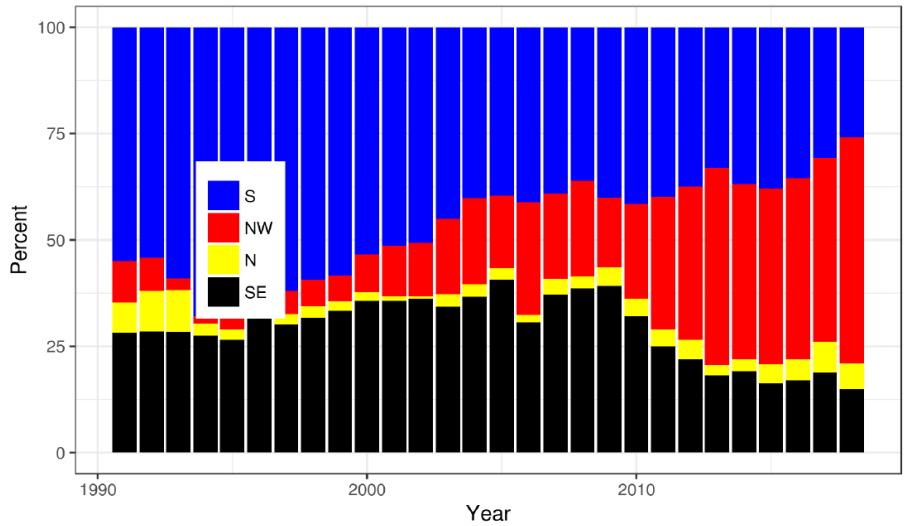


Figure 25. Proportion of catches of saithe by region.

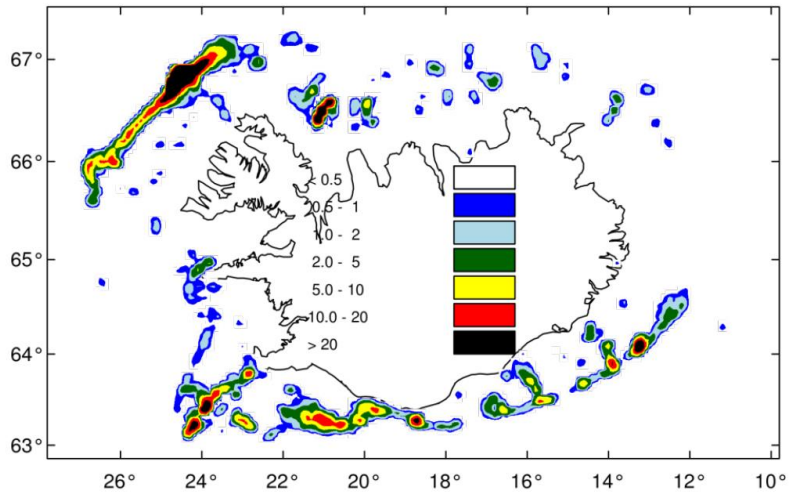


Figure 26. Location of catches (all gears) 2017/18 according to log books.

Yearly catches in numbers at age

The landings are converted to catch numbers at age by applying age distributions and individual weights from samples. These samples are mostly taken by MFRI staff, but some by staff from the directorate (mostly length samples). The sampling by the staff of the Marine Research Institute is directly linked to the daily landings statistics available from the Directorate of Fisheries. For each species, each fleet/gear and each landing strata a certain target of landings value behind each sample is pre-specified. Once the cumulative daily landings value pass the target value an automatic request is made to the sampling team for a specific sample to be taken.

However, it is noted that getting a representative sample is often difficult as large part of the catch is length categorized at sea. In that case samples must be taken from each length category and they weighted by the amount landed in each category. Sometime, the crew of fishing vessels is asked to take aside for the MRI one tub of fish that has not been length categorized. The branches of MFRI around Iceland that conduct the sampling tend to cooperate with the crew of certain vessels, and do often get most of their samples from those vessels. Investigation of the time and location of samples from each gear compared to amount caught show reasonable coherence. Sampling from catches is also done by employees of the Fisheries directorate, both to monitor occurrence of fish below landings size but also to monitor discard due to high grading.

Table 6. Number of samples and number of fish aged by gear type.

Fleet	Landings (t)	No. of otolith samples	No. of otoliths read	No. of length samples	No. of length measurements
Long lines	802	0	0	0	199
Gillnets	1346	2	46	3	375
Jiggers	1182	2	48	4	291
Danish seine	905	2	50	3	561
Bottom trawl	44234	50	1226	125	23830
Other gear	596	0	0	0	0
Total	49057	83	1370	135	25057

The number of samples and the number of otoliths read is shown in Table 6. The numbers vary somewhat from year to year, but are regarded as sufficient to obtain satisfactory input data to the assessment.

Numbers at age are calculated from length distributions and age-length keys from these samples of the fishery.

Mean weight at age in the catch are obtained from length distributions at age in the catches and a fixed length-weight relationship. The same method is used to compile number and biomass by age at each station in the survey, that is then the basis for age based survey indices and mean weight at age in the survey. Weight at age in the catches is also used as weight at age in the reference biomass and the spawning stock.

Predicted weights (Catch weights CW and stock weights SW) for the assessment year y are estimated by applying a linear model using current survey weights and weight of the year class in the previous year as predictors:

$$\text{Log}(CW_{y,a}) = \beta 0 + \beta 1 \log(CW_{y-1,a-1}) + \beta 2 \log(SW_{y,a})$$

Most saithe is landed gutted. Fishing vessels typically land gutted fish, but the quota allotted to the vessels is terms of ungutted weight, as is the assessed biomass. A fixed factor (0.84 for saithe) is used to convert ungutted to gutted[100]. Although the actual ratio may be somewhat different, this factor just acts as a scaling factor, and has no other impact on the assessment.

100 http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/slaegingarstudlar/ (Saithe is ufsi)

Maturity-at-age data are obtained from the groundfish survey in March, which takes place close to the spawning time. The data are smoothed, as there are quite large year-to-year fluctuations in the observed maturities.

Natural mortality. No information is available on natural mortality. For assessment and advisory purpose the natural mortality is set to 0.2 for all age groups.

Spawning time: For saithe, SSB is calculated by 1. January.

Catch per unit of effort is recorded routinely, but not used in the assessment. The trends have some similarity to trends in the assessment

Surveys

Two bottom trawl surveys are conducted in Icelandic waters: the Spring Survey in March (1985–2019) and the Autumn Survey in October (1996–2018) (except in 2011). In addition, there is a gillnet survey in April, covering the spawning grounds. Only the spring survey is used in the assessment of saithe, as this is the most consistent.

The spring survey is primarily conducted with rented commercial trawlers, of a type built in 1972-73, all almost identical. Each year, up to five trawlers have participated in the survey, each in a different area (NW, N, E, S, SW). The trawlers are now considered old and it is likely that they will be decommissioned soon, so the search for replacements has started. The survey gear is based on the trawl that was the most commonly used by the commercial trawling fleet when the survey started in 1984–1985. It has a relatively small vertical opening of 2–3 m. The headline is 105 feet, fishing line is 63 feet, footrope 180 feet and the trawl weight 4200 kg (1900 kg submerged). Length of each tow was set at 4 nautical miles and towing speed at approximately 3.8 nautical miles per hour. The minimum towing distance for the tow to be considered valid for index calculation is 2 nautical miles. Towing is stopped if wind is more than Beaufort force 8 (17–21 m/s.)

The stations in both surveys are shown in Figure 27 and the abundance indices in Figure 28.

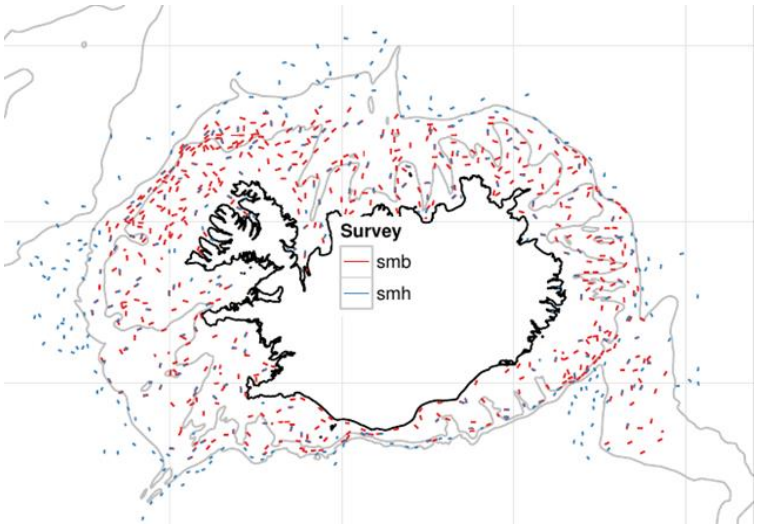


Figure 27. Bottom trawl surveys in Iceland. Red is spring survey, blue is autumn survey. These are the stations in 2013, but they vary very little from year to year.

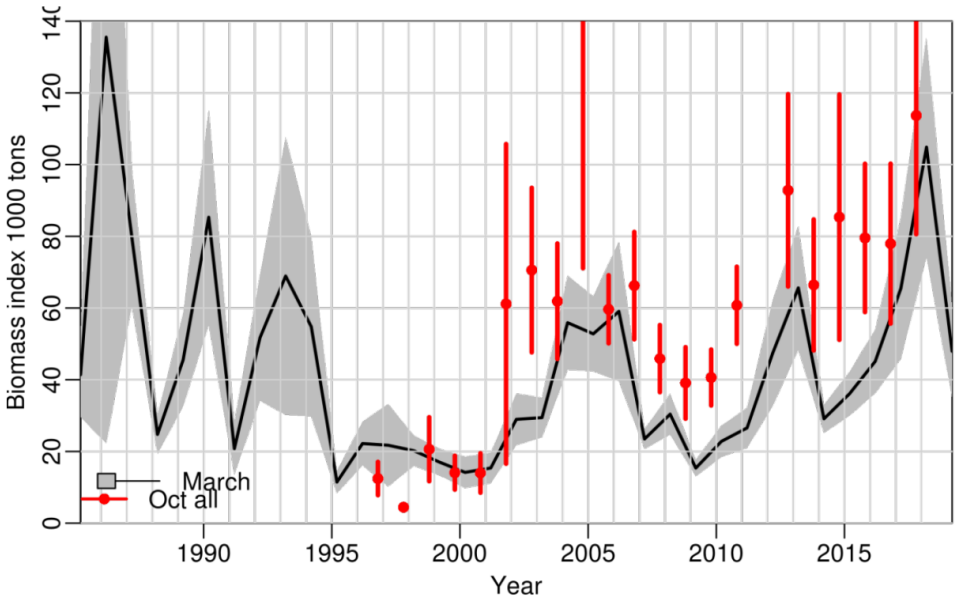


Figure 28. Indices in the Spring survey (March) - line shaded area) and the Autumn survey (point ranges)[101].

The survey indices differ between the surveys, the indices for the autumn survey being higher. This should not be problematic in itself, but the ratio is not always consistent over time and the autumn survey appears more noisy.

An extensive survey protocol exists for these surveys.[102] The English translation is of the manual from 2009, but there are at most minor changes from year to year.

In the surveys, fish of all species is length measured, in randomly collected samples. For the more important species, including saithe, random samples are taken for otolith reading, as well as length, weight (gutted and ungutted), sex and maturity. The number taken for otolith reading varies with the amount, for saithe it will be 5-25. The selection of fish to be sampled for age is linked to the length measurement - the computer is programmed to send a sound signal for every n length measured fish, where n depends on the otolith sampling ratio for the species.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

101 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2019/NWWG/10%20NWWG%20Report%202019_Sec%2008_Icelandic%20Saithe.pdf

102 https://www.hafogvatn.is/static/research/files/fjolrit-156.pdf

1.1.2.3. Clause 1.2.3.

Stock assessments shall be based on systematic research of the size and/or productivity of the fish stock(s).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The state of the stock and its tolerance to exploitation is assessed using the assessment tool 'Muppet' which is used as a forward running statistical catch at age type of model, tuned to the results of the spring bottom trawl survey. Data on individual growth and maturity is obtained from samples of the commercial and survey catches and the survey. Natural mortality has assumed values. The quality of the assessment appears satisfactory, as expressed by the moderate retrospective inconsistency All the signs from commercial catch data and surveys as well as the assessment indicate that saithe in 5.a is at present in a good state.

Evidence:

The assessment is run as a forward projecting stock model fitted to catch numbers at age, total catches and survey indices at age from the bottom trawl survey. Table 7 lists the data that are used in the assessment that are described in detail in Clause 1.2.2. The software has been named 'Muppet' and is written in AD-model builder. It is described in detail in the ICES stock annex for saithe[103] and in the 2019 NWWG report.[104] The code and detailed technical documentation can be found on github.[105] The assessment part It is linked to a management strategy evaluation module, where uncertainties derived from the fit of the assessment model (using MCMC) is used to generate uncertainties in the simulation part without making full assessments within the simulations. The application of the method to saithe was endorsed by ICES in a benchmark process in 2013 and confirmed in 2019, together with the management plan and reference points. The main results of the most recent assessment (2019) are shown in Figure 29.

Table 7. Input data types and characteristics.

Type	Name	Year range	Age range	Variable from year to year Yes/No
Caton	Catch in tonnes	1980-onward		Yes
Canum	Catch at age in numbers	1980-onward	3-14	Yes
Weca	Weight at age in the commercial catch	1980-onward	3-14	Yes
West	Weight at age of the spawning stock at spawning time.	1980-onward	3-14	Weca is used as West.
Mprop	Proportion of natural mortality before spawning	1980-onward	3-14	No, kept fixed at 0.
Fprop	Proportion of fishing mortality before spawning	1980-onward	3-14	No, kept fixed at 0.
Matprop	Proportion mature at age in the survey	1980-onward	3-14	Yes, but modelled with a smoother.
Natmor	Natural mortality	1980-onward	3-14	No, kept fixed at 0.2.

103 http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf

104 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2019/NWWG/10%20NWWG%20Report%202019_Sec%2008_Icelandic%20Saithe.pdf

105 https://github.com/hafro/Muppet_HCR

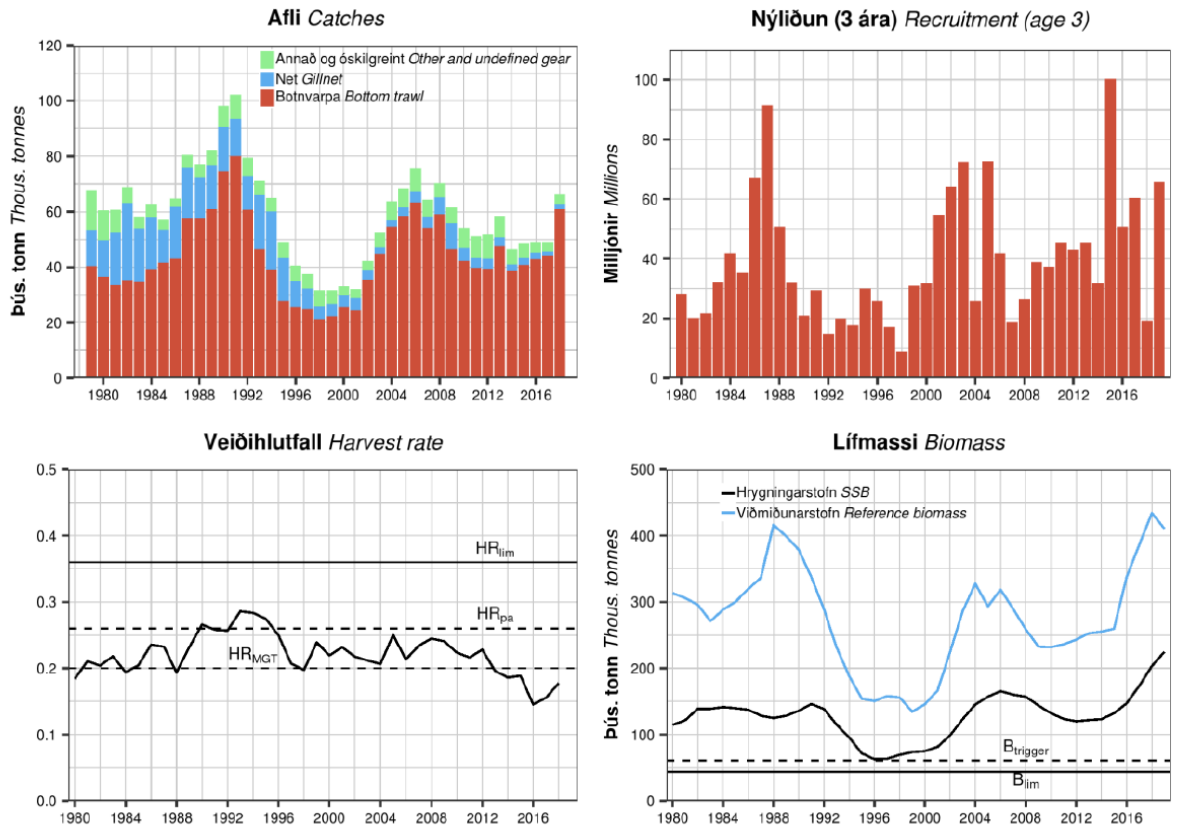


Figure 29. Assessment results Catch by gear type, recruitment, harvest rate, reference stock biomass (B4+) and spawning stock biomass (SSB).

The application of the method to saithe was endorsed by ICES in a benchmark process in 2013 and confirmed in 2019, together with the management plan and reference points.

The assessment of saithe has been problematic, and several methods have been explored over the years. The present method was introduced in a benchmark process in 2010, and has been used since. In addition, each year several other assessment methods have been applied for comparison. As shown in the table 8, various sources of information and model configurations are tested routinely, with somewhat diverging results. Model 1 is the approved assessment, with selection in the fishery at age split in 3 periods,

Table 8. Alternative methods run for comparison. Number one is the approved assessment.

nr	Type of model and settings	B4+ 2018	TAC
1	Separable 3 period	410	80.5
2	Survey outliers removed	459	85.3
3	Separable spring survey and autumn survey since 2000	476	87.2
4	Separable 3 periods 2018	477	84.8
5	SAM Spring survey	323	71.9
6	SAM Spring survey and autumn survey since 2000.	384	71.9

Main metrics based on alternative models and settings. All models except model 7–9 are based on more or less same code. Model 2 uses different data, i.e. survey indices are compiled by Winchorizing. SAM can lead to quite different runs based on the settings, for example number of observation variances.

The quality of the assessment appears satisfactory, as expressed by the moderate retrospective inconsistency (Mohn's rho = 0.114 for the reference B4+. (Figure 30). All the signs from commercial catch data and surveys indicate that saithe in Division 5.a is at present in a good state. This is confirmed in the assessment. Also, the harvest rate is below the target in recent years, which corresponds to the catches being below the quotas. Nevertheless, scrutiny of the details revels some issues that may be worth further examining, but should not be detrimental to the management. The survey data are noisy, which is to be expected with a semi pelagic, schooling fast swimming species. Linked to that is clustering in survey residuals.

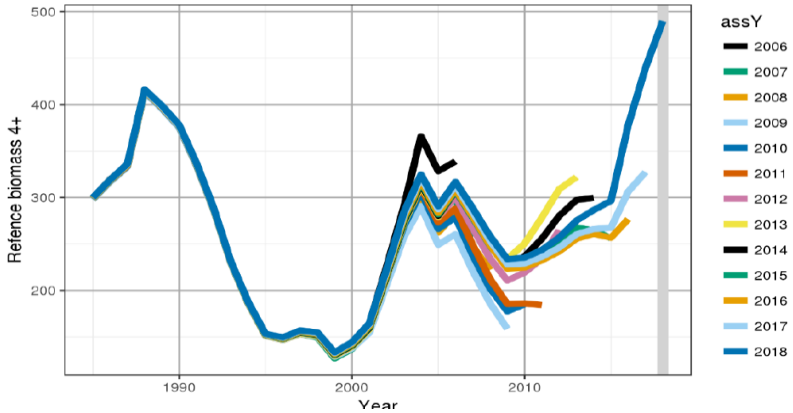


Figure 30. Retrospective pattern for the assessment model. The figure shows estimate of B4+. The grey vertical lines shows the year 2018.

The productivity of the stock is derived from recruitment estimates and yield per recruit. These are results from the assessment rather than input to the assessment, although the life history data that go into these analyses are based on regular samples, as outlined in Clause 1.2.2. Figure 31 shows the stochastic yield and biomass per recruit as function of the fishing mortality. The target harvest rate in the rule gives a long term yield close to the maximum, with a low probability of bringing the stock below the limit biomass.

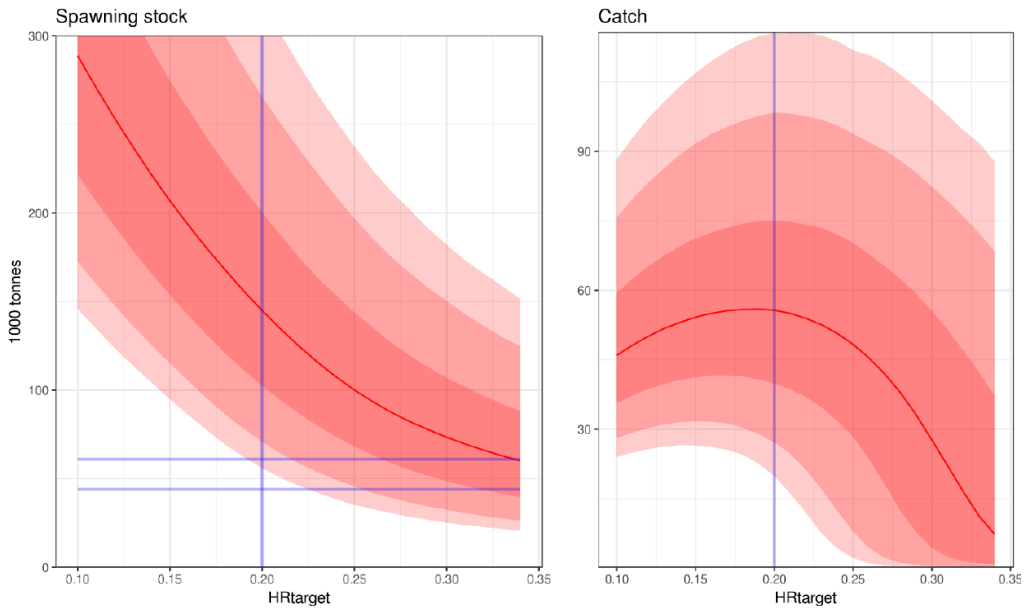
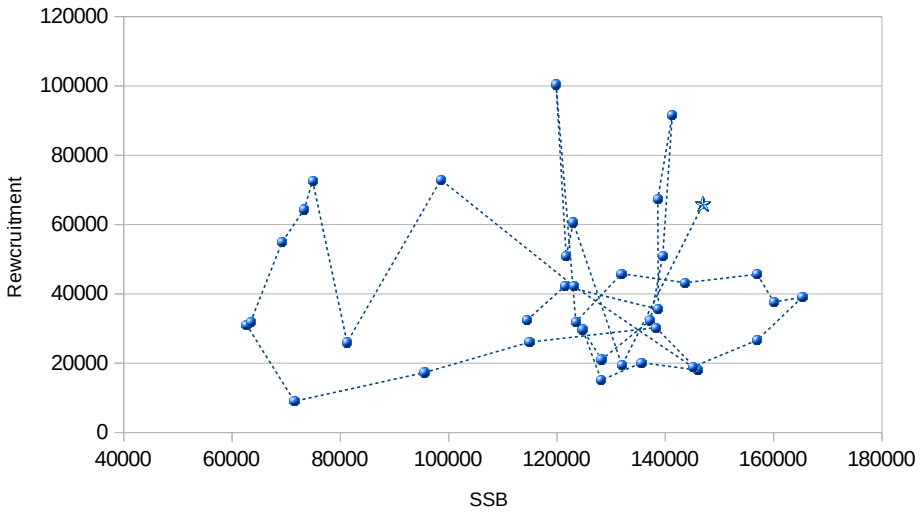


Figure 31. Equilibrium catch curve (left panel) and corresponding SSB (right panel) as a function of harvest rate (HR). In both panels, the solid red curves indicate the median of the distribution and the ribbons 5, 10, 25, 75, 90 and 95 percentiles. The vertical line is HR_{MGT} (0.2) and the horizontal lines Bpa and Blim.

Within the time frame covered by the assessment, recruitment does not seem to be dependent on the SSB (Figure 32, upper panel). There was a dip in both in the mid 1990ies, but the recruitment changed first, and the SSB followed (Figure 32, lower panel).



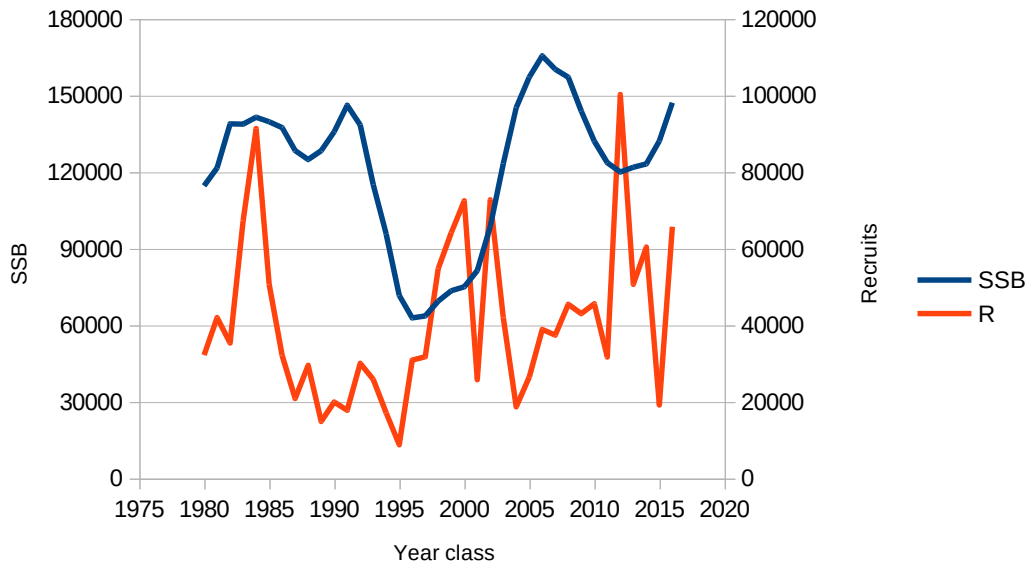


Figure 32. Icelandic saithe: Stock-recruit plot (upper) and time course of stock and corresponding recruitment. Time of recruitments is for the year when the year-class is born. Stock and recruit plot. The blue star in the scatter plot is the last pair (2016 year class).

Considerable changes have occurred in the distribution of saithe in Icelandic waters. One reason for this shift may be related to the distribution and availability of prey. The Northwards shifts in the distribution of saithe has been seen in other species as well, for example ling and tusk, which may be linked to increased temperatures.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.2.4. Clause 1.2.4.

For the stock under consideration, the determination of suitable conservation and management measures shall include or take account of total fishing mortality from all sources in assessing the state of the stock under consideration, including:

1.2.4.1. Estimates of discards;
1.2.4.2. Unobserved and incidental mortality,
1.2.4.3. Unreported catches and catches in other fisheries.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Discards are prohibited. Some attempts have been made to estimate discards of saithe, but the amounts are too small to be measurable. Unobserved and incidental mortality is covered by the assumed natural mortality. The value for that is just assumed at a level that is regarded as sensible for most gadoids, including saithe. The strict control with landings by the Directorate and detailed monitoring of fishing operations by the Coast Guard should make black landings very unlikely.

Evidence:

Discards

Discards are prohibited in Iceland and are generally assumed to be minor, although direct measurements of discards is problematic and incomplete. MFRI does systematic comparisons of length distributions in catches of cod and haddock with and without inspectors from the Directorate on board[106] of fishing vessels. In some previous years, saithe was included in these studies, but the discarding was too low to be measurable. There is no strong incentives for discarding saithe, the quotas are not fully utilized.

Unobserved and incidental mortality is covered by the assumed natural mortality. The value for that is just assumed at a level that is regarded as sensible for species like saithe. No specific causes of natural mortality have been observed.

Unreported catches and catches in other fisheries. The strict control with landings by the Directorate and detailed monitoring of fishing operations by the Coast Guard should make black landings very unlikely.

The Faroes and Norway have some fishing permits in Icelandic waters, subject to the rules and regulation that apply to the Icelandic fleet. Foreign vessels must also notify the Icelandic Coast Guard 6 hours prior and post entering and leaving Icelandic waters and during their time within Icelandic waters. Landings were previously permitted at authorised foreign ports but this is no longer the case following Regulation No. 745/2016 (Article 1)[107]

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

106 https://www.hafogvatn.is/is/midlun/utgafa/haf-og-vatnarannsoknir/maelingar-a-brottkasti-thorsks-og-ysu-2014-2015.
107 https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0745-2016

1.1.2.5. Clause 1.2.5.

In the course of research and stock assessment, relevant traditional, fisher and/or community information and/or knowledge shall be sought by the researchers through appropriate means/fora.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

There is close communication between scientists and the fishing industry, both in formal meetings and through informal contact. There are specific consultation groups between fishermen and the MRFI that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously. Logbooks are compulsory. Their information is not used directly in the stock assessment, but is important fishing information for both managers and scientists.

Evidence:

There is close communication between scientists and the fishing industry, both in formal meetings and through informal contact. Being a small nation, the Icelandic society is quite transparent. For example, in consultations, several institutions, both in industry and management, often emphasize the value of direct communication and of knowing people. Over time, relevant traditional, fisher and/or community information and/or knowledge has been and continues to be integrated in the knowledge base of the fishery resulting in a dynamic evolution of its management.

There are specific consultation groups between fishermen and the MRFI that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously. MFRI also publishes short newsletters regularly providing up-dates on stock analysis and related research outcomes. During the site visits in October 2019, the Audit Team asked the large boat and small boat fishermen organisations representatives if they had enough opportunities to interface with mangers across the year, to which they answered yes. They also mentioned that fishermen have the ability to call MFRI managers, Fiskistofa staff or Coast Guard agents directly when issues arise or when they wish to discuss any matters relating to fishing operations, performance and fishermen behaviour on the fishing grounds. In summary, communication channels and opportunities between fishermen and managers appear to be sufficient and satisfactory.

Logbooks are compulsory (Regulation Nr. 746/2016). Generally, they are electronic and assembled by the Directorate; the smallest vessels can still use logbooks on paper. The logbook contains information about position, gear, time, duration and catch for each fishing operation, as well as by-catches of birds and mammals (this area is subject to improvement), and where the fish is landed. This information is not used directly in the stock assessment, but is important information and background material for both managers and scientists, for example for monitoring CPUE and location of fisheries.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.2.6. Clause 1.2.6.

There shall be active collaboration with international scientific organisations, with the aim of ensuring that the focus is on internationally acknowledged research and assessment methods that provide the best available information on the condition of the stock under consideration at any time.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Iceland participates actively in ICES and with other international organisations like NEAFC sand NAFO. The publication record of MFRI clearly shows broad international cooperation on published scientific work

Evidence:
Iceland is member of ICES, which is a key forum for scientific and management activities and cooperation. The cooperation includes:

1) Routine stock assessments and management advice for many commercial stocks, including saithe.
2) Quality control of assessment standards and management plans.
3) For decades, Icelandic scientists have had a high standing within ICES on development of assessment methods and computing tools as well as standards for precautionary management.
4) Participation in the broad scientific community in ICES.

The publication record of MFRI clearly shows broad international cooperation on published scientific work.[108]

Iceland actively cooperates with several international organisations, in particular NEAFC and NAFO. Furthermore, the Icelandic government has cooperation agreements with Norway, Russia, Greenland, EU and The Faroe Islands. These are bilateral fisheries agreements as well as control agreements and agreements regarding catch information and information on fisheries and the monitoring of fishing activity through satellite driven vessel monitoring systems (VMS)[109].

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

108 https://www.hafogvatn.is/is/midlun/utgafa/ritaskra
109 http://www.fiskistofa.is/english/international-cooperation/

1.1.2.7. Clause 1.2.7.

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: **The Icelandic saithe is regarded as a separate stock and managed as such by Iceland. Stock assessment and evaluation of the management plan is done in cooperation between interested nations within the NWWG in ICES.**				
Evidence: The Icelandic saithe stock is not considered a shared stock by scientist or managers, although there can be some migrations between areas[110]. Episodes with immigration to Iceland are known, and one (age 7 in 1991) is taken into account in the assessment. Stock assessment is carried out in cooperation between the interested nations within the NWWG in ICES. This is also the case for the evaluation of management plan.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

110 Homrum, E. í, Hansen, B., Jónsson, S. Þ., Michalsen, K., Burgos, J., Righton, D., Steingrund, P., Jakobsen, T., Mouritsen, R., Hátún, H., Armannsson, H., and Joensen, J. S. 2013.
Migration of saithe (Pollachius virens) in the Northeast Atlantic. – ICES Journal of Marine Science, 70: 782 – 792.

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

1.1.3.1. Clause 1.3.1. The Precautionary Approach

1.1.3.1.1. Clause 1.3.1.1.

The precautionary approach[111] shall be implemented to protect the stock under consideration.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The precautionary approach is implemented through defining precautionary reference points for biomass and exploitation, and through a harvest rule that implies low risk of stock depletion.

Evidence:
The precautionary approach is implemented by:

- Defining precautionary reference points for SSB and harvest rate.
- Implementing a management plan that has been shown through simulations taking relevant uncertainties into account, to imply a low probability of exceeding the precautionary biomass limit.

The reference points valid after a review and revision by ICES in 2019, and adopted and stated by MFRI in their advice[112] , are tabulated below. They are discussed in detail in the following clauses.

Table 9. Reference points for saithe defined in 2019.

Nálgun *Framework*	Viðmiðunargildi *Reference point*	Gildi *Value*	Grunnur *Basis*
Aflaregla - MSY nálgun *Management plan* *- MSY approach*	MSY $B_{trigger}$	61000 t	Sama og B_{pa} *Same as B_{pa}*
	HR_{MSY}	0.2	Slembireikningar, það veiðihlutfall sem leiðir til þess að hrygningarstofn sé stærri en $B_{trigger}$ með 95% líkum *Stochastic HCR evaluation, SSB 95% of the time over $B_{trigger}$*
Varúðarnálgun *Precautionary approach*	B_{lim}	44000 t	B_{pa}/1.4
	B_{pa}	61000 t	B_{loss} er notað sem B_{pa} þar sem veiðidánartala hefur aldrei verið há, né hefur hrygningarstofn minnkað mikið og ekkert samband er á milli nýliðunar og hrygningarstofns *B_{loss} is used as B_{pa} as fishing pressure has never been high for this stock, the spawning stock not depleted significantly, and no relationship is seen between spawning stock and recruitment*
	HR_{lim}	0.36	Veiðihlutfall sem leiðir til þess að hrygningarstofn er yfir B_{lim} með 50% líkum *Equilibrium Harvest Rate which will maintain the stock above B_{lim} with 50% probability*
	HR_{pa}	0.26	95% líkur á að veiðihlutfall sé undir HR_{lim} $HR_{pa} = HR_{lim}$ x exp (-1.645σHR); σHR = 0.20. *95% probability that true HR is below HR_{lim}* *$HR_{pa} = HR_{lim}$ x exp (-1.645σHR); σHR = 0.20.*

The present state relative to the reference points is tabulated by ICES[113] in the table below:

111 Referring to clause 29.6 of the FAO Eco-labelling Guidelines for Fish and Fishery Products from Marine Capture Fisheries
112https://www.hafogvatn.is/is/veidiradgjof/ysa
113http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

Table 10. Saithe fishing pressure and stock size reference points.

	Fishing pressure				Stock size			
		2016	2017	2018		2017	2018	2019
Maximum sustainable yield	HR_{MSY}	✓	✓	✓ Below	MSY $B_{trigger}$	✓	✓	✓ Above
Precautionary approach	HR_{pa},HR_{lim}	✓	✓	✓ Below	B_{pa},B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	HR_{MGT}	✓	✓	✓ Within expected range	B_{MGT}	✓	✓	✓ Above

ICES advised in 2019[114] that the harvest control rule for saithe in 5.a proposed in the request with a harvest rate of 0.20 as proposed in the request with a MGT Btrigger of 61 000 t, is consistent with the precautionary approach and with the ICES MSY approach. However, a harvest rate of 0.19 maximizes median long-term yield.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

[114] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

1.1.3.1.2. Clause 1.3.1.2.

The stock under consideration shall not be overfished to a level causing recruitment overfishing[115].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The lowest biomass in the time period covered by the assessment is set as precautionary biomass Bpa, There is no indications that the recruitment is impaired when the SSB is at that level. Since this level was reached with a relatively low fishing mortality, the biomass limit is set at Bpa/1.4. This is in accordance with ICES standards. It has been demonstrated by simulations that the present management plan implies a low (<5%) probability of bringing SSB below the limit.

Evidence:

There is no convincing indications that the recruitment is impaired when the SSB is above the lowest observed since 1980 (approx. 61 000 tonnes in 1996) at that level (Figure 33). There was a period with poor recruitment in the early 1990ies, but apparently, low recruitments preceded a reduced biomass (Figure 34). ICES has defined a category called Type 6 "Stocks with narrow dynamic range and showing no evidence of past or present impaired recruitment". In such cases, the lowest observed SSB can be regarded as a precautionary biomass (Bpa) rather than a limit, and the limit can be derived as Bpa/1.4, = 44 000 tonnes. taking an assumed assessment uncertainty into account. The condition for this arrangement is that historical fishing mortality has been low. The Fishing mortality of ages 4–9 has been in the range 0.25–0.45 since 2004, which is regarded as relatively moderate. Previously, the highest average F during 5 years period was 0.41 (1991-1995) but the selection has changed in last decade toward smaller fish so F4–9 from the period after 2004 is not comparable to earlier years (they are lower for the same fishing pressure). In 2013, when the management plan was evaluated for the first time, Blim was set at Bloss = 61 000 tonnes. In a revision of reference points in 2016, that was changed to 44 000 tonnes, and Bpa was changed from 65000 tonnes (which was a rather arbitrary trigger point in the rule) to 61 000 tonnes. These definitions are now in line with ICES standards, and with the definition of precautionary biomass reference points for neighbouring saithe stocks, and were accepted by ICES in 2019[116]

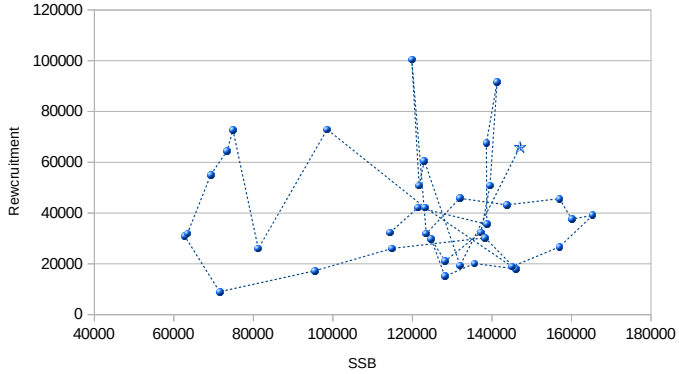


Figure 33. Stock and recruit plot. The blue star is the last pair (2016 year class).

115 The 'stock under consideration' is not overfished if it is above the associated limit reference point (or its proxy)." FAO Guidelines (2009), par. 30.1.

116 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

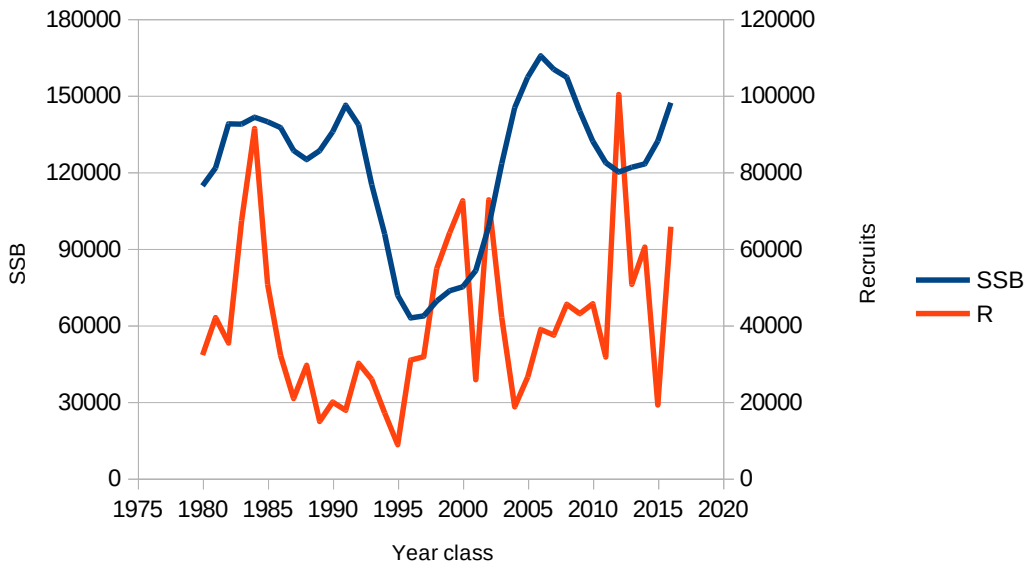


Figure 34. Time course of SSB and recruitment.

With the current harvest rule and the recruitment pattern seen so far, the probability that SSB shall fall below the Blim is <5%.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.3.1.3. Clause 1.3.1.3.

Relevant uncertainties shall be taken into account through a suitable method of risk assessment.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
According to simulations taking all relevant uncertainties into account, reaching the biomass limit Blim below which recruitment is unknown, is unlikely. This is according to standard procedures in ICES. At present the stock is well above the limit.

Evidence:

The harvest rule that is used for deciding quotas for saithe was tested for risks and uncertainties by simulation[117] [118]. The simulations were done as a bootstrap simulation, where all relevant uncertainties were represented by distributions, based on the experience with stock dynamics and assessment performance. The simulations were done as a continuation of the assessment, taking over the distributions of the stochastic variables as generated by MCMC resampling. The uncertainties applied in the simulation were:

- Recruitment was projected using a log-normal distribution based on the distribution of CVs, and autocorrelations estimated by the assessment model.
- Weight at age were modelled as a linear function of the weights the year and age before, with a stochastic autoregressive term and a term related to the abundance of the year class, to account for density dependence in growth.
- Selection at age was modelled as a logistic function of weight at age.
- The average weights at age and maturities at age of last 10 years is used, Stochastic variations are introduced around the average weights, a lognormal year factor with $\sigma = 0.13$ and autocorrelation $\rho = 0.5$. Maturity at age is fixed. Variations in weight at age are independent of stock/cohort size.
- Assessment error: Lognormally distributed (CV = 0.22, with autocorrelation $\rho = 0.5$, bias -0.07). The assessment error is higher than assumed in the first evaluation in 2013.
- Implementation error was included (like in the haddock) with autocorrelated lognormal distribution with $\sigma = 0.07$ and $\rho = 0.65$. Implementation error has been negative since the HCR was adopted in 2013.

Natural mortality (0.2), maturation at age (average over 2006–2008) and selection at age (representative of the period 1994–2008) in the fishery were assumed constant without error.

This procedure is a standard way of evaluating harvest rules in ICES and elsewhere.[119] The rule implies a low probability of bringing the stock below Blim. The probability of bringing SSB < Bpa, which would trigger a reduced harvest rate, is slightly above 5%. The adopted harvest rate (0.2) is marginally above HR_{MSY}= 0.19 as shown below.

117 https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

118 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2019/WKICEMSE/WKICEMSE%20Report%202019.pdf

119 Section 1.2.6 in http://www.ices.dk/community/advisory-process/Pages/Basis-for-ICES-Advice.aspx

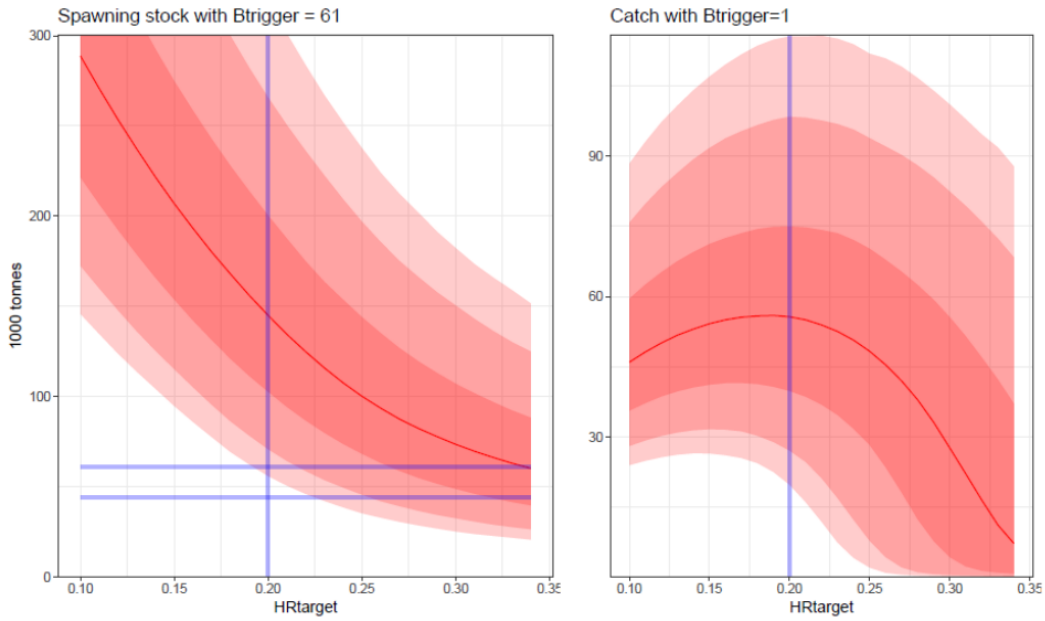


Figure 35. Equilibrium catch curve (left panel) and corresponding SSB (right panel) as a function of harvest rate (HR). In both panels, the solid red curves indicate the median of the distribution and the ribbons 5, 10, 25, 75, 90 and 95 percentiles. The vertical line is HR_{MGT} (0.2) and the horizontal lines Bpa and Blim.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.3.1.4. Clause 1.3.1.4.

Appropriate reference points shall be determined and remedial actions to be taken if reference points are approached or exceeded shall be specified[120].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
ICES has defined reference points for Icelandic saithe that have been adopted by MFRI. The harvest rule prescribes a reduction in the harvest rate if SSB goes below a trigger value of 61000 tonnes. With the current stock dynamics and harvest rule, this situation is unlikely (probability just above 5%). Further measures if SSB gets too low would depend on the reason why the SSB became reduced. The Icelandic management has the authority to take the necessary action.

Evidence:
Precautionary biomass reference points have been defined, as described in Clause 1.3.1.1 - 1.3.1.2.
That includes a limit biomass Blim = 44 000 tonnes and a precautionary Bpa (61 000 tonnes) as a safety margin above Blim - if the estimate of SSB is at Bpa there should still be no more than 5 % probability that it actually is at Blim.

A limit harvest rate HRlim = 0.36 was defined as the mortality where the long-term stochastic equilibrium SSB has a mean at Blim. A precautionary HRpa = 0.28 is defined as a safety margin to HRlim, assuming a CV of 20% in the assessed harvest rate. If HR is estimated at HRpa, the probability that it actually is at HRlim should be 5%.

The harvest rule has a trigger value equal to the Bpa. If the SSB estimate is below the trigger, the Harvest rate in the rule should be reduced linearly toward zero (See Clause 1.1.9). The SSB corresponding to the target HR = 0.20 has a 5-percentile between Bpa and Blim. If it turns out that the fishing mortality estimate exceeds the PA-value or the limit value, the immediate response would be to apply the agreed harvest rate in the harvest rule once again. If that is not sufficient, the further response will have to depend on the prevailing conditions. The Ministry has the authority to take necessary action.

The simulations provide ranges for the expected distributions of key variables. The 95 percentile for HR is stated as 0.29, which is close to HRpa. If these ranges are exceeded, there may be a need to revisit the management plan as the assumptions made when the management plan was evaluated may not be valid any more.

References:	As referenced in the text.

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

120 FAO Code of Conduct for Responsible Fisheries, Article 7.5.2.

1.1.3.1.5. Clause 1.3.1.5.

The long-term harvesting policy shall be stated in the Fisheries Management Plan.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The management strategy for Icelandic fish stocks, in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term. This also appears as the objective of the management plan for saithe.

Evidence:
The Government of Iceland has issued the following general statement on management plans[121]:

The management strategy for Icelandic fish stocks, in general, is to maintain the exploitation rate at the level which is consistent with the Precautionary Approach and that generates maximum sustainable yield (MSY) in the long term. Harvest Control Rules (HCR) are set by the managers of the fishery, in the case of Iceland by the government and are based on knowledge on the state of the stock and take account of the managers objectives, the nature of the resource and uncertainties. The main aim HCRs is thus to:

1) *Decrease the risk of short term interests influencing the level of exploitation.*
2) *Ensures that the available information on the resource are used in the most rigorous manner.*
3) *Long term sustainable yield*
4) *Ensure that stock is above save biological limits*
5) *Often (applies to saithe) include buffers on the amount of Catch/TAC change between fishing seasons.*

The harvest rule, which is almost unchanged after the revision in 2019, is published in the Ministry's webpages. The advice is given according to the rule, and used by the Ministry.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

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

1.1.3.1.6. Clause 1.3.1.6.

The Fisheries Management Plan shall specify how the precautionary approach shall be implemented for the stock under consideration.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The harvest rate according to the harvest rule of 0.20 implies a low probability of bringing the SSB below Blim, which is the biomass below which recruitment is impaired or stock dynamics unknown. An additional measure is to apply a reduced harvest rate if SSB goes below a trigger level of 61 kt.**				
Evidence: Following ICES practice[122], implementing the precautionary approach in a management plan would imply to ensure a low probability of bringing the spawning biomass to a point (expressed as Blim) where recruitment may be impaired or stock dynamics is unknown. For Icelandic saithe, this is achieved by applying a target harvest rate according to the harvest rule of 0.20, An additional measure is to apply a harvest rate below this value if SSB is below a trigger level of 61 kt. It has been demonstrated by simulations taking relevant uncertainties into account, that this rule implies a low probability (<0.05) of bringing the SSB below Blim.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

122 Section 1.2.6 in http://www.ices.dk/community/advisory-process/Pages/Basis-for-ICES-Advice.aspx

1.1.3.2. Clause 1.3.2. Management targets and limits

1.1.3.2.1. Clause 1.3.2.1. Harvesting rate and fishing mortality

Clause 1.3.2.1.1.

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[123].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The management target for the harvest rate is 0.20. Harvest rate is regarded as a proxy for fishing mortality. According to the rule, the target harvest rate shall be reduced if SSB in the assessment year is estimated below Btrigger = 61000 tonnes.**				
Evidence: The management target for harvest rate is 0.20. The harvest rate (TAC/Biomass of saithe aged 4 and older) is a proxy for fishing mortality. If the spawning stock biomass in the TAC year is below the trigger value of 61 kt, the target harvest rate is reduced according to the rule (see Clause 1.1.9)				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

123 F_{lim} can be explicit or implicit in cases where harvest rate is set annually to a precautionary F_{target} (or its proxy)

Clause 1.3.2.1.2.

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[124].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **There is no explicit measures planned for the event that fishing mortality shall exceed the limit. The first response would be to apply the target HR once again. The limit is so high that reaching it when setting TACs according to the target is very unlikely.**				
Evidence: The limit harvest rate is defined a 0.36 and the precautionary HRpa at 0.28. Reaching the limit with the current management plan is very unlikely, the 95 percentile of the HR is close to HRpa. If the limit is approached, the first recipe will be to apply the target HR once again. If the problem persists, specific measures would be applied based on the cause of the deviation.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

124 FAO Guidelines (2009), par. 30.2. See also: The 'stock under consideration' is not overfished if it is above the associated limit reference point (or its proxy)." FAO Guidelines (2009), par. 30.1.

1.1.3.2.2. Clause 1.3.2.2. Stock Biomass

Clause 1.3.2.2.1.

The long-term management target for stock size (biomass), either explicit or implicit depending on management approach, consistent with the objective of promoting optimum utilization, shall be specified.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **A long term target for the stock size is considered redundant and not defined.**				
Evidence: The management target is a harvest rate. Thus, the stock biomass will fluctuate according to weak and strong year classes. Therefore, a target biomass has not been defined, as it is considered redundant for this management strategy. The target harvest rate has been demonstrated to lead to a long term average yield near MSY.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

Clause 1.3.2.2.2.

Limits or directions for stock size (or its proxy) with respect to precautionary management, consistent with avoiding recruitment overfishing, shall be specified.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **A precautionary limit biomass has been defined as SSB = 44000 tonnes, which is regarded as a precautionary limit.**				
Evidence: A precautionary limit biomass Bpa has been defined as SSB = 61000 tonnes, which also is a trigger point in the harvest rule. This is the lowest observed SSB in the assessment time series. There has been no clear indications of recruitment failure at that level. A corresponding limit SSB has been defined at 44 000 tonnes. Simulations demonstrate a low risk of reaching the SSB limit with the target harvest rule. The biomass limit and its relation to ICES criteria is discussed in more detail under clauses 1.3.1.2.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

Clause 1.3.2.2.3.

The stock (biomass) limit reference point (B_{lim}) shall be developed in accordance with internationally accepted practice.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The procedure applied when setting reference points follows ICES standards and the results were accepted by ICES.**				
Evidence: The background for Blim is described in detail in Clause 1.3.1.2. This procedure follows ICES standards and the result was accepted by ICES.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

Clause 1.3.2.2.4.

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 rate is reduced already at an SSB = 61 kt, well above the limit biomass. If that is not sufficient, further measures to be taken should be adapted to the underlying cause. The government has the legal instruments to take action as needed.**				
Evidence: Already if SSB falls below the trigger point at 61000 tonnes, the fishing mortality according to the rule is reduced linearly towards the origin with the objective of maintaining or restoring stock size to levels above B_{lim}. According to the simulations done when evaluating the harvest rule, approaching Blim would be very unlikely unless something happens that was not foreseen in the simulations. If so happens, further measures to be taken would be adapted to the underlying cause. The government has the legal instruments to take action as needed.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

1.1.3.2.3. 1.3.2.3. Stock biology and life-cycle (structure and resilience)

Clause 1.3.2.3.1.

Information on the biology, life-cycle and structure of the stock shall be taken into account when designing management measures to promote optimal utilisation of the stock with respect to resilience to natural variability and fishing[125].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The harvest rule was designed to provide a near maximum long term yield and a stock abundance safely away from the limit.

Evidence:

The harvest rule was designed to provide a near maximum long term yield and a stock abundance safely away from the limit. The target harvest rate is set on the low side of the plateau associated with maximum yield, (see Figure 36) which provides a buffer biomass against natural variations in productivity, and ensures near maximum yield with a minimum fishing pressure.

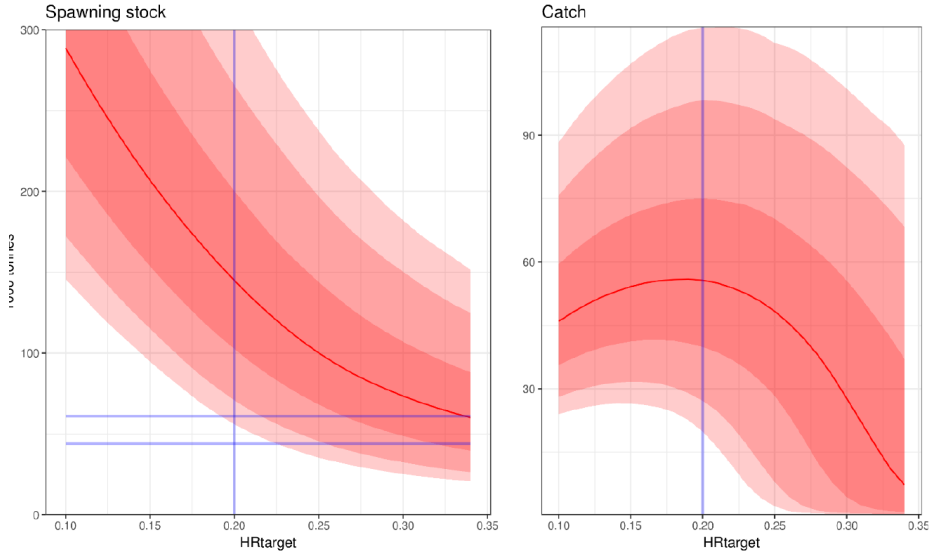


Figure 36. The long term probability distribution of catch and SSB at levels of HR. The black vertical line, marked HRmsy is the HR in the present management plan.

A fixed natural mortality rate of 0.2 is used both in the assessment and the forecast. The proportion of natural mortality before spawning (Mprop) and the proportion of fishing mortality before spawning (Fprop) are set to 0[126].

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

125 From FAO Guidelines (2009), para 30.3. The structure and composition of the "stock under consideration" which contribute to its resilience are taken into account.

126 http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf

Clause 1.3.2.3.2.

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})[127].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

There is an extensive system of closures to protect both spawners at spawning time and juveniles. The system is primarily for protecting cod, but may offer some protection to saithe as well.

Evidence:

The exploitation of saithe spawning component is not considered to be significant since the spawning stock biomass and B4+ indicators are their highest levels since 1980 (see Figure 1 of the 2019 ICES Advice[128]), hence the current closure and management regime is considered adequate for saithe.

Less is known about the spawning of saithe than for example for cod. Spawning takes place in shallow water (100–200 m) off the southeast, south and west coast of Iceland. The main spawning area is considered to be south/southwest off Iceland (Selvogsbanki, Eldeyjarbanki). Selvogsbanki overlaps with a specific cod spawning closure in April. Spawning was believed to be earlier than for cod but observation from a gillnet survey conducted in early April show substantial spawning of saithe in time when saithe spawning was thought to be finished[129]. The spawning seems to take place from February–April and the timing of spawning to be variable. The larvae drift clockwise around Iceland and in mid-June juveniles can be found in many coves, bays, and harbours, then about 3–5 cm long. At age 2 they move to deeper waters in winter. Saithe becomes mature at age 4–7.

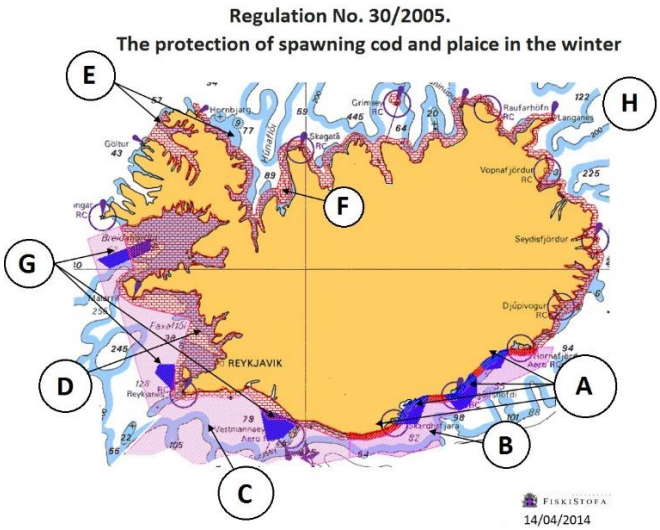
There is an extensive system of closures to protect both spawners at spawning time and juveniles. These closures are mainly directed at protecting cod, but may offer some protection to saithe as well. The effect may be limited, however, because saithe most likely spawns earlier than cod (February to April). Area closures can be permanent or temporary. Permanent closures can be to protect spawners or juveniles, or to protect vulnerable habitats. Temporary (short term) closures are mostly to protect juveniles (See Clause 1.3.2.3.3).

Some closures are designed to avoid exploitation of cod at the spawning grounds in the spawning season. These overlap to a fair extent with the known spawning grounds for saithe. Other permanent closures are for certain gears, mostly all around the year (Figure 38).

127 FAO Guidelines (2009), par. 30.3.

128 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

129 http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf



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 37. Spawning closures for cod and plaice.

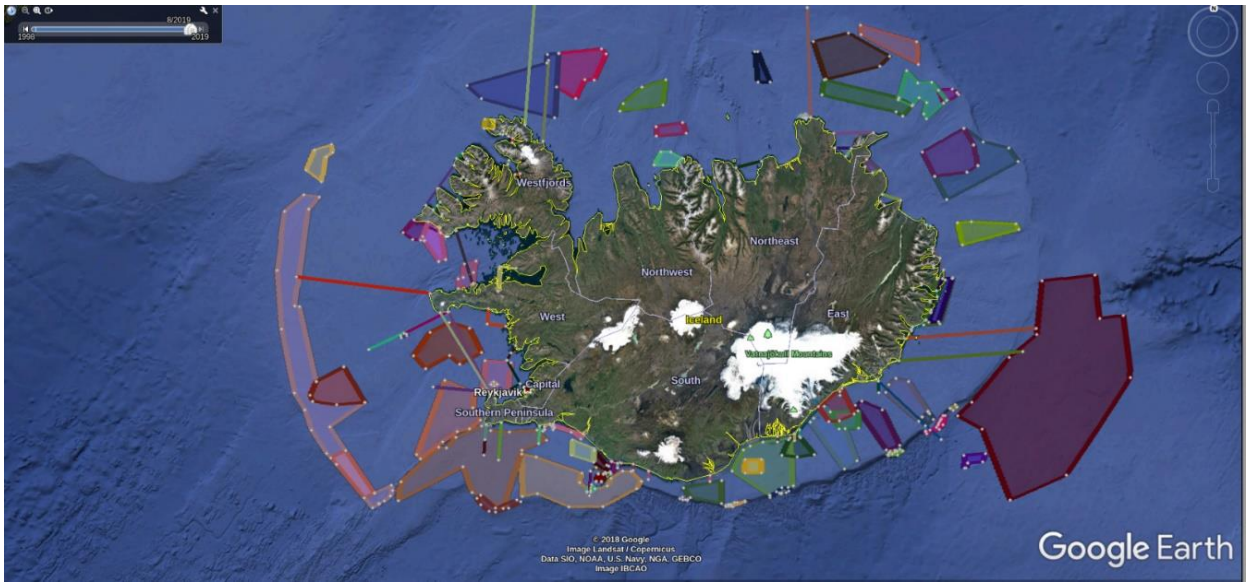


Figure 38. Screenshot of an example of interactive maps available from the Directorate.[130]. Clicking on a marked field gives a listing of coordinates, legal basis and other issues of interest.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

130 http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/ This site has a link to maps in Google earth which provide very detailed information on locations of interest.

Clause 1.3.2.3.3.

Consideration shall be given to relevant measures designed to limit fishing mortality of juvenile fish, with the objective to protect juveniles, to reduce the likelihood of growth overfishing and increasing the contribution of year classes to the spawning stock of the stock under consideration.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

There is a system for protecting juveniles by closing areas temporarily on short notice if there appears too much juveniles in catches. Furthermore, there are mesh size regulations in place to protect juveniles; the standard mesh size in trawl is 135 mm, and fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. Sorting grids in fishing gear are obligatory in certain fisheries to prevent catches of juvenile fish. Undersized saithe has to be sold, but gets a poorer price.

Evidence:

Two measures apply to protect juveniles in the fishery, area closures and minimum landing size. Mesh size regulations also serve to reduce the catches of juveniles.

In addition to closures that are permanent or regular (See Clause 1.3.2.3.2), there is a system for protecting juveniles by closing areas temporarily on short notice (skyndilokanir), These are triggered by finding too much juveniles in catches. They are managed by the MFRI, often at the advice from the Coast Guard, inspectors on board or the fishing fleet, applied on few hours notice and normally valid for 2 weeks. They are published in several channels, including on the web[131]. 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.

The discard ban also contributes to the efforts to limit juvenile mortality.

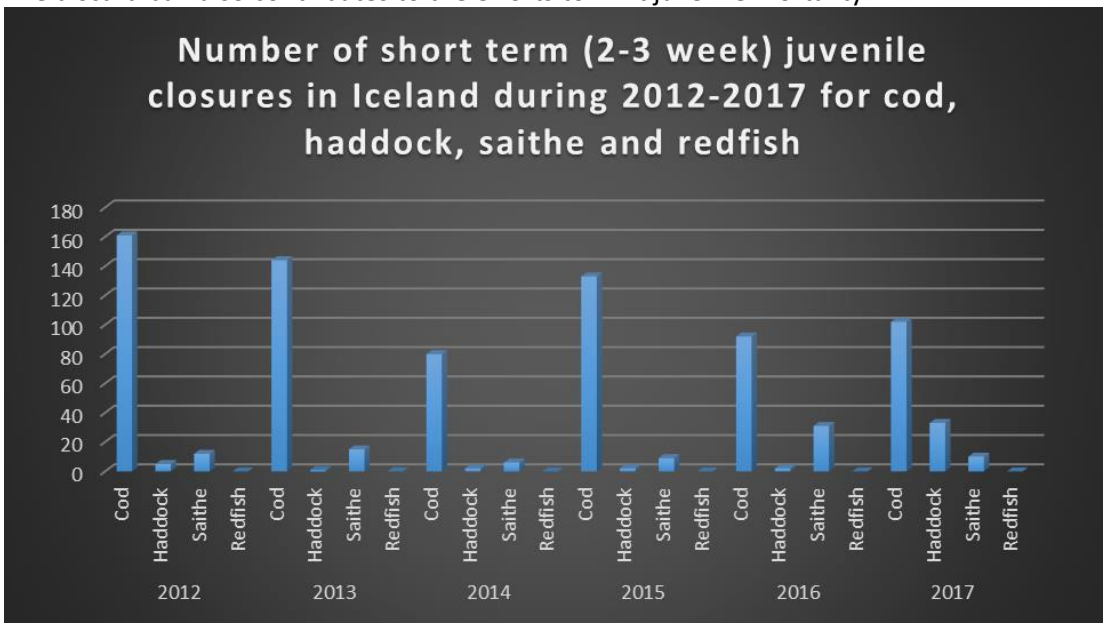


Figure 39. Short term juvenile closures in Iceland (2012-2017) for cod, haddock, saithe and redfish. Data provided by the MFRI.

131 https://www.hafogvatn.is/is/skyndilokanir

Furthermore, there are mesh size regulations in place to protect juveniles; the standard mesh size in trawl is 135 mm[132]. There is a minimum size of saithe at 55 cm. If smaller saithe is caught, it still has to be landed and sold, but special rules apply for payment to encourage landing, but discourage catching of undersized fish. These catches are only partially subtracted from the quota. Fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. Sorting grids in fishing gear are obligatory in certain fisheries to prevent catches of juvenile fish.	
References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

132 https://www.reglugerd.is/media/vidhengi/nr_543_2002.doc

1.1.4. Clause 1.4. External Scientific Review

1.1.4.1. Clause 1.4.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **ICES is regarded as the relevant scientific body that organizes stock assessments and performs evaluations of management plans. The assessment as well as the management plan were revisited in 2019 and approved.**				
Evidence: ICES is regarded as the relevant scientific body. It organizes stock assessments, performs evaluations of management plans and advises on a wide range of issues within marine science, including fisheries management. The assessment as well as the management plan for saithe were revised and approved in 2019.[133] The previous management plan was from 2013.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

133http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.07.pdf

1.1.4.2. Clause 1.4.2.

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: **The Icelandic management authorities decides the harvesting policy, including the management plan. It takes advice form the MFRI as well as from the industry and fishermen.**				
Evidence: The Icelandic management authorities (Ministry of Industries and Innovation) decides the harvesting policy, including the management plan. It takes advice from the MFRI as well as from the industry and fishermen. The MFRI advice generally follows the ICES advice unless there is strong reasons to deviate from it. Since 2013, when the first management plan was introduced, the TAC for saithe has been set according to ICES advice[134]. Managers and MFRI will seek the advice from ICES when revising harvesting policy. For saithe, this was done in 2019. The saithe assessment carried out in ICES has been internally and externally peer reviewed.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

134 https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf

1.1.5. Clause 1.5. Advice and Decisions on TAC

1.1.5.1. Clause 1.5.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The stock assessment and advice for the TAC in the coming year is provided annually by ICES. The MFRI provides advice to the Ministry, which is the competent fisheries management authority.**				
Evidence: The stock assessment and advice for the TAC in the coming year is provided annually by ICES in June, based on stock assessments in the North-Western Working Group where Icelandic scientists take part. Based on that, the MFRI provides advice to the Ministry, which is the competent fisheries management authority. Normally, the MFRI advice will be identical to the ICES advice. Since 2013, when the first management plan for saithe was implemented the TAC has been set according to ICES advice. The ICES advice is published on the ICES websites[135] and the MFRI advice is published on the MFRI website[136] once they are ready in June each year.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

135 http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/had.27.5a.pdf
136 https://www.hafogvatn.is/is/veidiradgjof/ysa

1.1.5.2. Clause 1.5.2.

Advice shall include the appropriate value(s) for precautionary reference points.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The advice published by the MFRI has reference points tabulated. These are identical to the reference points defined by ICES, and include the reference values in the harvest rule in the management plan.

Evidence:
The precautionary reference points are listed in the advice[137] as shown on Table 11 below:

Table 11. Reference points according to the MFRI advice on saithe.

Nálgun *Framework*	Viðmiðunargildi *Reference point*	Gildi *Value*	Grunnur *Basis*
Aflaregla - MSY nálgun *Management plan* *- MSY approach*	MSY $B_{trigger}$	61 000 t	Sama og B_{pa} *Same as B_{pa}*
	HR_{MSY}	0.2	Slembireikningar, það veiðihlutfall sem leiðir til þess að hrygningarstofn sé stærri en $B_{trigger}$ með 95% líkum *Stochastic HCR evaluation, SSB 95% of the time over $B_{trigger}$*
Varúðarnálgun *Precautionary approach*	B_{lim}	44 000 t	B_{pa}/1.4
	B_{pa}	61 000 t	B_{loss} er notað sem B_{pa} þar sem veiðidánartala hefur aldrei verið há, né hefur hrygningarstofn minnkað mikið og ekkert samband er á milli nýliðunar og hrygningarstofns *B_{loss} is used as B_{pa} as fishing pressure has never been high for this stock, the spawning stock not depleted significantly, and no relationship is seen between spawning stock and recruitment*
	HR_{lim}	0.36	Veiðihlutfall sem leiðir til þess að hrygningarstofn er yfir B_{lim} með 50% líkum *Equilibrium Harvest Rate which will maintain the stock above B_{lim} with 50% probability*
	HR_{pa}	0.26	95% líkur á að veiðihlutfall sé undir HR_{lim} $HR_{pa} = HR_{lim}$ x exp (-1.645σHR); σHR = 0.20. *95% probability that true HR is below HR_{lim}* *$HR_{pa} = HR_{lim}$ x exp (-1.645σHR); σHR = 0.20.*

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

137 https://www.hafogvatn.is/is/veidiradgjof/ufsi

1.1.5.3. Clause 1.5.3.

Decisions on TAC shall be taken by the competent fisheries management authority taking into consideration the entire distribution range of the stock under consideration, as appropriate.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The stock of saithe in Iceland is confined to Icelandic waters, thus it is not a shared stock. Decisions on TAC are taken by the Icelandic Ministry of Industries and Innovation.**				
Evidence: The stock of saithe in Iceland is not a shared stock. There may be some exchange of saithe between areas, in particular episodes where saithe belonging to one year class immigrates to Iceland. At present, one such episode (age 7 in 1991) is accounted for in the assessment, but it does not trigger any specific management action. Decisions on TAC are taken by the Icelandic Ministry of Industries and Innovation.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

1.1.5.4. Clause 1.5.4.

For shared stocks the setting of TAC shall take into consideration international agreements and scientific advice.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The saithe stock is not a shared stock, and there are no agreements on its management with neighbouring nations.**				
Evidence: The saithe stock is not a shared stock, and there are no agreements on its management with neighbouring nations.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

1.1.5.5. Clause 1.5.5.

The competent fisheries management authority shall decide on TAC within the boundaries set by the adopted harvesting policy.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The TAC is set by the Ministry after advice from MFRI and consultations with the industry. The Ministry has the authority to deviate from the advice, but will only do so if there is strong reasons for that. In practice, where harvest rules are in effect, the advice is set according to the rule and the TAC set according to the advice.**				
Evidence: The TAC is set by the Ministry after advice from MFRI and consultations with the industry. Although the Ministry has the authority to deviate from the advice, it will only do so if there is strong reasons for that. In practice, where harvest rules are in effect, the advice has been according to the rule and the TAC set according to the advice. For saithe this has been the case since the first harvest rule was adopted in 2013[138]. The national TAC is somewhat reduced because of quotas set aside for various purposes: Some is set aside for catches by Faroese, that have some fishing permits in Iceland but are outside the quota system. There are further adjustments to account for legal deviations, outlined in Clause 1.5.8.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

138https://www.hafogvatn.is/is/veidiradgjof/ufsi

1.1.5.6. Clause 1.5.6.

Management measures for conservation and sustainable use of the stock under consideration shall be specified in laws and regulations.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The management of saithe is part of the general fisheries management, stated in the suite of rules and regulations applicable to all commercial fisheries in Iceland.**				
Evidence: As discussed in more detail in Clause 1.1.7 - 1.1.10, the management of saithe is part of the general fisheries management, stated in the suite of rules and regulations applicable to all commercial fisheries in Iceland, discussed under Clauses 1.1.1 - 1.1.3. and 2.1.1 A harvest rule is in place for saithe, which states how the TAC is calculated based on stock abundance estimated in an analytic stock assessment. The rule has been evaluated and demonstrated to lead to sustainable use of the stock. The rule is *inter alia* published in the Ministry web pages[139]. Note that the formula in this reference may not be correct. There are several equivalent versions in various references, that probably are right, for example in the advice from MFRI.[140] The difference only applies if SSB is below the trigger, which has not happened so far.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

139 https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
140 https://www.hafogvatn.is/is/veidiradgjof/ysa

1.1.5.7. Clause 1.5.7.

Practical implementation shall be the task of (a) designated competent institution(s).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The practical implementation of management decisions is the task of the Directorate, which is the executive body that organizes the ITQ system and monitors catches, the Coast guard which is responsible for surveillance and enforcement at sea and the MFRI which performs assessments and provides advice.**				
Evidence: As described in detail under Clauses 1.1.1-3, and 2.1.1 the practical implementation of management decisions is the task of the Directorate, which is the executive body that organizes the ITQ system and monitors catches, the Coast guard which is responsible for surveillance and enforcement at sea and the MFRI which performs assessments and provides advice.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

1.1.5.8. Clause 1.5.8.

Decisions on TAC in the appropriate units 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:

Since the introduction of the management plan in 2013/14, the national TAC for saithe has been set equal to the recommended TAC, which is according to the harvest rule. The total catch has consistently been below the TAC for various reasons. Some deviations were included in the simulations when the recent management plan was approved.

Evidence:

There is a wide range of measures to ensure that the total catch is in accordance with the decided TAC.

- There is an obligation to land all catches, discarding is prohibited. Discards of saithe is to some extent monitored. It appears to be a minor problem, but it would be hard to exclude violations., as noted in Clause 2.1.1.
- All landings must take place in designated ports, where the catch is weighed by authorized personnel. The approved weighs are entered directly into a database held by the Directorate, which is the primary source for catch statistics and monitoring of the quota status.
- There is a close monitoring of activities at sea
    - Direct inspections by the Coast guard and by on board inspectors from the Directorate
    - Detailed VMS monitoring which is closely followed by the Coast Guard, for control but also for security reasons.

Nevertheless, there is some deviation of final catches from the decided TAC. Some reasons for that are readily identified:

- Transfer of quotas between years, which is legal within bounds.
- Transfer of quotas between species is possible to some extent, although quotas of other species cannot be used to cover cod catches.
- There are some fisheries outside the general quota system, see Clause 1.1.3 and 2.1.1. The Ministry can set aside up to 5.3% of the total quota for covering such needs as well as disturbances because of sizeable fluctuations in the catch quotas of individual species.
- Catches that would be illegal to sell (for example undersized fish) shall still be landed and sold, but the vessel gets only a minor part of the payment. In some cases, the rest goes to a fund to support research. The amount is only partially subtracted from the quota.
- In the long line fishery, some addition to the quota is granted to those that do the baiting ashore, to promote local workplaces.
- The Faroes and Norway have some small fishing rights in Icelandic waters which in some, but not all years have been accounted for when setting the national quota.

Since the introduction of the management plan in 2013/14, the national TAC has been set equal to the recommended TAC, which is according to the harvest rule. The total catch has always been below the TAC. Figure 40 show the recent historical record of adherence to the quotas, according to the MFRI advice. Some of this, but not all, is because of transfers between years and between species. The amounts set aside for the

fisheries outside that system seems to have been below the actual catches. Some deviations (CV = 7%) were included in the simulations when the recent management plan was approved, as a control of robustness to such deviations, see Clause 1.3.1.3.

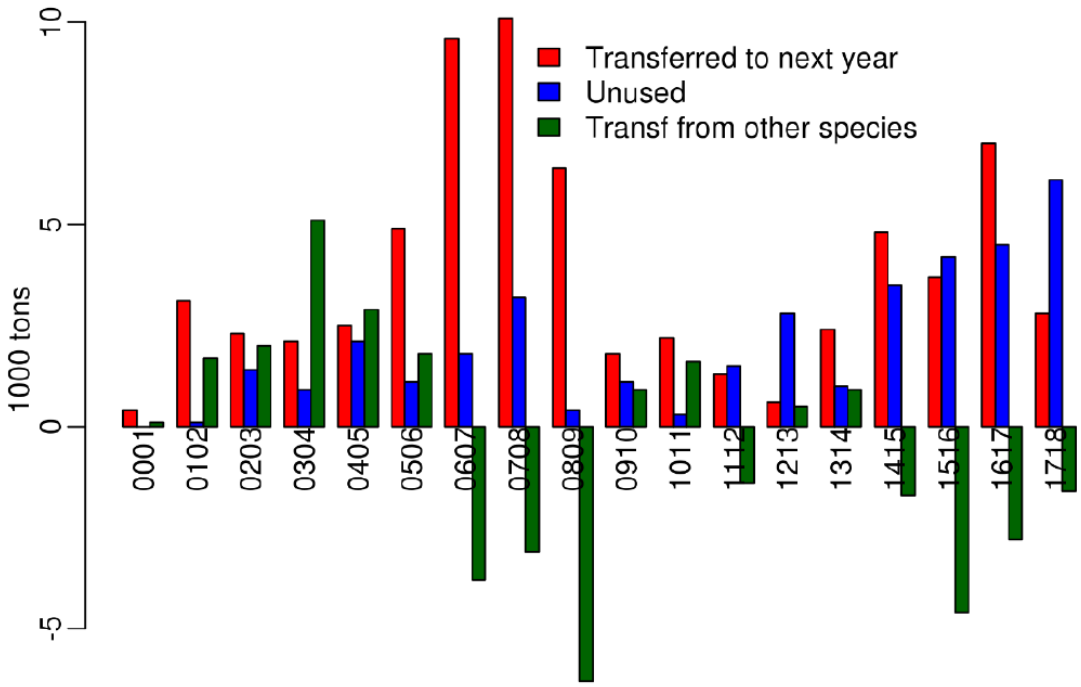


Figure 400. Transfer of quota to next fishing year, unused quota and transfer from other species (negative transfer from other species means transfer to other species, i.e. saithe quotas are used to cover catches of other species).

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

1.1.5.9. Clause 1.5.9.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Iceland participates in other fisheries and non-fisheries organisations/arrangements in the North Atlantic region.

Evidence:
Stock assessment and advice, including advice on TACs and reference points is provided by ICES. The management plan was evaluated and approved by ICES. The advice process in ICES involves all relevant nations. As saithe is regarded as a domestic stock, there is no management agreements with other nations, except some minor fishing rights for the Faroes and Norway. The advice is taken over by local authorities. In Iceland, the Ministry is advised by the MFRI, based on the ICES advice.

The general legal basis that applies to all Icelandic fish stocks also apply to saithe. The management measures cover setting of TAC, distributing the TAC on relevant parties in the ITQ system, control and enforcement to ensure that the actual removals correspond to the TAC, and protective measures.

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[141])
- The Northwest Atlantic Fisheries Organisation (NAFO[142])
- The International Council for the Exploration of the Sea (ICES[143])
- The North Atlantic Marine Mammal Commission (NAMMCO[144]).

Some of Iceland´s commercially important fish stocks, for example golden redfish, 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. For Icelandic saithe, this is not an issue.

References:	As referenced in the text.
Non-Conformance Number (if relevant)	**NA**

141 http://www.neafc.org/
142 http://www.nafo.int/
143 http://www.ices.dk/Pages/default.aspx
144 http://www.nammco.no/

1.1.5.10. Clause 1.5.10.

In the absence of specific information on the stock under consideration, generic evidence based on similar stocks may be used for fisheries with low risk to that stock under consideration. However, the greater the risk the more specific evidence is necessary to ascertain the sustainability of intensive fisheries[145].

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **Stock abundance is estimated by a full analytic assessment. Accordingly, using generic evidence as a fall back is not necessary.**				
Evidence: Stock abundance is estimated by a full analytic assessment. Accordingly, using generic evidence as a fall back is not necessary.				
References:	As referenced in the text.			
Non-Conformance Number (if relevant)				**NA**

145 FAO Guidelines (2009), para. 30.4.

8.2. Section 2: Compliance and Monitoring

8.2.1. Clause 2.1. Implementation, Compliance, Monitoring, Surveillance and Control

8.2.1.1. Clause 2.1.1.

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[146].

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 (DoF) 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, DoF works in accordance with the following Acts, the Directorate of Fisheries Act (no. 36/1992)[147], the Fisheries Management Act (no. 116/2006)[148], the Act on Fishing in Iceland's Exclusive Economic Zone (no. 79/1997)[149], the Act concerning the Treatment of Commercial Marine Fish Stocks (no. 57/1996)[150] and the Act on a Special Fee for Illegal Marine Catch (no. 37/1992)[151]. 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, monitors vessels using the VMS system e-logbooks, controls the reporting of data on the landings of individual vessels and monitors the weighing of catches[152]. 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. It works closely with the Icelandic Coast Guard, which carries out fisheries inspection at sea, monitors the EEZ and receives required notifications from vessels, Port Authorities and the MFRI.

The Directorate has a staff of 61 (as of December 2018[153]) located at six offices throughout the country with its headquarters in Akureyri. It has three core divisions: Salmon and Trout Fishing, the Fisheries Management Division (Fisheries Inspectorate) and the Service and Information division, and two support divisions: Information Technology and Human Resources and Finance (Fig. 42).

146 2005 FAO Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries.
147 https://www.althingi.is/lagas/149a/1992036.html.
148 https://www.althingi.is/lagas/nuna/2006116.html.
149 https://www.althingi.is/lagas/nuna/1997079.html
150 https://www.althingi.is/lagas/nuna/1996057.html
151 https://www.althingi.is/lagas/nuna/1992037.html.
152 http://www.fiskistofa.is/english/about-the-directorate/
153 http://www.fiskistofa.is/media/arsskyrslur/13_Fiskistofa-15.-april-2019_Starfsmenn.pdf

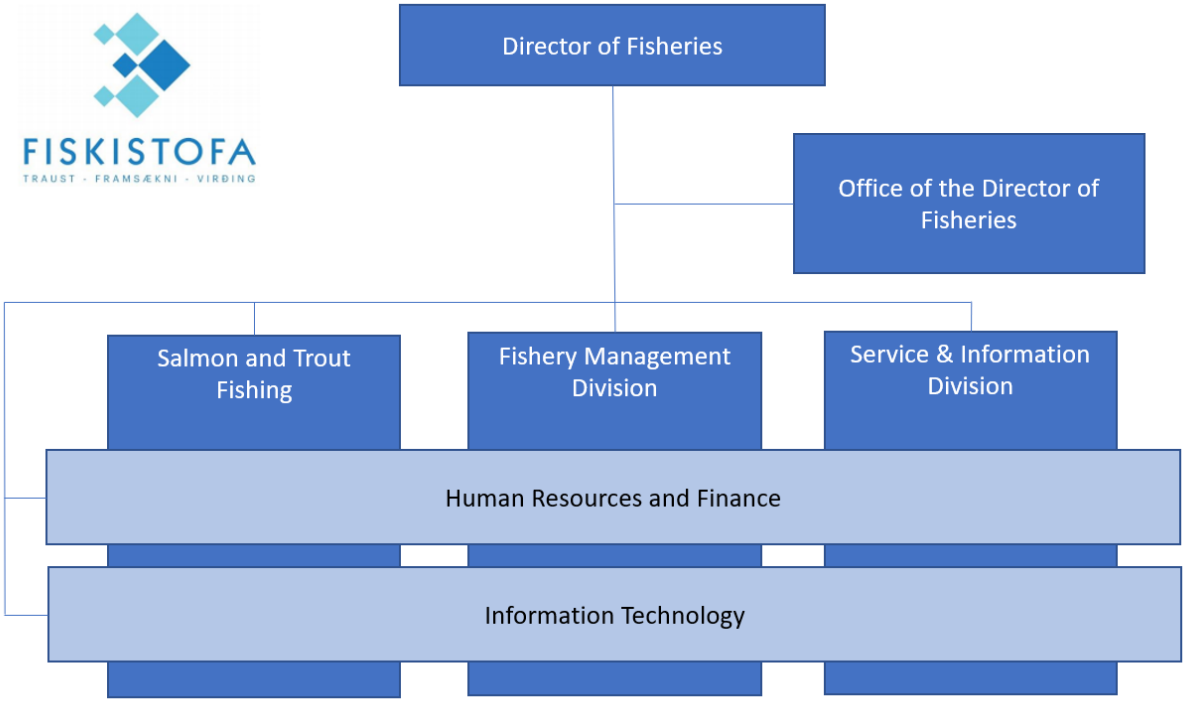


Figure 41. Directorate of Fisheries organisational chart and staff (Source: SAIG, modified from http://www.fiskistofa.is/umfiskistofu/skipurit/).

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[154]. It supersedes 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 saithe. General fishing permits are of two types, a general fishing permit with a catch quota or a general fishing permit with a hook-and-line catch 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).

Commercial fishing permits may only be granted to fishing vessels holding certificates of seaworthiness and registered in the Registry of Vessels (Article 5). This Registry is administered by the Maritime Division of the Icelandic Transport Authority (ICETRA)[155].

The Fisheries Management Act sets out penalties for the violation of its provisions, or rules adopted by virtue of it, which are provided in detail in the Act Concerning the Treatment of Commercial Marine Fish Stocks (Act No. 57 1996)[156]. Provisions of the Act on a Special Fee for Illegal Marine Catch[157] are also applied as appropriate. Penalties range from the issue of reprimands by the Directorate of Fisheries and the

[154] https://www.ecolex.org/details/legislation/fisheries-management-act-1990-lex-faoc003455/
[155] https://www.icetra.is/maritime/ships-and-cargoes/
[156] https://www.althingi.is/lagas/149a/1996057.html
[157] https://www.althingi.is/lagas/149a/1992037.html

suspension of commercial fishing permits to fines and, in cases of serious or repeated deliberate violation, imprisonment for up to six years (Article 24 and 25 of Act No. 116/2006).

The Act governing fishing activities within the Icelandic EEZ (Act No. 79/1997)[158] 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). 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.

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. The Act requires the Directorate of Fisheries to monitor and publish information on catches of the fleet (Articles 2-3). 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, must be landed in an officially recognised port.

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[159]. The Fishery Management Act also makes provisions for processing at sea, weighing by auction houses and the transfer of quotas to cover landings.

As required by Article 10 of Regulation No. 745/2016, each landing generates a weighing receipt[160,161] 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.

[158] *extwprlegs1.fao.org/docs/texts/ice89476.doc*
[159] https://www.stjornartidindi.is/Advert.aspx?RecordID=884be309-64a5-4367-9e4d-f5e7216b6f40
[160] https://www.fmis.is/blank
[161] http://www.unuftp.is/static/fellows/document/pan09prf.pdf

The scale operator has 10 minutes to enter the info within the system before it locks. There is a formal process involving the port authorities and the Directorate's service centre to make corrections. The system flags where weighing/re-weighing occurs and is checked by the Directorate's service centre once or twice a day to determine whether flagged items are acceptable. If not, the service centre refers them to inspectors for further checks (Fisheries Directorate, pers. com. site visit).

The weight registration document for each vessel is transmitted to the Fisheries Directorate who record it on their Catch Registration System (the Fisheries Directorate and Landing Ports database GAFL). The Directorate also receives the e-logbook information. These two sets of information are then compared, and the appropriate reduction is made to the vessel quota. 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 required by law. The reporting system is not real time but is very near real time (circa. 24 hours).

Weighing is undertaken on official port scales certified by the Fisheries Directorate and operated by individuals authorised by the Directorate. In circumstances where there are significant difficulties in using a port scale, private weighing scales can be used provided the company involved has been approved by the port authority, the scales and operators using them are certified and Fisheries Directorate inspectors have unimpeded access to the facilities. This is known as a 'Home-weighing license'. Fish markets can also be authorised to weigh catches by the Directorate. These private companies and fish markets are required to send weighing information to the relevant port authority who then submit it to the Fisheries Directorate's catch registration system. There are also legal requirements covering the licensing of the re-weighing of catch or weighing after gutting on land which are also monitored.

Processed at sea catches are registered as processed weights using an officially approved yield. This is monitored and verified by the Directorate staff. Weights at landing are checked at the processing base by Directorate staff. Processed weights are converted to live weight equivalents for deduction from each vessel's quota and management purposes by staff at the Directorate. Adjustments can be made by the Directorate to correct for errors – the system is transparent in so far that anyone can enter a vessel registration number on the Directorates website and obtain the catch, species, quota, remaining quota, quota rents for any vessel. The Directorate notes on the website that the information may be corrected by staff at later time post original posting of the information.

In December 2018 the Icelandic National Audit Office (NAO)[162] published a report on certain aspects of the Icelandic enforcement system. The report found no direct evidence of large-scale systematic violations, but identified a number of areas of weakness in particular in relation to the surveillance of weighing of catches (both at harbour scales and in-house weighing) and the surveillance of discarding. It highlighted that more quantitative data are needed to substantiate the conclusions that discards are low and that there are few irregularities in connection with re-weighing of catches after de-icing. A committee has been established to address the findings of the INAO report with a report due later this year to provide recommendations to the Minister on improvements to the enforcement system.

The Ministry of Industries and Innovation (MII) and Fisheries Directorate noted in a surveillance audit meeting with the CAB Vottunarstofan Tún that the issues highlighted in the NAO report were issues they were already aware of and had prioritised as an area to enforce and had already initiated action:

- A recent change to the law gives powers to the Directorate to place inspectors at processing plants suspected of irregularities in the re-weighing of catches after de-icing. Inspectors are in place for 6 weeks at the expense of the plant.

[162] https://rikisendurskodun.is/wp-content/uploads/2019/01/Eftirlit-Fiskistofu-Stjornsysluuttekt.pdf

- Every two months the Directorate publishes information on-line which compares the ice percentages recorded at re-weighing by a weighing licensed holder when an inspector is present with the average percentages recorded over the 2 month period[163]. This transparency encourages better compliance - the data is reported to show a narrowing of the difference in ice percentages over time. This is corroborated by studies by the University of Iceland showing the same trend and indicating that irregularities are small in terms of volume, 1-2 % of landed catches, although potentially large in number since they are caused mainly by small vessels with frequent landings. Tún note that the MII and the Directorate assess that these irregularities have reduced by 50% indicating that their actions are driving improvement.
- A further tool, introduced in spring 2019, is the publication on the Directorate's website of vessel catch composition with and without an inspector on board which can give an indication of levels of discarding.

Further, available evidence (e.g. data from scientific cruises held up against information reported by the vessels) still indicates that discards are low and re-weighing irregularities not significant. They note the incentive to cheat is low as there is no overcapacity in the system and there are a range of flexibility mechanisms in place designed to facilitate compliance and reduce the likelihood of overfishing. This includes the ability to transfer quota between years and between species (except cod), so for example, subject to certain limits you can trade quota to cover landings in excess of your quota or count the landings against next year's quota. Also, quota controls are tight with a very transparent system that records and publishes catch and landings in almost real-time, all vessels must use VMS, landings must be weighed by licensed weighers on calibrated scales and there are checks of fishing activity on vessels at sea by Inspectors and the Icelandic Coast Guard and also at landing by Inspectors. Overall, the system is considered to be effective, but the authorities work continuously to refine and improve the system as is evidenced by the above actions.

The Assessment Team will continue to review the actions implemented to improve the shortcomings identified in the Icelandic NAO report, in upcoming surveillances.

During the site visit, the assessors visited a fish market and 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 and has a capacity of 280-300 kg). The tubs are labelled for the purposes of traceability. The Audit Team were also shown the equipment used to measure ice.

The ITQ system has rules and flexibilities to allow for corrective management measures and adjustments to be incorporated. For example, a vessel can transfer some of its quota between fishing years but its quota is lost if it catches less than 50% of its total quota, measured in "cod equivalents", in two subsequent years. There is also a requirement that within the year, the net transfer of quota from any vessel must not exceed 50% (Article 15, Act No. 116/2006).

A separate hook and line quota system (krókaaflamark) is available for small vessels less than 30 gross tonnage (GT). The boats are only allowed to fish with handline or longline. These boats hold quotas for all the major demersal species and can freely transfer the quota between vessels operating in the hook and line system. However, quotas may not be transferred from vessels holding hook and line quotas to vessels

[163] Ice ratio figures for July and August 2019. http://www.fiskistofa.is/umfiskistofu/frettir/ishlutfall-i-juli-og-agust-1

holding regular quotas. Quotas may, on the other hand, be transferred from vessels holding regular quota to vessels holding hook and line quotas. Around 700 boats are currently licensed to fish with hook and line[164], but of these only 285 were allocated quotas at the beginning of the 2019/2020 fishing year. Boats without quota allocations can only fish by hiring in quota from others. No quota is though needed to take part in the coastal fishery which runs in May, June, July and August. In 2019, 621 boats took part in the coastal fishery.

Each fishing year the Minister shall have available harvest rights amounting to up to 5.3% of total TAC of ungutted demersal species (Article 8, Act No. 116/2006) which may be used:

1. to offset major disturbances which are anticipated because of sizeable fluctuations in the catch quotas of individual species;
2. for regional support, in consultation with the Regional Development Institute, through allocations;
    a) to smaller communities which are facing difficulties due to downturns in fisheries and which are dependent upon demersal fishing or processing;
    b) to communities which have suffered unexpected cutbacks in the total catch quotas of fishing vessels operating from and landing their catch in the communities in question, which has had a substantial impact on the employment situation in these communities.

In addition, the Minister shall have available up to 4,000 tonnes of mackerel which be allocated to vessels holding B-licenses (hook and longline quota) for mackerel (Article 10b, Act No. 116/2006).

Vessels may fish in excess of their catch quota for individual demersal species, with the result that their catch quota for other demersal species will be reduced in proportion to the relative value of each species. This authorisation is limited to 5% of the total value of the demersal quota held by the vessel, but no more than 1.5%[165] of the quota held for each individual demersal species. However, this authorisation does not apply to fishing in excess of the allocated catch quota of cod. Each vessel may though not exceed its overfishing of each species by more than 30% of its annual quota allocation.

Vessels may also fish up to 5% in excess of their catch quota for each demersal species with the result that the excess catch will be deducted from their allocated catch quota for the following fishing year.

Vessels may transfer up to 15%[166] of catch quotas for each demersal species from one fishing year to the next.

Vessels may also decide not to include part of the vessels catch in its catch quota. This is limited to no more than 0.5% of the vessel's pelagic catch and 5% of other marine catches per fishing year. Furthermore, this catch, known as 'VS catch', must be kept separate from the rest of the vessel's catch and weighed and recorded separately; it must be sold at an approved auction and the bulk of the proceedings of the sale must go to the Fisheries Commission Project Fund or 'VS Fund' (established by Act No. 37/1992), 20% going to the vessel (Article 11, Act No. 116/2006)[167]. The maximum of 20% return on VS catches means that there are limited incentives to land it; 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,

[164] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Krokaaflamarksbatar.
[165] Act No. 116/2006 as amended by Act No. 70/2011 (https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/)
[166] Act No. 116/2006 as amended by Act No. 22/2010
[167] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Sveigjanleiki_i_aflamarkskerfinu

preventing discards, improving the treatment of the fishery resource and promoting responsible fishing practices.

At sea surveillance is primarily the remit of the Icelandic Coast Guard. 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. Fig. 43 shows the number of boardings (fjöldi skyndiskoðana) undertaken by the Coast Guard since 2005. In 2018, the Coast Guard conducted around 130 vessel boardings, a decrease on the corresponding number of 155 in 2017 and 216 in 2016.

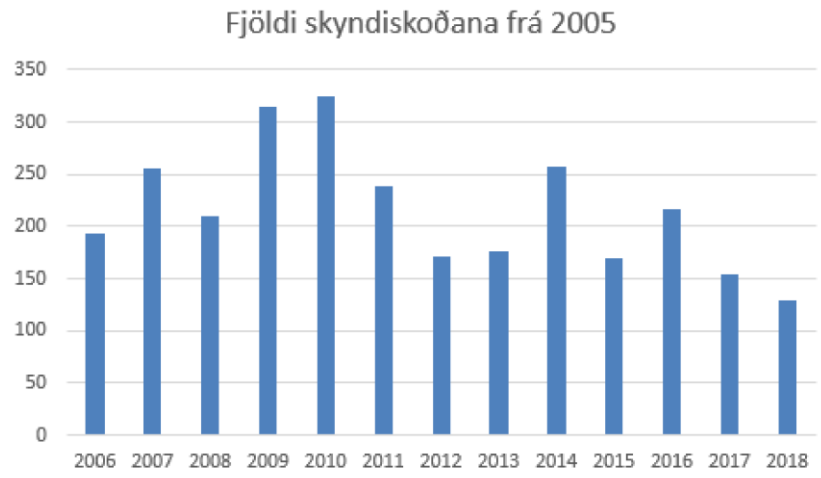


Figure 42. Number of inspections by the Coast Guard from 2006 (Source: Coast Guard presentation provided to the assessment team, October 2019).

The Coast Guard also undertake aerial surveillance, amounting to 217 hours in 2018, up from 166 hours in 2017, but fewer hours than in 2015 and 2016.

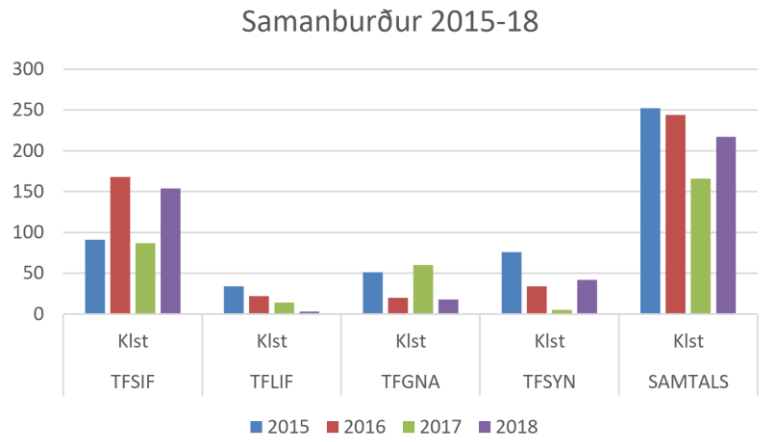


Figure 43. Air surveillance 2015-2018. The final column (Samtals) shows total hours air surveillance flown, whilst the other columns show hours by individual aircraft (Source: Coast Guard presentation provided to the assessment team October 2019).

Vessel logbooks are inspected during random unannounced boardings both at sea (by the Coast Guard) or at the quayside (by DoF inspectors) which may include a comparison of catch and logbook entries. Foreign vessels are also inspected – both in the Icelandic EEZ and further afield as part of Iceland's contribution to monitoring and surveillance as a member of NEAFC. In 2018, the Coast Guard inspected 18 foreign vessels, mostly Norwegian. No infringements were discovered except in the case of a Faroese longliner which was operating inside a short-term closure area.

Between 2014 and 2018 there have been 113 infringements of Icelandic vessels recorded by the Coast Guard (Fig. 45). In 2018 there were 16 infringements recorded, mostly associated with manning lists (lögskráningar) and fisheries (veiðar).[168] The number of recorded infringements in each category has either stayed the or reduced from the previous year, except for fisheries (veiðar) which saw an increase of one incident in 2017 to eight in 2018, and vanmönnum (manning) which rose from one incident in 2017 to five in 2018. In 2018, there were also two incidents of fishing without permits, whereas there had been none in 2017.

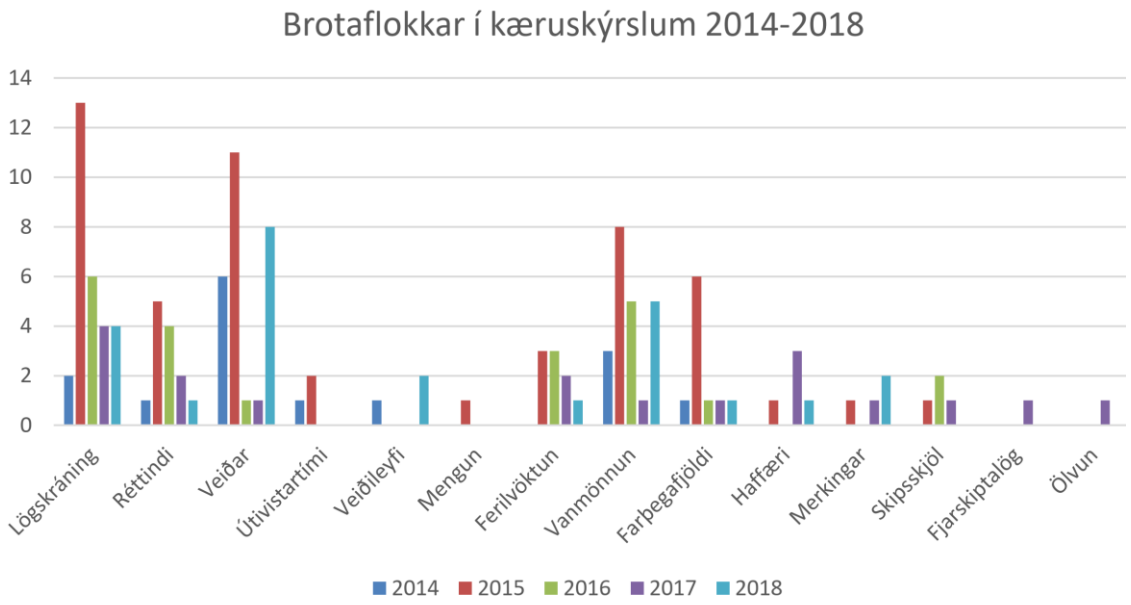


Figure 44. Reasons for the generation of remarks, by no. of remarks generated, during Coast Guard inspections in 2014-2018; Lögskráningar – Manning list, Réttindi – License, Veiðar – Fishing , Útivistartími – Time limits , Veiðileyfi – Fishing permit, Mengun – Pollution, Ferilvöktun – VMS, Vanmönnun – 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).

The Directorate's inspectors accompany vessels on fishing trips during which they check fishing methods and catches. In the fishing year 2018/2019, inspectors from the DoF were on-board vessels employing bottom trawl for 652 days (570 in the fishing year 1017/2018), 190 days on-board longliners (202) and 176 days on-board boats using gillnets (152). As revealed in Table 12, the coverage, i.e. the percentage of days-at-sea inspected, ranged in the fishing years 2018/2019 from 0.61% for longliners to 2.64% for trawlers. By contrast, in 2017/2018 larger emphasis was placed on inspecting gillnetters.

[168] Coast Guard presentation provided to the assessment team October 2019.

Table 12. Directorate inspector days on fishing vessels in the fishing years 2017/2018 and 2018/2019. (Source: Directorate of Fisheries, October 2019 site visit).

Fishery type	Bottom Trawl	Longline	Gillnet (include lumpsucker fishery and cod fishery)
2017/2018 days	570	202	152
2017/2018 coverage %	1.93%	0.64%	3.64%
2018/2019 days	652	190	176
2018/2019 coverage %	2.64%	0.61%	2.03%

In their annual report, the Fisheries Directorate publish a comprehensive summary of suspected offenses recorded during maritime surveillance (Table 13) and the enforcement action subsequently taken (Table 14)**Error! Reference source not found.**. By far the main suspected offenses detected relate to logbooks, specifically not submitting them in the required timeframes (399 in 2018), and fishing in excess of or without quota (1167 in 2018). Much of the former arises from late submission of logbooks each month by small vessels using paper logbooks, with each instance registered as an offence. Similarly, the quota infringement relates to each incidence detected of vessels that have taken longer than the 3 days required by law to balance their quota where they have landed fish in excess of their quota (where proceeding to fish without quota is a separate offence) (Pers. com. DoF).

Table 13. Overview of suspected offenses recorded in Icelandic fisheries (Source: Fiskistofa Annual Reports 2018[169], 2017[170] and 2016[171]).

Offenses recorded by Fiskistofa	2018	2017	2016
Violation of landing rules (broken down into:)	42	52	60
• *Not landing fish at official landing location*	6	*5*	4
• *Weighing container*	19	*10*	13
• *Misreporting (Landing full size fish as part of catches of juveniles)*	*14*	*9*	22
• *Incorrect specification of species*	*0*	*11*	4
• *Other*	*3*	*17*	17
Discarding catch	12	8	4
Violation of fishing license rules	*25*	36	15
Violation of lumpsucker fishery rules	39	19	11
Violation of coastal fishery rules	4	10	46
Logbooks (broken down into:)	457	719	689
• *Not submitting logbooks on time*	*399*	*674*	657
• *Other*	*58*	*45*	31
Fishing in excess of or without quota	1167	1201	1,060
Violation of law on salmon and trout fishing	3	1	2
Other violations	51	45	14

Where a suspected violation of the fisheries management legislation has occurred, the case is referred to the Directorate's Legal Department for enforcement action. In 2017, 220 cases where referred, 131 in 2016.

[169] http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf
[170] Fiskistofa 2017 Annual Report, Chapter 8. http://www.fiskistofa.is/media/arsskyrslur/medferd_mala_og_urskurdir.pdf
[171] Fiskistofa 2016 Annual Report, Chapter 8. http://www.fiskistofa.is/media/arsskyrslur/kafli8_2016.pdf

Breaches of the law are handled in several ways. Some cases are dropped and no further action taken, otherwise action taken ranges from the issue of reprimands, application of administrative fines, suspension or revocation of fishing permits and weighing licenses or, in a small number of cases, sent to the police for criminal action to be taken. There is also a specific chapter in the Annual Report summarising the imposition and collection of fees for illegal catches of fish in that year.

Where a suspected violation of the fisheries management legislation has occurred, the case is referred to the Directorate's Legal Department for enforcement action. In 2018, 239 cases were referred, whereas 220 cases had been deferred in 2017 and 131 in 2016 (Table 14). Breaches of the law are handled in several ways. Some cases are dropped and no further action taken, otherwise action taken ranges from the issue of reprimands, application of administrative fines, suspension or revocation of fishing permits and weighing licenses or, in a small number of cases, sent to the police for criminal action to be taken. There is also a specific chapter in the Annual Report summarising the imposition and collection of fees for illegal catches of fish in that year. In 2018, handling was completed of 185 cases deferred in that year and 46 cases deferred in 2017.

Table 14. Enforcement action taken (Source: Fiskistofa Annual Reports2018[172], 2017[Error! Bookmark not defined.] and 2016[Error! Bookmark not defined.]).

Offences	2018	2017	2016
Violation of fishing rules	49	97	31
Violation of weighing and landing rules	14	71	50
Violation of logbook rules	27	45	31
Violation of processing catch rules	2	0	2
Case sent to Police	4	1	4
Reprimands issued (broken down below)	92	96	79
Due to violation of fishing rules	49	50	14
Due to violations of weighing and landing rules	14	12	31
Due to violation of logbook rules	27	33	26
Due to other violations	2	3	8
Suspension of fishing permit	25	31	14
Suspension of weighing license	6	4	1
Guidance letter sent	7	6	6
No action taken	59	33	20
Case sent to another authority	5	1	1
Procedure still in progress	53	46	8
Case returned to the inspectors	0	2	No data
Fees			
Reminder letter sent for unpaid fishing fees 2017	234	231	145
Resulting in suspension of fishing permits	78	89	85
Fees imposed for illegal catches	1150	1201	130
Resulting in suspension of fishing permits	77	25	65

References:	As referenced within text.
Non-Conformance Number (if relevant)	**NA**

[172] http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf

8.2.1.2. 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:
Acts and regulations concerning conservation and management measures are publicly available and effectively disseminated through a number of government websites including via an annual law gazette.

Evidence:
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). In addition to their being easily accessible and searchable online laws and regulations are also effectively disseminated through an online law gazette which provides the most up to date versions of the legislation (i.e. incorporates latest amendments)[173].

The DoF 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.[174]

All scientific advice by MFRI[175] and ICES[176] is available online. Harvest control rules are scrutinised on request by an independent scientific body (ICES) with reports being published online[177] .

Up-to-date maps of fisheries closures are available on-line on the Fisheries Directorate website[178]. Temporary/sudden closures (general 2-3 weeks triggered by high juvenile abundance on fishing grounds) are announced by the Coastguard on VHF radio on a specified wavelength and also on the radio before the news and weather. They are also published on the MFRI website.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[173] https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/
[174] http://www.fiskistofa.is/
[175] https://www.hafogvatn.is/en/harvesting-advice.
[176] http://ices.dk/community/advisory-process/Pages/default.aspx.
[177] https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.07.pdf.
[178] http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/

8.2.2. Clause 2.2. Concordance between actual Catch and allowable Catch

8.2.2.1. Clause 2.2.1.

Concordance between the Total Allowable Catch (TAC) and actual total catch from stock under consideration shall be ensured through control, enforcement, documentation, correction and verification.[179]

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Landings must be recorded in logbooks at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland. Registered weights for each landing are sent to the Fisheries Directorate, recorded on their catch registration database (GAFL), and the appropriate amount is subtracted from the vessels quota. ITQ transfers are also monitored to ensure that vessels either have or source sufficient quota to cover the entirety of their catch within 3 days of landing. Compliance is checked through at-sea and on-land monitoring by the Coast Guard and Fisheries Directorate inspectors with enforcement action taken where non-compliance occurs (detailed in clause 2.1.1). Due to flexibility measures and to facilitate adherence to the discard ban catches in recent years have been consistently higher than the TAC set by the Ministry.

Evidence:

Fishing years in Iceland run from 1st September to 31st August the following year. Once the TAC for each species has been set, each vessel is allocated a catch share based on its holdings of permanent quotas. However, for certain species, e.g. cod, haddock, saithe, catfish, redfish, tusk and ling, a part of the TAC is set aside for other purposes, such as to offset major disturbances because of fluctuations in catch quotas, regional support, and the coastal fisheries.

The TAC set by Icelandic authorities for saithe in the quota year 2018/2019 was 79,092 tonnes, slightly below the 80,588 tonnes recommended by the MFRI and ICES.[180] Catches of saithe by Icelandic vessels make up the vast majority of the catches in Icelandic waters. In the fishing year 2017/2018, catches of Icelandic vessels totalled 58,748 tonnes, with foreign vessels registering catches of 270 tonnes.[181] MFRI and ICES maintain that 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 has increased since 2015 due to the large 2012 cohort and the cohorts from 2013 and 2014 are estimated to be above average.

Catches of saithe have in recent years been lower than the TAC. As Table 15 reveals catches of Icelandic and foreign vessels have been up to 5900 tonnes lower than TAC in recent fishing years. In the fishing year 2017/2018 the difference was 1,219 tonnes.

Table 15. Recommended TAC, national TAC and catches by Icelandic and foreign vessels Source: NFRI Advice 2019: Saithe.

[179] For long-lived species, this can include flexibility provisions such as legal allowance and adjustment for limited transfer of vessel quotas between adjacent management periods (years) as well as provisions providing incentives against discards.

[180] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0674-2018

[181] https://www.hafogvatn.is/static/extras/images/03-Saithe%20(1)1141505.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	40 000	50 000	51 600	700	52 300
2011/12	45 000	52 000	49 700	700	50 400
2012/13	49 000	50 000	51 300	900	52 200
2013/14	57 000[1)]	57 000	54 300	700	55 000
2014/15	58 000[1)]	58 000	52 100	500	52 600
2015/16	55 000[1)]	55 000	48 900	300	49 200
2016/17	55 000[1)]	55 000	48 800	300	49 100
2017/18	60 237[1)]	60 237	58 748	270	59 018
2018/19	79 092[1)]	79 092			
2019/20	80 588[1)]				

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

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 size of the vessel, record landings at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland.

Logbooks are compulsory as required by Regulation No.746/2016[182]. These must be electronic (e-logs) except for smaller vessels which are permitted to still use paper logbooks. Catch data must be entered on the e-log using a Fisheries Directorate-approved programme and all changes to entries must be visible and traceable. It is prohibited to start a fishing trip without a logbook on board. Vessel masters are required to record the following information in their logbooks:

- Ship name, ship registration number and call sign.
- Fishing gear, type and size.
- Location determination (latitude and longitude) and time when fishing gear is placed in the sea.
- Catch by quantity and species.
- Harvesting.
- Landing.
- Seabirds bycatch by species and species.
- Marine mammals bycatch by number and species.

The e-logs in use are developed and serviced by TrackWell, an Icelandic electronic systems service company; which also provide satellite Vessel Monitoring Systems (VMS) and electronic reporting systems. These systems generate mandatory reports to the Directorate, with data on catches and landings available in near real-time providing a valuable management reporting system for fleet management. The vessel logbook 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) 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

[182] https://www.stjornartidindi.is/Advert.aspx?RecordID=42a16a67-60a7-4ae7-ad7c-0f53fc254654

central server to a shared database that is accessible by both the Directorate (for management/ enforcement purposes) and the MFRI (for scientific purposes).

Logbooks are verified at sea by Fisheries Directorate inspectors and by the Coastguard and also on land by inspectors and through physical weighing at accredited weigh stations in landings ports.

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. In 2018, the Directorate's inspection covered 4.1% of all landings of demersal fish. 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 working days as required by law (Act No. 57/1996). Referring back to Clause 2.1.1 we note that the 1162 quota infringement (across all fisheries) recorded by the Directorate in 2018 relate to incidences where vessels that have taken longer than the 3 days required by law to balance their quota where they have landed fish in excess of their quota (where proceeding to fish without quota is a separate offence).[183] In 2018, the Directorate's inspection covered 4.1% of all landings of demersal fish.

In Iceland, the time restrictions attached to landing, recording and rationalising catch and quota mean that while the system is not real time it is very close (circa. 24 hours)[159].

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[183] http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf.

8.2.2.2. Clause 2.2.2.

Monitoring, surveillance and information feed-back shall be used to collate information on actual catch.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Monitoring, surveillance and information feedback is used to collate information on actual catch. 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.

Evidence:
As noted in clause 2.2.1, monitoring and surveillance information is used to collate information on actual catch. The system provides information on catch through recording catch information in logbooks, weighing of catch at landing and also records of the subsequent sale of the catch, which are compared to verify actual catches made. This is checked by surveillance at sea by the Coast Guard and inspectors of the Fisheries Directorate (for example, correct recording of catch in logbooks corresponding to composition of hauls) and also on land by inspectors (checking logbooks and correct weighing of landings). Information from logbooks and landings is submitted to the Fisheries Directorate catch registration system (GAFL). See evidence presented in clause 2.2.1.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.2.3. Clause 2.2.3.

Corrective management measures and/or appropriate adjustments in management decisions shall be implemented when the need is indicated by the relevant information.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Corrective management measures and/or appropriate adjustments in management decisions are implemented when the need is indicated by the relevant information.

Evidence:

The Icelandic saithe stock is currently not overfished or experiencing overfishing. According to ICES, the SSB is well above MSY $B_{trigger}$ and is currently at the time-series maximum.[184] The harvest rate (HR) has declined from 2009 and is presently below HR_{MSY}.

In December 2018 the Icelandic National Audit Office (NAO)[185] published a report on certain aspects of the Icelandic enforcement system. The report found no direct evidence of large-scale systematic violations, but identified a number of areas of weakness in particular in relation to the surveillance of weighing of catches (both at harbour scales and in-house weighing) and the surveillance of discarding. It highlighted that more quantitative data are needed to substantiate the conclusions that discards are low and that there are few irregularities in connection with re-weighing of catches after de-icing. A committee has been established to address the findings of the INAO report with a report due later this year to provide recommendations to the Minister on improvements to the enforcement system.

The Ministry of Industries and Innovation (MII) and Fisheries Directorate noted in a surveillance audit meeting with the CAB Vottunarstofan Tún that the issues highlighted in the NAO report were issues they were already aware of and had prioritised as an area to enforce and had already initiated action:

- A recent change to the law gives powers to the Directorate to place inspectors at processing plants suspected of irregularities in the re-weighing of catches after de-icing. Inspectors are in place for 6 weeks at the expense of the plant.
- Every two months the Directorate publishes information on-line which compares the ice percentages recorded at re-weighing by a weighing licensed holder when an inspector is present with the average percentages recorded over the 2 month period[186]. This transparency encourages better compliance - the data is reported to show a narrowing of the difference in ice percentages over time. This is corroborated by studies by the University of Iceland showing the same trend and indicating that irregularities are small in terms of volume, 1-2 % of landed catches, although potentially large in number since they are caused mainly by small vessels with frequent landings. Tún note that the MII and the Directorate assess that these irregularities have reduced by 50% indicating that their actions are driving improvement.
- A further tool, introduced in spring 2019, is the publication on the Directorate's website of vessel catch composition with and without an inspector on board which can give an indication of levels of discarding.

[184] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/had.27.5a.pdf
[185] https://rikisendurskodun.is/wp-content/uploads/2019/01/Eftirlit-Fiskistofu-Stjornsysluuttekt.pdf
[186] Ice ratio figures for July and August. http://www.fiskistofa.is/umfiskistofu/frettir/ishlutfall-i-juli-og-agust-1

Further, available evidence (e.g. data from scientific cruises held up against information reported by the vessels) still indicates that discards are low and re-weighing irregularities not significant. They note the incentive to cheat is low as there is no overcapacity in the system and there are a range of flexibility mechanisms in place designed to facilitate compliance and reduce the likelihood of overfishing. This includes the ability to transfer quota between years and between species (except cod), so for example, subject to certain limits you can trade quota to cover landings in excess of your quota or count the landings against next year's quota. Also, quota controls are tight with a very transparent system that records and publishes catch and landings in almost real-time, all vessels must use VMS, landings must be weighed by licensed weighers on calibrated scales and there are checks of fishing activity on vessels at sea by Inspectors and the Icelandic Coast Guard and also at landing by Inspectors. Overall, the system is considered to be effective, but the authorities work continuously to refine and improve the system as is evidenced by the above actions. . *The Assessment Team will continue to review the actions implemented to improve the shortcomings identified in the Icelandic NAO report, in upcoming surveillances.*	
References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

8.2.2.4. Clause 2.2.4.

Participating companies shall:

2.2.4.1. Ensure that they have been issued with all required permits;

2.2.4.2. Operate in compliance with the relevant rules and regulations;

2.2.4.3. Limit the catches of their vessels in accordance with their catch quota.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Fishing companies have been issued with all required permits; operate in compliance with the relevant rules and regulations; and limit the catches of their vessels in accordance with their catch quota. These are legal requirements which are monitored by the Fisheries Directorate, Coastguard and Port Authorities and enforcement action is taken.

Fishing companies have been issued with all required permits; operate in compliance with the relevant rules and regulations; and limit the catches of their vessels in accordance with their catch quota. These are all legal requirements, for example vessels must have a license to fish and cannot leave port if they do not have sufficient quota. If they fish in excess of their quota they must arrange any transfers required within strict time limits or they cannot resume fishing.

Compliance with these rules is monitored by the Fisheries Directorate and Coast Guard. Evidence presented by the Fisheries Directorate and the Icelandic Coast Guard shows that vessel operators and companies are generally compliant with the relevant legislation and ensure catches by their vessels are in accordance with their catch quota. Where violations are confirmed, enforcement action is taken. Most cases are on the lower end of the scale of seriousness and addressed by administrative penalties, in particular by reprimands. Relatively few cases involve the more serious penalties such as suspension of fishing permits or weighing licenses or prosecution by the police.

Very few selected fishing vessels (i.e. Norwegian, Faroese) have TAC to fish for saithe in Icelandic waters. Catches are nonetheless quite limited[187].
Foreign vessels are inspected by the Coast Guard – both in the Icelandic EEZ and further afield as part of Iceland's contribution to monitoring and surveillance as a member of NEAFC. In 2018, the Coast Guard inspected 18 foreign vessels, mostly Norwegian. No infringements were discovered except in the case of a Faroese longliner which was operating inside a short-term closure area.

See evidence presented in clause 2.1.1.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

[187] http://www.fiskistofa.is/veidar/aflaupplysingar/aflierlendraskipa/

8.2.3. Clause 2.3. Monitoring and Control

8.2.3.1. Clause 2.3.1. Vessel registration and catch quotas

8.2.3.1.1. Clause 2.3.1.1.

Allocated catch quotas by species are assigned in such a way that the combined quotas conform with the currently effective decision on TAC.

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 (i.e. the currently effective decision on TAC). Note that within fishing years additional inter-annual, inter-species and/or inter-vessel transfers may cause the amount a particular vessel is allowed to catch to increase or decrease.

Evidence:
Quotas conform to the overall decision on TAC, through the individual vessel quota share and other allocations. The headline TAC for a species is determined first and all subsequent allocations are in effect subdivisions of that figure. As a result, the allocated catch quotas for a species (when quotas are initially allocated) are assigned in such a way that the combined quotas for that species conform to the currently effective decision on TAC.

Catches by vessel are monitored and recorded in near real-time in a central database maintained by the Fisheries Directorate[188]. 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,
- land the catch and keep 20% of the value of the overage (to cover for fuel/crew costs) while forfeiting the remainder 80% to scientific research or,
- transfer a limited amount to the following fishing year where it is taken off that vessels individual quota share for that species.

References:	See footnote
Non-Conformance Number (if relevant)	**NA**

[188] http://www.fiskistofa.is/veidar/aflaheimildir/aflahlutdeildalisti/

8.2.3.1.2. Clause 2.3.1.2.

Commercial fishing shall be solely conducted with registered vessels authorised to participate in the fishery by the competent authorities.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Commercial vessels participating in the fishery require a permit issued by the Fisheries Directorate. Permits are only granted to fishing vessels holding certificates of seaworthiness and registered in the Registry of Vessels.

Evidence:
Commercial vessels participating in the fishery require a permit issued by DoF. This is a requirement of the Fisheries Management Act No.116/2006. These permits represent the initial legal requirement without which a vessel may not obtain the quota necessary to fish for Icelandic quota stocks, such as saithe. General fishing permits are of two types, a general fishing permit with a catch quota or a general fishing permit with a hook-and-line catch 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 of Act No. 116/2006). Foreign vessels are prohibited from fishing in Icelandic waters unless a right of access has been granted (e.g. Norway, Faroe Islands) (Act on fishing in Iceland's EEZ, No. 79/1997). At the beginning of the fishing year 2017/2018, DoF issued 1177 general fishing licenses to boats and vessels, somehow less than the 1,244 issued in the previous fishing year[189]. In 2019, a total of 623 licenses were issued for coastal fishing, as opposed to 557 in 2018.[190]

Commercial fishing permits may only be granted to fishing vessels holding certificates of seaworthiness and registered in the Registry of Vessels (Article 5 of Act No. 116/2006). This Registry is administered by the Maritime Division of the Icelandic Transport Authority (ICETRA)[191].

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[189] http://www.fiskistofa.is/media/arsskyrslur/3_Fiskistofa-15.-april-2019_Veidileyfi-og-aflaheimildir.pdf.
[190] http://www.fiskistofa.is/umfiskistofu/frettir/strandveidar-2019.
[191] https://www.icetra.is/maritime/ships-and-cargoes/

8.2.3.1.3. Clause 2.3.1.3.

The catch quota of each vessel or vessel group for each fish species and fishing year shall be recorded in the official central data base in a transparent manner.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The catch quota of each vessel for each fish species and fishing year is available on the Fisheries Directorate website. The Fisheries Directorate maintain a catch registration system (GAFL database) which is updated with information on registered catches from ports of landing and information on catches exported unprocessed. The catch statistics are published, subject to change, once they have been compared to submitted logbooks and reports from buyers, and are available on the Fisheries Directorate website.

The catch quota of each vessel or vessel group for each fish species and fishing year is available on the Fisheries Directorate website. For each vessel the information available for each species is:

1. Allocated quota (initial allocation of quota from the overall TAC based on no. of shares)
2. Compensations (quota gained/lost through compensations)
3. Quota transferred from the previous year (this may be a negative balance)
4. Quota transferred between vessels (a negative balance indicates an outward transfer of quota (i.e. quota transferred to other vessels) while a positive balance indicates an inward transfer of quota (i.e. quota gained from other vessels)
5. Allowed catch (the sum of 1 to 4 above)
6. Catch (vessels landings in the season to date of that species)
7. Balance (Allowed catch - Catch)
8. Overfished

For illustrative purposes, Table 16 shows the first 19 lines of the publicly available data on individual vessels' quota allocations of saithe in the 2019/2020 fishing year. 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 (GAFL) in a transparent manner and is publicly accessible.

Table 16. First 19 lines of table showing the Icelandic saithe fleet TAC allocation, transfer, balances and catches for the 2019/2020 fishing year (Source: Directorate of Fisheries.[192])

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

Reg. no.	Vessel	Class	Alloc. quota	Compen-sations	Trfr. prev. year	Trfr. b/t vessels	Allowed catch	Catch	Balance	Overfished
78	Ísborg ÍS 250	A	0	8,612	0	0	8,612	0	8,612	0
89	Grímsnes GK 555	A	6,052	0	365	98,017	104,434	42,765	61,669	0
173	Sigurður Ólafsson SF 44	A	111,684	0	4,768	-48,125	68,327	3,661	64,666	0
177	Fönix ST 177	A	0	2,390	0	0	2,390	0	2,390	0
182	Vestri BA 63	A	12,767	1,315	1,474	0	15,556	3,012	12,544	0
233	Erling KE 140	A	557,291	1,077	2,500	-31,250	529,618	0	529,618	0
253	Hamar SH 224	A	78,631	0	1,891	0	80,522	772	79,750	0
264	Hörður Björnsson ÞH 260	A	93,829	60,775	0	8,511	163,115	579	162,536	0
363	Maron GK 522	A	0	0	0	17,921	17,921	77	17,844	0
530	Hafrún HU 12	A	292	43,413	0	0	43,705	509	43,196	0
741	Grímsey ST 2	A	4,749	2,065	39	-6,853	0	0	0	0
926	Þorsteinn ÞH 115	A	92,607	10,193	13,633	-26,642	89,791	0	89,791	0
972	Kristín GK 457	A	20,128	0	2,963	0	23,091	707	22,384	0
1019	Sigurborg SH 112	A	0	0	0	4,050	4,050	4,050	0	0
1028	Saxhamar SH 50	A	34,315	0	787	0	35,102	3,175	31,927	0
1030	Páll Jónsson GK 357	A	200,923	0	29,579	0	230,502	9,796	220,706	0
1054	Sveinbjörn Jakobsson SH 10	A	11,115	0	1,636	0	12,751	22	12,729	0
1062	Kap II VE 7	A	270,442	0	39,813	0	310,255	16,624	293,631	0
1076	Jóhanna Gísladóttir GK 557	A	60,953	0	8,151	0	69,104	1,192	67,912	0

Registered catches are based on information from ports of landing and information on catches exported unprocessed. The catch statistics are published, subject to change, once they have been compared to submitted logbooks and reports from buyers, and are available on the Fisheries Directorate website[193].

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

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

8.2.3.1.4. Clause 2.3.1.4.

Information on the size and composition of the fleet of fishing vessels shall be available, documented and include the following provisions:

1) An officially maintained fishing vessel registry;
2) Participation in the fishery must be subject to licence;
3) Only vessels on the fishing vessel registry shall be authorised to participate in the fishery;[194]
4) For the stock under consideration, the allowed catch by species for each vessel or vessel group shall be specified.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Information on the size and composition of the fleet of fishing vessels is available and documented and includes an official fishing vessel registry maintained by the Icelandic Transport Authority (ICETRA). Participation in the commercial fisheries in Icelandic waters requires a fishing permit granted by the Fisheries Directorate and only vessels on the fishing vessel registry can be granted a permit. The allowed catch of saithe for each vessel or vessel group is specified on the Fisheries Directorate website.

Evidence:

As noted in clause 2.3.1.2 vessels participating in Icelandic fisheries require a fishery permit and must be registered on the ICETRA. Foreign vessels are prohibited unless agreement has been reached to allow access. See clause 2.3.1.2 and 2.3.1.3 for further information.

At the beginning of the fishing year 2017/2018, DoF issued 1177 general fishing licenses to boats and vessels, somehow less than the 1,244 issued in the previous fishing year[195]. In 2019, a total of 623 licenses were issued for coastal fishing, as opposed to 557 in 2018.[196]

Current quota share and TAC allocations by species, including saithe, as well as running catch totals and remaining quota for the season for each vessel are freely available on the Directorates website. The consistent is considered to be very transparent[197].

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[194] Foreign registered vessels may be allowed to fish in Icelandic waters by international agreement; such vessels require specific permit from the Icelandic authorities and their catches are strictly monitored.
[195] http://www.fiskistofa.is/media/arsskyrslur/3_Fiskistofa-15.-april-2019_Veidileyfi-og-aflaheimildir.pdf.
[196] http://www.fiskistofa.is/umfiskistofu/frettir/strandveidar-2019.
[197] http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/aflastodulisti.jsp?lang=en

8.2.3.2. Clause 2.3.2. Fishing vessel monitoring and control systems

8.2.3.2.1. Clause 2.3.2.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

The Icelandic Coast Guard, working closely with the Fisheries Directorate, administers an integrated monitoring, control and surveillance system which covers the activities of Icelandic and foreign fishing vessels.

Evidence:

The Icelandic Coast Guard 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 system. The purposes of the 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[198]. 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, DoF produces 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 technology meaning relatively small staff numbers can achieve extensive monitoring of the Icelandic fishing industry.

The integrated system uses all available data such as identification of the vessel, its movements, 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 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 Coast Guard uses several different but complementary electronic vessel monitoring systems including satellite-based systems comprising VMS and use of satellite imagery, 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 assessment team has visited the Operation Centre and witnessed these systems in use.

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

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

are taken each month) which can be used for example in detection of the uncommon occurrence of vessels not using VMS (Coast Guard pers. comm., site visit).

Emphasis is placed on data analysis including the use of VMS data in conjunction with other sources (e.g. IUU vessel lists, vessel registries, fishing licences, permits, port State control reports). The schematic below outlines the main inputs which make up the integrated MCS system in Iceland.

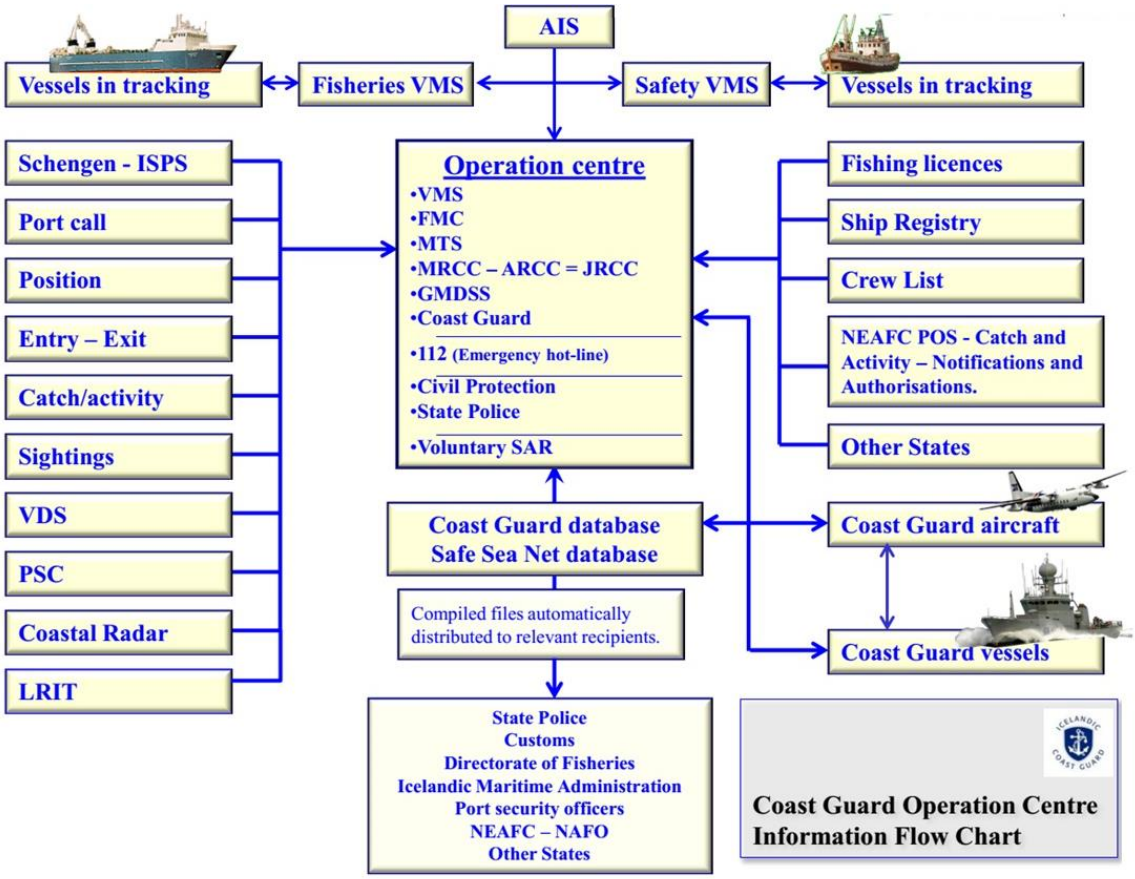


Figure 45. Schematic outlining the inputs which make up the integrated Monitoring, Control and Surveillance (MCS) system in Iceland (Source: presentation entitled Iceland's application for membership of the EU. Chapter 13, 28 February Icelandic Coast Guard ERS/VMS/AIS[199]).

The Coastguard conduct unannounced at-sea vessel boarding's in order to inspect gear, catch and catch records including logbooks as well as to perform inspections of mandatory safety equipment. The Coast Guard is currently investigating additional means to enhance detection of discarding to enhance the confidence of current discard estimates.

Data on coastguard enforcement activity in the past year has been provided in Clause 2.1.

Inspectors of DoF also accompany fishing vessels at sea during which they check fishing methods and catches, including gear configuration, mesh sizes, validity of fishing permits, the weighing and recording of catches as well as the species and size composition of the catch. The catch of vessels that are permitted to

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

fully process catches on board is converted into a live weight based on the measured utilisation of the catch. The inspectors check that samples taken to monitor this process are correctly taken and accurately reflect the processing utilisation[200] [201]. Days spent by inspectors of the Fisheries Directorate at sea inspecting vessels as a proportion of total fishing effort are shown in the Table 17. In the fishing year 2017/2018, most effort was directed at the gillnet fisheries, but in the fishing year 2018/2019 the bottom trawl fisheries were under most scrutiny. Inspectors also undertake in-port inspections, to inspect logbooks and monitor the landing of catches and ensure that they are correctly weighed and recorded, according to legal requirements.

Table 17. Inspector days on fishing vessels (Source: Directorate of Fisheries).

Fishery type	Bottom Trawl	Longline	Gillnet (include lumpsucker fishery and cod fishery)
2017/2018 days	570	202	152
2017/2018 coverage %	1.93%	0.64%	3.64%
2018/2019 days	652	190	176
2018/2019 coverage %	2.64%	0.61%	2.03%

DoF 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. These (sudden) closures generally lasts for two to three 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 temporary/sudden and long-term (regulatory) 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 they 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.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[200] The Icelandic Directorate of Fisheries – Responsibilities and main tasks. Page 8. http://www.fiskistofa.is/media/utgefid_efni/DOF.pdf
[201] Fiskistofa Annual Report, 2017. Maritime surveillance chapter. http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit-a-sjo/

8.2.3.2.2. Clause 2.3.2.2.

The fishing gear shall be subject to inspection, as well as the composition of the catch and its handling onboard the fishing vessels.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Fishing gear is subject to inspection, as well as the composition of the catch and its handling onboard the fishing vessels. At-sea inspections are undertaken during boardings by the Coast Guard and on fishing trips accompanied by the inspectors of the Fisheries Directorate.

Evidence:
As noted in clause 2.1.1 and 2.3.2.1 fishing vessels are subject to surveillance at sea by the coastguard and Inspectors of the Fisheries Directorate.

The Coastguard conduct unannounced at-sea vessel boarding's in order to inspect gear, catch and catch records including logbooks as well as to perform inspections of mandatory safety equipment.

The Directorate's inspectors also accompany vessels on fishing trips during which they check fishing methods and catches, including gear configuration, mesh sizes, validity of fishing permits, the weighing and recording of catches as well as the species and size composition of the catch. The catch of vessels that are permitted to fully process catches on board is converted into a live weight based on the measured utilisation of the catch. The inspectors check that samples taken to monitor this process are correctly taken and accurately reflect the processing utilisation[202],[203].

On land, inspectors from DoF inspect logbooks and monitor the landing of catches and ensure that they are correctly weighed and recorded, according to legal requirements. Surveillance is strategic and risk-based, using information supplied by DoF to identify highest risk activities where monitoring effort is then concentrated. In the fishing years 2017/2018, the inspector coverage was focussed on the gillnet fisheries (3.64% of trips accompanied by inspectors) compared to 1.93% and 0.64% of bottom trawl and longline fishing trips, respectively. This emphasis on gillnet fisheries was though reduced in the fishing year 2018/2019 when coverage of those vessels was reduced to 2.03%. The coverage of vessels operating bottom trawl as increased to 2.64% while the coverage of longliners remained similar at 0.61% (see clause 2.3.2.1).

Discards are estimated by comparing length of the catch composition between vessels that have DoF inspectors on board and those that do not, while fishing in relative close proximity to one another and at the same time.

Further information is available under clauses 2.1.1 and 2.3.2.1.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[202] The Icelandic Directorate of Fisheries – Responsibilities and main tasks. Page 8. http://www.fiskistofa.is/media/utgefid_efni/DOF.pdf
[203] Fiskistofa Annual Report, 2017. Maritime surveillance chapter. http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit-a-sjo/

8.2.3.2.3. Clause 2.3.2.3.

Areas closed from fishing shall be monitored by the authorities.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **Areas closed to fishing are monitored by the Coast Guard using the VMS system. Vessels fishing in proximity to closed areas are monitored at the Coast Guard Operation Centre and vessels are directly contacted if they encroach on prohibited areas.**				
Evidence: Closures can be short-term (sudden closures) or long-term (regulatory closures)[204] and are primarily monitored and enforced by the Icelandic Coast Guard using the VMS system[205]. Vessels fishing in proximity to closed areas are monitored at the Coast Guard Operation Centre and vessels are directly contacted if they approach or 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. Further information on the Coast Guard Monitoring, Control and Surveillance system is presented in clause 2.3.2.1.				
References:	See footnotes			
Non-Conformance Number (if relevant)				**NA**

[204] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Krokaaflamarksbatar
[205] http://www.lhg.is/media/LHG80/Landhelgisgasla_Islands_enska2_.pdf

8.2.3.2.4. 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.

Evidence Rating:	Low ☐	Medium ☑		High ☐
Non-Conformance:	Critical ☐	Major ☐	**Minor** ☑	None ☐

Summary Evidence:
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. Therefore, the Assessment Team have deemed a Minor Non-conformance to be appropriate in this instance. Following the issuance of this non-conformance, and in accordance with rules of the IRF Programme, the Client has submitted a Corrective Action Plan (CAP) to address the non-conformance raised within a defined period. Corrective Actions in place are to be reviewed annually at surveillance audits.

Evidence:
Vessel operators are required by law to up-date and transmit data on fishing activity after each haul (fishing event occasion). For small vessels that operate without an electronic logbook (below 6GRT) a report of catches must be submitted on landing.

Logbook recording of marine mammals and seabirds bycatch by number and species is required by Icelandic regulation[206]. 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 on-board inspectors. 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[207] and a MFRI report published in September 2019, entitled: "Bycatch of Seabirds and Marine Mammals in lumpsucker gillnets 2014-2018".[208]

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.

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"*.[209]

The MFRI report published in 2019 found that reported bycatch in E-logbooks by the fleet in 2018 had decreased from the previous year. Registration of mammals decreased from 989 in 2017 to 421 in 2018, and registration of seabirds from 2,417 in 2017 to 1,607 in 2018. This would indicate that registration was

[206] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[207] https://www.hafogvatn.is/static/research/files/fjolrit-178pdf
[208] https://www.hafogvatn.is/static/extras/images/medafli-fugla-og-spendyra-i-grasleppuveidum1157500.pdf
[209] https://nammco.no/wp-content/uploads/2017/04/nammco-meeting-iceland-gms.pptx

poorer in 2018 than in the previous year, possibly because the crews of boats taking part in the lumpsucker fishery in 2018 did not register bycatches as diligently after MSC revoked its certification in 2018. In 2018, inspectors from DoF were on-board in 102 trips, as opposed to 71 in 2017. In 2014, DoF inspectors were on-board in 38 trips. The coverage has risen from 1.3% in 2014 to 2.8% in 2018.[210].

Furthermore, the 2018 NAMMCO Scientific Working Group on By-catch recommended that the species identification on the logbooks be improved, perhaps with a picture of the species at different life stages appearing when the species ID is to be entered in the electronic logbook.

While much of the evidence related to non-compliance with reporting requirements may relate to the lumpsucker fishery, this fishery is part of the same 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 issued a Minor Non-conformance in December 2018 during the 4th surveillance activity for this fishery.

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.

Status: Open, Corrective Actions in place to be reviewed annually in subsequent audits.

A corrective action plan and year 1 progress against this non-conformance has been provided under the Non Conformances and Corrective Action Section of this report. Please refer to it for further detail.

During the October 2019 site visits the MFRI highlighted that in general, the number of seabirds and marine mammals recorded has been increasing in recent years and in 2018 was almost triple the number reported in 2016. They also noted that there may always be some underreporting issues with a logbook system (pers. comm. Guðjón Már Sigurðsson, MFRI).

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[210] https://www.hafogvatn.is/static/extras/images/medafli-fugla-og-spendyra-i-grasleppuveidum1157500.pdf.

8.2.3.2.5. Clause 2.3.2.5.

Fishing logbooks shall be subject to unannounced inspection.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The Coast Guard undertakes unannounced inspections at sea and check logbooks during these boardings. Fisheries Directorate inspectors also make unannounced checks of logbooks during port inspections.**				
It is a legal requirement that vessels give inspectors of the Fisheries Directorate and the Coast Guard access to their logbooks (see Article 8 of regulation on logbooks No. 746/2016)[211]. As noted in clause 2.3.2.2, the Coast Guard undertakes unannounced inspections at sea and check logbooks during these boardings. Fisheries Directorate inspectors also make unannounced checks of logbooks during port inspections as well as checking them during fishing trips at sea where they witness various aspects of fishing operations.				
References:	As referenced			
Non-Conformance Number (if relevant)				**NA**

[211] https://www.stjornartidindi.is/Advert.aspx?RecordID=42a16a67-60a7-4ae7-ad7c-0f53fc254654

8.2.3.2.6. Clause 2.3.2.6.

The timely and correct recording of catches in fishing logbooks shall be monitored by comparing the recorded catch amounts with the catch stored aboard the vessel at time of inspection.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The timely and correct recording of catches in fishing logbooks is monitored by comparing the recorded catch amounts with the catch stored aboard the vessel at time of inspection. Inspections involve at-sea boardings by the Coast Guard and on fishing trips accompanied by Fisheries Directorate inspectors.

Evidence:
The timely and correct recording of catches in fishing logbooks is monitored during random unannounced vessel boardings both at sea or at the quayside. These inspections include a comparison of the recorded catch amounts with the catch stored aboard the vessel at time of inspection. As noted in clause 2.3.2.2, the Coastguard conduct unannounced at-sea vessel boarding's during which catch and catch recording is checked. The Fisheries Directorate's inspectors accompany vessels on fishing trips during which they also check catches and the weighing and recording of catches – including on catcher processor vessels. Checks are also performed by inspectors in port.

The results of some of these inspections can be seen in the supporting evidence for Clause 2.1.1 which presents the main reasons for the generation of remarks during Coast Guard inspections in 2018. Remarks related to discrepancies between declared and actual catch fall under the Fishing (Veiðar) category. Clause 2.1.1 also presents information on the results of inspections by the Fisheries Directorate including monitoring of logbooks and the detection of violations and enforcement action subsequently taken.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.3.2.7. Clause 2.3.2.7.

Discarding of catch from stock under consideration shall be prohibited. Discarding that may occur shall be monitored, e.g. by estimating amount of catch discarded due to size based high grading by species, season, gear type and area as feasible. The method for the monitoring of discards shall be specified.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Discarding of saithe is prohibited. Discarding is monitored, by comparing the catches of vessels fishing in the vicinity of each other and, where unusual activity is detected, implementing closer surveillance of the vessel/s involved.

As discussed in previous clauses, saithe discards are considered negligible. 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 saithe. Vessels that do not hold sufficient quota to cover their catch composition must therefore make arrangements to correct that deficiency by making use of the flexibility built into the ITQ management system. These include declaring up to 5% of their demersal catches as VS catch. 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 Fisheries Commission Project or 'VS fund', under the auspices of the Ministry). The maximum of 20% return on VS catches means that there are limited incentives to land it; 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, preventing discards, improving the treatment of the fishery resource and promoting responsible fishing practices.

Other measures open to vessel operators include (see also Clause 2.1.1):

- rent in quota,
- transfer quota between species based on the cod equivalent values of each species,
- transfer a limited amount to the following fishing year where it is taken off that vessels individual quota share for that species.

If vessels do not have sufficient catch quotas for their probable catches they must suspend all fishing activities. Discarding is subject to penalty[212] (400,000 to 8,000,000 ISK or about 3,000 to 60,000 EUR). As noted in previous clauses, 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 (Article 13 of Act No. 57/1996).

The Coast Guard and DoF have been embracing new technology in order to enhance detection of discarding. This includes employing drones and high-quality cameras. CCTV is available in many harbours but have not been used to monitor landings and weighing of catches due to legal uncertainty over such use of CCTV. Fishermen have objected to employment of on-board cameras (pers. com. site visit, October 2019).

[212] https://www.althingi.is/altext/pdf/131/s/0982.pdf

In December 2018 the Icelandic National Audit Office (NAO)[213] published a report on certain aspects of the Icelandic enforcement system. The report found no direct evidence of large-scale systematic violations, but identified a number of areas of weakness in particular in relation to the surveillance of weighing of catches (both at harbour scales and in-house weighing) and the surveillance of discarding. It highlighted that more quantitative data are needed to substantiate the conclusions that discards are low and that there are few irregularities in connection with re-weighing of catches after de-icing. A committee has been established to address the findings of the INAO report with a report due later this year to provide recommendations to the Minister on improvements to the enforcement system. The Ministry of Industries and Innovation (MII) and Fisheries Directorate noted in a surveillance audit meeting with the CAB Vottunarstofan Tún that the issues highlighted in the NAO report were issues they were already aware of and had prioritised as an area to enforce and had already initiated action.	
References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[213] https://rikisendurskodun.is/wp-content/uploads/2019/01/Eftirlit-Fiskistofu-Stjornsysluuttekt.pdf

8.2.3.2.8. Clause 2.3.2.8.

Vessels must comply with relevant national fishery management measures, which may include; TAC and quota allocations, effort management measures (e.g. days at sea, access limitation, gear restrictions, maximum allowable proportion of undersized fish, closure of areas with a high proportion of fish recruiting to the fishery, etc.), and technical conservation measures (e.g. mesh size and other gear selectivity measures).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Vessels are required by law to comply with relevant national fishery management and technical conservation measures.

Evidence:
Vessels are required by law to comply with fishery management and technical conservation measures, through the laws and regulations summarised in clause 2.1.1 and compliance is monitored through remote surveillance and inspections at sea and on land by the Coast Guard and DoF with penalties applied where violations are detected.

Between 2014 and 2018 there have been 113 infringements recorded by the Coast Guard. During this period most of infringements have been related to manning list (lögskráningar), fishing (veiðar), manning (vanmönnun) and license (réttindi). In 2018, there were 25 infringements registered, whereof eight concerned with fishing (veiðar) (slides from a meeting with Coast Guard in October 2019).

By far the main suspected offenses detected by DoF in 2018 relate to logbooks, specifically not submitting them in the required timeframes (399 in 2018), and the late balancing of additional quota required (which must be done within 3 days from fishing event) (1162 in 2018).[214]

Catch quota of each vessel or vessel group, along with the fishing year is recorded in the official central database (GAFL) in a transparent manner and is publicly accessible[215].

References:	See footnote
Non-Conformance Number (if relevant)	**NA**

[214] http://www.fiskistofa.is/media/arsskyrslur/3_Fiskistofa-15.-april-2019_Veidileyfi-og-aflaheimildir.pdf.
[215]http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/aflastodulisti.jsp?lang=en

8.2.3.2.9. Clause 2.3.2.9.

Monitoring and control measures shall be in place and shall be conducted in a manner to encourage and demonstrate compliance (and deter unreported landings).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Monitoring and control and surveillance measures are in place. The Icelandic management model has been designed to promote compliance through reporting and includes provisions which create flexibility, enabling fishers to avoid non-compliance with rules and regulations and effectively encourages compliance. The rapid reporting system further encourages compliance through near real-time information on the catch of each vessel, quota allocation and transfers. This transparency in effect introduces an element of 'self-policing' into the management system.

Evidence:

The monitoring, control and surveillance system has been described in clause 2.1.1. Please refer also the previous clause 2.3.2.8. The Icelandic 'management model' has been designed to promote compliance through reporting. There are provisions within the system which create flexibility, enabling fishers to avoid non-compliance with rules and regulations and effectively encourages compliance. Compliance is monitored through remote surveillance and inspections at sea and on land by the Coast Guard and the Fisheries Directorate with penalties applied where violations are detected.

The system is transparent with information relating to quota allocations and performance of individual vessels in the fleet being readily publicly available[216]. The rapid reporting system encourages compliance through near real-time information of catch for each vessel, quota allocation and transfers. This transparency in effect introduces an element of 'self-policing' into the management system.

References:	< See footnote
Non-Conformance Number (if relevant)	**NA**

[216] http://www.fiskistofa.is/fyrirspurnatorg/fyrirspurnir-tengdar-afla/

8.2.3.2.10. Clause 2.3.2.10.

Catches shall be landed in authorised fishing ports. Authorised fishing ports provide the necessary facilities for handling and weighing of the catch.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Law requires that all catches by Icelandic vessels from Icelandic waters must be landed and weighed in an Icelandic port. Weighing is undertaken on official port scales, or on other approved scales at private companies or Fish Markets, that have been certified by the Fisheries Directorate and operated by individuals authorised by the Directorate. The Fisheries Directorate maintains a list on their website, organised by port, of all official Icelandic weighing license holders that they audit and the type of weighing license held.

Evidence:

The Treatment of Commercial Marine Stocks Act 57/1996 and Regulation No. 745/2016 on the weighing and registration of marine catch require that all catches by Icelandic vessels from Icelandic waters must be landed and weighed in an Icelandic port. Exceptions are made for special circumstances e.g. serious engine failure in which case the Fisheries Directorate may authorise landings abroad (Article 5 of Act No. 57/1996).

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[217]. Landings were previously permitted at authorised foreign ports but this is no longer the case following Regulation No. 745/2016 (Article 1)[218].

Weighing is undertaken 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 under the provisions of the Regulation No. 745/2016 on Weighing and Recording of Marine Resources.

During the site visit on the, the assessors visited a fish market and 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 (GAFL).

References:	See footnote
Non-Conformance Number (if relevant)	**NA**

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

[218] https://www.reglugerd.is/reglugerdir/allar/nr/745-2016.

8.2.3.2.11. Clause 2.3.2.11.

In cases of mixed species catches, all commercial species shall be landed.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Discarding of commercial species is prohibited by law and all commercial species must be landed. All commercial species are separated and declared by logbook and landed weight. This is monitored by Fisheries Directorate inspectors and penalties are in place for non-compliance.

Evidence:

Discarding of commercial species is prohibited by law and all commercial species must be landed (Act Concerning the Treatment of Commercial Marine Fish, No. 57/1996). All commercial species are separated and declared by logbook and landed weight (Article 9, Act No. 57/1996). This is monitored by Fisheries Directorate inspectors and penalties are in place for non-compliance.

The vast majority of species assessed by the MFRI are part of the quota system (see their advice page[219]). In addition to formal quota species, there are a suite of other commercial species which are landed. The Directorate's website has a public search function which lists 65 of these species[220]. Some of these are species for which there is a ban on direct fishing (e.g. Atlantic halibut, certain sharks, etc…) but that are landed as part of the discarding prohibition. Others do not have a formal National TAC but are landed and sold commercially.

As Table 18 reveals, VS catches in the fishing year 2018/2019 amounted to just over 1565 tonnes, whereof saithe catches were just over 18 tonnes.

Table 18. VS catches in the fishing year 2018/2019[221].

	Fishing year 2018/2019				
Species	Q1	Q2	Q3	Q4	All year
Cod	193.13	204.813	643.199	215.095	1.256.237
Haddock	27.685	5.394	45.161	4.394	82.634
Saithe	672	6.484	10.375	728	18.259
Golden redfish	1.164	407	19	3.625	24.196
Ling	55	696	2.236	2.282	5.269
Tusk	2.181	423	822	2.326	5.752
Catfish	27	0	12.061	988	13.076
Angelfish	22	0	5	12	39
Other species	32.85	4.378	65.415	57.527	160.17
Total	257.786	222.595	798.274	286.977	1.565.632

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[219] https://www.hafogvatn.is/en/harvesting-advice
[220] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/
[221] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp

8.2.3.2.12. Clause 2.3.2.12.

Landings shall be monitored. Harbor officials and fisheries inspectors shall monitor the correct weighing and registration of the catch.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Landings are monitored. Port authority officials and Fisheries Directorate inspectors monitor the correct weighing and registration of the catch. New powers have been enacted through legislation to address the risk posed by incorrect weighing of ice.

Evidence:
The legal requirements on the monitoring of landings and the weighing and registration of catch are comprehensive. They are set out in Act No. 57/1996 concerning the Treatment of Commercial Stocks, and Regulation No. 745/2016 on Weighing and Recording of Marine Resources. Inspectors from the Directorate of Fisheries inspect logbooks and monitor the landing of catches and ensure that they are correctly weighed and recorded according to the legal requirements. Port authorities also have a role in this process.

All Icelandic catches from Icelandic waters must be landed and weighed in registered Icelandic port. Exceptions are made for special circumstances e.g. serious engine failure in which case the Fisheries Directorate may authorise landings abroad (Article 5 of Act No. 57/1996).

Separation by species (if not already done on board), weighing and recording of the catch must occur within two hours of landing. Weighing is undertaken on official port scales certified by the Fisheries Directorate and operated by individuals authorised by the Directorate.

As required by Article 10 of Regulation No. 745/2016, each landing generates a weighing receipt[222,223] 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.

[222] https://www.fmis.is/blank
[223] http://www.unuftp.is/static/fellows/document/pan09prf.pdf

The information is sent within 1 day by port authorities to the Fisheries Directorate who record it on their Catch Registration System. The Directorate also receives the e-logbook information. These two sets of information are compared, and the appropriate reduction is made to the vessel quota. 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. The reporting system is very near real time (circa. 24 hours). Adjustments can be made by the Directorate to correct for errors – the system is transparent in so far that anyone can enter a vessel registration number on the Directorates website and obtain the catch, species, quota, remaining quota, quota rents for any vessel.

In circumstances where there are significant difficulties in using a port scale, private weighing scales can be used provided the company involved has been approved by the port authority, the scales and operators using them are certified and Fisheries Directorate inspectors have unimpeded access to the facilities. This is known as a 'Home-weighing license'[224]. Fish markets can also be authorised to weigh catches by the Directorate. These private companies and fish markets are required to send weighing information to the relevant port authority who then submit it to the Fisheries Directorate's catch registration system. There are also legal requirements covering the licensing of the re-weighing of catch or weighing after gutting on land which are also monitored.

Processed at sea catch are registered as processed weights using an officially approved yield. This is monitored and verified by the Directorate staff. Weights at landing are checked at the processing base by Directorate staff. Processed weights are converted to live weight equivalents for deduction from each vessels quota and management purposes by staff at the Directorate.

Monitoring of weighing license holders is risk-based with the aim of directing surveillance where it is most needed. Assessment of risk is based on various factors such as the quantity weighed, number of weighings, the number of vessels that land with the licensee concerned, etc. Recently, attention has been focussed on the percentage of ice measured during weighing of catches by weighing licensees. After gross weighing on the port scale, it is permissible to send catch for re-weighing in fish processing companies or on a fish market which has been authorized for re-weighing catch. The catch is then either balanced or sampled according to certain rules, ice is separated, and the net weight of the fish is found.

To address the risk posed by incorrect weighing of ice, in 2017 the Act on the Treatment of Marine Fish Stocks (Act No. 57/1996) was amended by Act No. 48/2017 (Act amending the Act on the Treatment of Marine Fish Stocks and the Act on the Directorate of Fisheries (monitoring of weighing license holders))[225]. The Act empowers the Fisheries Directorate to monitor all weighing by a weighing license holder for a period of up to six weeks in cases where monitoring of the weighing license holder by the Directorate detects a significant deviation of the percentage of ice in the vessel's catch in a particular fish species, compared to the average ice percentage for that vessel. The license holder is required to pay all the costs of this monitoring. Repeated infringements can result in result in suspension of the weighing license holder for up to a year. The Directorate of Fisheries began applying this measure in the autumn of 2017.

In December 2018 the Icelandic National Audit Office (NAO)[226] published a report on certain aspects of the Icelandic enforcement system. The report found no direct evidence of large-scale systematic violations, but identified a number of areas of weakness in particular in relation to the surveillance of weighing of catches

[224] http://www.fiskistofa.is/fiskveidistjorn/vigtunafla/
[225] https://www.althingi.is/altext/stjt/2017.048.html
[226] https://rikisendurskodun.is/wp-content/uploads/2019/01/Eftirlit-Fiskistofu-Stjornsysluuttekt.pdf

(both at harbour scales and in-house weighing) and the surveillance of discarding. It highlighted that more quantitative data are needed to substantiate the conclusions that discards are low and that there are few irregularities in connection with re-weighing of catches after de-icing. A committee has been established to address the findings of the INAO report with a report due later this year to provide recommendations to the Minister on improvements to the enforcement system.

The Ministry of Industries and Innovation (MII) and Fisheries Directorate noted in a surveillance audit meeting with the CAB Vottunarstofan Tún that the issues highlighted in the NAO report were issues they were already aware of and had prioritised as an area to enforce and had already initiated action:

- A recent change to the law gives powers to the Directorate to place inspectors at processing plants suspected of irregularities in the re-weighing of catches after de-icing. Inspectors are in place for 6 weeks at the expense of the plant.

- Every two months the Directorate publishes information on-line which compares the ice percentages recorded at re-weighing by a weighing licensed holder when an inspector is present with the average percentages recorded over the 2 month period[227]. This transparency encourages better compliance - the data is reported to show a narrowing of the difference in ice percentages over time. This is corroborated by studies by the University of Iceland showing the same trend and indicating that irregularities are small in terms of volume, 1-2 % of landed catches, although potentially large in number since they are caused mainly by small vessels with frequent landings. Tún note that the MII and the Directorate assess that these irregularities have reduced by 50% indicating that their actions are driving improvement.

- A further tool, introduced in spring 2019, is the publication on the Directorate's website of vessel catch composition with and without an inspector on board which can give an indication of levels of discarding.

The Assessment Team will continue to review the actions implemented to improve the shortcomings identified in the Icelandic NAO report, in upcoming surveillances.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[227] Ice ratio figures for July and August. http://www.fiskistofa.is/umfiskistofu/frettir/ishlutfall-i-juli-og-agust-1

8.2.3.2.13. Clause 2.3.2.13.

Catch shall be weighed by species at landing.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
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 law.

Evidence:
As noted in clause 2.1.1, 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.

As required by Article 10 of Regulation No. 745/2016, each landing generates a weighing receipt, 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.

During the site visit, the assessors visited a fish market and 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 (GAFL). Both the weighing scales and their operators are licensed and audited by the Directorate. Fish are stored in crates with the catch labelled for the purposes of traceability. We were also shown the equipment used to measure ice.

See Clause 2.1.1 for further information.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.3.2.14. Clause 2.3.2.14.

The weight (whole weight or gutted weight) by species of all catches of stock under consideration and by-catch species shall be measured by authorised harbour officials at landing and recorded in the official central data base (date, vessel, gear type, location, species, quantity).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The weight (whole weight or gutted weight) by species of all catches and by-catch species is measured by authorised harbour officials at landing and recorded in the Fisheries Directorate's catch registration system.**				
Evidence: As noted in clause 2.1.1, within two hours of landing catches are officially separated, weighed (whole weight or gutted weight) 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. Processed at sea catch are registered as processed weights using an officially approved yield. This is monitored and verified by the Directorate staff. Weights at landing are checked at the processing base by Directorate staff. Processed weights are converted to live weight equivalents for deduction from each vessels quota and management purposes by staff at the Directorate. See also the evidence presented in clause 2.3.2.13.				
References:	As referenced			
Non-Conformance Number (if relevant)				**NA**

8.2.3.2.15. Clause 2.3.2.15.

There is systematic monitoring of landing, weighing and registration of catches and discrepancies/deviations shall be recorded.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

There is systematic monitoring of landing, weighing and registration of catches with all catches being weighed and recorded at the port of landing by an official weigher using licensed scales before the official catch is recorded on a central catch registration system. The Fisheries Directorate compares information on catches from the portside official weighing system with the corresponding logbook entry for that landing and discrepancies/deviations are recorded and investigated.

Evidence:

As noted in clause 2.1.1, there is systematic monitoring of landing, weighing and registration of catches with all catches being weighed and recorded at the port of landing by an official weigher using licensed scales before the official catch is recorded on a central catch registration system (The Fisheries Directorate and Port Authorities database, GAFL).

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. At this point in the discrepancies/deviations between the declared and official records of a landing are detectable if present and are recorded. Depending on the nature of the discrepancy/deviation the Fisheries may then decide whether or not further action is warranted.

See also the evidence presented in clause 2.3.2.13.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.3.2.16. Clause 2.3.2.16.

Reasons for deviations shall be analysed and corrections made to reduce the likelihood of recurrence.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Data related to landings are processed in the Directorate´s database and catches are subtracted from vessels' quotas. Deviations where they occur can sometimes be rectified using the flexibility within the system (e.g. by using inter-annual, inter-vessel or inter-species transfers to cover catches of a species for which the vessel did not already have quota). Excess catches which are not corrected using these flexibility measures can result in a revocation of fishing licenses and fines.

Evidence:

As noted in clause 2.1.1, data related to landings are processed in the Directorate´s database and catches are subtracted from vessels' quotas. The system is designed such that reports are received in near real-time so that the Directorate can act quickly if vessels are approaching the end of their quotas. In addition, vessels are aware or can easily check online their current quota status for a particular species. All processors purchasing fish, be it directly or at auction, are obliged to submit monthly reports to the Directorate. In addition, the fish auction reports all sales of fish directly to the Directorate.

Deviations where they occur can sometimes be rectified using the flexibility within the system (e.g. by using inter-annual, inter-vessel or inter-species transfers to cover catches of a species for which the vessel did not already have quota). Excess catches which are not corrected using these flexibility measures can result in a revocation of fishing licenses and fines[228].

In addition to the landing, weighing and registration system for catches, export documentation provides an independent comparative check on catch quantities. 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.

References:	See footnote
Non-Conformance Number (if relevant)	**NA**

[228] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Vidurlog

8.2.3.2.17. 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.[229]

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Icelandic saithe is caught for the most part by vessels employing bottom trawl but also to a smaller extent by boats using gillnet, Danish seine and handline. Longline and gillnet fisheries are relevant to this clause. There are regulations that require passive fishing gear left unattended at sea to be marked so that the owner can be identified.

Evidence:

In recent years, around 90 % of all saithe catches have been registered by vessels employing bottom trawl, with 2-3% caught by boats using gillnets, Danish seine and handline.

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. Where the Fishing Directorate finds and recovers lost or abandoned gear they recover the cost of recovery from the gears' owner. 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 2018/19 Laws and regulations[230]. During the 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.

In Iceland there are specific gear marking regulations for anchored bottom set gillnets targeting cod. These provisions are contained in Regulation No. 115 of 13 February 2006[231]. 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 ~ 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.

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 on-board that allow them to retrieve lost gear even when both towing warps have parted, which is a rare situation. The Icelandic ITQ system allows for a slower paced fishery than would be expected if there was only an overall TAC with all boats fishing against it. The system allows fishers to target their efforts in optimum weather conditions leading to decreased rates of lost fishing gear.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

[229] This clause is applicable to gillnets, traps and pots.
[230] https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/.
[231] http://www.reglugerd.is/reglugerdir/allar/nr/115-2006.

8.2.3.3. Clause 2.3.3. Catches are subtracted from relevant quotas

8.2.3.3.1. Clause 2.3.3.1.

Landed catches shall be subtracted from the relevant quotas (allowable catch) of the vessel or vessel group.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Landed catches are subtracted from the relevant quotas (allowable catch) of the vessel or vessel group. Vessels must weigh catch within two hours of landing. The official weighed catch for each vessel is then submitted by the Port Authority to the Fisheries Directorate's catch registration system and deducted from the vessel's quota. Comparison of the official weighed catch is made with the vessels logbook as part of this process. Transfers of quota to meet any shortfall are also monitored to ensure any additional quota required is secured. Processed at sea catch is also monitored, including its conversion to live weights which are then deducted from the vessel's quota.

Evidence:

As noted in clause 2.1.1, information from fresh fish landings is collected through the portside official weighing system which is carried out by official staff and calibrated systems. Vessels must weigh catch within two hours of landing on the quay. 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 saithe and has a capacity of 280-300 kg). The weight registration document for each vessel is transmitted to the 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. 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 as required by law (Act No. 57/1996). The reporting system is near real time (circa. 24 hours).

The officially weighed catches are the official catch of record on which subsequent deductions from vessels' quota is based with e-log information being used as a secondary source to ensure accuracy.

Processed at sea catch is registered as processed weights using an officially approved yield. This is monitored and verified by the Directorate staff. Weights at landing are checked at the processing base by Directorate staff. Processed weights are converted to live weight equivalents for deduction from each vessel's quota and management purposes by staff at the Directorate.

See clause 2.1.1 for further information.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.3.3.2. Clause 2.3.3.2.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Some flexibility occurs in the quota management system so that the species composition of catches may be matched with the quota portfolio available to individual fishing vessels and to discourage discarding. This includes provision for some limited quota transfer between different species using 'cod-equivalents'

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 and to discourage discarding. There are a variety of provisions in place to facilitate flexibility and reduce any potential incentives relating to the discarding of fish.

In addition to within-species quota transfers between vessels and/or fishing years the system also makes provision for some limited quota transfer between different species. 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[232]. 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).

The cod-equivalent values for several representative species for the 2012/2013 - 2019/2020 fishing years are presented in Table 19. As can be seen the cod-equivalent value for more commercially valuable species is consistently higher across fishing years. Cod equivalent values change annually.

Table 19. Cod-equivalent values of representative species for the fishing years 2013/2014-2019/2020. (Source: http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/thorskigildisstudlar/).

	Fishing year							
Species	**2012/ 2013**	**2013/ 2014**	**2014/ 2015**	**2015/ 2016**	**2016/ 2017**	**2017/ 2018**	**2018/ 2019**	**2019/ 2020**
Cod (Þorskur)	*1.00*	*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	*1.00*
Saithe (Ufsi)	0.73	0.82	0.81	0.77	0.79	0.72	0.62	0.55
Golden redfish (Gullkarfi)	0.82	0.89	0.85	0.79	0.69	0.60	0.63	0.69
Norway lobster (Humar)	4.70	6.46	5.98	5.98	6.10	8.12	9.54	9.20
Greenland halibut (Grálúða)	2.47	2.67	2.59	2.48	2.65	2.61	2.43	2.27

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

Anglerfish (Skötuselur)	1.74	1.98	2.27	2.05	2.17	2.10	1.76	1.81
Ling (Langa)	0.59	0.73	0.76	0.68	0.68	0.73	0.74	0.7
Tusk (Keila)	0.39	0.52	0.51	0.47	0.42	0.38	0.40	0.39

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.2.3.3.3. Clause 2.3.3.3.

When a vessel's quota is used up, additional quota must be transferred to the vessel from other vessels or the vessel stops fishing.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

It is illegal to fish without quota and this is monitored closely by the Coast Guard and inspectors of the Fisheries Directorate. The quota management system includes a degree of flexibility so that the species composition of catches may be matched with the quota portfolio available to individual fishing vessels. Flexibility is facilitated by a number of provisions including the ability to use a limited amount of the following season's quota or to transfer a limited amount of unused quota to the following season, or transfer quota between species. Where a vessel has exhausted these options it must transfer quota from other vessels and if unable to do this it must stop fishing

Evidence:

As the Icelandic groundfish fishery is a mixed fishery there is 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 in quota management and reduce any potential incentives relating to the discarding of fish:

A vessel can exceed its allocation for a particular species in a fishing year by up to, but not exceeding, 5%; the excess is then deducted from that vessels allocation for that species in the following fishing year.

Additionally, a decision may be taken to postpone fishing up to 15% of a vessel's quota for a particular species in a fishing year and transfer the balance to the following season[233]; this measure may be particularly beneficial to the growth of long-lived species in maximising the return from strong year classes.

It is also possible to make some limited quota transfer between different species. 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[234]. 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). The results of some of inter-vessel and inter-seasonal transfers aimed at balancing catches and quotas may be seen in under Clause 2.3.1.

Vessels may also decide not to include part of the vessels catch in its catch quota. This is limited to no more than 0.5% of the vessel's pelagic catch and 5% of other marine catches per fishing year. Further this catch, known as 'VS catch', must be kept separate from the rest of the vessel's catch and weighed and recorded separately; it must be sold at an approved auction and the bulk of the proceedings of the sale must go to the Fisheries Commission Project Fund (established by Act No. 37/1992), 20% going to the vessel (Article 11, Act No. 116/1996).[235] The maximum of 20% return on VS catches means that there are limited incentives to land it; however, having the VS catch provisions within the fisheries management system allows the

[233] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Vidurlog
[234] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/thorskigildisstudlar/
[235] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Sveigjanleiki_i_aflamarkskerfinu

flexibility for vessels to land small catches which are outside their specific quota, preventing discards, improving the treatment of the fishery resource and promoting responsible fishing practices. Icelandic law prohibits fishing vessels going to sea without sufficient quota (Act No. 57/1996). This is monitored by the Fisheries Directorate inspectors and Coast Guard and penalties apply under the Act for violations of its provisions including suspension of the commercial fishing license (Article 14), the requirement to have an inspector on board the vessel for a period of time up to two months paid for by the vessel (Article 16), fines, and in the event of major or repeated deliberate violation, imprisonment for up to 6 years (Article 23). See clause 2.1.1 for further information on the results of this surveillance and enforcement. Consequently, where a vessel has exhausted its quota (including availing of all the additional quota it is allowed to generate within the rules) the only option it is left at that point is to transfer additional quota from other vessels and where it is unable to do so the vessel must stop fishing.	
References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

8.2.3.3.4. Clause 2.3.3.4.

Transfer of quota between vessels shall take effect only after it has been authorised and recorded to the official central data base.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **All transfers of quota must be authorised by the Fisheries Directorate and do not come into effect until they have confirmed it. Information on the catch quota, including quota transfers, of each vessel or vessel group, is recorded in the Fisheries Directorate's official central database.**				
Evidence: All transfers of quota must be authorised by the Fisheries Directorate. The Directorate of Fisheries must be notified of the transfer of quota and must receive this no later than 15 days after the end of the fishing year. Application forms for the transfer of quota are available online[236] and must be transmitted directly to the Directorate for authorisation of the transfer. Information on the catch quota, including quota transfers, of each vessel or vessel group, is recorded in the official central database (GAFL) (see evidence presented in clause 2.3.1.3).				
References:	As referenced			
Non-Conformance Number (if relevant)				**NA**

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

8.2.3.3.5. Clause 2.3.3.5.

Information on each vessels catch quota and quota use shall be updated regularly and made public and accessible to all on the official web-site, thus ensuring transparency.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Information on each vessels' catch quota and quota use is updated in near real-time and is made public and accessible to all on the Fisheries Directorates web-site, thus ensuring transparency.

Evidence:
As discussed previously, catch statistics are published by individual vessel and are readily available online in near real-time thus ensuring transparency[237]. For each vessel the information available for each species is:

1. Allocated quota (initial allocation of quota from the overall TAC based on no. of shares)
2. Compensations (quota gained/lost through compensations)
3. Quota transferred from the previous year (Note this may be a negative balance)
4. Quota transferred between vessels (a negative balance indicates an outward transfer of quota (i.e. quota transferred to other vessels) while a positive balance indicates an inward transfer of quota (i.e. quota gained from other vessels)
5. Allowed catch (the sum of 1 to 4 above)
6. Catch (vessels landings in the season to date of that species)
7. Balance (Allowed catch - Catch)
8. Overfished

For illustrative purposes see the table in the supporting evidence for 2.3.1.3 showing the first 19 lines of the publicly available data on individual vessels' quota allocations of saithe in the 2019/2020 fishing year.

References:	See footnote
Non-Conformance Number (if relevant)	**NA**

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

8.2.3.4. Clause 2.3.4. Rules are enforced

8.2.3.4.1. Clause 2.3.4.1.

Rules shall be enforced. There shall be penalties for serious infractions.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

There is a clearly established legal framework which sets out rules and regulations relating to fishing activity within Icelandic waters and the penalties for violation of these rules. It gives powers to the Ministry, the Fisheries Directorate, the Coast Guard and the MFRI to monitor fishing activities and enforce these rules. Penalties exist for serious infractions. This largely comprises administrative penalties ranging from guidance letters and reprimands to suspension of fishing permits and weighing licenses. More serious cases are sent to the police for prosecution under the criminal system which can result in imprisonment.

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. The penalties for violation of the laws and regulations have been described in clause 2.1.1 and range from the issue of reprimands by the Directorate of Fisheries and the suspension of commercial fishing permits to confiscation of gear and catch, fines and, in cases of serious or repeated deliberate violation, imprisonment for up to six years (for example, Articles 24 and 25 of Act No. 116/2006[154]; Articles 15-17 of Act No. 79/1997[158]; Chapter 4 of Act no. 57/1996[156]).

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). Other at sea monitoring and inspection duties reside with the Coast Guard. In addition, the MFRI also has the legal power to enact temporary spatial closures.

A breakdown of inspection activities in 20178 with comparison with previous years was provided to the assessment team by the Coast Guard and is summarised in clause 2.1.1, alongside details of Fisheries Directorate Inspections.

Vessel logbooks are inspected during random unannounced boardings both at sea (by the Coast Guard) or at the quayside (by DoF inspectors) which may include a comparison of catch and logbook entries. Foreign vessels are also inspected – both in the Icelandic EEZ and further afield as part of Iceland's contribution to monitoring and surveillance as a member of NEAFC. In 2018, the Coast Guard inspected 18 foreign vessels, mostly Norwegian. No infringements were discovered except in the case of a Faroese longliner which was operating inside a short-term closure area.

Between 2014 and 2018 there have been 113 infringements of Icelandic vessels recorded by the Coast Guard (Fig. 47). In 2018 there were 16 infringements recorded, mostly associated with manning lists

(lögskráningar) and fisheries (veiðar).[238] The number of recorded infringements in each category has either stayed the or reduced from the previous year, except for fisheries (veiðar) which saw an increase of one incident in 2017 to eight in 2018, and vanmönnum (manning) which rose from one incident in 2017 to five in 2018. In 2018, there were also two incidents of fishing without permits, whereas there had been none in 2017.

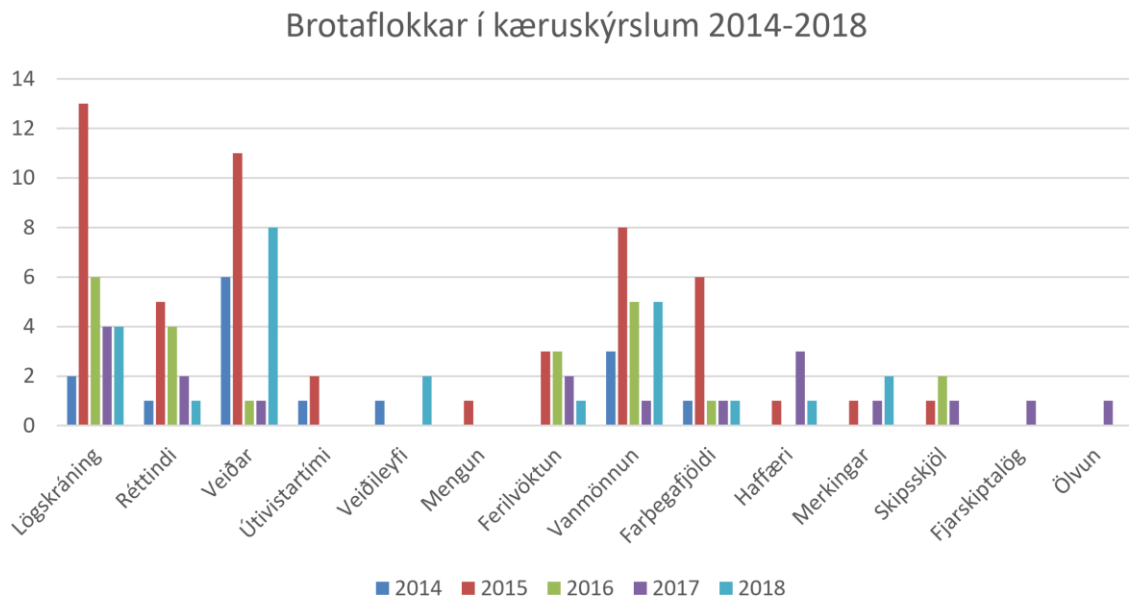


Figure 46. Reasons for the generation of remarks, by no. of remarks generated, during Coast Guard inspections in 2014-2018; Lögskráningar – Manning list, Réttindi – License, Veiðar – Fishing , Útivistartími – Time limits , Veiðileyfi – Fishing permit, Mengun – Pollution, Ferilvöktun – VMS, Vanmönnun – 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).

In their annual report, the Fisheries Directorate publish a comprehensive summary of suspected offenses recorded during maritime surveillance (Table 20) and the enforcement action subsequently taken (Table 21). By far the main suspected offenses detected relate to logbooks, specifically not submitting them in the required timeframes (399 in 2018), and fishing in excess of or without quota (1167 in 2018). Much of the former arises from late submission of logbooks each month by small vessels using paper logbooks, with each instance registered as an offence. Similarly, the quota infringement relates to each incidence detected of vessels that have taken longer than the 3 days required by law to balance their quota where they have landed fish in excess of their quota (where proceeding to fish without quota is a separate offence) (Pers. com. DoF).

Table 20. Overview of suspected offenses recorded in Icelandic fisheries (Source: DoF Annual Reports 2018[239], 2017[240] and 2016[241]).

Offenses recorded by Fiskistofa	2018	2017	2016
Violation of landing rules (broken down into:)	42	52	60

[238] Coast Guard presentation provided to the assessment team October 2019.
[239] http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf
[240] http://www.fiskistofa.is/media/arsskyrslur/Arsskyrsla_2017.pdf.
http://www.fiskistofa.is/media/arsskyrslur/medferd_mala_og_urskurdir.pdf
[241] Fiskistofa 2016 Annual Report, Chapter 8. http://www.fiskistofa.is/media/arsskyrslur/kafli8_2016.pdf

• *Not landing fish at official landing location*	6	*5*	4
• *Weighing container*	19	*10*	13
• *Misreporting (Landing full size fish as part of catches of juveniles)*	*14*	*9*	22
• *Incorrect specification of species*	*0*	*11*	4
• *Other*	*3*	*17*	17
Discarding catch	12	8	4
Violation of fishing license rules	*25*	36	15
Violation of lumpsucker fishery rules	39	19	11
Violation of coastal fishery rules	4	10	46
Logbooks (broken down into:)	457	719	689
• *Not submitting logbooks on time*	*399*	*674*	657
• *Other*	*58*	*45*	31
Fishing in excess of or without quota	1167	1201	1,060
Violation of law on salmon and trout fishing	3	1	2
Other violations	51	45	14

Where a suspected violation of the fisheries management legislation has occurred, the case is referred to the Directorate's Legal Department for enforcement action. In 2018, 239 cases were referred, whereas 220 cases had been deferred in 2017 and 131 in 2016 (Table 21). Breaches of the law are handled in several ways. Some cases are dropped and no further action taken, otherwise action taken ranges from the issue of reprimands, application of administrative fines, suspension or revocation of fishing permits and weighing licenses or, in a small number of cases, sent to the police for criminal action to be taken. There is also a specific chapter in the Annual Report summarising the imposition and collection of fees for illegal catches of fish in that year. In 2018, handling was completed of 185 cases deferred in that year and 46 cases deferred in 2017.

Table 21. Enforcement action taken (Source: DoF Annual Reports2018[242], 2017[243]**Error! Bookmark not defined.** and 2016[244]).

Offences	**2018**	**2017**	**2016**
Violation of fishing rules	49	97	31
Violation of weighing and landing rules	14	71	50
Violation of logbook rules	27	45	31
Violation of processing catch rules	2	0	2
Case sent to Police	4	1	4
Reprimands issued (broken down below)	92	96	79
Due to violation of fishing rules	49	50	14
Due to violations of weighing and landing rules	14	12	31
Due to violation of logbook rules	27	33	26
Due to other violations	2	3	8
Suspension of fishing permit	25	31	14
Suspension of weighing license	6	4	1
Guidance letter sent	7	6	6

[242] http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf.
[243] http://www.fiskistofa.is/media/arsskyrslur/Arsskyrsla_2017.pdf.
[244] http://www.fiskistofa.is/media/arsskyrslur/arsskyrsla_2016.pdf.

No action taken	59	33	20
Case sent to another authority	5	1	1
Procedure still in progress	53	46	8
Case returned to the inspectors	0	2	No data
Fees			
Reminder letter sent for unpaid fishing fees 2017	234	231	145
Resulting in suspension of fishing permits	78	89	85
Fees imposed for illegal catches	1150	1201	130
Resulting in suspension of fishing permits	77	25	65

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

8.2.3.5. Clause 2.3.5. Analysis is carried out

8.2.3.5.1. Clause 2.3.5.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
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.

Evidence:
Given the fact that all catches are recorded on the central database any deviations between actual total catch and the TAC for a particular species are easily detectable. Note that deviations may be attributable to the legitimate inter-species, inter-vessel or inter-annual quota transfers but, in any case, where there are anomalies analysis is carried out to determine the root cause of the deviation. As shown in Table 22, these mechanisms may lead to actual catches overshooting allocated quotas.[245]

Table 22. Allocated quota for saithe and balancing mechanism in the fishing year 2018/2019. Source: DoF.

Alloc. quota	62.916
Compensations	2.803
Trfr. prev. year	2.793
Allowed catch	68.6
Catch	58.148
Balance	10.452
Transfers	-2.498
New balance	7.954
Trfr/ next year	4.372
Over fished	139
Net quota status	3.633

Catches of saithe have in recent years been lower than the TAC.[246] As Table 23 reveals the difference between overall catches of Icelandic and foreign vessels have been up to 5900 tonnes in the fishing year 2014/2015, but in recent years the difference has been much less.

Table 23. Recommended TAC, national TAC and catches by Icelandic and foreign vessels Source: NFRI Advice 2019: Saithe.

[245] http://www.fiskistofa.is/english/quotas-and-catches/total-catch-and-quota-status/?skipnr=0&timabil=1819&fyrirspurn=UmSkip&landhelgi=i.
[246] https://www.hafogvatn.is/static/extras/images/03-Saithe%20(1)1141505.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	40000	50000	51600	700	52300
2011/12	45000	52000	49700	700	50400
2012/13	49000	50000	51300	900	52200
2013/14	57000[1)]	57000	54300	700	55000
2014/15	58000[1)]	58000	52100	500	52600
2015/16	55000[1)]	55000	48900	300	49200
2016/17	55000[1)]	55000	48800	300	49100
2017/18	60237[1)]	60237	58748	270	59018
2018/19	79092[1)]	79092			
2019/20	80588[1)]				

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

In their latest advice, MFRI and ICES observe that catches of saithe have been below TAC in recent fishing years. This is mostly attributed to the fact that since the turn of the century there have been changes in fleet composition in the demersal fisheries in Iceland. The use of longline has become much more prevalent while the use of gillnets and Danish sense has diminished. As saithe has traditionally been mostly harvested by vessels employing bottom trawls, nets and seine, these changes could have contributed to lower catch rates of saithe in recent years. The fleet has also been targeting more small saithe. Part of the saithe quota is also transferred to other species.

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 size of the vessel, record landings at sea and these are verified and standardised through physical weighing at accredited weigh stations in landings ports throughout Iceland.

See also clause 2.1.1.

References:	See footnotes
Non-Conformance Number (if relevant)	**NA**

8.2.3.5.2. Clause 2.3.5.2.

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. If analysis reveals discrepancy between the information stated in the reports and the information received from the harbour weighing, corrective measures shall be taken when this is deemed appropriate.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **All processors purchasing fish, be it directly or at auction, are obliged to submit monthly reports to the Directorate. In addition, the fish auction reports all sales of fish directly to the Directorate. Analysis of catches includes the comparison of reported catches with the amount of sold or exported products to verify independently that 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 reports all sales of fish directly to the Directorate. 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 landings aligned accurately with those reported[247]. If comparison reveals discrepancies in reported and actual landings received from quayside weighing by registered weighers corrective action is taken as appropriate.				
References:	As referenced			
Non-Conformance Number (if relevant)				**NA**

[247] http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Vidurlog

8.2.3.5.3. Clause 2.3.5.3.

There shall be full traceability from catch, through processing, export and delivery on the market.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Where required, there is full traceability from catch, through processing, export and delivery on the market is possible.

Evidence:
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.

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.

References:	As referenced
Non-Conformance Number (if relevant)	**NA**

8.3. Section 3: Ecosystem Considerations

8.3.1. Clause 3.1. Guiding Principle

8.3.1.1. Clause 3.1.1.

Adverse impacts of the fishery on the ecosystem shall be considered and appropriately assessed and effectively addressed[248], consistent with the precautionary approach[249].

Evidence Rating:	Low ☐	Medium ☑		High ☐
Non-Conformance:	Critical ☐	Major ☐	**Minor** ☑	None ☐

Summary Evidence:

Since the Icelandic groundfish fishery of which saithe is part of is multispecies in nature with vessels simultaneously targeting numerous species, habitat and bycatch effects 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 Endangered, Threatened and Protected (ETP) species occurring in Icelandic waters according to OSPAR.

E-logbooks recording of all marine mammals and seabirds catches (by species and numbers) 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.

It is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs; 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.

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.

[248] FAO Code of Conduct for Responsible Fisheries, Article 7.2.

[249] In this context refer to 2009 FAO Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries, Article 3l: 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. ...

Associated species catch and bycatch to the saithe fishery

The Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species. With regards to 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.

ICES reports that Icelandic saithe catches from 2015/16 to 2017/18 have been caught in these proportions and with the following gears:

Icelandic saithe total catches		Bottom Trawl	Gillnet	Handline/ Jiggers	Danish Seine	Longline	Nephrops trawl	Total
2017/18	65,360 t[250]	92%	3%	1.8%	1.8%	1.1%	0.7%	
2016/17	49,057 t[251]	90.2%	2.7%	2.3%	1.8%	1.5%	1%	
2015/16	49,223 t[252]	87%	5%	3.2%	2%	1.8%	0.7%	
Average		**89.73%**	**3.56%**	**2.43%**	**1.86%**	**1.46%**	**0.8%**	**99.9%**

Landed bycatch and associated species accounting for > 0.5% of the cumulative total for each of these gear types (i.e. bottom trawl, longline, gillnet, demersal seine and handlines) targeting and/or catching saithe are shown in the tables below, compiled from catch data 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, about 3.5% of the overall cod catches)[253]. 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[254].

Table 24. Break down of landed bycatch and associated species (i.e. > 0.5% of the overall catch) in bottom trawl fisheries that targeted and caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 seasons).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %
Bottom Trawl	Þorskur /cod	142,639	47.24%	46.96%
	Ufsi /saithe	54,330	17.99%	16.51%
	Karfi / Gullkarfi / Golden redfish	47,314	15.67%	17.28%
	Ýsa /haddock	23,701	7.85%	7.28%
	Djúpkarfi / beaked redfish	10,536	3.49%	3.44%
	Grálúða / Greenland halibut	8,716	2.89%	3.27%
	Gulllax / greater silver smelt	4,966	1.64%	1.69%
	Skarkoli / plaice	2,247	0.74%	0.75%
	Steinbítur / Atlantic wolffish	1,662	0.55%	0.61%
	Langa / ling	1,538	0.51%	0.60%

250

251 http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pok.27.5a.pdf

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

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

254 http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/slaegingarstudlar/

Table 25. Break down of landed bycatch and associated species (i.e. > 0.5% of the overall catch) in gillnet that caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 seasons).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %
Gillnet	Þorskur /cod	18960	89.02%	81.65%
	Ufsi /saithe	1318	5.58%	7.41%
	Grálúða / Greenland halibut	0	0%	*5.51%
	Langa / ling	370	1.66%	2.33%
	Ýsa /haddock	313	1.43%	1.28%
	Skarkoli / plaice	182	0.84%	0.75%

*Greenland halibut was only caught in the 2015/16 and 2016/17 seasons, none in the 2017/18 season.

Table 26. Break down of bycatch and associated species (i.e. > 0.5% of the overall catch) in handline/jigger fisheries that caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 seasons).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %
Handline/ Jiggers	Þorskur /cod	15993	74.10%	67.51%
	Makríll / mackerel	4313	19.98%	26.07%
	Ufsi /saithe	1059	4.91%	5.43%
	Karfi / Gullkarfi / Golden redfish	122	0.57%	0.6%

Table 27. Break down of bycatch and associated species (i.e. > 0.5% of the overall catch) in demersal seine fisheries that caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 seasons).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %
Demersal Seine	Þorskur /cod	15715	48.39%	50.54%
	Skarkoli / plaice	5602	17.25%	16.41%
	Ýsa /haddock	4920	15.15%	15%
	Steinbítur / Atlantic wolffish	2145	6.60%	5.09%
	Þykkvalúra / Sólkoli / lemon sole	1197	3.69%	3.58%
	Ufsi /saithe	1047	3.22%	3.14%
	Karfi / Gullkarfi / Golden redfish	586	1.80%	1.54%
	Langlúra / witch	473	1.46%	2.06%
	Sandkoli/dab	392	1.21%	1.14%
	Langa / ling	172	0.53%	0.66%

Table 28. Break down of landed bycatch and associated species (i.e. > 0.5% of the overall catch) in longline fisheries that caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 seasons).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %

Longline	Þorskur /cod	81,177	72.72%	71.60%
	Ýsa /haddock	14,391	12.89%	13.10%
	Steinbítur / Atlantic wolffish	5,588	5.01%	4.67%
	Langa / ling	4,384	3.93%	4.41%
	Keila / tusk	2,123	1.90%	2%
	Karfi / Gullkarfi / Golden redfish	1,208	1.08%	1.17%
	Hlýri / spotted wolffish	873	0.78%	0.86%
	Ufsi /saithe	653	0.58%	0.66%
	Tindaskata / starry ray	447	0.40%	0.74%

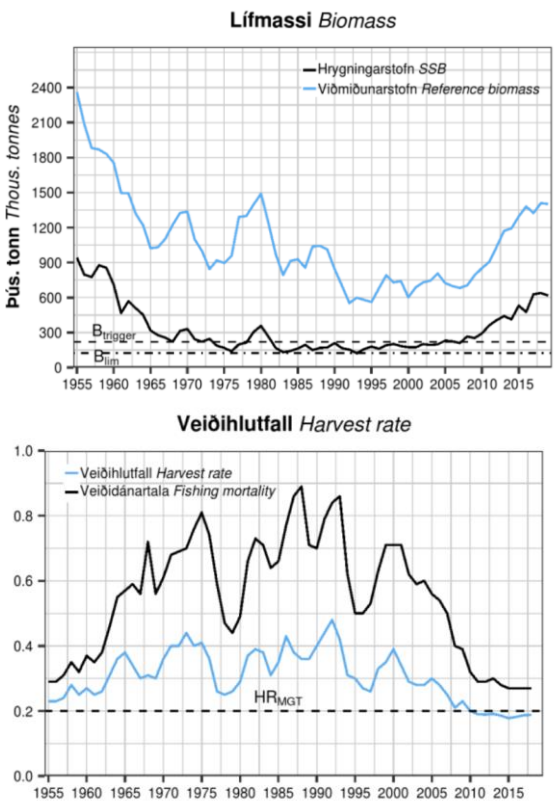
Table 29. Break down of bycatch and associated species (i.e. > 0.5% of the overall catch) in Nephrops trawl fisheries that caught saithe in the 2017/18 season and the last 3 years average (2015/16, 2016/17 and 2017/18 season).

Gear	Species	2017/18 Total Catches (t)	2017/18 catches %	Last 3 years average catches %
Nephrops trawl	Þorskur /cod	2,232	30.21%	30.18%
	Karfi / Gullkarfi / Golden redfish	2,214	29.97%	26.07%
	Humar / Norway Lobster	819	11.09%	15.35%
	Langa / ling	537	7.27%	7.53%
	Ufsi /saithe	413	5.59%	5.28%
	Langlúra / witch	330	4.47%	4.46%
	Skötuselur / anglerfish	258	3.49%	3.03%
	Stórkjafta / Öfugkjafta / Megrim	209	2.83%	3.02%
	Ýsa /haddock	109	1.48%	1.58%
	Steinbítur / Atlantic wolffish	85	1.15%	1.00%
	Lýsa / whiting	54	0.73%	0.76%
	Blálanga / blue ling	43	0.58%	0.67%
	Þykkvalúra / Sólkoli / lemon sole	39	0.53%	0.58%

Status of bycatch and associated species in the saithe target and non-target fisheries calculated from average catches (per relevant gear type) of the past three fishing seasons, as detailed above.

ÞORSKUR – *COD* (*Gadus morhua*)[255]	
Figures from the June 2019 MFRI Advice:	MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2019/2020 should be no more than 272 411 tonnes. Estimated spawning stock biomass (SSB) has increased in recent years and has not been larger in almost 60 years. Harvest rate has declined and is at its lowest value

[255] https://www.hafogvatn.is/static/extras/images/01-Cod%20(1)1141503.pdf

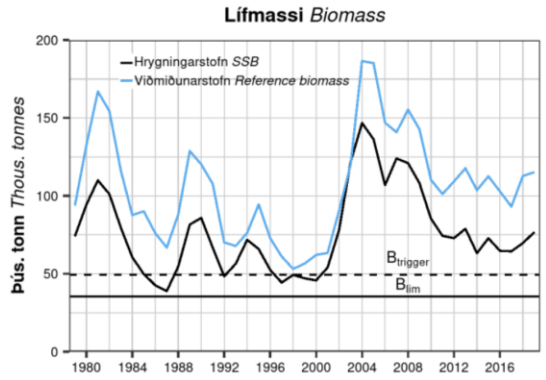


in the assessment period. Recruitment since 1988 (mean = 140) is lower than the average recruitment in the period 1955–1985 (mean = 205). The increase in SSB is therefore primarily the result of lower harvest rate. Sizes of the year classes 2014 and 2015 are near the long-term average but year class 2016 is small.

The saithe fishery does not appear to have any significant negative effects on this stock.

ÝSA – HADDOCK (*Melanogrammus aeglefinus*)[256]

Figures from the June 2019 MFRI Advice:



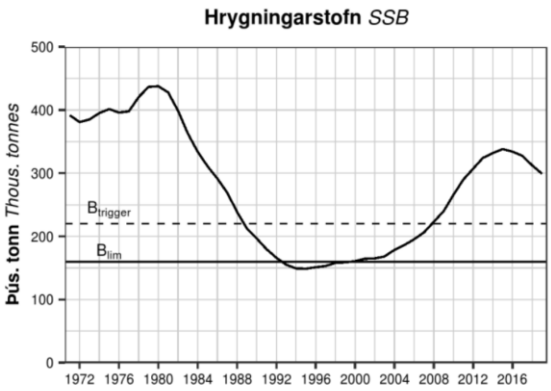
MFRI and ICES advised that when the Icelandic management plan is applied, catches in the fishing year 2019/2020 should be no more than 41 823 tonnes. The spawning-stock biomass (SSB) has decreased since 2008, but stabilized above MSY Btrigger in recent years. The harvest rate is currently estimated above HRMGT = HRMSY. Recruitment is highly variable and has increased since 2015. Reference biomass will increase in the next two years while the 2014 cohort remains in the fishery. The 2015–2017 cohorts are estimated close to the long-term mean recruitment and thus the stock is projected to decrease. Average weight of the 2014–2017 year classes is predicted to be above average in 2019.

The saithe fishery does not appear to have any significant negative effects on this stock.

GULLKARFI – GOLDEN REDFISH (*Sebastes norvegicus*)[257]

[256] https://www.hafogvatn.is/static/extras/images/02-Haddock%20(1)1141504.pdf
[257] https://www.hafogvatn.is/static/extras/images/05-GoldenRedfish%20(1)1141506.pdf

Figures from the June 2019 MFRI Advice:

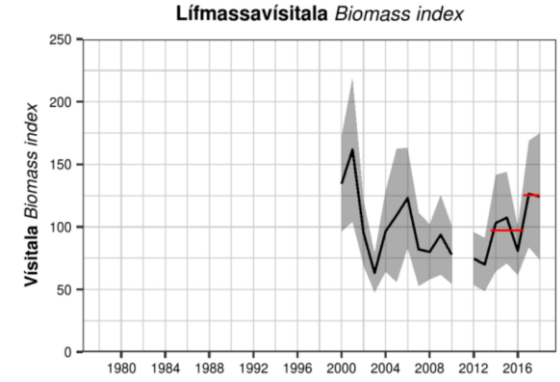


MFRI and ICES advise that when the management plan is applied, catches in the fishing year 2019/2020 in the East Greenland/Iceland/Faroe Islands area should be no more than 43568 tonnes. Spawning-stock biomass (SSB) steadily increased from 2002–2015 and then showed a decreasing trend but remains well above MSY Btrigger. Fishing mortality has decreased in the past two decades but is above FMSY. The 2009–2012 year classes are estimated to be record lows in the time series.

The saithe fishery does not appear to have any significant negative effects on this stock.

DJÚPKARFI – DEMERSAL BEAKED REDFISH (*Sebastes mentella*)[258]

Figures from the June 2019 MFRI Advice:



TAC and catches:

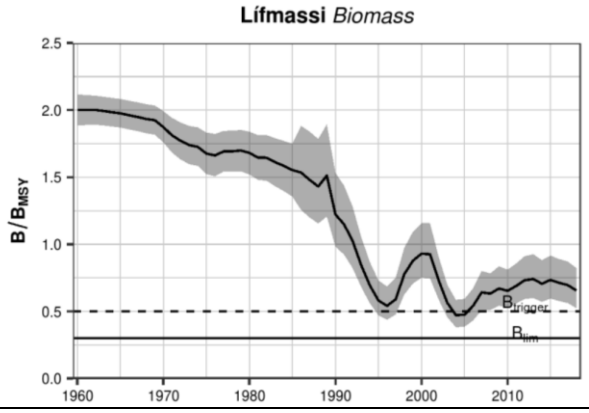
Fiskveiðiár *Fishing year*	Tillaga *Recommended TAC*	Aflamark *National TAC*	Afli *Catches*
2010/11	10000	12500	12085
2011/12	10000	12000	12321
2012/13	10000	10000	10396
2013/14	10000	10000	9753
2014/15	10000	10000	9037
2015/16	10000	10000	9599
2016/17	12922	12922	8556
2017/18	11786	11786	10540
2018/19	13012	13012	
2019/20	12492		

The fishery for Icelandic slope S. mentella in Icelandic waters is a directed bottom trawl fishery along the shelf and slope west, southwest, and southeast of Iceland at depths between 500 and 800 m. MFRI and ICES advised that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 12492 tonnes. The IS-SMH biomass index shows an increasing trend after 2013. Since 2007, survey estimates have consistently shown very low estimates for juveniles (≤30 cm). The ICES framework for category 3 stocks was applied (ICES, 2012). The IS-SMH survey index was used as an indicator of stock development. The advice is based on comparing the mean of the two latest index values (index A) with the mean of the three preceding values (index B), combined with the catch advice for 2019. The index is estimated to have increased by 27.9% (more than 20%), thus the uncertainty cap was applied. The precautionary buffer was applied in 2017 and was applied again this year due to a lack of incoming recruitment. Catches in Iceland in the past 5 years have been within TAC levels.

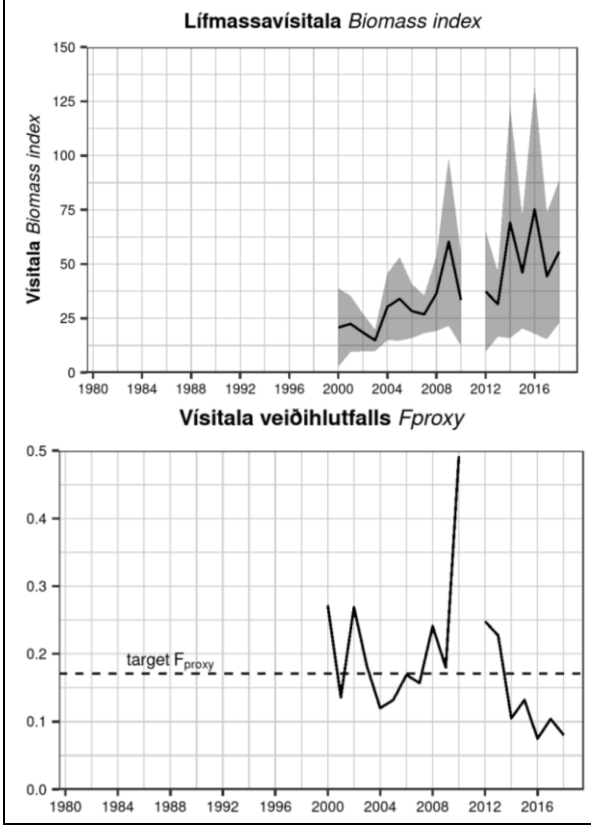
The saithe fishery does not appear to have any significant negative effects on this stock.

GRÁLÚÐA – GREENLAND HALIBUT *(Reinhardtius hippoglossoides)*[259]

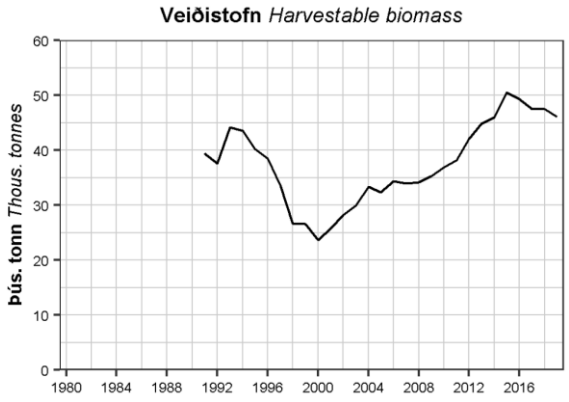
[258] https://www.hafogvatn.is/static/extras/images/61-DemersalSmentella%20(1)1141508.pdf
[259] https://www.hafogvatn.is/static/extras/images/22-GreenlandHalibut%20(1)1141512.pdf

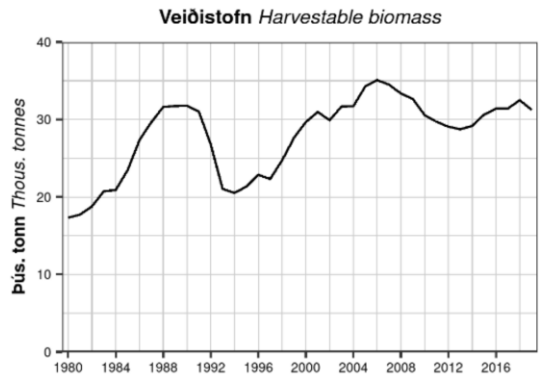
Figures from the June 2019 MFRI Advice: 	MFRI and ICES advised that when the MSY approach is applied, catches in the 2019/2020 fishing year should be no more than 21 360 tonnes. According to an agreement between Iceland and Greenland, 56.4% of the TAC is allocated to Iceland. The stock biomass is stable and is above MSY Btrigger. Fishing mortality is estimated to be above FMSY. **The saithe fishery does not appear to have any significant negative effects on this stock.**

GULLLAX – GREATER SILVER SMELT (*Argentina silus*)[260]

Figures from the June 2019 MFRI Advice: 	MFRI and ICES advise that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 9124 tonnes. The survey index has been high since 2014 but has fluctuated greatly. The Fproxy has decreased since 2010 and has been below the target Fproxy since 2014. **The saithe fishery does not appear to have any significant negative effects on this stock.**

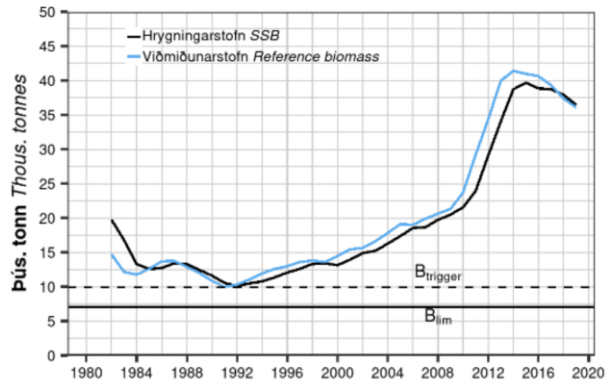
[260] https://www.hafogvatn.is/static/extras/images/19-GreaterSilverSmelt1141531.pdf

SKARKOLI – PLAICE (*Pleuronectes platessa*)[261]	
Figures from the June 2019 MFRI Advice:  	MFRI advises that when the MSY approach is applied, catches in the fishing year 2019/2020 should be no more than 6985 tonnes. In addition, the MFRI recommends that regulations regarding area closures on spawning grounds remain in effect. The harvestable biomass steadily increased from 2000–2015 and then showed a slightly decreasing trend. Fishing mortality has declined since 1997 and has been around FMSY since 2011. Recruitment has been stable since 1994. **The saithe fishery does not appear to have any significant negative effects on this stock.**

STEINBÍTUR–ATLANTIC WOLFFISH (*Anarhichas lupus*)[262]	
Figures from the June 2019 MFRI Advice:  	MFRI advises that when the MSY approach is applied, catches in the fishing year 2019/2020 should be no more than 8344 tonnes. MFRI recommends a continued closure of the spawning area west of Iceland during the spawning and incubation season in autumn and winter. Harvestable biomass declined from 2006–2013 but has increased since then and is now close to the highest level in the assessment history. Fishing mortality has been below or close to FMSY since 2014. Recruitment has been low since 2006, as compared to the two preceding decades. **The saithe fishery does not appear to have any significant negative effects on this stock.**

LANGA – LING (*Molva molva*)[263]	
Figures from the June 2019 FRMI Advice:	MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2019/2020 should be no more than 6599 tonnes. The spawning-stock biomass (SSB) and the reference biomass (ling >75 cm) in 2018 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. Recruitment was high from 2004 to 2011 but has declined to the levels of the 1980s and 1990s.

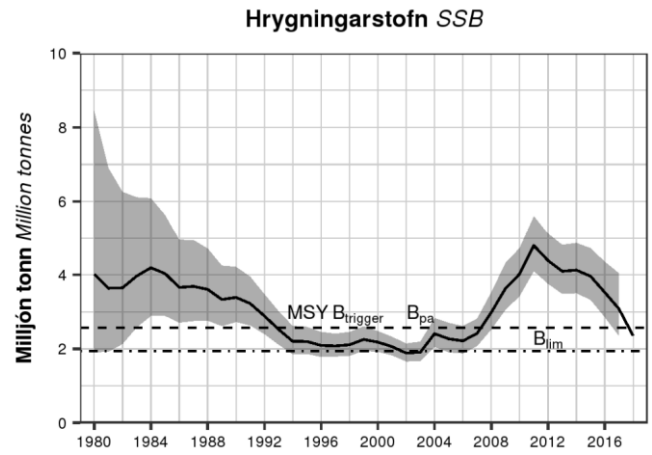
[261] https://www.hafogvatn.is/static/extras/images/23-Plaice%20(1)1141499.pdf
[262] https://www.hafogvatn.is/static/extras/images/09-AtlanticWolffish%20(1)1141514.pdf
[263] https://www.hafogvatn.is/static/extras/images/06-Ling1141517.pdf

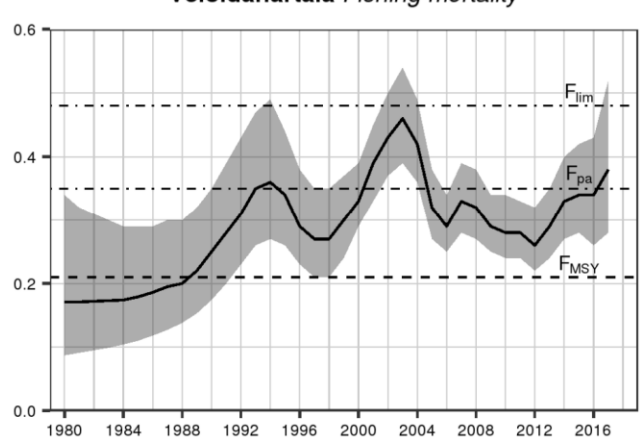


The saithe fishery does not appear to have any significant negative effects on this stock.

MAKRÍLL – MACKEREL (*Scomber scombrus*)[264]

Figures from the June 2019 MFRI Advice:





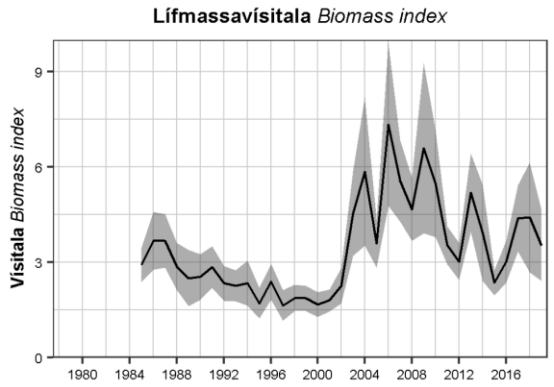
Icelandic catches of mackerel in 2017 were 167 367 tonnes. Most of the catches was caught in pelagic trawl (97%) but 3% were caught by jiggers. ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 318 403 tonnes. The spawning-stock biomass (SSB) is estimated to have 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.

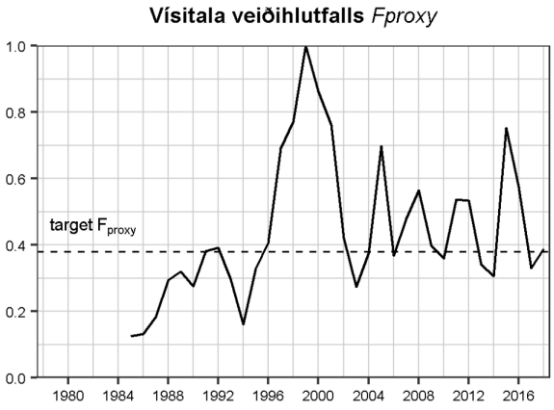
The saithe fishery does not appear to have any significant negative effects on this stock.

ÞYKKVALÚRA – LEMON SOLE (*Microstomus kitt*)[265]

[264] https://www.hafogvatn.is/static/extras/images/Makrill1097054.pdf
[265] https://www.hafogvatn.is/static/extras/images/24-LemonSole%20(1)1141520.pdf

Figures from the June 2019 MFRI Advice:



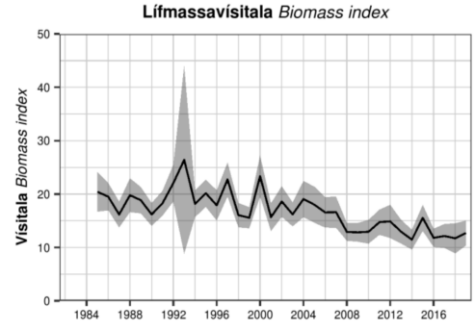


MFRI advises that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 1341 tonnes. The IS-SMB biomass index has been relatively high but variable since 2003 compared to the period 1992–2002. Fproxy has been highly variable for two decades. IS-SMB recruitment index has been high since 2002, and it is therefore likely that the stock biomass will remain stable or increase.

The saithe fishery does not appear to have any significant negative effects on this stock.

TINDASKATA – STARRY RAY (*Amblyraja radiate*)[266]

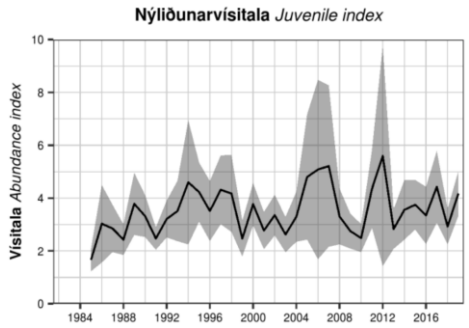
Figures from the June 2019 MFRI Advice:



MFRI does not recommend a TAC for the 2019/2020 fishing year. The survey biomass index (IS-SMB) shows a long term decreasing trend. Since 2008, the biomass index has been stable but at the lowest level in the time series. The abundance index of juveniles (<21 cm) appears to be stable, despite large variations.

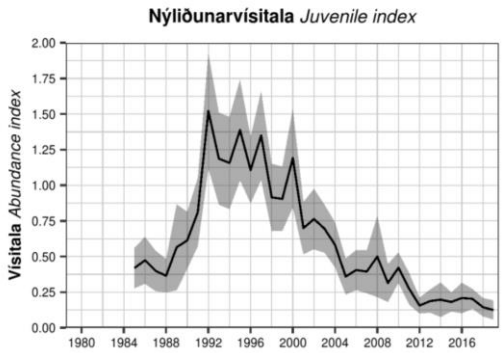
The saithe fishery does not appear to have any significant negative effects on this stock.

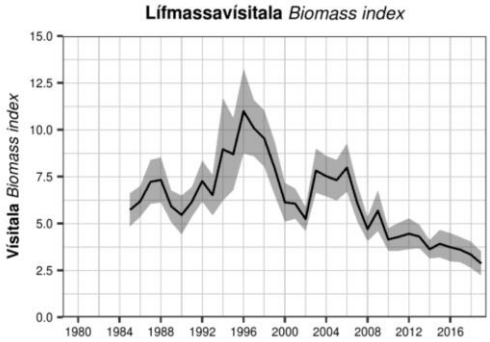
[266] https://www.hafogvatn.is/static/extras/images/12-StarryRay1141533.pdf



HLÝRI – SPOTTED WOLFFISH (*Anarhichas minor*)[267]

Figures from the June 2019 MFRI Advice:





Around 98% of Spotted wolffish (*Anarhichas minor*) is currently caught as bycatch in trawl and longline fisheries and is mainly found at the northwest and north parts of the continental shelf of Iceland, at sandy or muddy substrate and depths of 100-400 meters. In recent years the fisheries of saithe have been moving from areas off south Iceland to areas off NW Iceland.

Since 2012 catches have been consistently above advice/recommended TAC. Spotted wolffish was included in the ITQ system in 2018 and the TAC in 2018/2019 was set as per recommended TAC of 1001 t[2]. Preliminary catches in 2018/19 have exceeded the TAC (1200 t caught by August 7th 2019) based on Fiskistofa records[3]. We note, these values may be subject to revision.

Year	Advice/ Recommended TAC	National TAC	Spotted Wolffish Catches	Total catches as a % of advice
12/13	900		2,042	227%
13/14	900		2,250	250%
14/15	900		1,655	184%
15/16	900		1,913	213%
16/17	1128		1,587	141%
17/18	1080		1,528	141%
18/19	1001	1,001	1,234	123%
19/20	375	375		

In a request for clarification, the Ministry confirmed that spotted wolffish is caught with other species in the mixed fishery and is therefore very difficult to manage. They also

[267] https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish%20(1)1141515.pdf
[2] https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish_TR1141496.pdf
[3] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/

explained that in the fishing year (2019/2020) the TAC is extremely small so there might be additional difficulties in maintaining the species within TAC.

In their 2019 Advice, MFRI advised that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 375 tonnes. Biomass and juvenile indices are at their lowest levels in the time series. Fproxy has been high since 2000.

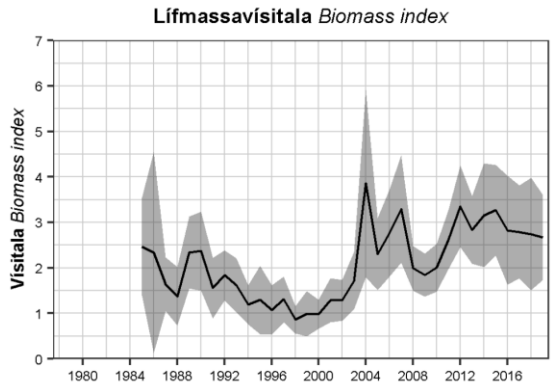
This year the basis of the Fproxy was changed due to low spawning stock biomass and poor recruitment and thus the Fproxy applied last year is no longer considered precautionary. The target Fproxy is now defined as the mean Fproxy from the reference period of 1985–1998. This period was chosen as fishing pressure did not have any observed detrimental effects on the stock biomass. The catch advice is based on multiplying the most recent index value with the target Fproxy value. As this is the first year this basis is used the uncertainty cap was not applied.

Spotted Wolffish in Europe is categorised as near threatened under the IUCN Red list based on a last assessment from 2014[4].

It is not clear to what degree management has been successful at reducing harvest for this stock since catches in 2018/19 appear to have exceeded the TAC by over 20%. The same or perhaps a bigger issue remains for the reduced 2019/2020 quota and the related effects on the stock. **The saithe fishery overlaps in terms of fishing gears (bottom trawl only), fishing grounds (NW only) and depths with spotted wolffish catch and is therefore considered to have an effect on this stock, itself a component of the Iceland marine ecosystem.**

LANGLÚRA – *WITCH (Glyptocephalus cynoglossus)*[268]	
Figures from the June 2019 MFRI Advice:	MFRI advises that when the precautionary approach is applied, catches in the 2019/2020 fishing year should be no more than 1067 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 2015–2019. Low recruitment in recent years might lead to a decline in the stock in the near future. Fproxy

[4] https://www.iucnredlist.org/species/18263655/44739959
268 https://www.hafogvatn.is/static/extras/images/25-Witch%20(1)1141521.pdf

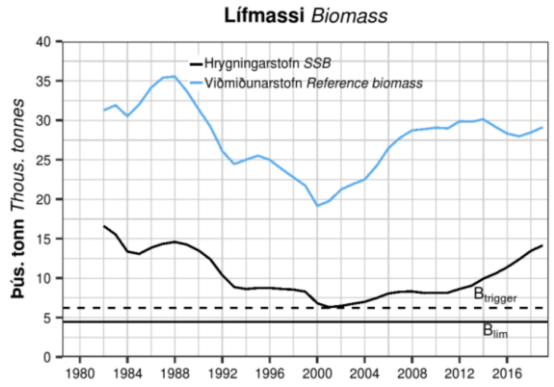


has remained relatively low and stable over the last seven years.

The saithe fishery does not appear to have any significant negative effects on this stock.

KEILA – TUSK (*Brosme brosme*)[269]

Figures from the June 2019 MFRI Advice:



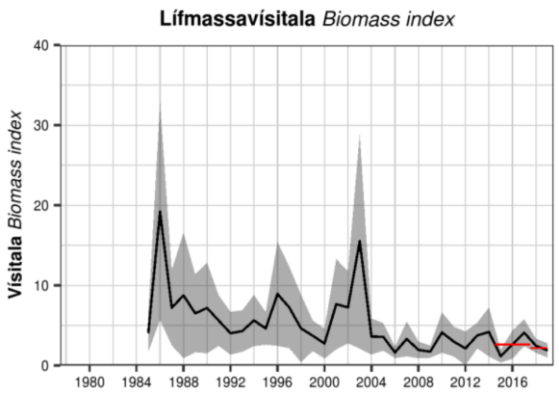
MFRI and ICES advise that when the Icelandic management plan is applied, catches in the fishing year 2019/2020 should be no more than 3856 tonnes. In addition, continued closure of the nursery areas off the southeast and southern coast should be maintained. SSB has increased in recent years while the reference biomass (tusk ≥40 cm) has declined but remains at a high level. Harvest rate has declined in recent years and is close to HRMGT. Recruitment in 2012–2015 was low, but has increased since then.

The saithe fishery does not appear to have any significant negative effects on this stock.

SANDKOLI – DAB (*Limanda limanda*)[270]

Figures from the June 2019 MFRI Advice:	MFRI recommends a TAC no higher than 399 tonnes for the 2019/2020 fishing year. The MFRI also recommends that the defined quota area from Snæfellsnes to Stokksnes will be abolished, and all

[269] https://www.hafogvatn.is/static/extras/images/08-Tusk1141519.pdf
[270] https://www.hafogvatn.is/static/extras/images/27-Dab%20(1)1141501.pdf



Dab. *Recommended TAC, national TAC, catch in the quota area, and total catches (tonnes).*

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	297	399
2018/19	500	500		
2019/20	399			

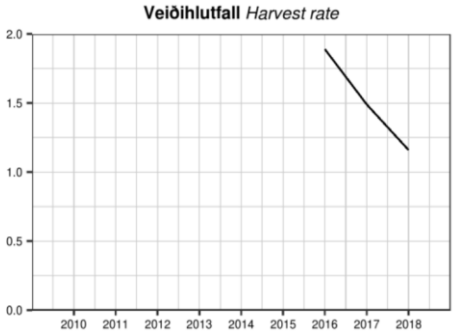
dab fishing grounds be under TAC limits. IS-SMB biomass index has remained low since 2004, as compared to the years 1985–2003. Catches have been within national TAC limits in the past few years.

The saithe fishery does not appear to have any significant negative effects on this stock.

The following species: Norway Lobster, Anglerfish, Megrim, Whiting, and Blue ling are all species caught in Nephrops trawl gear (targeting Norway lobster) with which only 0.7% of saithe has been caught on average in the past 3 years. Hence, the effect of the saithe fishery per se on these species is considered to be negligible.

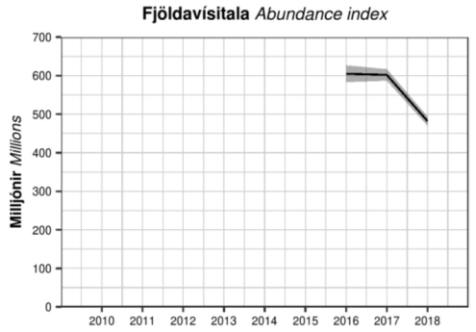
HUMAR – NORWAY LOBSTER (*Nephrops norvegicus*)[271]

Figures from the June 2019 MFRI Advice:



MFRI advises a monitoring fishery for sampling and mapping of distribution of no more than 235 tonnes in 2019. MFRI furthermore advises that Norway lobster fishing areas in Jökuldjúp and Lónsdjúp should be closed for all Norway lobster trawling. To reduce fishing disturbance on Norway lobster grounds MFRI also recommends that areas in Breiðamerkurdjúp, Hornafjarðardjúp and Lónsdjúp should be closed for bottom trawling other than Norway lobster trawling. Stock abundance is estimated to have declined by 20% from 2016. The harvest rate has declined from 1.9% in 2016 to 1.2% in 2018. Burrow density in 2018 (0.07 burrows/m^2) is one of the lowest reported for other functional units within ICES. According to older assessment methods (VPA) the stock is only one third of Bpa. Length measurements from catches and assessment data indicate several years of recruitment failure. A monitoring fishery of 235 tonnes in 2019 is recommended to map the

[271] https://www.hafogvatn.is/static/extras/images/040-Humar1118193.pdf



Norway lobster. *Recommended TAC, national TAC, and catches (tonnes). * Includes also autumn catches*

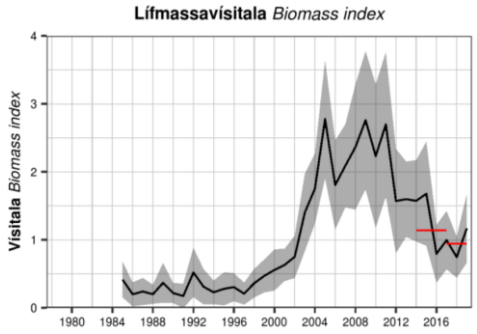
Fiskveiðiár / ár *Fishing year / year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli *Catches*
2010/11	2100	2100	2259
2011/12	2000	2100	2130
2012/13	1900	1900	1965
2013/14	1750	1750	1983
2014/15	1650	1650	1425
2015/16	1500	1500	1536
2016/17	1300	1300	1186
2017/18*	1150	1150	869
2019	235		

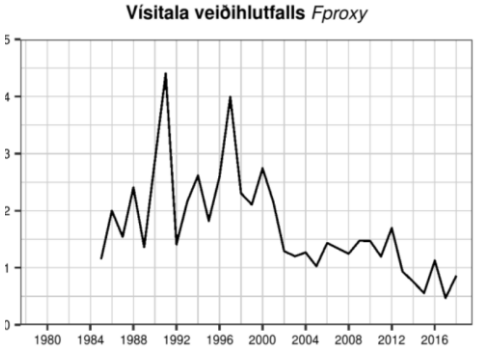
distribution, density and length composition of the stock. Catches nearly doubled from 2004 to 2010 when they reached 2500 tonnes. Since then, catches have decreased and were 728 tonnes in 2018, which is the lowest catch since 1957 when the fishery started. Effort has been stable from 2009 but CPUE has reached historically low levels. TAC for the past two fishing seasons has not been caught. Norway lobster is entirely caught in Nephrops trawl. Catches in the past 5 years have been, on average, below TAC and advice.

The saithe fishery does not appear to have any significant negative effects on this stock.

SKÖTUSELUR – ANGLERFISH (*Lophius piscatorius*)[272]

Figures from the June 2019 MFRI Advice:



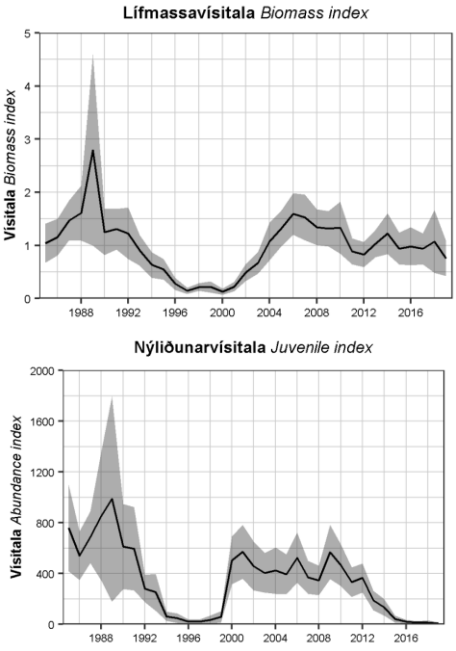


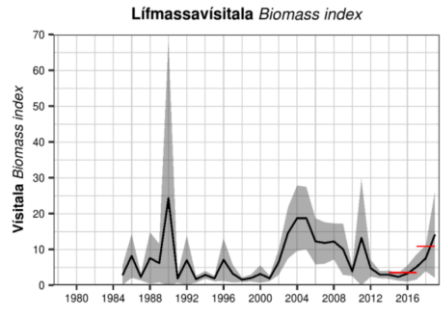
MFRI advises that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 441 tonnes. The biomass index was high in 2005–2011 compared to previous years but has since then decreased substantially. Juvenile indices show strong recruitment for year classes 1998–2007, but poor recruitment before and after this period. Fproxy was stable when the stock peaked but has decreased in recent years and is now lower than the target.

After nearly a decade of very low recruitment estimates, the target Fproxy is no longer appropriate. Consequently, the ICES framework for category 3 stocks using survey trends was applied instead. As before, the IS-SMB index was used as the index for stock development. The advice is based on the ratio of the mean of the last two index values (Index A) and the mean of the three preceding values (Index B) multiplied by the mean catches in the last three years. The index ratio has decreased by 20% and thus an uncertainty cap was not applied. The stock status relative to candidate reference points is unknown and the precautionary buffer was applied (0.8). Catches in the past 5 years have been below the TAC.

The saithe fishery does not appear to have any significant negative effects on this stock.

[272] https://www.hafogvatn.is/static/extras/images/14-Anglerfish1141525.pdf

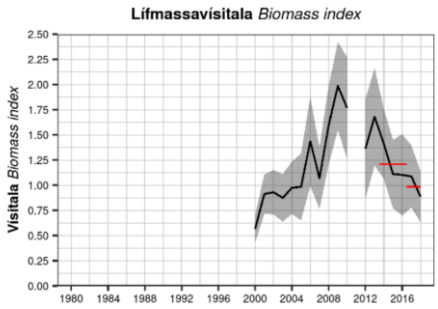
STÓRKJAFTA – MEGRIM (*Lepidorhombus whiffiagonis*)[273]	
Figures from the June 2019 MFRI Advice: 	MFRI does not advise a TAC for megrim for the 2019/2020 fishing year. IS-SMB recruitment index declined rapidly between 1989 and 1994. It stayed low until 1999, after which it increased and remained high until 2012 when it declined rapidly again and was very low in 2016–2019. The biomass index has for the most part followed fluctuations in the recruitment index but has remained high since 2006. **The saithe fishery does not appear to have any significant negative effects on this stock.**

LÝSA – WHITING (*Merlangius merlangus*)[274]	
Figures from the June 2019 MFRI Advice: 	MFRI advices that when the precautionary approach is applied, whiting catches in the fishing year 2019/2020 should be no more than 836 tonnes. Catches peaked in 2011 but have decreased since then apart from a slight increase in 2018. The recruitment index was low in 2009-2014 but has increased in 2014 and 2018. The biomass index was low in 2012–2015 but has increased since then. Fproxy was high in 2009–2015 but has since decreased. **The saithe fishery does not appear to have any significant negative effects on this stock.**

[273] https://www.hafogvatn.is/static/extras/images/26-Megrim%20(1)1141522.pdf
[274] https://www.hafogvatn.is/static/extras/images/04-Whiting1141527.pdf

BLÁLANGA – BLUE LING (*Molva dipterygia*)[275]

Figures from the June 2019 MFRI Advice:



Blue ling. *Recommended TAC, national TAC, and catches (tonnes).*

Fiskveiðiár *Fishing year*	Tillaga *Rec. TAC*	Aflamark *National TAC*	Afli Íslendinga *Catches Iceland*
2010/11	-		6464
2011/12	4000	-	4238
2012/13	3100	-	2996
2013/14	2400	2400	1653
2014/15	3100	3100	1898
2015/16	2550	2550	1734
2016/17	2040	2040	932
2017/18	1956	1956	554
2018/19	1520	1520	
2019/20	483		

MFRI and ICES advise that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 483 tonnes. Additionally, the MFRI advises that spawning areas south of Vestmannaeyjar and Franshóll be closed to all fishing activities during spawning season (15 February–30 April). The biomass index peaked in 2009 but has declined since then. The juvenile index was at a historic low in 2010–2018, with the exception of a small increase in 2017. Fproxy has been at a low level for the last 3 years.

In 2012-2018 the target Fproxy (catch/survey biomass) was defined as the mean Fproxy from the reference period 2002–2009. The target Fproxy was considered precautionary because it was based on exploitation during a period when no detrimental effects were observed on the stock. However, according to IS-SMH, recruitment (abundance of blue ling ≤40 cm) has been at a low level since 2010 and the target Fproxy is thus no longer precautionary. The stock is now composed of primarily large mature individuals. In 2018, recruitment is still very low, and no immature individuals were measured in commercial catches. Hence, the advice is now based on the ICES framework for data limited stocks (Category 3.2). In addition, a precautionary buffer is applied, as it is the first time this rule is used. Catches in past 5 years have been well below TAC.

The saithe fishery does not appear to have any significant negative effects on this stock.

[275] https://www.hafogvatn.is/static/extras/images/07-Blueling1141495.pdf

Vulnerable and ETP species Interactions

Further to the Icelandic saithe fishery associated catches and bycatch listed 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 2018 ICES Ecosystem report of the Icelandic Ecoregion[276] and shown below.

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, and 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 30. 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[277] website, on August 8th 2019.

Species catches (t) per year	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18
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

[276] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf
[277] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/

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[278], last assessed in 2006) species-complex (Iglésias, 2009)[279]. Investigation of skates in Icelandic waters have 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.

A taxonomic revision of these species has concluded that the smaller-bodied blue skate should retain the scientific name *Dipturus batis* and the larger-bodied flapper skate is now referred to as *Dipturus intermedius* (Last et al., 2016). FAO have accepted the latter name, assigning it the ASFIS code DRJ. Flapper skate is reported predominantly from the northern North Sea and north-west Scotland and is occasionally found in the Celtic Sea. The smaller blue skate is reported predominantly in the Celtic Sea, and its distribution extends northwards to Iceland. The southern limits of both species are uncertain[280].

The grey/blue 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, very close to the 10 years average. No TAC is available for this species because there is no directed fishery for it. More than half of the catches (all bycatch) are taken in longline fisheries, and about 20% are taken by bottom trawl gear as shown below.

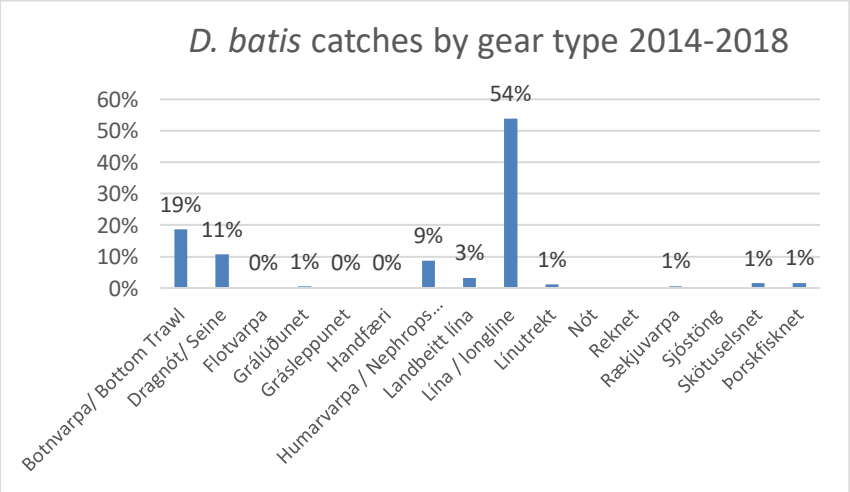


Figure 47. *D. batis* bycatch by gear type, 2014-2018 average.

[278] https://www.iucnredlist.org/species/39397/10198950#assessment-information
[279] https://onlinelibrary.wiley.com/doi/abs/10.1002/aqc.1083
[280] http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/rjb.27.89a.pdf

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 considered an issue and can lead to some moderate errors in landings data.

Indices of abundance are uncertain as only limited survey data exists. Recent survey trends in Icelandic waters indicate some increase in the scientific groundfish survey.

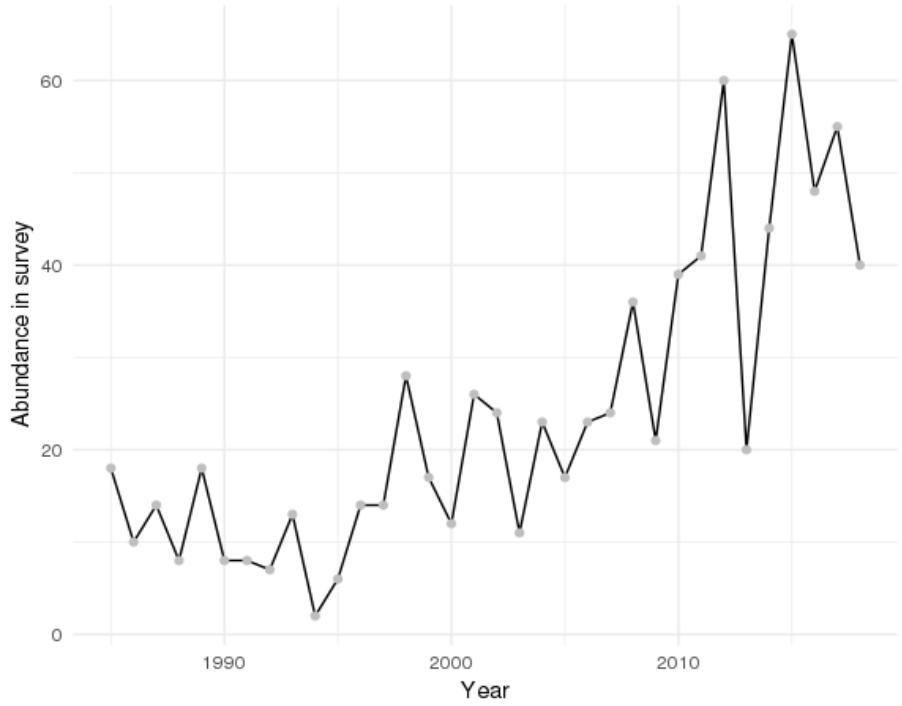


Figure 48. Total catch in numbers of Grey skate (Dipturus flossada/batis) in MFRI spring survey (1985 – 2018) (Source: MFRI data provided to assessment team during Nov. 2018 site visits).

During the October 2019 site visits the MFRI informed the Audit Team that 56 grey skates were caught in the 2019 spring survey. They stated that given this limited information it would appear that the abundance of grey skate is not declining.

Dipturus spp. abundance in EU Waters

There are currently no robust indicators of stock size for blue skate and flapper skate in EU waters[281]. The Spanish Porcupine Bank survey (SpPGFS-WIBTS-Q4) has seen increasing catch rates of Dipturus spp. (ICES, 2018). However, this survey may not be representative of the whole stock area.

The UK southwestern beam trawl survey (UK-Q1-SWBeam) caught immature blue skate, with preliminary studies indicating an increasing trend in Division 7.e (ICES, 2018). These and other surveys in the Celtic Seas may provide a stock size indicator in the future.

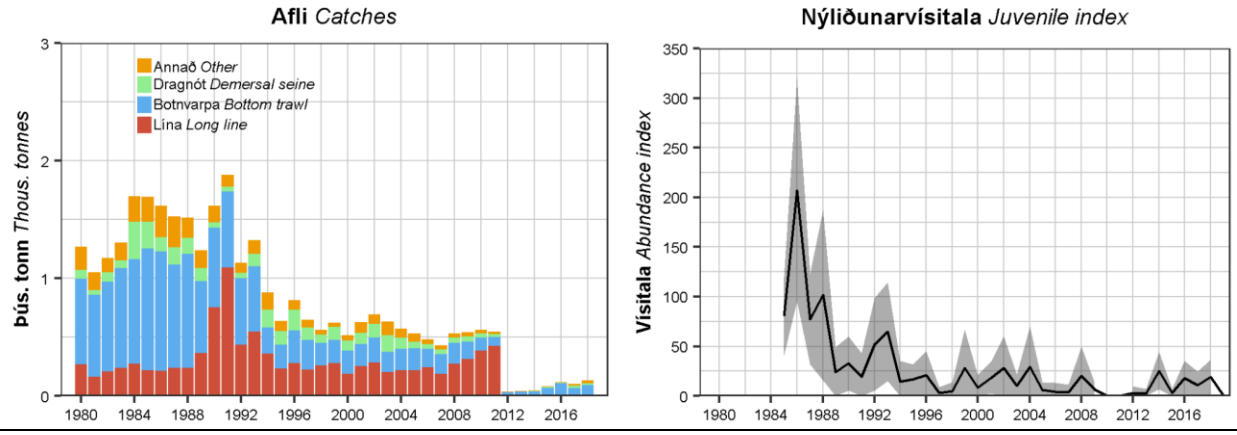
[281] http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/rjb.27.67a-ce-k.pdf

Atlantic halibut (*Hippoglossus hippoglossus*)

Atlantic halibut is classified as Endangered on the IUCN Red list but has been last assessed globally in 1996[282]. 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 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[283] and stipulating that all viable halibut in other fisheries must be released. In 2019, MFRI's advice is that these regulations remain in effect[284].



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

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

[284] https://www.hafogvatn.is/static/extras/images/21-AtlanticHalibut1141466.pdf

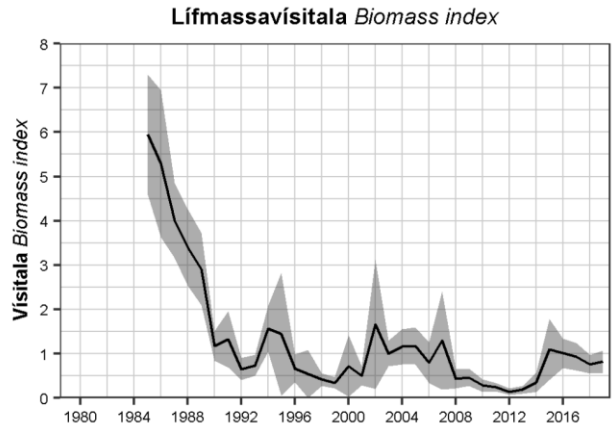


Figure 49. Catch by gear type, IS-SMB juvenile (<30 cm) and biomass (≥20 cm) indices.

Orange roughy (*Hoplostethus atlanticus*)

Recent catches of orange roughy in Iceland have been quite small recently, and have been 18.9 tonnes in 2017-18. Orange roughy is considered Vulnerable under the IUCN red list as assessed last in 2014[285]. During the 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.

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. [286] 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 historically 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 10 tonnes, in recent years. Catches in 2015, 2016, and 2017 were 8, 8 and 2 tonnes, respectively.

[285] https://www.iucnredlist.org/species/155168/45884209
[286] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0456-2017

Squalus acanthias is currently listed as Vulnerable under the IUCN red list as last assessed in 2016[287]. 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. In the spring survey, 2 spiny dogfish were caught in 2019, 1 in 2018, none in 2017, 5 in 2016 and 2 in 2015 (MFRI, October 2019 Site visits). As explained above, there is a ban on spiny dogfish in Iceland 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 very small.

Porbeagle shark (Lamna nasus)

Lamna nasus is currently listed as Vulnerable under the IUCN red list as last assessed in 2006[288]. Recorded catches of Porbeagle shark in Iceland are very small (in the region of 1 tonne or less in the past 10 years) and unlikely to negatively affect the stock. There is a ban on fishing Porbeagle shark in Iceland.

Greenland shark (*Somniosus microcephalus)*

Somniosus microcephalus is considered near threatened under the IUCN Red list as last assessed in 2006[289]. 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 scale artisanal fisheries and is a periodic bycatch in bottom trawl fisheries[290]. National landings in 2017/2018 totalled 10 t with no specific changes or trends apparent in the annual landings[291]. No Greenland sharks have been caught in the last 5 spring surveys (MFRI, October 2019 Site visits).

Basking sharks and leafscale gulper sharks

No interactions/bycatch or catch by the haddock and saithe fisheries has been reported for those two species over the past 3 years (MFRI, October 2019 Site visits).

Vulnerable Marine Mammals

Blue Whale

The blue whale is recognised in the OSAPR list as one of the threatened and declining species in the Icelandic Waters ecoregion. The 2018 NAMMCO progress report for Iceland[292] reported that 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 and playbacks with low frequency sounds to blue whales. Two more fin/blue whale hybrids were genetically confirmed by the MFRI.

[287] https://www.iucnredlist.org/species/91209505/2898271
[288] https://www.iucnredlist.org/species/11200/3261697
[289] https://www.iucnredlist.org/species/60213/12321694
[290] https://seaiceland.is/what/fish/sharks-and-skates/greenland-shark
[291] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGEF/26%20WGEF%20Report%202018_Section%2024%20Greenland%20shark_NEA.pdf
[292] https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf

North Atlantic Right Whale

No specific monitoring information is available for this species. Sightings of this species are very rare in Iceland and most of the living population is thought to reside in Eastern US and Canada coast[293]. No interactions between Blue whales and Northern right whales have been recorded in recent years with Icelandic fisheries. This was confirmed during the October 2019 site visits by the MFRI.

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) catches is a legal requirement (Reg. 126/2014)[294].

E-logbook app modifications

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. 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 review on this development in the next audit.

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).

In 2018, Directorate's Inspectors registered the bycatch 259 marine mammals and birds during their work on board of fishing vessels (2018 Fiskistofa Monitoring Report, part of the Annual Report)[295].

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 31. Unannounced inspector days on fishing vessels in the past 2 years.

Fishery type	Bottom Trawl	Longline	Gillnet (include lumpsucker fishery and cod fishery)
2017/2018 days	570	202	152
2017/2018 coverage %	1.93%	0.64%	3.64%
2018/2019 days	652	190	176
2018/2019 coverage %	2.64%	0.61%	2.03%

[293] https://www.cbc.ca/news/canada/nova-scotia/mogul-north-atlantic-right-whale-travelling-wanderlust-france-1.5200318
[294] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[295] http://www.fiskistofa.is/media/arsskyrslur/5_Fiskistofa-15.-april-2019_Eftirlit.pdf

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 Directorate's inspectors are present they are not always in a position to document any bycatch. For instance, in the pelagic pair trawl fishery, inspectors are below deck to monitor the catch, and not in a position to see if a seabird or marine mammal is caught[296].

Since 2014, inspection and recording improved with stricter guidelines regarding marine mammal by-catch and supervision of the inspectors. Prior to this the inspectors 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)[297]

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 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)

[296] 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
[297] http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGBYC/wgbyc_2017.pdf

Monitoring of Icelandic waters was conducted by the Marine and Freshwater Research Institute (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[298]:

- 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.

Observed seabird bycatch in the cod fishery was 17 northern fulmars, three loons (Gavia spp.), two eider ducks and one common guillemot.

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.[299]

Table 32. 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 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. Relevant to this assessment, most of the available data comes from the gillnet fisheries targeting cod.

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

Relevance to the saithe fishery

An average of 3.5% of the total Icelandic saithe catches have been caught in gillnet gear in the past 3 years. This means that the direct effects of saithe catches on marine mammals caught as bycatch in cod gillnet gear are intrinsically limited and not likely attributable to the saithe fishery in any significant manner. However, a brief assessment of key marine mammal bycatch is provided below for a clearer understanding of the general impacts occurring in cod gillnets.

Table 33. 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[300]).

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

The 2018 NAMMCO Scientific committee report[301] only provided (raised) data in 2017 for the lumpfish fishery, but not for the cod gillnet fishery in 2017. However, observed marine mammal bycatch in the cod fishery in 2017[302] was 28 harbour porpoises and 1 ringed seal, and 1 harp seal in the demersal trawl fishery. Hence, we use data up to 2016 for the analysis below.

Icelandic Redlist on Marine Mammals

In 2018, the first National Redlist on Icelandic mammals based on the IUCN criteria was published by the Icelandic Institute of Natural History in co-operation with MFRI[303]. In total 18 species were assessed. North Atlantic right whales and harbour seals were classified as critically endangered (CR) while blue whales and grey seals were assessed as vulnerable (VU). Both cetacean species harvested by Iceland, fin whales and common minke whales, were assessed as least concern (LC) as were seven other cetacean species including humpback

[300] 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

[301] https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf

[302] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2019/ICES%20WGBYC%20Report%202019.pdf

[303] https://www.ni.is/midlun/utgafa/valistar/spendyr/valisti-spendyra

whales and sei whales. Two species (sperm and N-bottlenose whales) could not be assigned conservation status due to data deficiency (DD)[304].

Harbour porpoises (*Phocoena phocoena*) interactions

Harbour porpoises are classified as Least Concern in the IUCN Red List[305] (population trend unknown, last assessed in 2008). They are also classified as Least Concern in the Icelandic National Redlist (based on a 2016 assessment)[306]. Annual estimates of harbour porpoise by-catch have decreased in recent years as gillnet effort has decreased (see table below), from a high of 7,300 animals in 2003 to about 1600 animals in 2009–2013[307] 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[308].

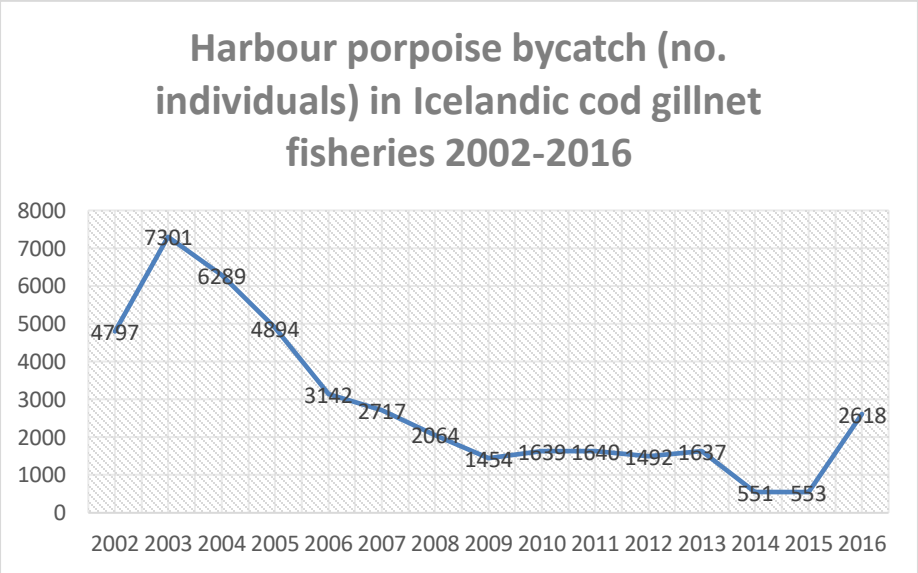


Figure 50. Bycatch of harbour porpoise in the Icelandic cod gill net fishery from 2002 to 2016. Data pulled together from Pálsson et al. 2015 and the 2017 NAMMCO 24th Scientific Committee Meeting Report. Note that these numbers exclude catches in the lumpsucker fishery (see table below for details of 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).

[304] https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf
[305] https://www.iucnredlist.org/species/17027/6734992
[306] https://www.ni.is/node/27406
[307] 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
[308] https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf

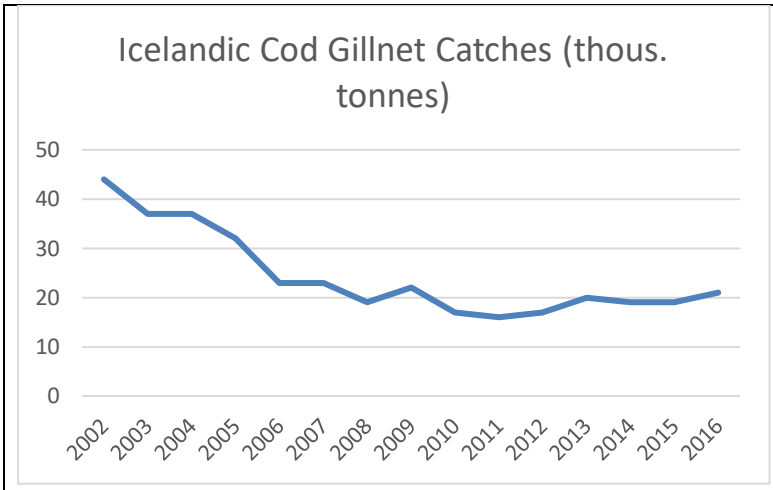


Figure 51. Icelandic cod gillnet catches (thous. tonnes) from 2002 to 2016.[309]

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[310]), but it is important to note that the 2007 estimate is considered to be a minimum estimate based on an incomplete aerial survey.

The NAMMCO Bycatch Working Group met in April 2018 and reported[311] that they did not endorse the recent by-catch estimates presented for harbour porpoises in Iceland and the recommended analyses should be presented to the BYCWG at its next meeting before a more reliable estimate could be endorsed. However, regarding the need for information on harbour porpoise by-catch rates off Iceland for the upcoming International Workshop on the Status of Harbour Porpoises in the North Atlantic (WSHPNA), the WG agreed that as an interim measure the stratified estimate presented, i.e. 1841 porpoises a year, could be considered as an upper bound for the by-catch in cod gillnets for the period 2013-2017. This estimate presumes that April bycatch rates (from the MFRI survey) are indicative of activity in other months and is based on the porpoise availability index which might need some more tweaking. The WG is therefore concerned, that the harbour porpoise bycatch estimate for cod gillnet might be lower than the presented stratified estimate.

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[312] and this threshold is likely to have been met or exceeded in 2016. 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 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

[309] https://www.hafogvatn.is/static/extras/images/%C3%BEorskur%20(5)731728.pdf
[310] 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
[311] https://nammco.no/wp-content/uploads/2019/01/bycwg-october_2018_final-report_291118.pdf
[312] OSPAR, 2009. Background Document for Harbour porpoise Phocoena phocoena. OSPAR Commission. http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena

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).

In 2016 an aerial survey was performed. Despite the poor coverage in it, the uncorrected harbour porpoise population estimate is at least double that of all previous estimates other than that from 2007, when a specialist harbour porpoise observer was employed and all known biases were corrected. Availability bias is likely substantial for this species but dive profile data from the survey area are lacking[313]. This data, although not definitive at this point, appears to imply that the harbour porpoise is increasing and as such, may not be below biological limits.

Information from the Report of the Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic (December 3rd - 7th 2018, Tromsø, Norway)[314] reported abundance information for harbour porpoise in Iceland showing bycatch information and an increase in abundance.

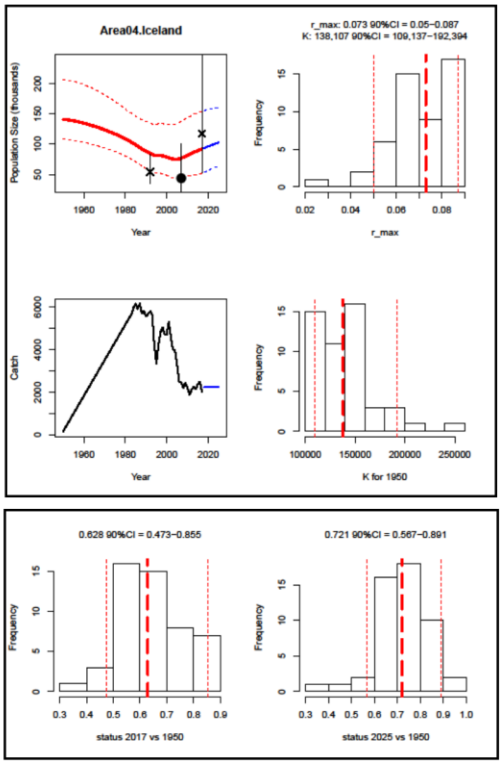


Figure 52*b*. Assessment of the harbour porpoise population in the Iceland assessment area using a population dynamic model (Zerbini et al. 2011). Upper left panel: Estimated population abundance in the given period. Upper right panel: Estimated median rmax (bolded hatched line) given with a 90% credible interval. Middle left panel: Estimated annual by-catch over the given period (used as model input). Middle right panel: Estimated median K1950 given with a 90% credible interval. Lower left panel: Estimated abundance median current depletion level (2017 abundance relative to K1950) with a 90% credible interval. Lower right panel: Predicted median future depletion level (2025 predicted abundance relative to K1950) with 90% credible interval.

[313] https://nammco.no/wp-content/uploads/2018/09/report_aewg_2018_final.pdf
[314] https://nammco.no/wp-content/uploads/2019/02/final-report_hpws_2019.pdf#page=34&zoom=100,64,350

The conclusion of the NAMMCO assessment is that the population in the Icelandic area seems to be recovering. Furthermore, based on the model run outputs, the PBR for 2018 is around 3500 porpoises.

In the larger context, saithe catches in gillnet fisheries account for 7.41% of the total catches in this ger type, while cod accounts for >80% of the total. The saithe fishery is not considered, per se, to have a significant effect on harbour purposes since the vast majority of the bycatch is caught in cod and lumpfish fisheries.

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[315]. 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. Around 200 samples have been received per year this way in addition to the samples from bycaught porpoises in the gillnet survey around Iceland in the spring and occasional samples from stranded animals. Preliminary results were presented to a workshop on harbour porpoises in November 2018.

Marine mammals bycatch reduction devices trials

Acoustic porpoise deterrents (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 got caught in nets with pingers, while 5 porpoises got caught in control nets nearby. Another type of porpoise deterrents (PALs) were tested in the cod gillnet fishery in April of 2018 and like the pingers, showed no reduction in porpoise bycatch as 12 porpoises were caught in nets with the devices, while 11 porpoises got caught in the control nets. Almost all the bycaught porpoises in the PAL sets (eleven out of twelve) were large adult males, while the gender ratio was six males and five females in the control sets. Interestingly, 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[316]. Further trials with pingers were planned for April 2019[317].

Seals bycatch monitoring in 2017

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. The 2018 NAMMCO Scientific Working Group on By-catch reported very unreliable estimates of seal bycatch based on MFRI survey, inspector and logbook data (where an issue with identification of seals seem to be present). The WG did not endorse any of the 2017 by-catch estimates presented for seals in Iceland during the 2018 meeting and stated that the recommended analyses should be presented to the BYCWG at its next meeting before an estimate can be endorsed [318].

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[319] (population trend is unknown, last assessed in 2016). However, harbour seals are currently classified

315 https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf

316 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2019/ICES%20WGBYC%20Report%202019.pdf

317 https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf

318 https://nammco.no/wp-content/uploads/2019/01/bycwg-october_2018_final-report_291118.pdf

319 https://www.iucnredlist.org/species/17013/45229114

as Critically Endangered on the Icelandic National Red list, based on IUCN criteria[320] and 2016 population estimates[321].

Harbour seals interactions

In 1980, the abundance of harbour seals was estimated at around 33,000 animals but the population declined rapidly until 1989 to around 15,000 animals. The 2018 harbour seal census resulted in a population estimated of 9,434 animals (95% confidence intervals of = 6,149-12,726). The 2019 MFRI Advice indicates that current population size is 72% smaller than the first abundance estimate from 1980 and the population is 21% under the management objective of 12,000 animals.[322]

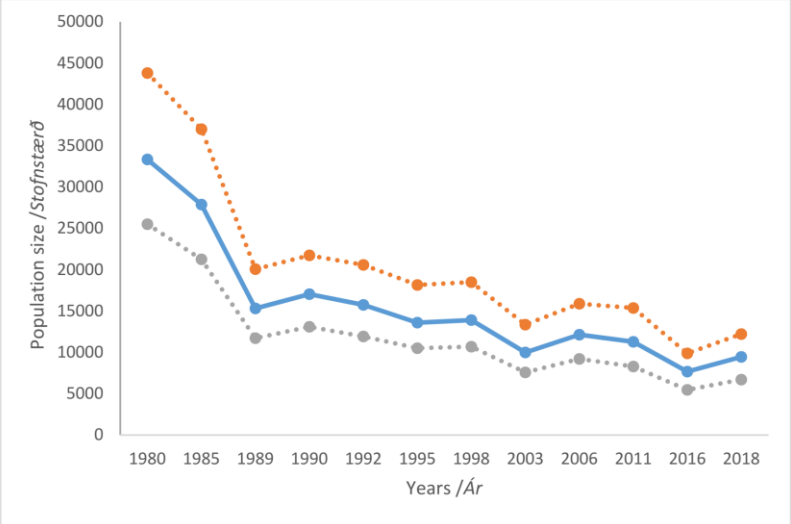


Figure 53. Trends in the Icelandic harbour seal population from 1980 to 2018. The mean values (solid blue line) are the estimated population size for respective years. The 90% confidence intervals indicated with dotted lines (90% CI low = grey line and 90% CI high = orange line).

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 also high.

Limited data are available on seal bycatch, but data collected by on-board observers of the Directorate of Fisheries, and in the MFRI gillnet survey, indicate that on average, 1389 ± 486 (± CV*estimate) harbour seals have been bycaught annually in the lumpfish fishery between 2014 and 2018. Bycatch in cod gillnet fishery and bottom trawls is less common and more uncertainty associated with the bycatch estimates in those fisheries. Between 2014 and 2018, it has been estimated that annually, 15 harbour seals were bycaught in cod gillnet fisheries (CV=1.02) and 17 harbour seals in bottom trawls (CV=1.00) (Marine and Freshwater Institute, in prep.)[323].

Based on these most recent estimates, 97.7% of the harbour seal bycatch can be attributed to the lumpfish fishery and the reminder 1.07% to the cod gillnet fishery and 1.22% to the bottom trawl fishery. Of all Icelandic

320 https://www.ni.is/midlun/utgafa/valistar/spendyr/valisti-spendyra
321 https://www.ni.is/node/27368
322 https://www.hafogvatn.is/static/extras/images/landselur_191145061.pdf
323 https://www.hafogvatn.is/static/extras/images/landselur_191145061.pdf

catches in gillnet gear, saithe made up 7.4% of the total catches in the past 3 seasons, hence this fishery is responsible for about 0.07% of the harbour seal gillnet bycatch and this effect is not deemed significant. Of all Icelandic catches in bottom trawl gear, saithe made up 16.5% of the total catches in the past 3 seasons, hence this fishery is responsible for about 0.2% of the harbour seal bottom trawl bycatch. This effect is not deemed significant. Current harbour seal bycatch (~98%) is therefore, for the most part, dependent upon lumpsucker fishery effort[324].

A full population survey was conducted during the moulting period in 2018 and the data analysis is currently ongoing. The current aim is to conduct aerial population censuses every second year while the population is under the target level. The MFRI advice to the Ministry has been: "that direct hunt should be prevented and that actions must be taken to reduce by-catch 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." No legislation and no new management objective is currently in place. However, Icelandic authorities are investigating possibilities of how legislation on seal hunting and obligatory reporting of catch statistics can be implemented. There is an increased effort to improve by-catch data collection. MFRI will define a population level objective based on biological criteria[325].

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, last assessed in 2016) on the IUCN Red List[326] but as Vulnerable in the Icelandic National Red List[327] based on a 2018 assessment.

The Icelandic management objective from 2005 states that the Icelandic grey seal population size should be kept above 4100 animals, which corresponds to the observed population size from 2004. The population is currently estimated in the 2019 MFRI Advice to be 6300 animals, which is 50% above the management objective. If the population decreases significantly measures will be taken to reverse the trend. Close monitoring of the population is advised. MFRI advises that actions must be taken to reduce by-catch of grey 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.

[324] https://www.hafogvatn.is/static/research/files/hv2017-009pdf
[325] https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf
[326] https://www.iucnredlist.org/species/9660/45226042
[327] https://www.ni.is/node/27369

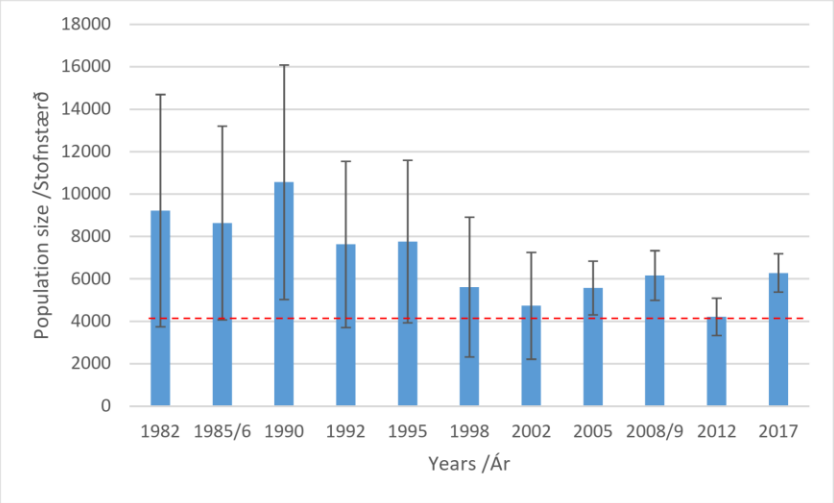


Figure 54. Grey seal. Stock size with 95% confidence intervals. The broken line indicates the management objective.

No grey seals were estimated to have been bycaught by the cod gillnet fishery between 2014 and 2016 (see table 1 of 2017 NAMMCO report[328]), but in 2013 it was estimated that 33 grey seals were bycaught in cod gillnet fisheries. This is compared to an average of 989 grey seals caught in the lumpsucker fishery between 2014-2018[329]. The effects of the cod (and saithe) fishery on this species is not considered significant and the most recent estimate of stock size is within management targets.

Harp Seals

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 caught in 2014, 212 in 2015 and 144 in 2016. One incident was recorded in the trawl fishery in 2017. 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 at 4.5 million individuals, based on a 2015 assessment[330].

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[331] in the IUCN Red List (as well as being marked as non-resident or breeding in Iceland), while hooded seals are

[328] https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf
[329] https://www.hafogvatn.is/static/extras/images/utselur_20191125514.pdf

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

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

considered Vulnerable in the IUCN Red List[332] (last assessed in 2015). Hooded seals are native and resident to Canada, Greenland and Iceland, their current estimated population is 340,000 mature individuals and their population trend is unknown.

The ICES/NAFO/NAMMCO working group on harp and hooded seals (WGHARP) will meet in Tromsø, Norway, 2-6 September 2019. New data from all populations is available and the group will do assessments of status and harvest potentials[333]. New data will be assessed during the next audit.

Based on the limited gillnet catches of saithe, the direct effects of the saithe fishery on harp, hooded and ringed seals are not considered significant.

Seabirds bycatch

The 2018 ICES Ecosystem Overview[334] 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.

Pálsson *et al*. (2015[335]) 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 (see table below). 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.

Table 34. 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

[332] https://www.iucnredlist.org/species/6204/45225150
[333] https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf
[334] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf
[335] https://www.hafogvatn.is/static/research/files/fjolrit-178pdf

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

In a very crude approximation, if the 2% effort coverage mentioned in the Pálsson *et al.*, (2015) study was to be raised to 100% to represent the full gillnet effort, the highest annual take would belong to common guillemot at 0.39%, northern gannet at 0.32% and loom at 0.33% a year. All the other species would have an annual take well below 0.1% of their estimated population size. Population size of each species was taken from the seabird Red list estimates of the Icelandic Institute of Natural History https://en.ni.is.

2014-2016 seabird bycatch in the cod fishery

The MFRI provided data from 2014-2016 with a rough estimated annual bycatch of seabirds in cod gillnets, longlines and otter trawl. Variance around the estimate (based on the CV) is shown in brackets.

Table 35. Icelandic cod fishery (gillnet, longline, otter trawl) annual seabird estimated bycatch from 2014-2016, including estimates of annual removal.

Species	Cod gillnets	Longline	Otter trawl	Iceland Institute of Natural History (INH) Red List Classification	Population estimated in INH's 2018 Red List	Annual bycatch % removal of estimated population*
Northern fulmar (*Fulmarus glacialis*)	1702 (1362-2042)	920 (340-1500)	0	Endangered	1.2 million pairs	0.11%
Common guillemot (*Uria aalge*)	454 (340-568)	0	0	Vulnerable	693,000 pairs	0.03%
Northern gannet (*Morus bassanus*)	128 (69-187)	0	45 (2-90)	Vulnerable	37,000 pairs	0.23%
Atlantic puffin (*Fratercula arctica)*	13 (1-26)	0	0	Critically Endangered	2 million pairs	0.00%
Razorbill (*Alca torda*)	26 (2-52)	0	0	Near threatened	313,000 pairs	0.00%
Common loon (*Gavia immer*)	82 (3-164)	0	0	Vulnerable	200–300 pairs	16.40%
Common eider (*Somateria mollissima*)	142 (2-282)	0	0	Vulnerable	850,000 birds	0.02%
Cormorants (*Phalacrocorax carbo*)	0	47 (16-78)	0	Least Concern	4,581 pairs	0.51%
Great-black backed gull (*Larus marinus*)	0	67 (2-134)	0	Endangered	6,000–8,000 pairs	0.48%

***Note, the potential decline trajectory of these populations resulting from their INH Red List classification has not been taken into account in the annual percentage removal calculation.**

Observed seabird bycatch in 2017[336] in the cod gillnet fishery was 3 northern fulmars, 2 gannets, and 8 common guillemots. No seabirds were observed in the demersal trawl fishery. Observed seabird bycatch in the longline fishery was 69 northern fulmars, 24 northern gannets, 5 lesser black-backed gulls, and 35 herring gulls.

No raised estimates were available for 2017 but we note that an up to date report on cod bycatch is due for publication towards the end of 2019 (Guðjón Már Sigurðsson, MFRI, pers. comm, 15th August 2019).

Relevance to the saithe fishery

An average of 7.41% of the total Icelandic gillnet catches in the past 3 years were saithe catches. This means that the direct effects of saithe catch on seabirds caught as bycatch in cod gillnet gear are intrinsically limited (i.e. less than 10% of the total). However, an assessment of key seabird bycatch is provided below for a clearer understanding of the general impacts occurring in cod gillnets. We also consider available trawl bycatch information (for Northern gannet only caught in trawl gear).

Seabird status

Based on Pallson et al. (2015) data spanning from 2009 to 2014, 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. Furthermore, these two-seabird species were also the most frequently caught in the 2014-2016 cod estimates (gillnet, longline, trawl) provided by the MFRI. Information on these two species as well as other minor bycatch species (including a discussion on common loon) from the 2014-2016 dataset are listed below.

Common Guillemot

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). [337]

Uria aalge is a common breeding bird in Iceland with 693,000 pairs; ten colonies are of international importance (≥10.000 pairs) and all the population breeds within important bird areas IBAs. It is listed as Vulnerable (VU, A4abc) in the Icelandic Red list 2018[338], uplisted from Least concern (LC) in 2000. The annual removal by the (cod) gillnet fishery is estimated at 0.03% and not considered significant.

Northern fulmar

Northern fulmar (*Fulmarus glacialis*) 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 assessment

336 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2019/ICES%20WGBYC%20Report%202019.pdf

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

338 https://www.ni.is/node/27097

Northern Fulmar is categorised as Least Concern in the IUCN red list, with 7 million mature individuals and an increasing population trend[339].

Fulmarus glacialis is the second most common breeding bird in Iceland with 1.2 million pairs; 38 colonies are of international importance (≥10.000 pairs) and 81.5% of the population breed within important bird areas (IBA). It is listed as Endangered (EN, A4abc) in the Icelandic Red list 2018[340], uplisted from Least concern (LC) in 2000. The annual removal by the (cod) gillnets and longline fisheries is estimated at 0.11% and not considered significant.

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[341].

Morus bassanus is most common seabird off southern Iceland with 37,000 pairs in 2013/2014; two colonies are of international importance (≥10,000 pairs) and all the population breeds within IBAs.

Icelandic Red list 2018 classification[342]: Vulnerable (VU, D2), the same as the last assessment in 2000. The annual removal by the (cod) gillnet and trawl fisheries is estimated at 0.23% and not considered significant.

Common Eider duck

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). Based on a 2018 assessment, this species is categorised as Near Threatened in the IUCN Red List with an unknown population trend. The European population is estimated at 791,000-955,000 pairs[343].

Somateria mollissima is a common breeding bird in Iceland. The winter population is estimated to be 850,000 birds, including some tens of thousands from NE-Greenland and Svalbard. Approx. 44% of the birds breed in designated IBAs and approx. 31% of the birds moult in such areas.

Icelandic Red list 2018 Classification[344]: Vulnerable (VU, A2b), uplisted from Least concern (LC) in 2000. The annual removal by the (cod) gillnet fishery is estimated at 0.02% and not considered significant.

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

339 https://www.iucnredlist.org/species/22697866/132609419#conservation-actions
340 https://www.ni.is/node/26962
341 https://www.iucnredlist.org/species/22696657/132587285#conservation-actions
342 https://www.ni.is/node/27100
343 https://www.iucnredlist.org/species/22680405/132525971#conservation-actions
344 https://www.ni.is/node/27107

as a regularly occurring migratory species. The species is considered in the Nordic Action Plan for seabirds in Western-Nordic areas (TemaNord 2010). Last assessed 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. 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 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%[345].

Alca torda is a common breeding bird in Iceland with 313,000 pairs; ten colonies are of international importance (≥10.000 pairs) and all the population breeds within IBAs.

Icelandic Red list 2018 Classification[346]: Near threatened (NT), uplisted from Least concern (LC) in 2000. The annual removal by the (cod) gillnet fishery is estimated at 0.00% and not considered significant.

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)[347].

Fratercula arctica is the most common breeding bird in Iceland with approx. 2 million pairs; ten colonies are of international importance (≥10.000 pairs) and approx. 98% of the population breeds within IBAs.

Icelandic Red list 2018 Classification[348]: Critically Endangered (CR, A4abc), uplisted from Least concern (LC) in 2000. The annual removal by the (cod) gillnet fishery is estimated at 0.00% and not considered significant.

Common loon or great northern diver

The common loon or 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. Last assessed in 2018, this species is categorised as Least Concern in the IUCN Red List with a stable population trend. Wetlands International (2016) estimated the

345 https://www.iucnredlist.org/species/22694852/131932615#population
346 https://www.ni.is/node/27099
347 https://www.iucnredlist.org/species/22694927/132581443#conservation-actions
348 https://www.ni.is/node/27101

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).[349]

The Gavia immer population in Iceland is roughly estimated 200–300 pairs. Known breeding territories are c. 500, with 56% within IBAs, ten of which are specifically designated for this species. Furthermore, one staging area is designated IBA, holding 10% and sometimes 30% of the population.

Icelandic Red list 2018 Classification: Vulnerable (VU, D1), downlisted from EN in 2000.

The annual removal by the cod fishery is estimated at 16.4%. Since saithe made up an average of 7.41% of all the Icelandic gillnet catches in the past 3 years, the direct contribution of common loon bycatch in the gillnet fisheries responsible for saithe catches can be calculated as (7,41% of the 16.4% removal) 1.21%. This value is considered to be quite small but potentially significant, given the small *G. immer* population.

The MFRI provided further clarification on common loon bycatch where they highlighted that the estimate has a large variance based on an actual catch of 3 birds over several years. The birds are only vulnerable to bycatch for part of the year before they move to freshwater for nesting, hence the potential for an overestimate. They also noted that these 3 birds were all caught in the same year, and that is only 3 birds caught since 2010 when proper reporting started in the MFRI survey. They continued with saying that the estimate would be much lower if they include data from 2017-2019, but that analysis has not been finalized yet (Guðjón Már Sigurðsson, MFRI, pers. comm, 17th September 2019).

Accordingly, and in connection with the spotted wolffish status and management issue identified earlier the team issues a minor non-conformance against clause 3.1.1.

Non-conformance #2 (Clause 3.1.1: Minor Non-conformance). There is insufficient evidence that adverse impacts of the saithe fishery on the spotted wolffish and common loon ecosystem components are being considered and appropriately assessed and effectively addressed, consistent with the precautionary approach.

Status: Open, Corrective Actions in place to be reviewed annually at surveillance audits.

A corrective action plan against this non-conformance has been provided under the Non Conformances and Corrective Action Section of this report. Please refer to it for further detail.

We also note, for contextual clarity and outside the bounds of this assessment, that the gillnet fishery for lumpfish is also the cause of some common loon bycatch (see table 6 in the MFRI Mean catch of birds and marine mammals in lumpfish fishing 2014-2018 report [350]) likely contributing to the overall takes of this small population.

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

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

[350] Meðafli fugla og sjávarspendýra í grásleppuveiðum 2014-2018 https://www.hafogvatn.is/static/extras/images/medafli-fugla-og-spendyra-i-grasleppuveidum1157500.pdf

Protection Areas. Last assessed 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)[351].

Phalacrocorax carbo is a rather rare breeding bird in W-Iceland with 4,581 pairs in 2017; but has increased considerably at an all time low in 1995 (2,346). The two main breeding areas are designated IBAs for this species and hold almost all of the population.

Icelandic Red list 2018 Classification[352]: Least concern (LC) as in 2000. The annual removal by the cod longline fishery is estimated at 0.51% and not considered significant (i.e. only ~1% of saithe is caught with longline gear).

Great-black backed gull

Great-black backed gull (*Larus marinus*) is categorised as Least Concern in the IUCN Red List, last assessed in 2018, with a European population estimated at 118,000-133,000 pairs, which equates to 237,000-266,000 mature individuals or 360,000-400,000 individuals (BirdLife International 2015). This species used to be the most common gull in Iceland, but the population has declined dramatically in the past decades and is now roughly estimated 6,000−8,000 pairs. One area is designated IBA for this species and 63% of the birds may breed in IBAs.

Icelandic Red list 2018 classification: Endangered (EN, A2abc), uplisted from Vulnerable (VU) in 2000.

The annual removal by the (cod) longline fishery is estimated at 0.48% and not considered significant (i.e. only ~1% of saithe is caught with longline gear).

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. Please see Non-conformance #1 (Clause 2.3.2.4: Minor Non-conformance) for further detail. During the October 2019 site visits the MFRI highlighted that in general, the number of seabirds and marine mammals recorded has been increasing in recent years and in 2018 was almost triple the number reported in 2016. They also noted that there may always be some underreporting issues with a logbook system (pers. comm. Guðjón Már Sigurðsson, MFRI).

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[353].

[351] https://www.iucnredlist.org/species/22696792/132592923#population
[352] https://www.ni.is/node/27105
[353] 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

A smartphone app is in development by the Directorate of Fisheries, aimed at making both reporting and identification of bycatch easier for operators in the fishery.

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.

Discards
Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty[354] (ISK 400,000 to 8,000,000 or about EUR 3,000 to 60,000). 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. Discards are not accounted for in the stock assessment process. This has been discussed earlier in Section 1.

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). 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 saithe in 2018/2019 totalled 18,253 kg[355].

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 trawls and dredges having a greater impact than static gear such as longlines, set nets or pots. As shown earlier in this clause, over the past 3 years, 90% of the saithe catches were caught with bottom trawl, 3.56% with gillnet (no habitat effects), 2.43% with handline (no habitat effects), 1.86% with Danish seine (likely minimal habitat effects), 1.46% with longline (minimal habitat effects) and 0.8% with nephrops trawl.

Accordingly, potential habitat effects of the Icelandic fishery can be attributed mainly to bottom trawling.

Trawling distribution and effort[356]

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

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

[356] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf

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.

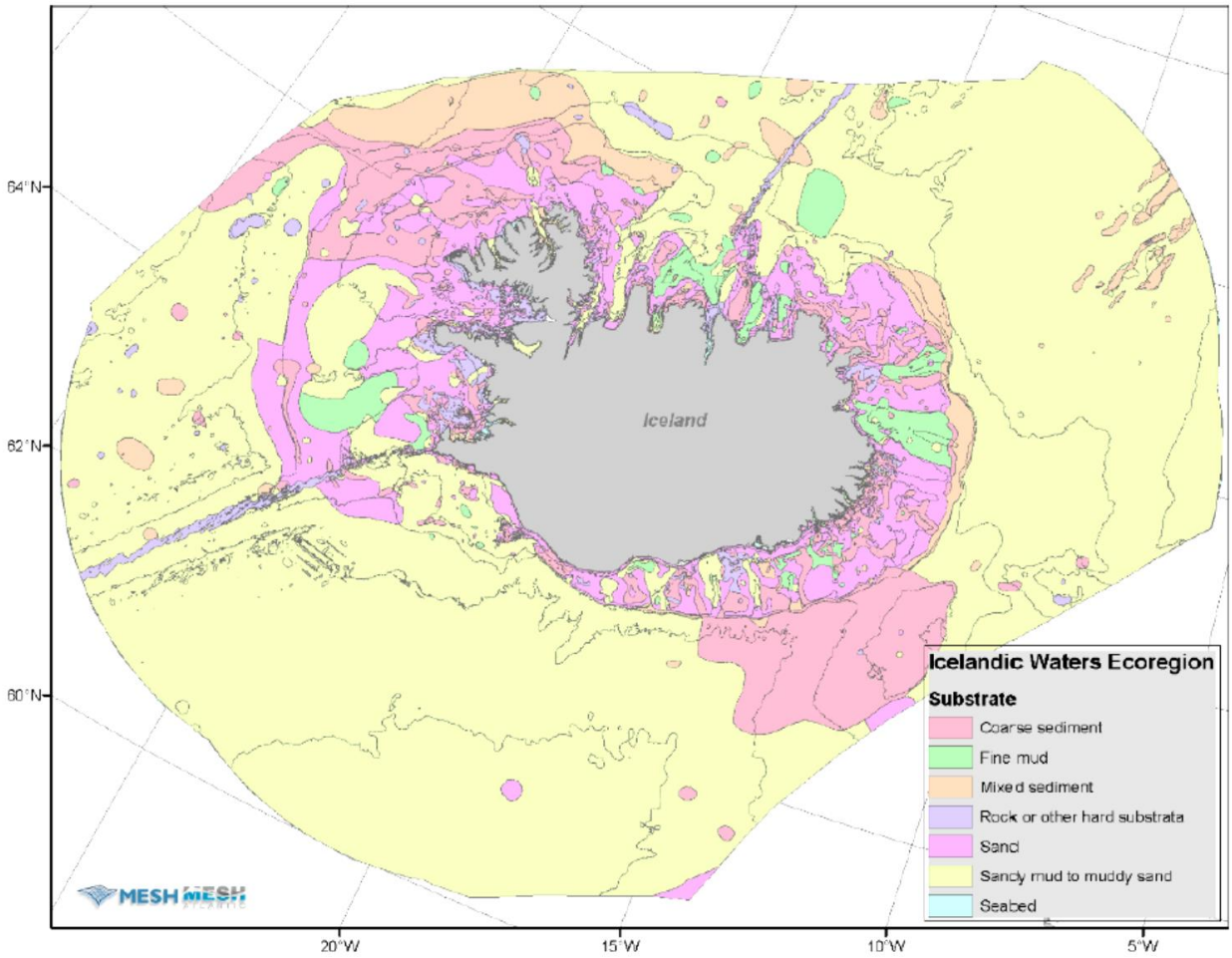


Figure 55. Major substrates in the Icelandic Waters ecoregion (compiled by EMODnet Seabed Habitats; www.emodnet-seabedhabitats.eu).

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

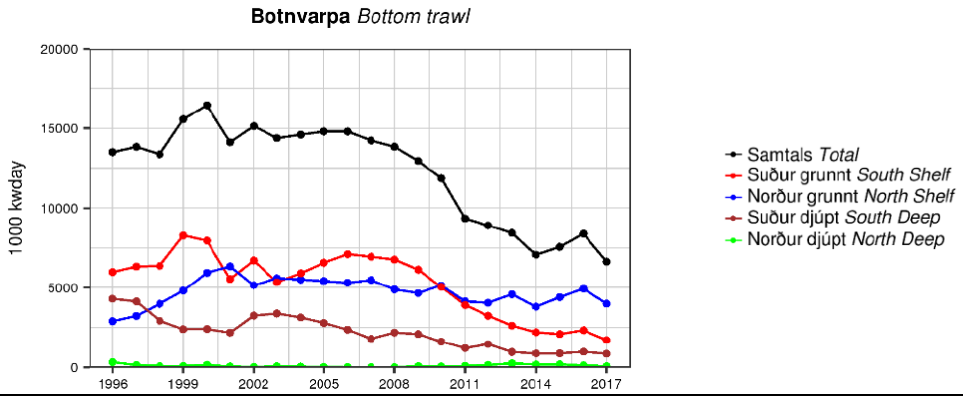


Figure 56. Annual total bottom-trawl fishing effort (1000 kW days) based on logbooks from trawl fisheries targeting demersal fish in the Icelandic ecoregion from 1996 to 2017. Bottom trawl effort in 2017 is about 50% of what it was in 2007.

Bottom Trawl footprint in Iceland

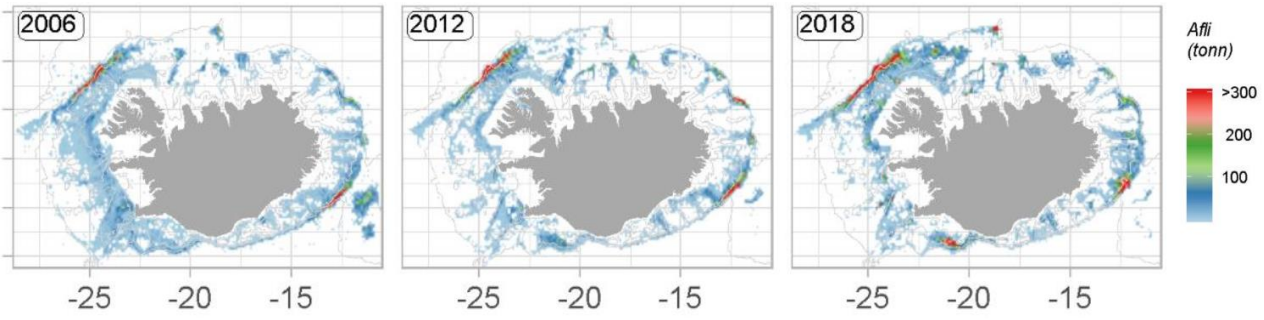


Figure 57. Spatial distribution of bottom-trawl effort days based on logbooks from bottom trawl fisheries in 2006, 2012 and 2018[357]. Note the white patches inshore indicating permanent trawl closures.

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 2018 ICES Report on the Icelandic Ecoregion Ecosystem[358] 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[359] we can 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.

[357] https://www.hafogvatn.is/static/extras/images/02-Cod_TR_isl%20(1)1141502.pdf
[358] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf
[359] https://www.hafogvatn.is/static/files/Veidiradgjof/vistkerfi.pdf

During the site visits, HB Grandi (who held 20% of the saithe quota in 2019) stated that all of their trawlers (4 wetfish and 2 freezer trawlers), as well other trawlers in the industry[360], use pelagic flying doors because they do not drag on the seafloor, save on fuel costs while decrease gear damage. Common use of "T90 bottom trawls" (30% lesser net) with pelagic doors (not dragged on the bottom) in Iceland[361], has resulted in considerable fuel savings without sacrificing fishing efficiency. Furthermore, bottom trawlers in Iceland are also reported to use rock hoppers.

Commonly encountered habitats in the Icelandic ecoregion tend to be hard ground, varying from sandy mud to gravel and cobbled areas (Ragnarsson & Steingrímsson, 2003 [362]). These areas tend to be resilient, more dynamic areas and it is unlikely that bottom trawl gear will reduce their structure and function to the point where there would be serious irreversible harm, as they have been fished for many years and still provide productive fish stocks over the long-term. In cooperation with researchers at MFRI, trawl fisheries are actively contributing to benthos mapping programmes by recording all benthos bycatch to species level where relevant.

The impact of seine net fishery (Scottish seining, fly-dragging) was examined by Thorarinsdóttir et al. (2010) [363] in Skagafjörður, Iceland, by comparing benthic communities in areas open to fishing to an area where no fishing is allowed but otherwise comparable. Data obtained from analysis of grab samples revealed no significant differences in the species composition between areas although the abundance of benthic organisms tended to be greater within the closed area than in the fished area. Danish seines can only be used in areas of relatively smooth bottom, which are themselves not likely to be vulnerable to fishing gear impacts anyhow, indicating that Danish seine gear has a small to negligible effects on benthic habitats.

Protection of Vulnerable Marine Ecosystems (VMEs)

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.

In 2004 an initiative towards mapping and protecting cold-water corals in Icelandic waters was undertaken by the Marine and Freshwater Research Institute, involving for the first time a video documentation of coral-reefs south of Iceland. As a result, the coral-reefs that were mapped and were considered to be at risk of damage by bottom fishing were protected. As a follow up to this initiative, a benthic habitat mapping project was started with the long-term goal of mapping and describing the various benthic habitats around Iceland. The main focus of this project is mapping vulnerable habitats or ecosystems. Among the more recent outputs from this work include records of sponge and sea pen aggregations. In addition, since 2016 the benthic by-catch captured in the annual ground fish survey has been analysed and recorded, including species that are indicators of vulnerable ecosystems.

[360] http://www.hampidjan.is/news/news-article/clear-advantages-of-flying-doors
[361] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
[362] https://academic.oup.com/icesjms/article/60/6/1200/652072
[363] https://www.hafogvatn.is/static/research/files/fjolrit-151pdf

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[364]. 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[365]. 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.

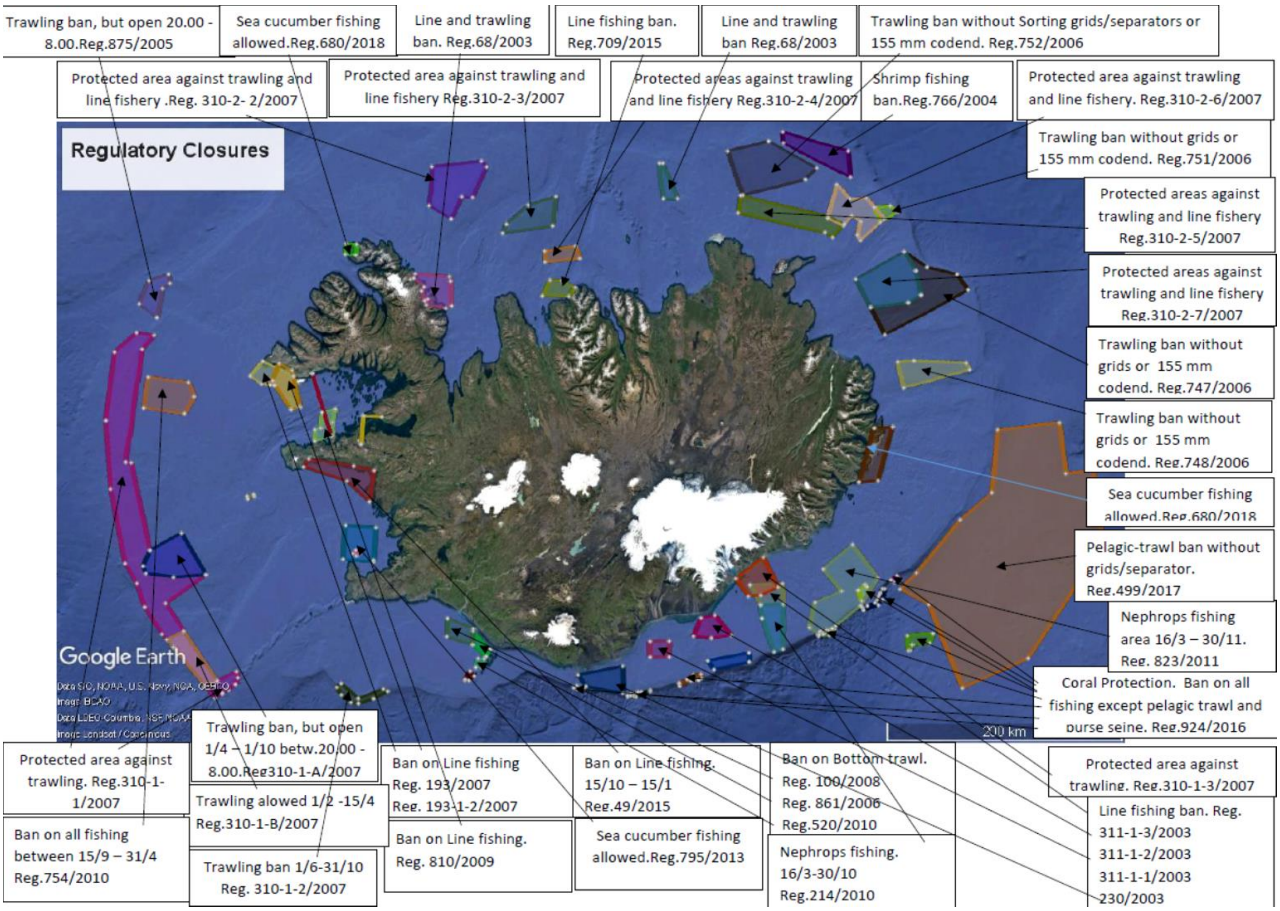


Figure 58. Regulatory Closures in Icelandic waters as of November 2018. The long purple trawl closures in the South West of Iceland were originally designed to protect golden redfish juveniles, and were originally set up in the early 1990s[366]

[364] https://www.government.is/news/article/?newsid=e747dac7-fb88-11e7-9423-005056bc4d74
[365] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/domsmalaraduneyti/nr/1154
[366] https://www.hafogvatn.is/static/research/files/fjolrit-133pdf

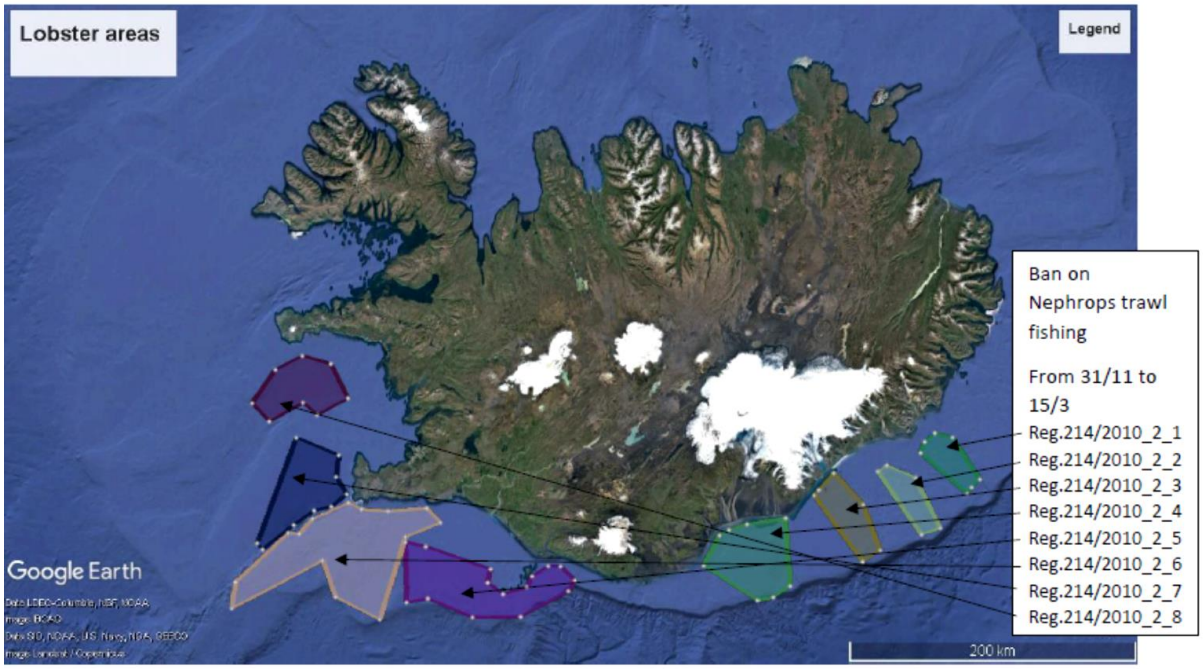


Figure 59. Temporary Nephrops fishing Closures in Icelandic waters.

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[367].

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 (pers. comm. MFRI, site visits).

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[368]. 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[369]. 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:

367 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

368 https://hafsbotninn.wordpress.com

369 http://novasarc.hafogvatn.is/

- 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.
- 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.

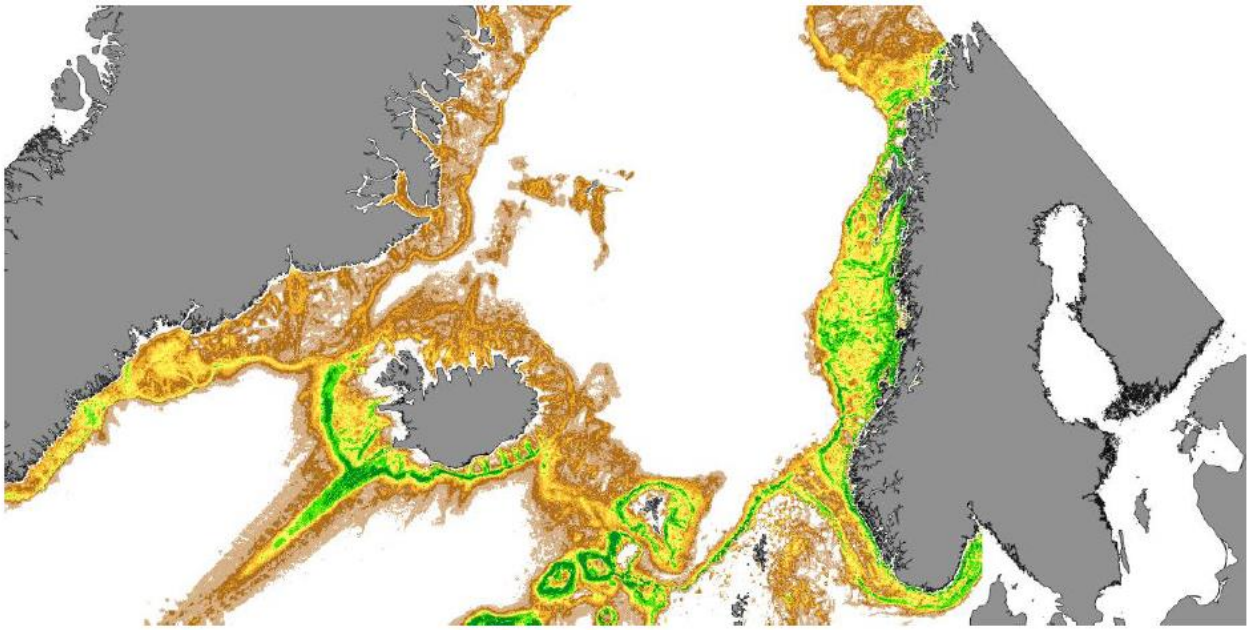


Figure 60. Distribution of the VME shallow sea pen based on first test run of the habitat suitability model. Green is 1 and white is zero probability of occurrence (Source: Report of NovasArc workshop, Tórshavn, Faroes, November 20-24, 2017[370]).

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. In July 2019, a cruise was completed, part of a long-term data collection project to map different habitats on the seabed so that they can be defined, and their diversity examined. Another aim of this project is to assess if these are vulnerable or poor habitats and whether action is needed to protect them[371]. 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[372].

[370] http://novasarc.hafogvatn.is/docs/NovasArc_report_workshop_4.pdf
[371] https://www.hafogvatn.is/is/midlun/frettir-og-tilkynningar/furdudyr-fjolufaetlur-bakteriur-og-koralar
[372] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2005/may/Iceland%20and%20East%20Greenland.pdf

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[373].

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.

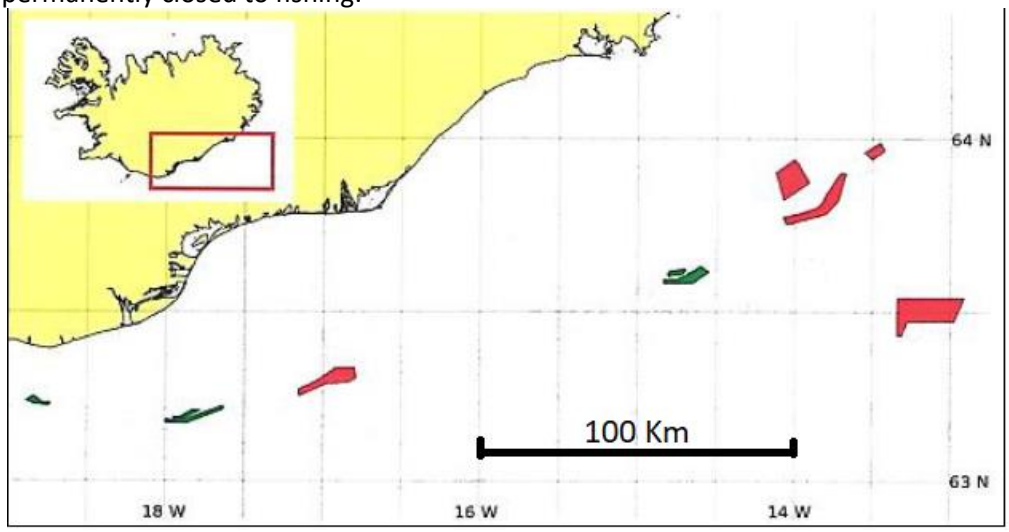


Figure 61. 10 coral closures in South East Iceland, current as of November 2018. Maps can be viewed by downloading Google Earth and clicking on the following kml file produced by the Directorate of Fisheries http://uv.fiskistofa.is/uv.kml

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

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 by environmental law nr 249/2001 and 510/2007[374]. 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 62. Coordinates and location of protected natural resources (i.e. hydrothermal vent) at Arnarnesstrýtur in Eyjafjörður north of the Arnarnes river[375].

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

As outlined above the most probable adverse impacts of the Icelandic saithe 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.

References:	See footnotes.
Non-Conformance Number (if relevant)	**#2**

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

8.3.1.2. Clause 3.1.2.

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.[376]

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Ecosystem impacts that are likely to have serious consequence include bycatch issues, ETP species interactions and habitat effects of the fishery. Resulting management actions or further analysis of identified risks are demonstrably consistent with the precautionary approach.

Evidence:

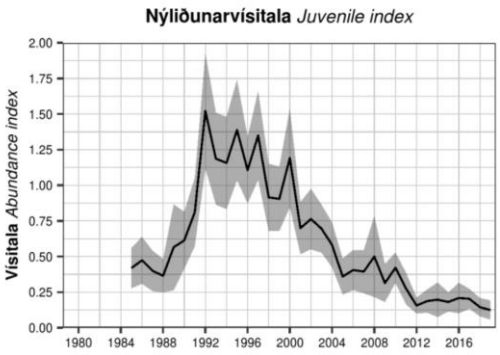
Based on the information and analysis provided in Clause 3.1.1, above, ecosystem impacts that are likely to have serious consequence include bycatch issues, ETP species interactions and habitat effects of the fishery. Key issues and management responses to those are summarised below.

Bycatch issues

There are a number of species at potential risk of bycatch from the saithe fishery for which immediate management responses or further analysis of the identified risk are being effected. These are summarised below.

HLÝRI – SPOTTED WOLFFISH (*Anarhichas minor*)[377]

Figures from the June 2019 MFRI Advice:



Around 98% of Spotted wolffish (*Anarhichas minor*) is currently caught as bycatch in trawl and longline fisheries and is mainly found at the northwest and north parts of the continental shelf of Iceland, at sandy or muddy substrate and depths of 100-400 meters. In recent years the fisheries of saithe have been moving from areas off south Iceland to areas off NW Iceland.

Since 2012 catches have been consistently above advice/recommended TAC. Spotted wolffish was included in the ITQ system in 2018 and the TAC in 2018/2019 was set as per recommended TAC of 1001 t[2]. Preliminary catches in 2018/19 have exceeded the TAC (1200 t caught by August 7th 2019) based on Fiskistofa records[3]. We note, these values may be subject to revision.

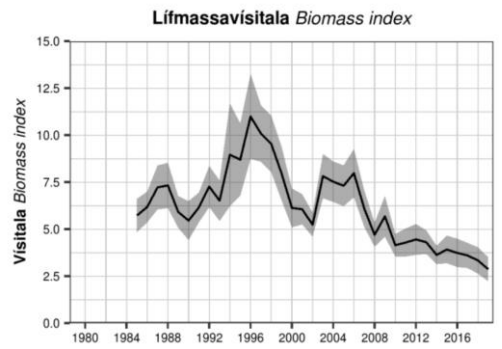
Year	Advice/ Recommended TAC	National TAC	Spotted Wolffish Catches	Total catches as a % of advice
12/13	900		2,042	227%

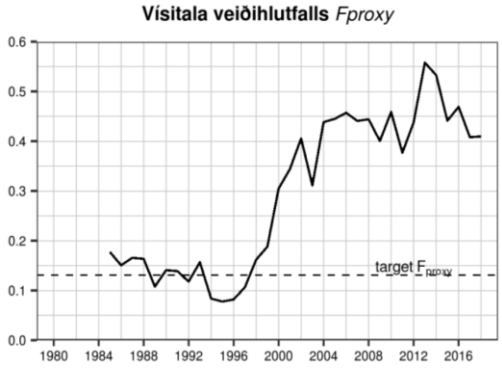
[376] 2005/2009 FAO Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries.

[377] https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish%20(1)1141515.pdf

[2] https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish_TR1141496.pdf

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





13/14	900		2,250	250%
14/15	900		1,655	184%
15/16	900		1,913	213%
16/17	1128		1,587	141%
17/18	1080		1,528	141%
18/19	1001	1,001	1,234	123%
19/20	375	375		

In a request for clarification, the Ministry confirmed that spotted wolffish is caught with other species in the mixed fishery and is therefore very difficult to manage. They also explained that in the fishing year (2019/2020) the TAC is extremely small so there might be additional difficulties in maintaining the species within TAC.

In their 2019 Advice, MFRI advised that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 375 tonnes. Biomass and juvenile indices are at their lowest levels in the time series. Fproxy has been high since 2000.

This year the basis of the Fproxy was changed due to low spawning stock biomass and poor recruitment and thus the Fproxy applied last year is no longer considered precautionary. The target Fproxy is now defined as the mean Fproxy from the reference period of 1985–1998. This period was chosen as fishing pressure did not have any observed detrimental effects on the stock biomass. The catch advice is based on multiplying the most recent index value with the target Fproxy value. As this is the first year this basis is used the uncertainty cap was not applied.

Spotted Wolffish in Europe is categorised as near threatened under the IUCN Red list based on a last assessment from 2014[4].

It is not clear to what degree management has been successful at reducing harvest for this stock since catches in 2018/19 appear to have exceeded the TAC by over 20%. The same or perhaps a bigger issue remains for the reduced 2019/2020 quota and the related effects on the stock. **The saithe fishery overlaps in terms of fishing gears (bottom trawl only), fishing grounds (NW only) and depths with spotted wolffish catch and is therefore considered to have an effect on this stock, itself a component of the Iceland marine ecosystem. A minor**

[4] https://www.iucnredlist.org/species/18263655/44739959

	non-conformance has been raised under clause 3.1.1. regarding this issue.

ETP species issues

There are a number of ETP species at potential risk of interaction from the saithe fishery for which immediate management responses or further analysis of the identified risk are being carried out. These are summarised below.

Atlantic halibut

Atlantic halibut (*Hippoglossus hippoglossus*) is classified as Endangered on the IUCN Red list[378]. A committee established in 2010 by the minister of fisheries due to the poor state of the Atlantic halibut stock in Iceland, concluded that the most effective way to rebuild the stock would be to ban all targeted fishing. In 2012, a regulation was issued to ban all targeted fishing for Atlantic halibut[379] and stipulating that all viable halibut in other fisheries must be released. In 2019, MFRI's advice is that these regulations remain in effect[380].

Annual landings of Atlantic halibut were 36–119 tonnes in 2012–2018, which are the lowest landings since the beginning of the fishery. The decrease is due to management decisions.

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. [381]

Catches of spiny dogfish and porbeagle sharks have been very low in recent years. Catches of Greenland sharks have been 10 t in the 2017/18 season.

Issues with recording of marine mammal and seabird bycatch and relative management actions

E-logbook app modifications

A smartphone app is in development by the Directorate of Fisheries, to make reporting and identification of marine mammal and seabird bycatch easier for operators in the fishery. During the 2019 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. During the October 2019 site visits the MFRI highlighted that in general, the number of seabirds and marine mammals recorded has been increasing in recent years and in 2018 was almost triple the number reported in 2016. They also noted that there may always be some underreporting issues with a logbook system (pers. comm. Guðjón Már Sigurðsson, MFRI).

Marine mammal bycatch

[378] https://www.iucnredlist.org/species/10097/3162182
[379] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/18302

[380] https://www.hafogvatn.is/static/extras/images/21-AtlanticHalibut1141466.pdf
[381] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0456-2017

Harbour porpoises (*Phocoena phocoena*)

Harbour porpoises are classified as Least Concern in the IUCN Red List[382] (population trend unknown, last assessed in 2008). They are also classified as Least Concern in the Icelandic National Redlist (based on a 2016 assessment)[383]. Annual estimates of harbour porpoise by-catch have decreased in recent years as gillnet effort has decreased (see table below), from a high of 7,300 animals in 2003 to about 1600 animals in 2009–2013[384] 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[385].

In 2016 an aerial survey was performed. Despite the poor coverage in it, the uncorrected harbour porpoise population estimate is at least double that of all previous estimates other than that from 2007, when a specialist harbour porpoise observer was employed and all known biases were corrected. Availability bias is likely substantial for this species but dive profile data from the survey area are lacking[386]. This data, although not definitive at this point, appears to imply that the harbour porpoise is increasing and as such, may not be below biological limits.

Information from the Report of the Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic (December 3rd - 7th 2018, Tromsø, Norway)[387] reported abundance information for harbour porpoise in Iceland showing bycatch information and an increase in abundance.

The conclusion of the NAMMCO assessment is that the population in the Icelandic area seems to be recovering. Furthermore, based on the model run outputs, the PBR for 2018 is around 3500 porpoises. The catch in the cod and lumpfish fisheries in each year, in 2014, 2015 and 2016 was below this threshold.

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[388]. 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. Around 200 samples have been received per year this way in addition to the samples from bycaught porpoises in the gillnet survey around Iceland in the spring and occasional samples from stranded animals. Preliminary results were presented to a workshop on harbour porpoises in November 2018.

Harbour seals

In 1980, the abundance of harbour seals was estimated at around 33,000 animals but the population declined rapidly until 1989 to around 15,000 animals. The 2018 harbour seal census resulted in a population estimated of 9,434 animals (95% confidence intervals of = 6,149-12,726). The 2019 MFRI Advice indicates that current population size is 72% smaller than the first abundance estimate from 1980 and the population is 21% under the management objective of 12,000 animals.[389] Between 2014 and 2018, it has been estimated that annually,

[382] https://www.iucnredlist.org/species/17027/6734992
[383] https://www.ni.is/node/27406
[384] 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
[385] https://nammco.no/wp-content/uploads/2018/01/08-nammco-26-scientific-committee-report.pdf
[386] https://nammco.no/wp-content/uploads/2018/09/report_aewg_2018_final.pdf
[387] https://nammco.no/wp-content/uploads/2019/02/final-report_hpws_2019.pdf#page=34&zoom=100,64,350
[388] https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf
[389] https://www.hafogvatn.is/static/extras/images/landselur_191145061.pdf

15 harbour seals were bycaught in cod gillnet fisheries (CV=1.02) and 17 harbour seals in bottom trawls (CV=1.00) (Marine and Freshwater Institute, in prep.)[390].

Based on these most recent estimates, 97.7% of the harbour seal bycatch can be attributed to the lumpfish fishery and the reminder 1.07% to the cod gillnet fishery and 1.22% to the bottom trawl fishery. Of all Icelandic catches in gillnet gear, saithe made up 7.4% of the total catches in the past 3 seasons, hence this fishery is responsible for about 0.07% of the harbour seal gillnet bycatch and this effect is not deemed significant. Of all Icelandic catches in bottom trawl gear, saithe made up 16.5% of the total catches in the past 3 seasons, hence this fishery is responsible for about 0.2% of the harbour seal bottom trawl bycatch. This effect is not deemed significant. Current harbour seal bycatch (~98%) is therefore, for the most part, dependent upon lumpsucker fishery effort[391].

A full population survey was conducted during the moulting period in 2018 and the data analysis is currently ongoing. The current aim is to conduct aerial population censuses every second year while the population is under the target level. The MFRI advice to the Ministry has been: "that direct hunt should be prevented and that actions must be taken to reduce by-catch 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." No legislation and no new management objective is currently in place. However, Icelandic authorities are investigating possibilities of how legislation on seal hunting and obligatory reporting of catch statistics can be implemented. There is an increased effort to improve by-catch data collection. MFRI will define a population level objective based on biological criteria[392].

Harp Seals

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 caught 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 at 4.5 million individuals, based on a 2015 assessment[393].

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[394] 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[395] (last assessed in 2015). Hooded seals are native and resident to Canada, Greenland and Iceland, their current estimated population is 340,000 mature individuals and their population trend is unknown.

[390] https://www.hafogvatn.is/static/extras/images/landselur_191145061.pdf
[391] https://www.hafogvatn.is/static/research/files/hv2017-009pdf
[392] https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf

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

[394] https://www.iucnredlist.org/species/61382318/61382321
[395] https://www.iucnredlist.org/species/6204/45225150

The ICES/NAFO/NAMMCO working group on harp and hooded seals (WGHARP) will meet in Tromsø, Norway, 2-6 September 2019. New data from all populations is available and the group will do assessments of status and harvest potentials[396].

Icelandic Committee for Consultation on Responsible Management of Living Marine Resources
In response to the recently recognized issue of seabird and marine mammal bycatch in cod and lumpfish gillnet fisheries 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 these matters. The Committee's recommendation to the Ministry include:

- Improvement of information collection and monitoring activities to gather reliable seabird and marine mammal bycatch information from vessel e-logbooks 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;
- Measures to reduce bycatch (e.g. potential spatial/temporal closures at sensitive times such as around seal pupping or bird breeding season); and
- US Marine Mammal Protection Act importing requirements collectively dealt with through improvements in the previous two points (i.e. information gathering and management measures).

Habitat effects and related improvement measures
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 December 2018 ICES Report on the Icelandic Ecoregion Ecosystem[397] 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. Based on recent data from the MFRI Ecosystem Overview report[398] 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 site visits HB Grandi stated that all of their trawlers (4 wetfish and 2 freezer trawlers), as well other trawlers in the industry[399], use pelagic flying doors because they do not drag on the seafloor saving on fuel costs and decrease gear damage. Bottom trawlers in Iceland are also reported to use rock hoppers, as well as flying doors.

[396] https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf
[397] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf
[398] https://www.hafogvatn.is/static/files/Veidiradgjof/vistkerfi.pdf
[399] http://www.hampidjan.is/news/news-article/clear-advantages-of-flying-doors

Protection of Vulnerable Marine Ecosystems (VMEs)

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 (please refer to clause 3.1.1).

Specific to VMEs, there are specific closures in place for cold water coral (i.e. 10 closures) and hydrothermal vents (1 closure) in Icelandic waters.

MFRI is currently participating in the Norwegian Institute of Marine Research-led NovasArc project, together with the Faroe Marine Research Institute[400] to map VMEs in Nordic waters. 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.

In a long-term mapping project, albeit opportunistic in nature, the MFRI also 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. 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. In July 2019, a cruise was completed, part long-term data collection project to map different habitats on the seabed so that they can be defined, and their diversity examined. Another aim of this project is to assess if these are vulnerable or poor habitats and whether action is needed to protect them[401].

References:	See footnote.
Non-Conformance Number (if relevant)	**NA**

[400] http://novasarc.hafogvatn.is/

[401] https://www.hafogvatn.is/is/midlun/frettir-og-tilkynningar/furdudyr-fjolufaetlur-bakteriur-og-koralar

8.3.2. Clause 3.2. Specific Criteria

8.3.2.1. Clause 3.2.1. Information gathering and advice

8.3.2.1.1. Clause 3.2.1.1.

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

The minimum reference size for saithe is 55 cm. As discarding is prohibited it is mandatory to land all specimens below these lengths. The minimum reference lengths are used to trigger area closures when catches comprise of more than 30% or greater of fish below the reference size. Where an area closure has been triggered, it remains closed for a minimum of two weeks and is subject to periodic monitoring.

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[402] [403], 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)*[404]. Mesh size and gear restrictions are mandated to protect both juvenile stocks (trawl mesh size 135 mm with separator panel) and spawners (gill net mesh size 8 inches/203 mm)[405].

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

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

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

[405] 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

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 of Iceland. Bird hunting and exploitation of wild bird is controlled under Regulation 456 issued in 1994[406].

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[407] 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[408].

Stocks of non-target species commonly caught in the saithe fisheries 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 44 fish stocks in Iceland[409] as well as advice on harvest and management of different marine mammals (e.g. whales harvest, seals management). Their most recent advice, which include routine monitoring and assessment efforts, is available online.

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… Records for 65 species can be retrieved on their website.[410]

References:	See footnotes.
Non-Conformance Number (if relevant)	**NA**

406 https://www.stjornartidindi.is/Advert.aspx?RecordID=8bd54700-a433-413f-83ed-48cd60438a4b
407 https://link.springer.com/article/10.1007/s12562-010-0254-2
408 https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
409 https://www.hafogvatn.is/en/harvesting-advice
410 http://www.fiskistofa.is/english/quotas-and-catches/catches-in-individual-species/

8.3.2.1.2. Clause 3.2.1.2.

Information shall be available on the potential effect of fishing on endangered, threatened and protected species[411], 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: **There is enough information to assess the effects of fisheries on ETP species in Icelandic waters.**				
Evidence: There is enough information to assess the effects of fisheries on ETP species in Icelandic waters. A comprehensive list of ETP species listed under OSPAR and under the Icelandic INH Red List, as relevant and interacting with the fishery under assessment (including marine mammals and seabirds), has been assessed in Clause 3.1.1. *Please refer to it for further information.*				
References:	See footnote.			
Non-Conformance Number (if relevant)				**NA**

[411] 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.

8.3.2.2. Clause 3.2.2. By-catch and discards

8.3.2.2.1. Clause 3.2.2.1.

Discarding, including discarding of catches from non-target commercial stocks, is prohibited.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
According to section 2 of Act no. 57/1996, concerning the treatment of commercial marine stocks, discard of catches (although with minor exceptions) is prohibited. Discarding violations are subject to penalty ranging from ISK 400K to 8M.

Evidence:

Since 1996, discarding in Icelandic fisheries is prohibited and subject to penalty[412] (ISK 400K to 8M).

- 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[413].

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 it 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[414].

[412] Act concerning the Treatment of Commercial Marine Stocks No. 57-1996: https://www.althingi.is/altext/pdf/131/s/0982.pdf
[413] http://www.nwwac.org/_fileupload/Image/Iceland%20fisheries%20directorate%202007%20presentation%20re%20discards%20to%20EU%20delegation.ppt
[414] http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp

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 saithe in 2018/2019 totalled 18,253 kg[415].	
References:	Refer to footnotes.
Non-Conformance Number (if relevant)	**NA**

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

8.3.2.2.2. Clause 3.2.2.2.

Where relevant, appropriate steps shall be taken to avoid, minimize or mitigate encounters with seabirds and marine mammals.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Key bycatch risks relate to seabird bycatch in longline gear and gillnets, and marine mammal bycatch in gillnets. There are technical measures/mechanisms in place in Icelandic longliners to mitigate adverse impacts on 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. There have been extensive trials with pingers in gillnet gear and research is continuing.

Evidence:
Th vast majority of saithe catches are taken with trawl gear where issues of seabirds and marine mammal bycatch is considered minimal. A small portion of saithe (3.5% in the past 3 years) has been caught with gillnet gear. Key bycatch risks in gillnet gear relate mainly to marine mammal bycatch.

Marine mammals bycatch reduction devices trials
Acoustic porpoise deterrents (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 got caught in nets with pingers, while 5 porpoises got caught in control nets nearby. Another type of porpoise deterrents (PALs) were tested in the cod gillnet fishery in April of 2018 and like the pingers, showed no reduction in porpoise bycatch as 12 porpoises were caught in nets with the devices, while 11 porpoises got caught in the control nets. Almost all the bycaught porpoises in the PAL sets (eleven out of twelve) were large adult males, while the gender ratio was six males and five females in the control sets. Interestingly, 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[416]. Further trials with pingers were planned for April 2019[417].

Regarding gillnet bycatch of seabirds, current annual takes (2014-2016) based on rough MFRI estimates appear to be very limited (i.e. 0.51% and lower) for species including northern fulmar, common guillemot, northern gannet, Atlantic puffin, razorbill, common eider, cormorants and great black backed gull, with the potential exception of common loon, where takes might be significant at the population level. This issue has been raised as a non-conformance under clause 3.1.1. The inability to accurately measure trends in seabird bycatch over time makes it hard to establish whether dedicated steps need to be taken to avoid, minimize or mitigate encounters with seabirds. Accordingly, the issue of underreporting of seabirds and marine mammals bycatch information in the logbook system is also an active minor non-conformance under clause 2.3.2.4. Corrective Action Plans for both issues have been provided by the Client Group.

References:	See footnotes.
Non-Conformance Number (if relevant)	**NA**

416 http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2019/ICES%20WGBYC%20Report%202019.pdf

417 https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf

8.3.2.2.3. Clause 3.2.2.3.

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 should be taken.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

Non-target catches, including discards, of stocks associated to the saithe fishery, caught with bottom trawl, gillnet, demersal seine, handlines and longline do not threaten these non-target stocks with serious risk of extinction or comparable irreversible risks. Most of these stocks are actively managed by the MFRI.

Evidence:

ICES reports that Icelandic saithe catches from 2015/16 to 2017/18 have been caught in these proportions and with the following gears:

Icelandic saithe total catches		Bottom Trawl	Gillnet	Handline/ Jiggers	Danish Seine	Longline	Nephrops trawl	Total
2017/18	65,360 t[418]	92%	3%	1.8%	1.8%	1.1%	0.7%	
2016/17	49,057 t[419]	90.2%	2.7%	2.3%	1.8%	1.5%	1%	
2015/16	49,223 t[420]	87%	5%	3.2%	2%	1.8%	0.7%	
Average		**89.73%**	**3.56%**	**2.43%**	**1.86%**	**1.46%**	**0.8%**	**99.9%**

Landed bycatch and associated species accounting for > 0.5% of the cumulative total for each of these gear types (i.e. bottom trawl, gillnet, demersal seine, handlines and longline) targeting and/or catching saithe are shown in the tables below, compiled from catch data downloaded from the Directorate's website at http://www.fiskistofa.is/veidar/aflaupplysingar/bradabirgdatolur/.

Table 36. Saithe associated species catch and bycatch above the 0.5% threshold of total catches for each of the six gear types that targeted and caught saithe: bottom trawl, gillnet, demersal seine, handlines, longline and Nephrops trawl, as averaged in the last 3 seasons.

Gear	Species	2017/18 catches %	Last 3 years average catches %
Bottom Trawl	Þorskur /cod	47.24%	46.96%
	Ufsi /saithe	17.99%	16.51%
	Karfi / Gullkarfi / Golden redfish	15.67%	17.28%
	Ýsa /haddock	7.85%	7.28%
	Djúpkarfi / beaked redfish	3.49%	3.44%
	Grálúða / Greenland halibut	2.89%	3.27%
	Gulllax / greater silver smelt	1.64%	1.69%
	Skarkoli / plaice	0.74%	0.75%
	Steinbítur / Atlantic wolffish	0.55%	0.61%
	Langa / ling	0.51%	0.60%

418

419 http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pok.27.5a.pdf

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

Longline	Þorskur /cod	72.72%	71.60%
	Ýsa /haddock	12.89%	13.10%
	Steinbítur / Atlantic wolffish	5.01%	4.67%
	Langa / ling	3.93%	4.41%
	Keila / tusk	1.90%	2%
	Karfi / Gullkarfi / Golden redfish	1.08%	1.17%
	Hlýri / spotted wolffish	0.78%	0.86%
	Ufsi /saithe	0.58%	0.66%
	Tindaskata / starry ray	0.40%	0.74%
Gillnet	Þorskur /cod	89.02%	81.65%
	Ufsi /saithe	5.58%	7.41%
	Grálúða / Greenland halibut	0%	*5.51%
	Langa / ling	1.66%	2.33%
	Ýsa /haddock	1.43%	1.28%
	Skarkoli / plaice	0.84%	0.75%
	Karfi / Gullkarfi / Golden redfish	0.38%	0.46%
Demersal Seine	Þorskur /cod	48.39%	50.54%
	Skarkoli / plaice	17.25%	16.41%
	Ýsa /haddock	15.15%	15%
	Steinbítur / Atlantic wolffish	6.60%	5.09%
	Þykkvalúra / Sólkoli / lemon sole	3.69%	3.58%
	Ufsi /saithe	3.22%	3.14%
	Karfi / Gullkarfi / Golden redfish	1.80%	1.54%
	Langlúra / witch	1.46%	2.06%
	Sandkoli/dab	1.21%	1.14%
	Langa / ling	0.53%	0.66%
Handline/ Jiggers	Þorskur /cod	74.10%	67.51%
	Makríll / mackerel	19.98%	26.07%
	Ufsi /saithe	4.91%	5.43%
	Karfi / Gullkarfi / Golden redfish	0.57%	0.60%
Nephrops trawl	Þorskur /cod	30.21%	30.18%
	Karfi / Gullkarfi / Golden redfish	29.97%	26.07%
	Humar / Norway Lobster	11.09%	15.35%
	Langa / ling	7.27%	7.53%
	Ufsi /saithe	5.59%	5.28%
	Langlúra / witch	4.47%	4.46%
	Skötuselur / anglerfish	3.49%	3.03%
	Stórkjafta / Öfugkjafta / Megrim	2.83%	3.02%
	Ýsa /haddock	1.48%	1.58%
	Steinbítur / Atlantic wolffish	1.15%	1.00%
	Lýsa / whiting	0.73%	0.76%

	Blálanga / blue ling	0.58%	0.67%
	Þykkvalúra / Sólkoli / lemon sole	0.53%	0.58%

Target and non-target catches, including discards, of stocks other than saithe, as listed in the table above, do not threaten any of these stocks with serious risk of extinction. However, please refer to the issues of spotted wolffish bycatch overharvesting highlighted and scored under clause 3.1.1 where an assessment of all bycatch has been reported.

References:	As referenced.

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

8.3.2.2.4. 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:
As appropriate, suitable steps are considered to avoid, minimize or mitigate encounters with endangered, threatened and protected species, as appropriate and relevant in the context of the saithe fishery. Most of these steps include ban on direct harvest for these species.

Evidence:

Suitable steps are 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. Some of these steps include the ban on direct harvest, other are not considered significant enough to initiate a dedicated action. For other marine mammal and seabird species, the take is not considered to be significant and as such, specific steps to mitigate encounters with endangered, threatened and protected species may not strictly be necessary. Detailed information has been provided under clause 3.1.1, including information on seabirds and marine mammals listed in the Icelandic INH Red list[421]. Please refer to that for further details, including non-conformance details.

A summary for species highlighted in the OSPAR list that interact with the fishery under assessment, is reproduced below in summary form from clause 3.1.1.

Common skate (Grey skate)
Total catch of skate in Icelandic waters in 2017/18 was 139 tonnes, very close to the 10 years average. Recent survey trends in Icelandic waters indicate some increase in the scientific groundfish survey. Right outside Iceland, in EU waters, there are currently no robust indicators of stock size for blue skate and flapper skate[422], however, the Spanish Porcupine Bank survey (SpPGFS-WIBTS-Q4) has seen increasing catch rates of Dipturus spp. (ICES, 2018). It is noted that this survey may not be representative of the whole stock area. Also, the UK southwestern beam trawl survey (UK-Q1-SWBeam) caught immature blue skate, with preliminary studies indicating an increasing trend in Division 7.e (ICES, 2018). These and other surveys in the Celtic Seas may provide a stock size indicator in the future.

Atlantic halibut (*Hippoglossus hippoglossus*)
Atlantic halibut is classified as Endangered on the IUCN Red list but has been last assessed globally in 1996[423]. Annual landings of Atlantic halibut were 36–119 tonnes in 2012–2018, which are the lowest landings since the beginning of the fishery. The decrease is due to management decisions. The 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. In 2012, a regulation

[421] https://en.ni.is/node/27837
[422] http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/rjb.27.67a-ce-k.pdf
[423] https://www.iucnredlist.org/species/10097/3162182

was issued to ban all targeted fishing for Atlantic halibut[424] and stipulating that all viable halibut in other fisheries must be released. In 2019, MFRI's advice is that these regulations remain in effect[425].

Orange roughy (*Hoplostethus atlanticus*)
Recent catches of orange roughy in Iceland have been quite small recently and have been 18.9 tonnes in 2017-18. Orange roughy is considered Vulnerable under the IUCN red list as assessed last in 2014[426]. During the 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.

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. [427] This is the same mechanism adopted (i.e. VS catches) for Atlantic halibut catches, for which directed fishing is banned.

Leafscale gulper sharks
No interaction with the fishery in question have been recorded in the past 3 years.

Blue Whale
No issues have been identified with the fishery under assessment. This was confirmed during the site visits by the MFRI.

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

For harbour seals, grey seals and harp seals please refer to the summary provided under Clause 3.1.2.

Black-legged Kittiwakes (*Rissa tridactyla*)
None have been reported as bycatch in the 2014-2016 data set provided by the MFRI.

Thick-billed murre (*Uria lomvia*)
None have been reported as bycatch in the 2014-2016 data set provided by the MFRI.

Additional seabirds caught in 2014-2016 in longline and trawl fisheries targeting and catching saithe and assessed as ETP species by the Iceland Institute of Natural History (INH) Red List Classification are shown below.

Catches of these species are not generally considered significant (see clause 3.1.1 for further details). However, the gillnet catches of *Gavia immer* have been assessed and scored, and a minor non-conformance has been assigned.

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

[425] https://www.hafogvatn.is/static/extras/images/21-AtlanticHalibut1141466.pdf
[426] https://www.iucnredlist.org/species/155168/45884209
427 https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0456-2017

References:	See footnotes.
Non-Conformance Number (if relevant)	**NA**

8.3.2.2.5. 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:

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. Where Fiskistofa finds and recovers lost or abandoned gear they recover the cost of recovery from the gears' owner. The Directorate confirmed that gear loss (e.g. longlines, gillnets which can go lost) and ghost fishing is not considered an issue and that reporting lost gear is compulsory. Additionally, the Icelandic ITQ system operates in such a way that gear losses are minimised.

Evidence:

The Icelandic ITQ system allows for a slower paced fishery than would be expected if there was only an overall TAC with all boats fishing against it. Accordingly, the system allows fishers to target their efforts in optimum weather conditions leading to decreased rates of lost fishing gear. During the 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.

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 markings. 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[428].

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 (such as longlines), 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.

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

[428] https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/

special grapples onboard that allow them to retrieve lost gear even when both towing warps have parted, a quite rare situation.	
References:	See footnote.
Non-Conformance Number (if relevant)	**NA**

8.3.2.3. Clause 3.2.3 – Habitat Considerations

8.3.2.3.1. Clause 3.2.3.1.

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.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
Fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. 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.

Evidence:
Saithe in Icelandic waters (Division 5.a) is managed as a one unit, though taggings have shown that in some years saithe migrates from distinct waters into Icelandic waters and vice versa. Saithe is both demersal and pelagic. They can be found all around Iceland, but are most common in the warm waters south and southwest off Iceland. Spawning starts late January with a peak in February in shallow water (100-200 m) off the southeast, south and west coast of Iceland. The main spawning area is considered to be south/southwest off Iceland (Selvogsbanki, Eldeyjarbanki). The larvae drift clockwise all around Iceland and in mid-June juveniles can be found in many coves, bays, and harbors then about 3-5 cm long. At age 2 they move to deeper waters in winter. Saithe becomes mature at age 4-7.

Closures
Large areas within the Icelandic EEZ are closed for fishing, either temporarily or permanently. There are many large closures for bottom trawl gear around Iceland (please refer to Clause 3.1.1 and the figures provided therein). Collectively, these closures are aimed at protecting juveniles and spawning fish and protecting vulnerable marine ecosystems from gear interactions. Furthermore, 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[429]. 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[430]. 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.

[429] https://www.government.is/news/article/?newsid=e747dac7-fb88-11e7-9423-005056bc4d74
[430] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/domsmalaraduneyti/nr/1154

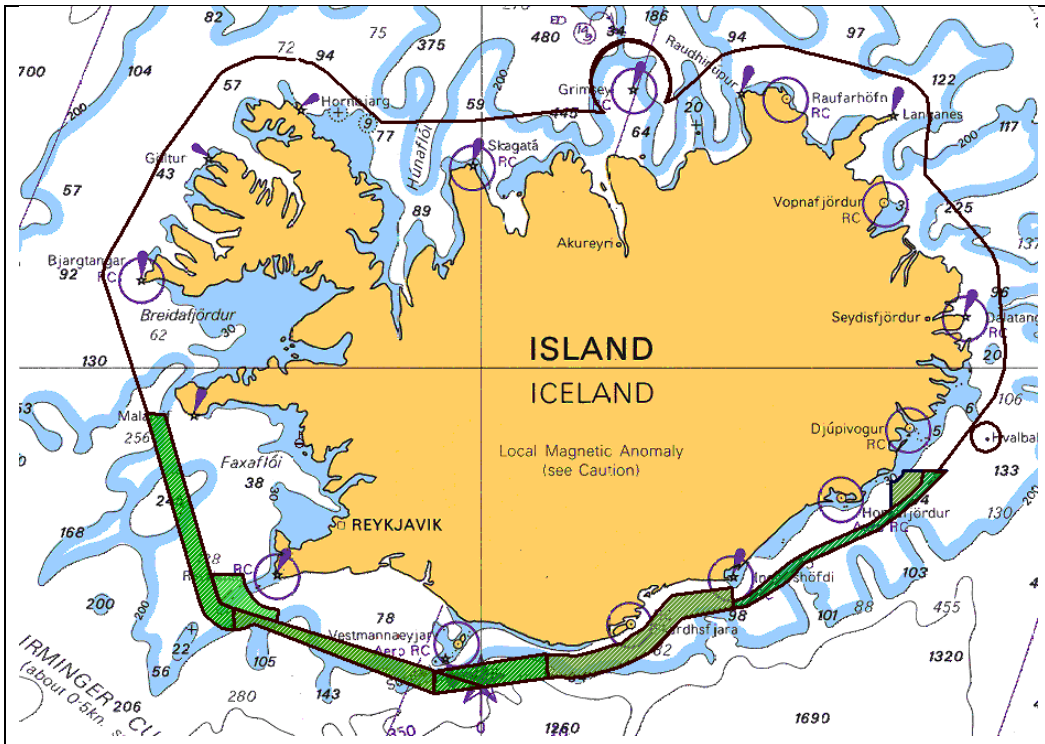


Figure 63. Temporary fishing areas for group 1, large-size vessels.

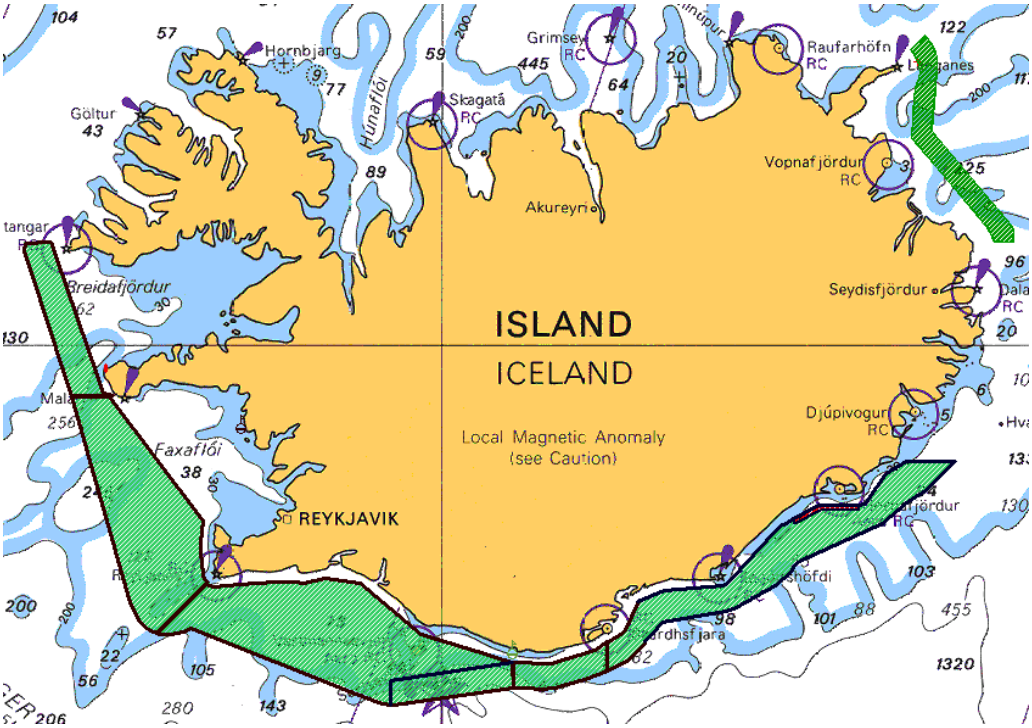


Figure 64. Temporary fishing areas for group 2, mid-size vessels.

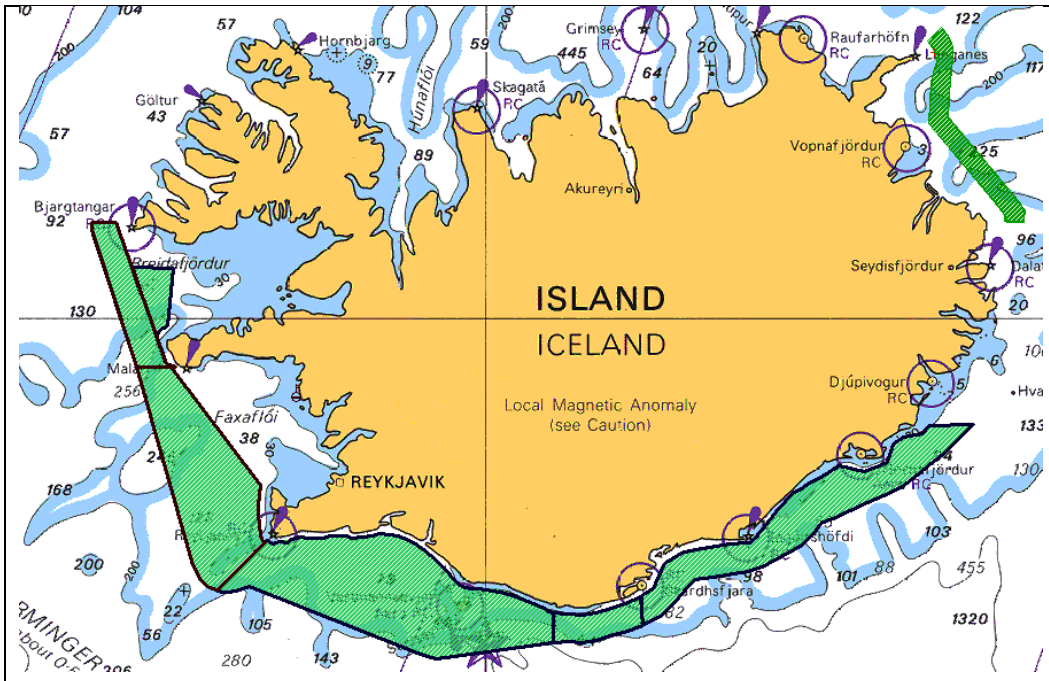


Figure 65. Temporary fishing areas for group 3, small-size vessels.

These closures, in particular those of a permanent nature listed under clause 3.1.1, 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.

In addition to closures that are permanent or regular (See Clause 1.3.2.3.2 for details), there is a system for protecting juveniles by closing areas temporarily on short notice. These are triggered when finding too much juveniles in catches. They are managed by the MFRI, often at the advice from the Coast Guard or the fishing fleet, applied on few hours-notice and normally valid for 2 weeks. They are published in several channels, including on the web[431]. 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.

431 https://www.hafogvatn.is/is/skyndilokanir

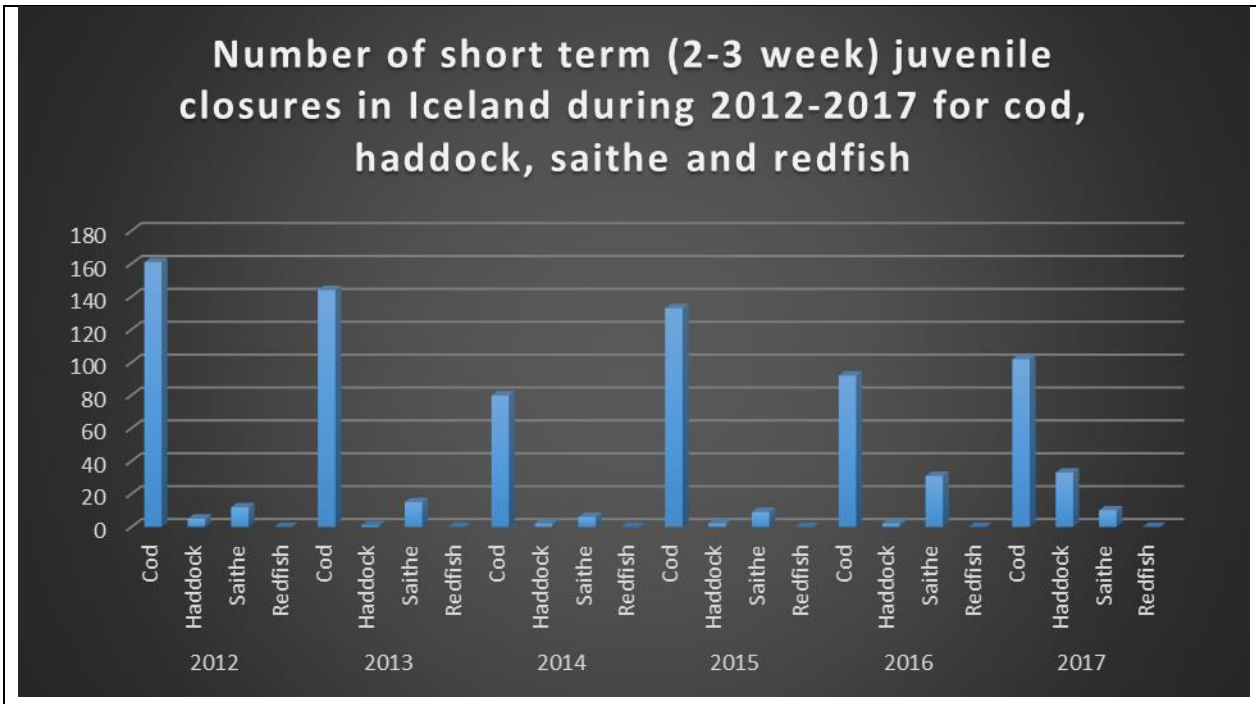


Figure 66. Short term/sudden closures (e.g. 2-3 week closures) implemented in Icelandic waters to protect juveniles of cod, haddock, saithe and redfish from 2012 to 2017. Source MFRI, provided during the 2018 site visits.

Commonly encountered habitats in the Icelandic ecoregion tend to be hard ground, varying from sandy mud to gravel and cobbled areas (Ragnarsson & Steingrímsson, 2003 [432]). These areas tend to be resilient, more dynamic areas and it is unlikely that bottom trawl gear will reduce their structure and function to the point where there would be serious irreversible harm, as they have been fished for many years and still provide productive fish stocks over the long-term. In cooperation with researchers at MFRI, trawl fisheries are actively contributing to benthos mapping programmes by recording all benthos bycatch to species level where relevant.
Please also refer to additional fishery closures listed in Clause 3.1.1.

References:	See footnote.
Non-Conformance Number (if relevant)	**NA**

[432] https://academic.oup.com/icesjms/article/60/6/1200/652072

8.3.2.3.2. Clause 3.2.3.2.

Management measures must take into account significant continuous stony coral areas, identified through scientific and formal methods.

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:
The Icelandic government has closed 10 areas in South East Iceland where significant coral cover has been identified through scientific research.

Evidence:
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 an initiative towards mapping and protecting cold-water corals in Icelandic waters was undertaken by the Marine and Freshwater Research Institute, involving for the first time a video documentation of coral-reefs south of Iceland. As a result, 10 areas in to the southeast of Iceland were permanently closed to fishing.

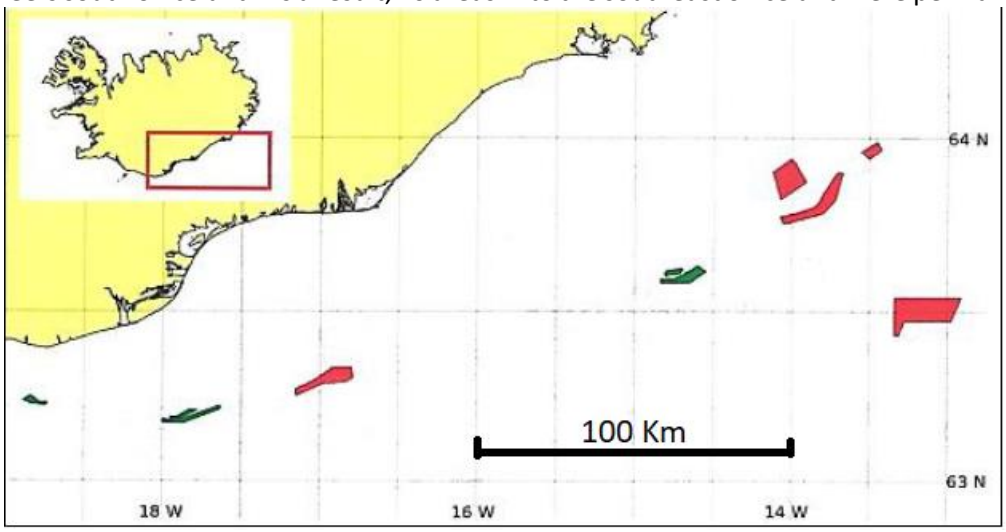


Figure 67. Ten coral closures in South East Iceland, current as of November 2018. Maps can be viewed by downloading Google Earth and clicking on the following kml file produced by the Directorate of Fisheries http://uv.fiskistofa.is/uv.kml

As a follow up to this initiative, a benthic habitat mapping project was started with the long-term goal of mapping and describing the various benthic habitats around Iceland. The main focus of this project is mapping vulnerable habitats or ecosystems. Among the more recent outputs from this work include records of sponge and sea pen aggregations. In addition, since 2016 the benthic by-catch captured in the annual ground fish survey has been analysed and recorded, including species that are indicators of vulnerable ecosystems (MFRI, information submitted during site visits).

References:	As referenced.
Non-Conformance Number (if relevant)	**NA**

8.3.2.3.3. Clause 3.2.3.3.

Such areas shall be documented and protected through their closure to fishing, where appropriate, with gear that has significant bottom impact (established through 3.2.4.2).

Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑
Summary Evidence: **The Icelandic government has closed 10 areas in South East Iceland where significant coral cover has been identified through scientific research.**				
Evidence: The Icelandic government has closed 10 areas in South East Iceland where significant coral cover has been identified through scientific research. Please see the evidence provided under Clause 3.2.3.2.				
References:	As noted.			
Non-Conformance Number (if relevant)				**NA**

8.3.2.3.4. Clause 3.2.3.4.

Known thermal vents structures shall be protected through area closure 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:

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 and are fully protected by environmental law no. 249/2001 and 510/2007.

Evidence:

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 by environmental law nr 249/2001 and 510/2007[433]. In addition, there are known hydrothermal vents deep north of Iceland on the Grimsey-Kolbeinsey ridge and at Steinakoll, south of Melsa at the Reykjanes ridge, Southwest Iceland. These are in more remote areas and have less surface structure and are not been considered threatened by fishing activities (evidence received by the MRI, September 2014, as part of the original full assessment activities, see also map here[434]).

Figure 68. Coordinates and location of protected natural resources (i.e. hydrothermal vent) at Arnarnesstrýtur in Eyjafjörður north of the Arnarnes river[435].

Chen (2003)[436] provides an example of a lesser surface structure hydrothermal vent is the Reykjanes Ridge. Detailed along- axis survey [German et al., 1994 and German and Parson, 1998] has found only one hydrothermal vent along the 600 km of the Reykjanes Ridge, which corresponds to a value of 0.014 for the

[433] https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/hverastrytur_eyjafirdi_249_2001.pdf
[434] https://vents-data.interridge.org/ventfields-osm-map
[435] https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/Hverastrytur_Arnarnesnofum_kort.pdf
[436] http://onlinelibrary.wiley.com/doi/10.1029/2001JB000816/full

"plume incidence" factor. The plume incidence is defined as the fraction of the ridge segment length overlain by hydrothermal plumes or vent fields. Therefore it represents an average assessment of the hydrothermal activity on a segment scale. German and Parson [1998] also reported that conventional black smoker plumes are almost completely absent, even directly above the recently imaged axial magma chamber at 57°45'N [Sinha et al., 1997]. For comparison, data collected at the 11°N–30°N area of the Mid-Atlantic Ridge (MAR), which was thought as a good representative of hydrothermal activities at the MAR, have yielded an along-axis average of at least one vent site for every 150 km [German et al., 1995]. This translates into a plume incidence factor of 0.053 for MAR. These observations suggested that the Reykjanes Ridge is associated with at least a factor of 4 less than normal hydrothermal activity at MAR.	
References:	As referenced.
Non-Conformance Number (if relevant)	**NA**

8.3.2.4. Clause 3.2.4. Foodweb Considerations

8.3.2.4.1. Clause 3.2.4.1.

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:
Icelandic saithe 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:

Saithe is an active, gregarious fish occurring inshore and offshore waters. Studies on the diet of this species in various localities in the North Atlantic have shown the pelagic character of its food. During its first two years of existence, it inhabits mostly coastal waters where it feeds mainly on plankton like appendicularians and crustaceans. After this coastal period, it migrates to the open sea and its food remains pelagic, although prey is larger and consists of euphausiids, fishes and cephalopods. Saithe trophic level has been estimated to be around 4.25, based on adult diet composition in 5 studies[437].

The Icelandic Waters ecoregion foodweb is characterized by high primary production. Capelin is considered on of the main key prey species in the ecoregion and its lifecycle and migration pattern is an important energy transfer in the ecosystem. Capelin feeds mainly on copepods and euphausiids in waters north of Iceland and then moves to Icelandic waters where it is one of the most important prey for many species, e.g. cod, haddock, saithe, Greenland halibut, seabirds, and marine mammals. Other prey species of lesser importance are shrimp and sandeel. The annual consumption of fish, cephalopods, and crustaceans by cetaceans within the Icelandic Waters ecoregion has been estimated at 6.3 million tonnes. The foodweb has been affected by changes in hydrography, the capelin fishery, increased immigration of mackerel, and the increasing abundance of large baleen whales. Unlike capelin, mackerel feeds in the ecoregion and are a minor prey item, thereby exporting energy from the system.

A June 2018 publication by Sturludottir *et. al.*[438] 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).

[437] https://www.fishbase.se/summary/Pollachius-virens.html
[438] 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

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.

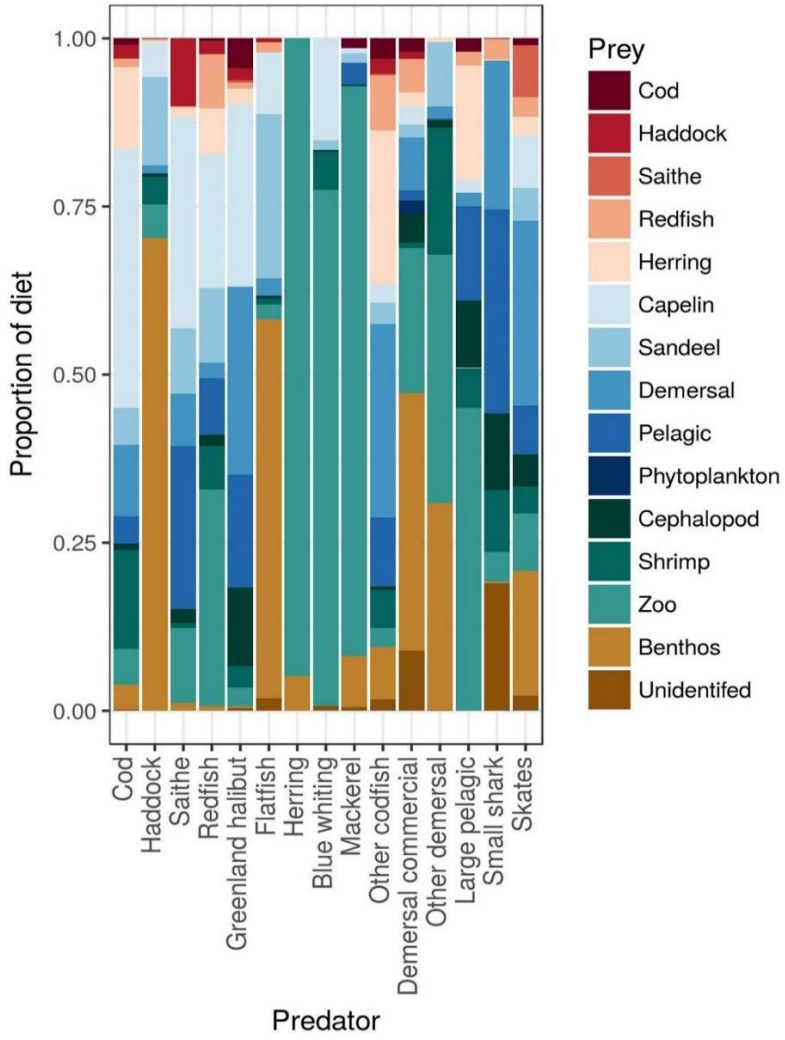


Figure 69. Average diet composition from stomach content data that was available for 15 of the 20 fish groups.

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.

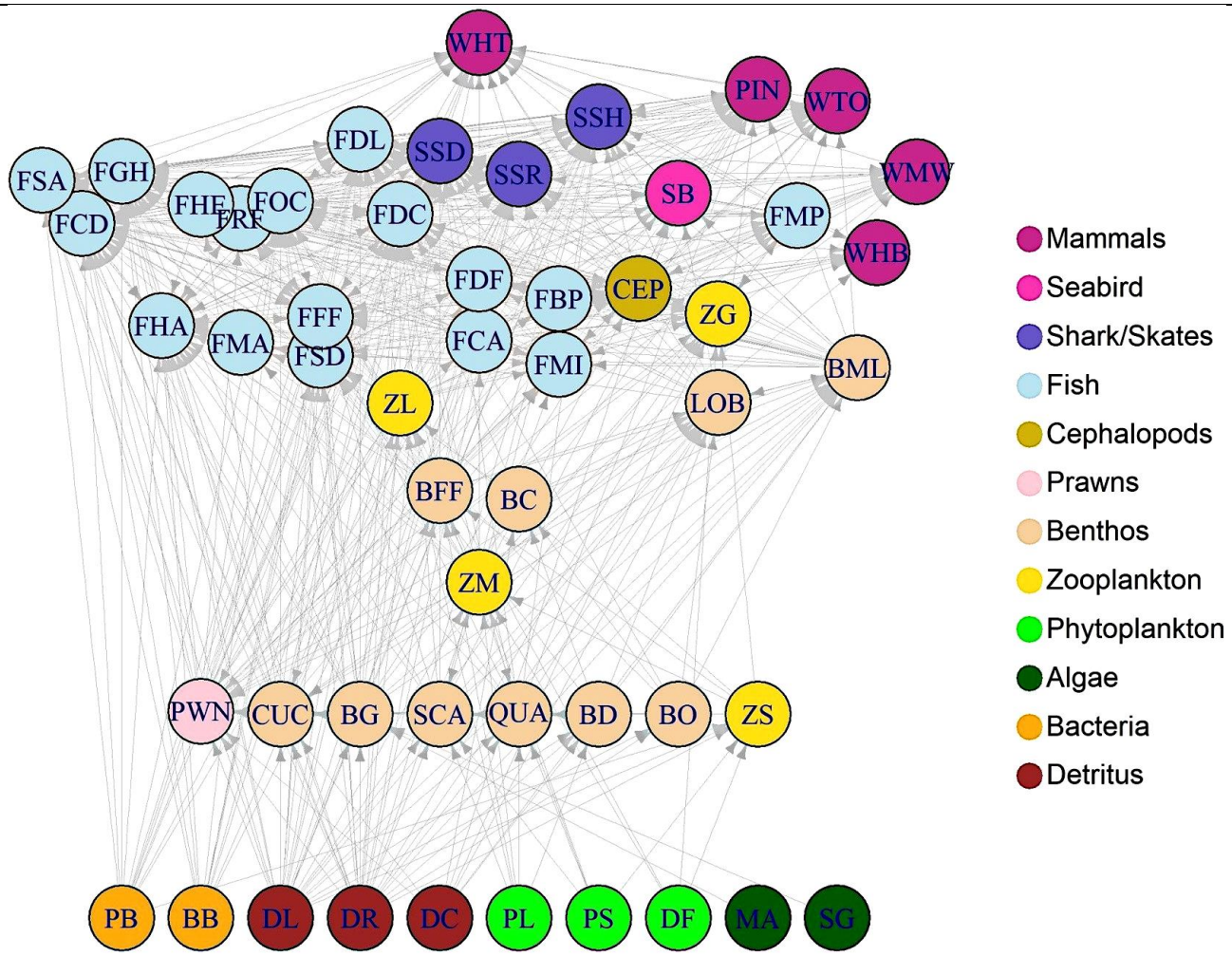


Figure 70. Food web connections between the modeled functional groups. Important fish species codes: FCD is Cod (Gadus morhua); FHA is Haddock (Melanogrammus aeglefinus); FSA is Saithe (Pollachius virens), FRF is Redfish (Sebastes sp); FGH is Greenland halibut (Reinhardtius hippoglossoides), FFF is Flatfish, FHE is Herring (Clupea harengus); FCA is Capelin (Mallotus villosus), FMI is Blue whiting (Micromesistius poutassou), FMA is Mackerel (Scomber scombrus).

Icelandic saithe 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.

References:	See footnotes.
Non-Conformance Number (if relevant)	**NA**

8.3.3. Clause 3.2.5. Precautionary Considerations

8.3.3.1.1. Clause 3.2.5.1.

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[439], as being of serious concern in the fishery in question.

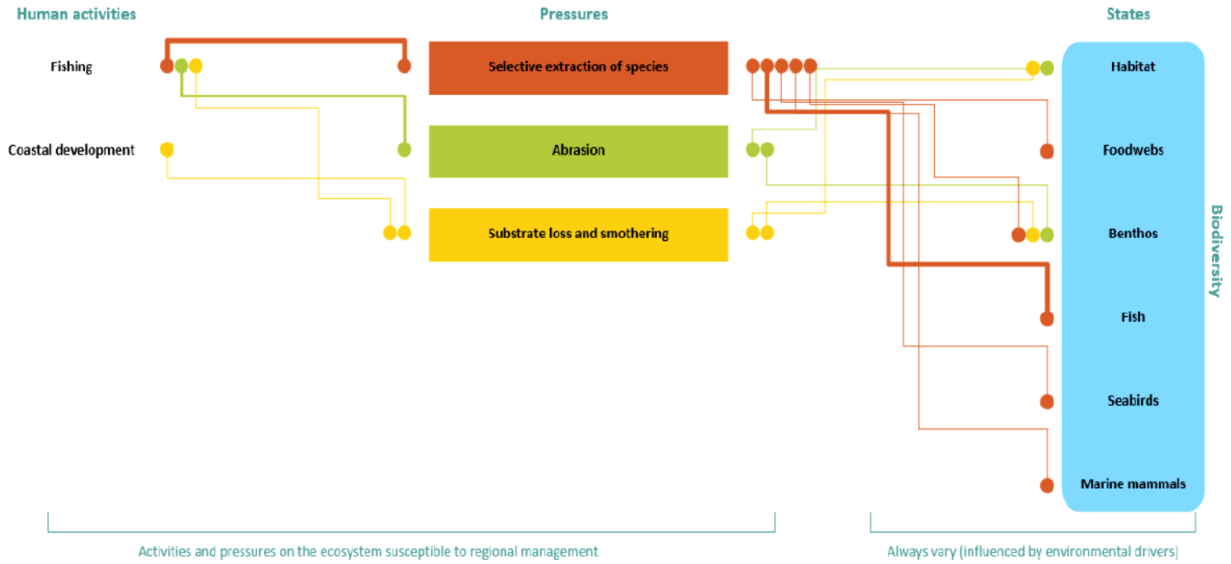
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-Conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

Summary Evidence:

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[440]. The document identifies the major regional pressures for the ecoregion (Figure below).



[439] In 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. ...

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

Figure 71. 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 flying pelagic doors[441] 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.

The Fisheries Management Plan for Icelandic saithe summarizes the measure in place relevant to ecosystem effects as follows.

The fisheries are managed by a catch quota system. The annual quota is allocated to individual vessels or vessel groups so that the sum of quotas for individual vessels and vessel groups equals the TAC according to the HCR. Within the system there are various measures to make the fisheries economically viable, together with measures to coordinate catch composition and the TAC and to reduce discard, which is prohibited by law. The use of bottom trawl and pelagic trawl is not permitted inside 12 nm along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels. In many areas special rules regarding fishing gear apply such as mandatory use of a sorting grid when fishing for shrimp to avoid juveniles and small fish or bycatch grids when fishing for pelagic species in certain areas. 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 (Icelandic saithe FMP[442]).

References:	See footnotes.
Non-Conformance Number (if relevant)	**NA**

[441] https://www.government.is/topics/business-and-industry/fisheries-in-iceland/fisheries-management/
[442] https://www.government.is/news/article/2013/06/10/FISHERIES-MANAGEMENT-PLAN-ICELANDIC-SAITHE/

9. External Peer Review

9.1. Peer Reviewer 1

9.1.1. General comments – Peer Reviewer 1

Peer Reviewer Comments	Assessment Team Response
General Comments	
The report is well structured and provides a complete review of the saithe fishery. Good information is provided on the stock status, the compliance and monitoring as well as for environmental issues. Active institutions (e.g.: MII, MFRI, etc.), management plans established a saithe fishery system that is clearly well-managed and based on high quality scientific advice, monitoring and enforcement activities. Therefore, I support the overall conclusion of the assessment that the fishery is in conformance with the requirements of the FAO-based Icelandic Responsible Fisheries Management Specification. There are few cases where more detailed information should be added to the assessment report (see the detail in scoring elements review). However, such deficiencies can be considered as relatively minor issues.	Assessment Team response: comments acknowledged.

9.1.2. Scoring element review – Peer Reviewer 1

Peer Reviewer Comments	Assessment Team Response
Background Section	
Background material is comprehensive and provides a lot of general information about the fishery in Iceland. However, I would expect more details about the target stocks. In particular, the information about stock boundaries (is the stock shared with other countries?) and the details of the HCRs of the management plan.	Assessment Team response: comments acknowledged. Additional background for both items information has been added in the background section.

9.1.2.1. Section 1 – Fisheries Management

#	Peer Reviewer Comments	Assessment Team Response
1.1	**The Fisheries Management System**	
1.1.1	The authors should provide details about the responsible body for data collection. It seems to be MFRI but more details are needed to justify that the management system is implemented appropriately (see 1.2.1)	As specified in the clause, the MFRI is responsible for fish stock assessment and scientific advice, and for obtaining the necessary information for that task, in particular sampling of catches, scientific surveys and providing scientific background for advice. MFRI also has the authority to manage short term area closures, which are used extensively to protect juveniles and spawning fish. The MFRI has two research vessels Árni Friðriksson (LOA 69.9 m) and Bjarni Sæmundsson (LOA 56 m). The former, delivered in 2000, is a modern multi-purpose research vessel designed for fisheries and oceanographic research, principally in the North Atlantic Ocean, temperate and arctic water, and equipped to modern standards for a marine research vessel.
1.1.2	The authors should provide more details about the saithe HCRs implemented in the management plan (If SSBY ≥ MGT Btrigger…).	Additional text provided in the text.
1.1.3		
1.1.4		
1.1.5	It is clear from the text that several mechanism are in place allowing the authorities to explain how information is used or not used via direct informal communication. However, formal reporting is focused on the performance of fisheries in relation to commercial species. The same is not always evident for the reporting of information and management actions in relation to by-catch and other ecosystem elements. This issue needs to be taken into account.	Comment acknowledged. Ecosystem effects of the target fishery and an analysis of how management takes these elements into account (i.e. bycatch ETPs, habitat, ecosystem structure) is described in depth in Section 3. This clause refers principally to the stock under consideration, saithe.
1.1.6		
1.1	**The Fisheries Management Plan**	
1.1.7		
1.1.8.1		
1.1.8.2	It is stated: “Saithe can migrate between areas (Homrum et al., 2013)”. Provide more details to justify the stock unit. “Migrate between areas” can be also outside the EEZ?. The authors should better clarify this point.	Comment acknowledged. The unit managed by Icelandic authorities is the Icelandic saithe stock distributed all around Iceland, and in stock assessment and management saithe within Icelandic EEZ waters is assumed to be a single homogeneous unit.

#	Peer Reviewer Comments	Assessment Team Response
		Icelandic saithe (Pollachius virens) is fairly abundant in the coastal waters around Iceland and is mostly limited to the Icelandic continental shelf. It spawns in February-April along the coast mostly in the South and West. The 0-group and juveniles drift clockwise around the coast and are found in shallow bays and coves until they migrate to deeper waters at ages 1-2. Saithe can migrate between areas[443]. Saithe stocks in the Northeast Atlantic intermingle as a result of migration among stock areas. The extent of migration has been poorly quantified. Homrum et al., 2013 estimated measures of the migration based on existing tagging data from Icelandic, Faroese and Continental (Scotland, North Sea and Norway) waters. Saithe tagged in Icelandic waters were seldom caught outside Icelandic waters (<1% of tag returns) showing limited evidence of emigration, whereas 42% of adult saithe tagged in Faroese waters were recaptured outside Faroese waters. Of adult saithe tagged in Norwegian waters 6.6% were recaptured outside Continental waters. In broad terms, there was a net migration of saithe towards Icelandic waters. The distance between tagging and recapture increased with increasing size and age, with saithe tagged in Norwegian waters moving the longest distances. The results demonstrate significant, but variable, migration rates of adult saithe in the Northeast Atlantic. More detailed studies are needed to clarify the mechanisms behind the migration and what causes the differences among the areas. Episodes with immigration to Iceland are known, and one (age 7 in 1991) such event has been formally taken into account in the assessment. Clarification added to the text.
1.1.8.3		
1.1.8.4		
1.1.9.1		
1.1.9.2		

443 Homrum, E. í, Hansen, B., Jónsson, S. Þ., Michalsen, K., Burgos, J., Righton, D., Steingrund, P., Jakobsen, T., Mouritsen, R., Hátún, H., Armannsson, H., and Joensen, J. S. 2013. Migration of saithe (Pollachius virens) in the Northeast Atlantic. – ICES Journal of Marine Science, 70: 782 – 792.

#	Peer Reviewer Comments	Assessment Team Response
1.1.9.3		
1.1.9.4		
1.1.10.1		
1.1.10.2		
1.1.10.3		
1.1.10.4		
1.1.10.5		
1.1.10.6		
1.1.10.7	It is not clear if the management plan of the target species considers measures relevant to ecosystem effects or it is just the policy of the Icelandic government.	Comment acknowledged. Aside from the different HCRs in place to manage individual species of importance such as cod, haddock, saithe and redfish, the fishery management plans for these species largely overlap when it comes down to ecosystem management measures. Key ecosystem management measures largely consist of spatial and temporal closures, individual species management with the ITQ system or through other means when non quota species are involved.
1.2	**Research and Assessment**	
1.2.1		
1.2.2		
1.2.3		
1.2.4.1		
1.2.4.2		
1.2.4.3		
1.2.5	Make clear reference to the appropriate mean or fora used to share knowledge between research and fisher and/or community. Probably here Evidence rating should be Medium.	There are specific consultation groups between fishermen and the MRFI that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously. MFRI also publishes short newsletters regularly providing up-dates on stock analysis and related research outcomes. During the site visits in October 2019, the Audit Team asked the large boat and small boat fishermen organisations representatives if they had enough opportunities to interface with mangers across the year, to which they answered yes. They also mentioned that fishermen have the ability to call MFRI managers, Fiskistofa staff or Coast Guard agents directly when issues arise or when they wish to discuss any matters relating to

#	Peer Reviewer Comments	Assessment Team Response
		fishing operations, performance and fishermen behaviour on the fishing grounds. In summary, communication channels and opportunities between fishermen and managers appear to be sufficient and satisfactory. Clarification added to the text. The Team is of the opinion that the score remains high.
1.2.6	Make reference only to ICES.	
1.2.7	NA	
1.3	**The Precautionary Approach**	
1.3.1.1	The authors should take into account also ICES. 2019. (Saithe in 5.a. Evaluation of the current management plan for saithe in Icelandic waters, input data, and stock assessment. In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, sr.2019.08, https://doi.org/10.17895/ices.advice.4896)	Comment acknowledged. ICES advised in 2019 that the harvest control rule for saithe in 5.a proposed in the request with a harvest rate of 0.20 as proposed in the request with a MGT Btrigger of 61 000 t, is consistent with the precautionary approach and with the ICES MSY approach. However, a harvest rate of 0.19 maximizes median long-term yield. Clarification added to the clause.
1.3.1.2		
1.3.1.3		
1.3.1.4		
1.3.1.5		
1.3.1.6		
1.3.2	**Management Targets and Limits**	
1.3.2.1	**Harvesting rate and fishing mortality**	
1.3.2.1.1		
1.3.2.1.2		
1.3.2.2	**Stock biomass**	
1.3.2.2.1		
1.3.2.2.2		
1.3.2.2.3		
1.3.2.2.4		
1.3.2.3	**Stock biology and life-cycle (structure and resilience)**	
1.3.2.3.1	It is not clear how natural mortality is modelled in the harvest rule.	A fixed natural mortality rate of 0.2 is used both in the assessment and the forecast. The proportion of natural mortality before

#	Peer Reviewer Comments	Assessment Team Response
		spawning (Mprop) and the proportion of fishing mortality before spawning (Fprop) are set to 0. Clarification added to the clause.
1.3.2.3.2	Provide a figure with overlap of spawning grounds of saithe.	Comment acknowledged. The exploitation of saithe spawning component is not considered to be significant since the spawning stock biomass and B4+ indicators are their highest levels since 1980 (see Figure 1 of the 2019 ICES Advice[444]), hence the current closure and management regime is considered adequate for saithe. Less is known about the spawning of saithe than for example for cod. Spawning takes place in shallow water (100–200 m) off the southeast, south and west coast of Iceland. The main spawning area is considered to be south/southwest off Iceland (Selvogsbanki, Eldeyjarbanki). Selvogsbanki overlaps with a specific cod spawning closure in April. Spawning was believed to be earlier than for cod but observation from a gillnet survey conducted in early April show substantial spawning of saithe in time when saithe spawning was thought to be finished[445]. The spawning seems to take place from February–April and the timing of spawning to be variable. The larvae drift clockwise around Iceland and in mid-June juveniles can be found in many coves, bays, and harbours, then about 3–5 cm long. At age 2 they move to deeper waters in winter. Saithe becomes mature at age 4–7. Clarification added to the clause.
1.3.2.3.3	I would add also the discard ban.	Comment acknowledged. Text added to the clause.
1.4	**External Scientific Review**	
1.4.1		
1.4.2	I would add also that the saithe assessment carried out in ICES has been internally and externally peer reviewed.	Clarification added to the clause.

[444] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf
[445] http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf

#	Peer Reviewer Comments	Assessment Team Response
1.5	**Advice and Decisions on TAC**	
1.5.1		
1.5.2		
1.5.3	NA	
1.5.4	NA	
1.5.5		
1.5.6		
1.5.7		
1.5.8		
1.5.9	Iceland is also participating in Tuna Commissions.	Comment acknowledged.
1.5.10	NA	

9.1.2.2. Section 2 – Compliance and Monitoring

#	Peer Reviewer Comments	Assessment Team Response
2.1	**Implementation, Compliance, Monitoring, Surveillance and Control**	
2.1.1		
2.1.2		
2.2	**Concordance between actual Catch and allowable Catch**	
2.2.1		
2.2.2		
2.2.3		
2.2.4.1		
2.2.4.2		
2.2.4.3	The authors should provide details about how foreing vessels cathces are controlled as well as if there are fish processing vessels.	Very few selected fishing vessels (i.e. Norwegian, Faroese) have TAC to fish for saithe in Icelandic waters. Catches are nonetheless quite limited[446]. Foreign vessels are inspected by the Coast Guard – both in the Icelandic EEZ and further afield as part of Iceland's contribution to monitoring and surveillance as a member of NEAFC. In 2018, the Coast Guard inspected 18 foreign vessels, mostly Norwegian. No infringements were discovered except in the case of a Faroese longliner which was operating inside a short-term closure area. Clarification added to the evidence.
2.3	**Monitoring and Control**	
2.3.1	**Vessel registration and catch quotas**	
2.3.1.1		
2.3.1.2		
2.3.1.3		
2.3.1.4		
2.3.2	**Fishing vessel monitoring and control systems**	
2.3.2.1		
2.3.2.2		
2.3.2.3		
2.3.2.4		
2.3.2.5		

[446] http://www.fiskistofa.is/veidar/aflaupplysingar/aflierlendraskipa/

#	Peer Reviewer Comments	Assessment Team Response
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		
2.3.3	Catches are subtracted from relevant quotas	
2.3.3.1		
2.3.3.2		
2.3.3.3		
2.3.3.4		
2.3.3.5		
2.3.4	Rules are enforced	
2.3.4.1		
2.3.5	Analysis is carried out	
2.3.5.1		
2.3.5.2		
2.3.5.3		

9.1.2.3. Section 3 – Ecosystem Considerations

#	Peer Reviewer Comments	Assessment Team Response
3.1	Guiding Principle	
3.1.1		
3.1.2		
3.2	Specific Criteria	
3.2.1	Information gathering and advice	
3.2.1.1		
3.2.1.2		
3.2.2	By-catch and discards	
3.2.2.1		
3.2.2.2		
3.2.2.3		
3.2.2.4		
3.2.2.5		
3.2.3	Habitat Considerations	
3.2.3.1		
3.2.3.2		
3.2.3.3		
3.2.3.4		
3.2.4	Foodweb Considerations	
3.2.4.1		
3.2.5		
3.2.5.1		

9.1.3. Conclusion – Peer Reviewer 1

The report is well organized and provides a complete review of the saithe fishery. I support the overall conclusion of the assessment that the fishery is in conformance with the requirements of the FAO-based Icelandic Responsible Fisheries Management Specification.

Assessment Team Response: Comments acknowledged.

9.2. Peer Reviewer 2

9.2.1. General comments – Peer Reviewer 2

Peer Reviewer Comments	Assessment Team Response
General Comments	
A very careful analysis of the criteria has been carried out by the assessment team. Well presented and comprehensive evidence is supplied in the report to illustrate all points. In general Icelandic fisheries are exceptionally well managed in terms of both short and long term objectives. However, I have to agree with the non-conformance regarding the non-reporting/under- reporting of seabirds and marine mammal bycatch, and also the non-conformance regarding the lack of data for the spotted wolfish and common loon.	Assessment Team response: comment acknowledged.

9.2.2. Scoring element review – Peer Reviewer x

Peer Reviewer Comments	Assessment Team Response
Background Section	
This is a good overview of the stock biology, the fishery and the management, it is well written and logical. I see no areas that require further clarification, only points where there may be scope for improving the text. One improvement I would propose is more detail being place in the background section leaving the	Assessment Team response: comment acknowledged.

evidence sections to justify the evidence ratings. A lot of information is repeated though various evidence sections.	

9.2.2.1. Section 1 – Fisheries Management

#	Peer Reviewer Comments	Assessment Team Response
1.1	**The Fisheries Management System**	
1.1.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1	**The Fisheries Management Plan**	
1.1.7	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.8.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.8.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.8.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.8.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.9.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.9.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.9.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.9.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.1.10.7	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2	**Research and Assessment**	
1.2.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.4.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.4.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.4.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.2.7	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3	**The Precautionary Approach**	

#	Peer Reviewer Comments	Assessment Team Response
1.3.1.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.1.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.1.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.1.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.1.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.1.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2	**Management Targets and Limits**	
1.3.2.1	**Harvesting rate and fishing mortality**	
1.3.2.1.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.1.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.2	**Stock biomass**	
1.3.2.2.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.2.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.2.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.2.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.3	**Stock biology and life-cycle (structure and resilience)**	
1.3.2.3.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.3.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.3.2.3.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.4	**External Scientific Review**	
1.4.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.4.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5	**Advice and Decisions on TAC**	
1.5.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.7	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.8	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.9	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
1.5.10	<Insert (if comment is not required then you can leave blank or mark as N/A)>	

9.2.2.2. Section 2 – Compliance and Monitoring

#	Peer Reviewer Comments	Assessment Team Response
2.1	**Implementation, Compliance, Monitoring, Surveillance and Control**	
2.1.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.1.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2	**Concordance between actual Catch and allowable Catch**	
2.2.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2.4.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2.4.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.2.4.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3	**Monitoring and Control**	
2.3.1	**Vessel registration and catch quotas**	
2.3.1.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.1.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.1.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.1.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2	**Fishing vessel monitoring and control systems**	
2.3.2.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.6	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.7	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.8	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.9	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.10	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.11	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.12	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.13	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.14	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.15	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.16	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.2.17	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.3	**Catches are subtracted from relevant quotas**	

#	Peer Reviewer Comments	Assessment Team Response
2.3.3.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.3.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.3.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.3.4	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.3.5	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.4	**Rules are enforced**	
2.3.4.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.5	**Analysis is carried out**	
2.3.5.1	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.5.2	<Insert (if comment is not required then you can leave blank or mark as N/A)>	
2.3.5.3	<Insert (if comment is not required then you can leave blank or mark as N/A)>	

9.2.2.3. Section 3 – Ecosystem Considerations

#	Peer Reviewer Comments	Assessment Team Response
3.1	**Guiding Principle**	
3.1.1	On pg 187 the title refers to 'Associated species catch and bycatch to the cod fishery' this should be the saithe fishery. The info on the MFRI and environmental conditions would be better placed in the background section. Annual take of marine mammals as a percentage of their population size such as with the harbour porpoise, would be much more useful information (where available) than solely numbers of animals taken as bycatch.	Assessment Team response: comments acknowledged. The typo has been corrected. The information mentioned has been moved to the background. We agree with the comment. Where population size of marine mammals were available, these have been provided. In the case of harbour purpose less precise information was available. In 2016 an aerial survey was performed. Despite the poor coverage in it, the uncorrected harbour porpoise population estimate is at least double that of all previous estimates other than that from 2007, when a specialist harbour porpoise observer was employed and all known biases were corrected. Availability bias is likely substantial for this species but dive profile data from the survey area are lacking[447]. This data, although not definitive at this point, appears to imply that the harbour porpoise is increasing and as such, may not be below biological limits.
3.1.2	The monitoring plan for the spotted wolffish is likely provide sufficient data to evaluate the effects of the cod fishery. Pg 237 lists the 'US Marine Mammal Protection Act importing requirements' under the Icelandic Committee for Consultation on Responsible Management of Living Marine Resources' recommendation to the Ministry. It is not clear what is meant by this, more detail could be provided. Minor non-conformance number # 2 isn't noted at the end of the section	Comments acknowledged. The MMPA Import Provisions rule implements aspects of the Marine Mammal Protection Act that aim to reduce marine mammal bycatch associated with international commercial fishing operations, by requiring nations exporting fish and fish products to the United States to be held to the same standards as U.S. commercial fishing operations, starting from 2021. All in all, this importing rule is thought to be pushing Iceland to

[447] https://nammco.no/wp-content/uploads/2018/09/report_aewg_2018_final.pdf

#	Peer Reviewer Comments	Assessment Team Response
		further decrease marine mammal bycatch and improve the management of these animals. The Non-Conformance #2 is marked at the ned of clause 3.1.1 scoring box, where the non-conformance was applied.
3.2	**Specific Criteria**	
3.2.1	**Information gathering and advice**	
3.2.1.1	N/A	
3.2.1.2	N/A	
3.2.2	**By-catch and discards**	
3.2.2.1	N/A	
3.2.2.2	N/A	
3.2.2.3	I don't see the evidence to justify that the species named in the table are not threatened by the saithe fishery, percentages of catch is shown. All these species are assessed under 3.1.1, it would be better to list whether it is likely that these species are above the point of recruitment impairment or not in the table provided.	This clause deals with bycatch rather than endangered or threatened species (assessed elsewhere). The analysis for all the species reported in the table mentioned has been carried out under clause 3.1.1. None of these species is considered to be significantly affected by the cod fishery. However, we note the issue of spotted wolfish bycatch which is been addressed through a corrective action plan.
3.2.2.4	N/A	
3.2.2.5	N/A	
3.2.3	**Habitat Considerations**	
3.2.3.1	N/A	
3.2.3.2	N/A	
3.2.3.3	N/A	
3.2.3.4	N/A	
3.2.4	**Foodweb Considerations**	
3.2.4.1	The evidence presented in this section discusses capelin as a key species but fails to go into detail on the reasons why saithe is not a key species apart from showing the results of a model.	Comments acknowledged. Further information has been provided accordingly in the clause. Saithe is an active, gregarious fish occurring inshore and offshore waters. Studies on the diet of this species in various localities in the North Atlantic have shown the pelagic character of its food. During its first two years of existence, it

#	Peer Reviewer Comments	Assessment Team Response
		inhabits mostly coastal waters where it feeds mainly on plankton like appendicularians and crustaceans. After this coastal period, it migrates to the open sea and its food remains pelagic, although prey is larger and consists of euphausiids, fishes and cephalopods. Saithe trophic level has been estimated to be around 4.25, based on adult diet composition in 5 studies . The Icelandic Waters ecoregion foodweb is characterized by high primary production. Capelin is considered on of the main key prey species in the ecoregion and its lifecycle and migration pattern is an important energy transfer in the ecosystem. Capelin feeds mainly on copepods and euphausiids in waters north of Iceland and then moves to Icelandic waters where it is one of the most important prey for many species, e.g. cod, haddock, saithe, Greenland halibut, seabirds, and marine mammals. Other prey species of lesser importance are shrimp and sandeel. The annual consumption of fish, cephalopods, and crustaceans by cetaceans within the Icelandic Waters ecoregion has been estimated at 6.3 million tonnes. The foodweb has been affected by changes in hydrography, the capelin fishery, increased immigration of mackerel, and the increasing abundance of large baleen whales. Unlike capelin, mackerel feeds in the ecoregion and are a minor prey item, thereby exporting energy from the system.
3.2.5	**Precautionary Considerations**	
3.2.5.1	N/A	

9.3. Peer Reviewer 3

9.3.1. General comments – Peer Reviewer 3

Peer Reviewer Comments	Assessment Team Response
General Comments	
I find this report to be very well-researched and well-written; it is obvious that it builds on extensive previous knowledge about Icelandic fisheries management among the members of the	Assessment Team response: comments acknowledged.

Assessment Team. My own competence lies within management, enforcement and compliance, so this has been my focus in reviewing the report. I have a few specific comments and questions to the Assessment team (see below), but by and large the information provided on enforcement and compliance is very detailed and clearly presented. Also, I fully agree with the Team's conclusions. I haven't proofread the report, but it's generally rather 'clean'. Ideally, the Team should attempt to make the use of names of the management bodies consistent. Fisheries Directorate/Fishing Directorate/Directorate of Fisheries are used in different parts of the report; Coast Guard/Coastguard/coastguard and MRI/MFRI likewise.	

9.3.2. Scoring element review – Peer Reviewer 3

Peer Reviewer Comments	Assessment Team Response
Background Section	

9.3.2.1. Section 1 – Fisheries Management

#	Peer Reviewer Comments	Assessment Team Response
1.1	**The Fisheries Management System**	
1.1.1	'Policies incorporate a number of International Agreements.' To be very formalistic, the legal instruments listed include both agreements (which equals treaty, i.e. is legally binding) and declarations (which are non-binding). So I would say '…international agreements and declarations'.	Comments acknowledged. Changes made to the text.
1.1.2		
1.1.3		
1.1.4		
1.1.5	There is an emphasis on transparency in the scientific process here although the Directorate's public overview of catches and quota status is also mentioned. Is it worth mentioning that also infringements are made publicly available? The publication of information on every inspection and infringement is rather extraordinary. It is mentioned under Section 2 but also belongs in the wider picture.	Comments acknowledged. Changes made to the text.
1.1.6		
1.1	**The Fisheries Management Plan**	
1.1.7		
1.1.8.1		
1.1.8.2		
1.1.8.3		
1.1.8.4		
1.1.9.1		
1.1.9.2		
1.1.9.3		
1.1.9.4		
1.1.10.1		
1.1.10.2		
1.1.10.3		
1.1.10.4		
1.1.10.5		
1.1.10.6		
1.1.10.7		
1.2	**Research and Assessment**	

#	Peer Reviewer Comments	Assessment Team Response
1.2.1		
1.2.2		
1.2.3		
1.2.4.1		
1.2.4.2		
1.2.4.3		
1.2.5		
1.2.6		
1.2.7		
1.3	The Precautionary Approach	
1.3.1.1		
1.3.1.2		
1.3.1.3		
1.3.1.4		
1.3.1.5		
1.3.1.6		
1.3.2	Management Targets and Limits	
1.3.2.1	Harvesting rate and fishing mortality	
1.3.2.1.1		
1.3.2.1.2		
1.3.2.2	Stock biomass	
1.3.2.2.1		
1.3.2.2.2		
1.3.2.2.3		
1.3.2.2.4		
1.3.2.3	Stock biology and life-cycle (structure and resilience)	
1.3.2.3.1		
1.3.2.3.2		
1.3.2.3.3		
1.4	External Scientific Review	
1.4.1		
1.4.2		
1.5	Advice and Decisions on TAC	
1.5.1		
1.5.2		

#	Peer Reviewer Comments	Assessment Team Response
1.5.3		
1.5.4		
1.5.5		
1.5.6		
1.5.7		
1.5.8		
1.5.9		
1.5.10		

9.3.2.2. Section 2 – Compliance and Monitoring

#	Peer Reviewer Comments	Assessment Team Response
2.1	**Implementation, Compliance, Monitoring, Surveillance and Control**	
2.1.1	- The National Audit Office's December 2018 report has caused some discussions in MSC circles. I fully agree with how the team here deals with it. - In the overview of offences in Table 10, by far the most frequently recorded offence is 'fishing in excess of or without a quota' (approx. 1000-1200 per year in 2016-2018; the similar figure for most other categories of offenses is far below 100). Not only is this a high figure; fishing in excess of or without a quota is also a very serious infringement, so it sounds rather dramatic. As I understand the assessment team, the high number 'relates to each incidence detected of vessels that have taken longer than the 3 days required by law to balance their quota where they have landed fish in excess of their quota.' Can we rest assured that there isn't any hidden overfishing here? - The instances of fees imposed for illegal catches increased nearly tenfold from 2016 to 2017/2018 – any particular reason?	Comments acknowledged. Yes, it is correct, the high number relates to each incidence detected of vessels that have taken longer than the 3 days required by law to balance their quota to their catches. The reason for the 2016/17 to 2017/18 increase is that Directorate of Fisheries decided to clamp down on the small boat fishers that were more than 3 days late at balancing their quotas. The instances of fees imposed for illegal catches relates directly to the previous point.
2.1.2		
2.2	**Concordance between actual Catch and allowable Catch**	
2.2.1		
2.2.2		
2.2.3		
2.2.4.1		
2.2.4.2		
2.2.4.3		
2.3	**Monitoring and Control**	
2.3.1	**Vessel registration and catch quotas**	
2.3.1.1		
2.3.1.2		
2.3.1.3		
2.3.1.4		
2.3.2	**Fishing vessel monitoring and control systems**	
2.3.2.1		
2.3.2.2		
2.3.2.3		

#	Peer Reviewer Comments	Assessment Team Response
2.3.2.4		
2.3.2.5		
2.3.2.6	The assessment team says that inspectors compare reported catch with catch stored on board. Does this include a full physical check of the catch in the holds (e.g. counting of boxes/containers and weighing of a sample)?	Comments acknowledged. Yes, that is correct.
2.3.2.7	Regarding the VS quota: Does this in practice imply that all vessels automatically get a 5 % addition to their quota, i.e. that the effective TAC is 5 % higher than the declared TAC? (That said, I understand the logic behind this arrangement.)	Comments acknowledged. No, this does not mean that vessels have an additional 5% of catches added to their catches. 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 Fisheries Commission Project or 'VS fund', under the auspices of the Ministry). The maximum of 20% return on VS catches means that there are limited incentives to land it; 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, preventing discards, improving the treatment of the fishery resource and promoting more responsible fishing practices.
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		
2.3.3	**Catches are subtracted from relevant quotas**	
2.3.3.1		
2.3.3.2		
2.3.3.3		
2.3.3.4		
2.3.3.5		
2.3.4	**Rules are enforced**	

#	Peer Reviewer Comments	Assessment Team Response
2.3.4.1		
2.3.5	Analysis is carried out	
2.3.5.1		
2.3.5.2		
2.3.5.3		

9.3.2.3. Section 3 – Ecosystem Considerations

#	Peer Reviewer Comments	Assessment Team Response
3.1	Guiding Principle	
3.1.1		
3.1.2		
3.2	Specific Criteria	
3.2.1	Information gathering and advice	
3.2.1.1		
3.2.1.2		
3.2.2	By-catch and discards	
3.2.2.1		
3.2.2.2		
3.2.2.3		
3.2.2.4		
3.2.2.5		
3.2.3	Habitat Considerations	
3.2.3.1		
3.2.3.2		
3.2.3.3		
3.2.3.4		
3.2.4	Foodweb Considerations	
3.2.4.1		
3.2.5	Precautionary Considerations	
3.2.5.1		

9.3.3. Conclusion – Peer Reviewer 3

Please provide an overall conclusion including:

- An indication of whether or not you believe the conclusion of the Assessment Team is appropriate conclusion based on the evidence presented in the assessment report.

The conclusions of the assessment team are appropriate based on the evidence presented in the report.

Where non-conformances requiring corrective actions on behalf of the fishery have been raised, for each such non-conformance, please provide:

- An indication of whether or not you believe the non-conformances are appropriate.
- An indication of whether or not you believe the Corrective Action Plan is appropriate and likely to address the non-conformance within the specified timeframe.

The non-conformances and the Corrective Action Plan are appropriate.

Assessment Team response: comments acknowledged.

10. Non-conformances and Corrective Actions

During this re-assessment audit all clauses but two were found to be in full conformance. One minor non-conformance was identified (during the 4th surveillance in 2018/19) against clause 2.3.2.4 of the IRFM Standard (V2), relating to the appropriate recording of marine mammal and seabird bycatch data in fishing logbooks, while a new minor non-conformance was identified during this re-assessment against clause 3.1.1 relative to the bycatch of spotted wolffish and common loon. Progress against these two NCs is shown below.

Non-conformance 1 (of 1)	
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
Non-conformance level:	Minor Non-conformance
Non-conformance:	Although required by legislation, there is evidence of extensive non-reporting/under-reporting of seabirds and marine mammals bycatch such that the Assessment Team cannot be confident that catch amounts by species and fishing area (of marine mammals and seabirds) are estimated and continually recorded in fishing logbooks.
Rationale:	The recording of marine mammals and seabirds by number and species is required by Icelandic regulation[448]. 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 Pallson *et al.* 2015[449] and the March 2018 MFRI report titled: "Bycatch of Seabirds and Marine Mammals in lumpsucker gillnets 2014-2017". Pallson *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[450]. 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"*. 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.
Corrective Action Plan	In accordance with rules of the IRF Programme, the Client is required to submit a Corrective Action Plan (CAP) within 28 days. **The Client submitted the following CAP in February 2019**

[448] https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
[449] https://www.hafogvatn.is/static/research/files/fjolrit-178.pdf
[450] https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf

To whom it may concern

ATVINNUVEGA- OG
NÝSKÖPUNARRÁÐUNEYTIÐ

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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

Further 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: 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.
Assessment Team CAP response	**The Assessment Team has accepted the Corrective Action Plan provided by the Client for the fishery under assessment.**
Year 1 progress	**The Client Group submitted the following corrective action evidence in October 2019** To whom it may concern ATVINNUVEGA- OG NÝSKÖPUNARRÁÐUNEYTIÐ *Ministry of Industries and Innovation* Skúlagötu 4 101 Reykjavík Iceland tel.: + (354) 545 9700 postur@anr.is anr.is Reykjavík October 25, 2019 Reference: ANR19020189/15.09.00 Subject: Bycatches of non-commercial species in fisheries The Ministry of Industries and Innovation, Department of Fisheries and Aquaculture has initated work aimed at reducing bycatch of seabirds and marine mammals in fishing operations. The workplan includes measures aimed at increasing the reliability of recording of catch of non-commercial species in logbooks by location, gear and species. Currently, the larger Icelandic vessels have electronic logbooks, but most smaller vessels still have paper logbooks. The Directorate of Fisheries has been working on an electronic „logbook-app“ to take over from the paper logbooks which will greatly facilitate recording of non-commercial bycatch onboard small vessel. The app was planned to be ready for use in 2019, but is now expected to be delayed until 2020. A trial version of the app has been initiated. A task-force has been set up in the Department of Fisheries and Aquaculture to work especially with gillnet fisheries aimed at improving data collection and reviewing possible management measures to minimize bycatch of seabirds and marine mammals. The task-force will be working closely with stakeholders, The Directorate of Fisheries and The Marine and Freshwater Research Institute. A general information campaign aimed towards all the Icelandic fleet to encourage more accurate recording of non-commercial bycatch will be run in 2020. On behalf of the Minister of Industry and Commerce Jóhann Guðmundsson Director General, Department of Fisheries and Aquaculture Following the letter supplied by the Ministry on October 25th 2019 to update on progress towards closure of Minor Non Conformance #1, the Client Group spoke in a conference call with the audit team lead and clarified the following information: The Task Force group has just been set up and it is different and independent from the Committee for Consultation on Responsible Management of Living Marine Resources, reformed in its most

	current form (and remit) in Nov. 2018. The head of the Task Force is a high-level official in Iceland, the former Permanent Secretary for Fisheries. The appointed Chair of the Committee for Consultation on Responsible Management of Living Marine Resources brings industry and management stakeholders together to gather information, explore options and seek consensus on what can be done and agreed in a practical sense, thus assisting in the official decision-making process. The Task Force is set to continue to collaborate directly with various stakeholders and to explore multiple options and solutions. The Chairs of the Committee and the newly formed Task Force have been in contact to report on recent issues, developments and general updates and to discuss future options. The Client Group communicated that there is a proposed regulation on the table aiming to prohibit all deliberate killing of seals in Iceland (with only minor exception subject to strict conditions and requiring permit from the Directorate of Fisheries) which, if adopted, would contribute to a reduction in overall mortality and assist seal populations growth. Furthermore, an important first step has been recognised as the need to improve social recognition and acceptance of the issues across the gillnet fisheries (for lumpfish and cod), currently considered at high risk. The Client Group further communicated, on behalf of the head of the Task Force, that the small vessels bycatch recording App should be ready for the end of the year, prior to trial by a select group of fishermen. However, the full recording of seabird and marine mammal bycatch in the App may extend beyond the next (2020) fishing season. Meetings have been scheduled in late 2019 to further discuss the App with the Directorate. Another action that is under consideration is the use of picture cards for gillnet fishermen to enable better identification of seals and seabirds and to investigate if additional forms to record bycatch are required in the small fleet. The Task Force is also planning to conduct meetings with small boat owners to reiterate the need to improve data collection. The Directorate is also considering to hold educational meetings around Iceland prior to the start of the next season to increase awareness of the issue and the need for improved catch recording.
Assessment Team Determination on Year-1 Corrective Evidence	**The Assessment Team has determined that the information supplied is sufficient to meet the original CAP deliverable for year 1. The non-conformance remains open and on track towards appropriate closure.** **The first surveillance activities will review evidence that the corrective actions highlighted above have been carried out.**

Non-conformance 2 (of 2)	
Clause:	3.1.1. Adverse impacts of the fishery on the ecosystem shall be considered and appropriately assessed and effectively addressed, consistent with the precautionary approach.
Non-conformance level:	*Minor Non-conformance*
Non-conformance:	There is insufficient evidence that adverse impacts of the saithe fishery on the following ecosystem components: 1) Spotted wolffish, and; 2) Common loon are being considered and appropriately assessed and effectively addressed, consistent with the precautionary approach.

Spotted wolffish Rationale:

Around 98% of spotted wolffish (*Anarhichas minor*) is currently caught as bycatch in the trawl and longline fisheries that target saithe and is mainly found at the northwest and north parts of the continental shelf of Iceland, at sandy or muddy substrate and depths of 100-400 meters, in fishing ground overlapping with those of saithe. From 2002, the catch on longline has been increasing relative to that taken in demersal trawl. In 2018, longline catch was around 53% of the total catch.

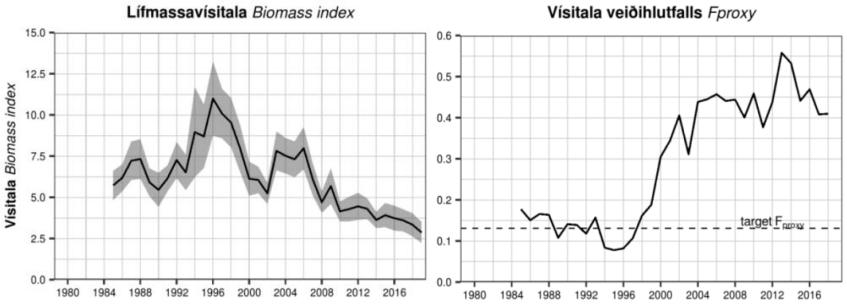
Since 2012 catches have been consistently above advice/recommended TAC. Spotted wolffish was included in the ITQ system in 2018 and the TAC in 2018/2019 was set as per recommended TAC of 1001 t[2]. Issues surrounding this stock were flagged as a potential issue during the IRF 4th surveillance assessment in 2018, preceding the current re-assessment.

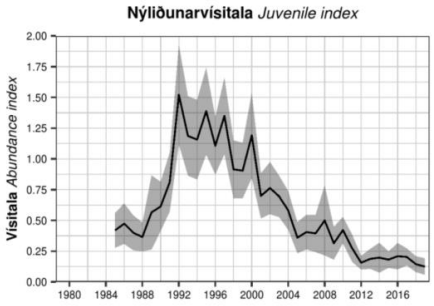
Preliminary catches in 2018/19 have exceeded the TAC based on Fiskistofa records[3].

Year	Advice/ Recommended TAC	National TAC	Spotted Wolffish Catches	Total catches as a % of advice
12/13	900		2,042	227%
13/14	900		2,250	250%
14/15	900		1,655	184%
15/16	900		1,913	213%
16/17	1128		1,587	141%
17/18	1080		1,528	141%
18/19	1001	1,001	1,234	123%
19/20	375	375		

In a request for clarification, the Ministry confirmed that spotted wolffish is caught with other species in the mixed fishery and is therefore very difficult to manage. They also explained that in the fishing year (2019/2020) the TAC is extremely small so there might be additional difficulties in maintaining the species within TAC.

In their 2019 Advice, MFRI advised that when the precautionary approach is applied, catches in the fishing year 2019/2020 should be no more than 375 tonnes. As shown below, biomass and juvenile indices are at their lowest levels in the time series. Fproxy has been high since 2000.





This year the basis of the Fproxy was changed due to low spawning stock biomass and poor recruitment and thus the Fproxy applied last year is no longer considered precautionary. The target Fproxy is now defined as

[2] https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish%20(1)1141515.pdf
[3] http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/

	the mean Fproxy from the reference period of 1985–1998. This period was chosen as fishing pressure did not have any observed detrimental effects on the stock biomass. The catch advice is based on multiplying the most recent index value with the target Fproxy value. As this is the first year this basis is used, the uncertainty cap was not applied. Spotted Wolffish in Europe is categorised as near threatened under the IUCN Red list based on a last assessment from 2014[4]. It is not clear to what degree management has been successful at reducing harvest for this stock since catches in 2018/19 appear to have exceeded the TAC by over 20%. The same or perhaps a bigger issue remains for the reduced 2019/2020 quota and the related effects on the stock. The saithe fishery overlaps in terms of fishing gears, fishing grounds and depths with spotted wolffish catch and is therefore considered to have an effect on this stock, itself a component of the Iceland marine ecosystem.
Common loon Rationale:	The common loon or 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. Last assessed 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).[451] The Gavia immer population in Iceland is roughly estimated at 200–300 pairs. Known breeding territories are c. 500, with 56% within IBAs, ten of which are specifically designated for this species. Furthermore, one staging area is a designated IBA, holding 10% and sometimes 30% of the population. Icelandic Red list 2018 Classification[452]: Vulnerable (VU, D1), downlisted from EN in 2000. The annual removal by the cod fishery is estimated at 16.4% (see table below). Since saithe made up an average of 7.41% of all the Icelandic gillnet catches in the past 3 years, the direct contribution of common loon bycatch in the gillnet fisheries responsible for saithe catches can be calculated as (7,41% of the 16.4% removal) 1.21%. This value is considered to be quite small but potentially significant, given the small *G. immer* population. **Table 37.** Icelandic cod fishery (gillnet, longline, otter trawl) annual seabird estimated bycatch from 2014-2016, including estimates of annual removal. Source: MFRI.

Species	Cod gillnets	Longline	Otter trawl	Iceland Institute of Natural History (INH) Red List Classification	Population estimated in INH's 2018 Red List	Annual bycatch % removal of estimated population*
Northern fulmar (*Fulmarus glacialis*)	1702 (1362-2042)	920 (340-1500)	0	Endangered	1.2 million pairs	0.11%
Common guillemot (*Uria aalge*)	454 (340-568)	0	0	Vulnerable	693,000 pairs	0.03%
Northern gannet (*Morus bassanus*)	128 (69-187)	0	45 (2-90)	Vulnerable	37,000 pairs	0.23%

[4] https://www.iucnredlist.org/species/18263655/44739959

451 https://www.iucnredlist.org/species/22697842/132607418#conservation-actions

452 https://en.ni.is/node/27141

	Atlantic puffin (*Fratercula arctica)*	13 (1-26)	0	0	Critically Endangered	2 million pairs	0.00%
	Razorbill (*Alca torda*)	26 (2-52)	0	0	Near threatened	313,000 pairs	0.00%
	Common loon (*Gavia immer*)	82 (3-164)	0	0	Vulnerable	200–300 pairs	16.40%
	Common eider (*Somateria mollissima*)	142 (2-282)	0	0	Vulnerable	850,000 birds	0.02%
	Cormorants (*Phalacrocorax carbo*)	0	47 (16-78)	0	Least Concern	4,581 pairs	0.51%
	Great-black backed gull (*Larus marinus*)	0	67 (2-134)	0	Endangered	6,000–8,000 pairs	0.48%

*Note, the potential decline trajectory of these populations resulting from their INH Red List classification has not been taken into account in the annual percentage removal calculation.

The MFRI provided further clarification on common loon bycatch where they highlighted that the estimate has a large variance based on an actual catch of 3 birds over several years. The birds are only vulnerable to bycatch for part of the year before they move to freshwater for nesting, hence the potential for an overestimate. They also noted that these 3 birds were all caught in the same year, and that is only 3 birds caught since 2010 when proper reporting started in the MFRI survey. They continued with saying that the estimate would be much lower if they include data from 2017-2019, but that analysis has not been finalized yet (Guðjón Már Sigurðsson, MFRI, pers. comm, 17th September 2019).

In view of the lack of reliable data to establish more precise bycatch estimates across the fishery (due to logbook underreporting of seabird and marine mammal bycatch and limited Directorate's Inspectors coverage on fishing vessels), the Team treats the estimates provided by the MFRI in September 2019 as best available information, in the absence of better-quality data to counter it. Considering the above, the Assessment Team determines that the saithe fishery is likely having an impact on the Icelandic *Gavia immer* population, partly due to the small population size of this species.

Corrective Action Plan

In accordance with rules of the IRF Programme, the Client is required to submit a Corrective Action Plan (CAP) within 28 days.

Corrective Action Plan (CAP) submitted by the client in November 2019

Action to improve management of the spotted wolffish was taken by setting a TAC and allotting individual quotas to vessels beginning in the fishing year 2018-2019. Normally, such change in management approach is expected to lead to adjustment and changes in vessel behaviour, thus in turn leading to catch avoidance and consequent catch reduction. This process may take some time to stabilise and for that reason it is too early to tell to what extent this change serves to remedy the situation. Nevertheless, the TAC for 2019-2020 is only 37.5% of the previous year's TAC and thus the situations deserves more focused study. It is thus positive to seek other management tools and measures that may further aid in this endeavour. Accordingly, the MFRI has set up a monitoring plan (below). Among other things, this plan sets the goal of further charting the situation in order to identify more closely areas for potential closure during spawning time and beyond. It would thus be appropriate to collate the results and initiate further planning in connection with the next surveillance assessment.

To whom it may concern

MARINE & FRESHWATER RESEARCH INSTITUTE

Reykjavík, 20.11.2019
21.09.01 /HLÝ
GÞ/mþ

Monitoring plan for spotted wolffish *(Anarhichas minor)*

The aim of the plan is to monitor spatial and temporal changes in catches of spotted wolffish. Reporting of following variables will be done each month.

- § Total catch.
- § Catch by fishing gear.
- § Identifying the vessels that are taking most of the catch.
- § Temporal and spatial changes in the catch.

A research team of 6 scientist from the Marine and Freshwater Research Institute (MFRI) and one from *Fisheries Iceland has been established* . The first meeting of this group will be on the 28th November where the following issues will be discussed.

- § To put more manpower to age read otoliths of spotted wolffish, in order to improve the stock assessment.
- § Examination of reported catch of spotted wolffish from logbooks at spawning time, to locate possible spawning areas. Possible benefits of ongoing research on migration of spotted wolffish, where 15 fishes out of 44 tagged with Digital Storage Tags (DSTs) have been recaptured to locate spawning areas of spotted wolffish. If such areas are found the group will decide on further research steps in order to identify more closely areas for potential closure during spawning and incubation time of spotted wolffish.
- § Ongoing research on fecundity of spotted wolffish will be discussed. One of the aims of this research is to examine if fecundity of spotted wolffish can be estimated with biological variables which are easy to measure and if so used to estimate total egg production (TEP) which can be used to examine the relationship between TEP and recruitment.
- § Future research which will benefit the conservation of spotted wolffish.

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The Client re-highlighted the MFRI clarification on common loon bycatch whereby they stated that the estimate has a large variance based on an actual catch of 3 birds over several years. The birds are only vulnerable to bycatch for part of the year before they move to freshwater for nesting, hence the potential for an overestimate. They also noted that these 3 birds were all caught in the same year, and that is only 3 birds caught since 2010 when proper reporting started in the MFRI survey. They continued with saying that the estimate would be much lower if they include data from 2017-2019, but that analysis has not been finalized yet (Guðjón Már Sigurðsson, MFRI, pers. comm, 17th September 2019).

	Hence, at this point, it is difficult to see what specific management action could be taken at this time. The Client awaits the outcome of the analysis discussed by the MFRI (above) in 2020 and notes that there is ongoing action to improve the recording of bycatch in the fishery. Furthermore, the client plans to monitor whether there are instances of common loon bycatch, in order to assess and evaluate and reconsider accordingly, in cooperation with the relevant expert at the MFRI.
Assessment Team CAP response	The Assessment Team has accepted the CAP submitted by the Client Group in collaboration with the MFRI. The CAP is thus considered adequate to address the spotted wolfish and common loon issue. Monitoring of such CAP and related measures will occur in upcoming surveillance audits. Accordingly, the Assessment Team will be requesting the Client group for updated information about this issue at the 1st Surveillance audit in late 2020/early 2021 and will try to establish a more specific set of milestones for future surveillances at that time, to better define the timelines for closure of this minor non-conformance.

The Assessment Team has also issued a number of formal Recommendations for the Client Group to consider.

Recommendation #1 (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[453]) and sea-pen fields[454]. 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.

Recommendation #2 (relating to clause 3.2.2.3)
The assessment team recommends that the population and status of harbour porpoise (*Phocoena phocoena)* in Iceland is appropriately monitored and quantified due to conflicting abundance estimates (e.g. resulting from absolute and relative survey abundance indexes[455] and recent modelling efforts[456]) due to the potential risk of significant depletion to its population, specifically in regard to performance against proposed thresholds (e.g. ASCOBANS annual replacement potential of 1.7% for harbour porpoises[457], or 2018 PBR limit of 3500 porpoises[5]).

It is noted that the issues highlighted in these recommendations will be reviewed in subsequent surveillance audits, and that some of these have the potential to develop into non-conformances if the issues worsen.

[453] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf
[454] https://novasarc.hafogvatn.is/project/
[455] https://nammco.no/wp-content/uploads/2019/11/final-report_aewg-20192.pdf
[456] https://www.ascobans.org/sites/default/files/document/ascobans_ac25_inf.4.3a_joint-imr-nammco-ws-harbour-porpoise.pdf
[457] http://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena

11. Recommendation and Determination

The assessment team determines that the management system of the applicant fishery, the Icelandic saithe (*Pollachius virens*) commercial fisheries, under state management by the Icelandic Ministry of Industries and Innovation, fished directly with demersal trawls (i.e. main gear), gillnets, Danish seine nets, long-lines, 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), be granted re-certification to the Icelandic Responsible Fisheries Certification Programme.

12. References

Bibliography	Weblink
ABCBIRDS. 2015. In-Depth Analyses of Seabird Bycatch in Individual Marine Stewardship Council Fisheries. American Bird Conservancy.	https://abcbirds.org/wp-content/uploads/2015/05/ABC_Analysis_of_MSC_Certification_on_Seabird_Bycatch_Pt_2_Fishery_Analyses.pdf
ACAP (2017) ACAP Review and Best Practice Advice for Reducing the Impact of Pelagic Longline Fisheries on Seabirds. In: ACAP - Tenth Meeting of the Advisory Committee. ACAP, Wellington, New Zealand.	https://acap.aq/en/bycatch-mitigation/mitigation-advice/3242-acap-2017-review-and-best-practice-advice-for-reducing-the-impact-of-pelagic-longline-fisheries-on-seabirds/file
Agnarsson, S., and Arnason, R. 2003. The Role of the Fishing Industry in the Icelandic Economy. A historical Examination. WR:03. Institute of Economic Studies.	http://www.ioes.hi.is/sites/hhi.hi.is/files/W-series/2003/w0307.pdf
Agnarsson, S., Matthiasson, T., & Giry, F. (2016). Consolidation and distribution of quota holdings in the Icelandic fisheries. Marine Policy, 72, 263–270. doi:10.1016/j.marpol.2016.04.037	https://www.sciencedirect.com/science/article/pii/S0308597X16302238
Althingi 2015. Law on Marine and Freshwater Research Institute. Lög um Hafrannsóknastofnun, rannsókna- og ráðgjafarstofnun hafs og vatna. Nr. 112/2015	http://www.althingi.is/lagas/nuna/2015112.html
Althingi. 2017. Act amending the Act on Access to Marine Marine Stocks and the Act on the Directorate of Fisheries (monitoring of weighing license holders). Accessed 20 December 2019.	https://www.althingi.is/altext/stjt/2017.048.html
Althingi. 2018. Act on fishing in Iceland's exclusive fishing zone 1997 no. May 26. Icelandic law, 20 January 2019. Issue 149a	https://www.althingi.is/lagas/nuna/1997079.html
Althingi. Act 2015 nr. 112 on Marine Research Institute, research and advisory body for sea and water. Accessed 20 December 2019.	https://www.althingi.is/lagas/nuna/2015112.html
Althingi. Act concerning the Treatment of Commercial Marine Stocks No. 57-1996.	https://www.althingi.is/altext/pdf/131/s/0982.pdf
Althingi. Act on a Special Fee for Illegal Marine Catch (1992 nr. 37). Ministry of Business and Innovation. Accessed 20 December 2019.	https://www.althingi.is/lagas/149a/1992037.html
Althingi. Act on the Directorate of Fisheries (1992 no. 36). Ministry of Business and Innovation. Accessed 20 December 2019.	https://www.althingi.is/lagas/149a/1992036.html
Althingi. Lög um stjórn fiskveiða	https://www.althingi.is/lagas/nuna/2006116.html

Anita Gilles, Thorvaldur Gunnlaugsson, Bjarni Mikkelsen, Daniel G. Pike, Gísli A. Víkingsson. Harbour porpoise Phocoena phocoena summer abundance in Icelandic and Faroese waters, based on aerial surveys in 2007 and 2010. NAMMCO SC/18/AESP/11	http://www.hafro.is/Bokasafn/Greinar/sc_18-AESP11.pdf
ASCOBANS. 2009. OSPAR Background Document for Harbour porpoise Phocoena phocoena. Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas.	https://www.ascobans.org/en/document/ospar-background-document-harbour-porpoise-phocoena-phocoena
Beaulieu, S.E., Szafranski, K. (2019) InterRidge Global Database of Active Submarine Hydrothermal Vent Fields, Version 3.4. Electronic publication available from http://vents-data.interridge.org	https://vents-data.interridge.org/ventfields-osm-map
BirdLife International 2018. Alca torda. The IUCN Red List of Threatened Species 2018: e.T22694852A131932615.	https://www.iucnredlist.org/species/22694852/131932615#population
BirdLife International 2018. Cepphus grylle. The IUCN Red List of Threatened Species 2018: e.T22694861A132577878. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694861A132577878.en.	https://www.iucnredlist.org/species/22694861/132577878#conservation-actions
BirdLife International 2018. Clangula hyemalis. The IUCN Red List of Threatened Species 2018: e.T22680427A132528200. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22680427A132528200.en.	https://www.iucnredlist.org/species/22680427/132528200#population
BirdLife International 2018. Fratercula arctica. The IUCN Red List of Threatened Species 2018: e.T22694927A132581443. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694927A132581443.en	https://www.iucnredlist.org/species/22694927/132581443#conservation-actions
BirdLife International 2018. Fulmarus glacialis. The IUCN Red List of Threatened Species 2018: e.T22697866A132609419. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22697866A132609419.en	https://www.iucnredlist.org/species/22697866/132609419#conservation-actions
BirdLife International 2018. Gavia immer. The IUCN Red List of Threatened Species 2018: e.T22697842A132607418. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22697842A132607418.en	https://www.iucnredlist.org/species/22697842/132607418#conservation-actions
BirdLife International 2018. Morus bassanus. The IUCN Red List of Threatened Species 2018: e.T22696657A132587285. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22696657A132587285.en	https://www.iucnredlist.org/species/22696657/132587285#conservation-actions
BirdLife International 2018. Rissa tridactyla. The IUCN Red List of Threatened Species 2018: e.T22694497A132556442. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694497A132556442.en.	https://www.iucnredlist.org/species/22694497/132556442#conservation-actions

BirdLife International 2018. Uria aalge. The IUCN Red List of Threatened Species 2018: e.T22694841A132577296. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694841A132577296.en	https://www.iucnredlist.org/species/22694841/132577296#conservation-actions
BirdLife International 2018. Uria lomvia. The IUCN Red List of Threatened Species 2018: e.T22694847A132066134. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22694847A132066134.en	https://www.iucnredlist.org/species/22694847/132066134
BirdLife International. 2018. Phalacrocorax carbo. The IUCN Red List of Threatened Species 2018: e.T22696792A132592923. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22696792A132592923.en.	https://www.iucnredlist.org/species/22696792/132592923#population
BirdLife International. 2018. Somateria mollissima. The IUCN Red List of Threatened Species 2018: e.T22680405A132525971. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22680405A132525971.en	https://www.iucnredlist.org/species/22680405/132525971#conservation-actions
Boveng, P. 2016. Pusa hispida ssp. hispida. The IUCN Red List of Threatened Species 2016: e.T61382318A61382321. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T61382318A61382321.en	https://www.iucnredlist.org/species/61382318/61382321
Bowen, D. 2016. Halichoerus grypus. The IUCN Red List of Threatened Species 2016: e.T9660A45226042. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T9660A45226042.en	https://www.iucnredlist.org/species/9660/45226042
Chen, Y. J. (2003). Influence of the Iceland mantle plume on crustal accretion at the inflated Reykjanes Ridge: Magma lens and low hydrothermal activity? Journal of Geophysical Research, 108(B11). doi:10.1029/2001jb000816	http://onlinelibrary.wiley.com/doi/10.1029/2001JB000816/full
Cochrane, K.L. (ed.). 2002. A fishery manager's guidebook. Management measures and their application. FAO Fisheries Technical Paper No. 424. Rome, FAO. 231p.	http://www.fao.org/3/i0053e/i0053e.pdf
Collette, B., Fernandes, P. & Heessen, H. 2015. Anarhichas minor. The IUCN Red List of Threatened Species 2015: e.T18263655A44739959.	https://www.iucnredlist.org/species/18263655/44739959#population
Dulvy, N.K., Notarbartolo di Sciara, G., Serena, F., Tinti, F. & Ungaro, N., Mancusi, C. & Ellis, J. 2006. Dipturus batis. The IUCN Red List of Threatened Species 2006: e.T39397A10198950. http://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T39397A10198950.en.	https://www.iucnredlist.org/species/39397/10198950#assessment-information
ECOLEX. 2019. Fisheries Management Act, 1990. Accessed 20 December 2019.	https://www.ecolex.org/details/legislation/fisheries-management-act-1990-lex-faoc003455/

Ellis, J., Farrell, E., Jung, A., McCully, S., Sims, D. & Soldo, A. 2015. Lamna nasus. The IUCN Red List of Threatened Species 2015: e.T11200A48916453.	https://www.iucnredlist.org/species/11200/48916453#geographic-range
EMODnet. 2019. EMODnet Seabed Habitats. European Marine Observation and Data Network (EMODnet).	https://www.emodnet-seabedhabitats.eu/
FAO. 2019. Species Fact Sheets Pollachius virens (Linnaeus, 1758). Food and Agriculture Organisation of the United Nations.	http://www.fao.org/fishery/species/3016/en
Fishbase. 2019. Pollachius virens (Linnaeus, 1758) Saithe. FishBase. Accessed 20 December 2019.	https://www.fishbase.se/summary/Pollachius-virens.html
Fisheries Management 2018/2019 Laws and regulations. Sjórn fiskveiða 2018/2019 Lög og reglugerðir. Accessed 20 December 2019.	http://vefbirting.oddi.is/raduneyti/fiskveidar2018/
Fiskistofa home page	http://www.fiskistofa.is/english
Fiskistofa. 2005. Reglugerð Nr. 30/2005 on spawning closures. Accessed 20 December 2019.	http://www.fiskistofa.is/media/veidisvaedi/Hrygningarstopp_2.pdf
Fiskistofa. 2017. Fiskistofa Annual Report, 2017. Maritime surveillance chapter. Directorate of Fisheries	http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit-a-sjo/
Fiskistofa. 2018. Directorate of Fisheries Organisational Chart. Directorate of Fisheries. Accessed 20 December 2019.	http://www.fiskistofa.is/umfiskistofu/skipurit/
Fiskistofa. 2019. About Fisheries Management. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/#Sveigjanleiki_i_aflamarkskerfinu
Fiskistofa. 2019. About the Directorate. Accessed 20 December 2019.	http://www.fiskistofa.is/english/about-the-directorate/
Fiskistofa. 2019. Allocation of catch quotas for the fishing year 2018/2019. Accessed 20 December 2019.	http://www.fiskistofa.is/veidar/aflaheimildir/uthlutadaflamark/
Fiskistofa. 2019. Catch and quota status by fish species. Accessed 20 December 2019.	http://www.fiskistofa.is/english/quotas-and-catches/total-catch-and-quota-status/
Fiskistofa. 2019. Catch of species by vessel. Accessed 20 December 2019.	http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/
Fiskistofa. 2019. Catch, quota concessions and catch value. Accessed 20 December 2019.	http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/afli-og-aflaverdmaeti/
Fiskistofa. 2019. Catches of all species. Accessed 20 December 2019.	http://www.fiskistofa.is/veidar/aflaupplysingar/afliallartegundir/
Fiskistofa. 2019. Closures. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/veidibann

Fiskistofa. 2019. Cod equivalents. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/thorskigildisstudlar/
Fiskistofa. 2019. District quota fishing season 2018/2019. Accessed 20 December 2019.	http://www.fiskistofa.is/veidar/aflaheimildir/byggdakvoti/byggdakvoti-1819/
Fiskistofa. 2019. Fisheries Management Division. Accessed 20 December 2019.	http://www.fiskistofa.is/umfiskistofu/starfsemi/veidieftirlitssvid/
Fiskistofa. 2019. Fisheries Management. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/
Fiskistofa. 2019. Gutting factor. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/stjornfiskveida/slaegingarstudlar/
Fiskistofa. 2019. List of species caught. Accessed 20 December 2019.	http://www.fiskistofa.is/veidar/aflaheimildir/aflahlutdeildalisti/
Fiskistofa. 2019. Overview of VS catches by species. Accessed 20 December 2019.	http://www.fiskistofa.is/veidar/aflastada/vs-afli/vsafli.jsp
Fiskistofa. 2019. Regulatory Closures. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/
Fiskistofa. 2019. Transfer of fishing rights. Accessed 20 December 2019.	http://www.fiskistofa.is/eydublod/flutningurveidiheimilda/
Fiskistofa. Fiskistofa 2016 Annual Report, Chapter 8. Directorate of Fisheries	http://www.fiskistofa.is/media/arsskyrslur/kafli8_2016.pdf
Fiskistofa. Fiskistofa 2017 Annual Report, Chapter 8. Directorate of Fisheries	http://www.fiskistofa.is/media/arsskyrslur/medferd_mala_og_urskurdir.pdf
Fiskistofa. Fiskistofa 2018 Fishing permits and catch quotas Report. Directorate of Fisheries	http://www.fiskistofa.is/media/arsskyrslur/3_Fiskistofa-15.-april-2019_Veidileyfi-og-aflaheimildir.pdf
Fiskistofa. Fiskistofa 2018 Handling of Cases Annual Report. Directorate of Fisheries	http://www.fiskistofa.is/media/arsskyrslur/8_Fiskistofa-15.-april-2019_Medferd-mala.pdf
Fiskistofa. Fiskistofa 2018 Monitoring Annual Report. Directorate of Fisheries	http://www.fiskistofa.is/media/arsskyrslur/5_Fiskistofa-15.-april-2019_Eftirlit.pdf
Fiskistofa. Land surveillance. Accessed 20 December 2019.	http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit-a-landi/
Fiskistofa. Link to interactive maps of closures.	http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/
Fiskistofa. The Icelandic Directorate of Fisheries - Responsibilities and main tasks. Accessed 20 December 2019.	http://www.fiskistofa.is/media/utgefid_efni/DOF.pdf
Fiskistofa. Weighing catch. Accessed 20 December 2019.	http://www.fiskistofa.is/fiskveidistjorn/vigtunafla/

Fiskistofa: International cooperation	http://www.fiskistofa.is/english/international-cooperation/
Fiskistofa: Links to daily updates of quotas and catches	http://www.fiskistofa.is/english/quotas-and-catches/
Fiskistofa: Links to webpages for the various kinds of closures.	http://www.fiskistofa.is/fiskveidistjorn/veidibann
Fiskistofa: Links to webpages for the various kinds of closures.	http://www.fiskistofa.is/fiskveidistjorn/veidibann
Fordham, S., Fowler, S.L., Coelho, R.P., Goldman, K. & Francis, M.P. 2016. Squalus acanthias. The IUCN Red List of Threatened Species 2016: e.T91209505A2898271. https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T91209505A2898271.en.	https://www.iucnredlist.org/species/91209505/2898271
Government of Iceland. 2002. Reglugerð um möskvastærðir- og útbúnað varpna til veiða á botnfiski, rækju og humri. (Regulation 543/2002 on mesh size in bottom trawl)	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/4032
Government of Iceland. 2005. Regulation 752/2005: 'On the Control of the Search and Rescue in the Search and Rescue Region of Iceland For a Maritime- and Aeronautical Rescue'.	http://www.lhg.is/media/leit_og_bjorgun/RESCUE_EN.pdf
Government of Iceland. 2019. Fisheries in Iceland.	https://www.government.is/topics/business-and-industry/fisheries-in-iceland/
Government of Iceland. 2019. History of Fisheries. Accessed 20 December 2019.	https://www.government.is/topics/business-and-industry/fisheries-in-iceland/history-of-fisheries/
Government of Iceland. 2019. Management Strategy and Harvest Control Rules. Accessed 20 December 2019.	https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
Government of Iceland. 2019. Ministry of Industries and Innovation. Accessed 20 December 2019.	https://www.government.is/ministries/ministry-of-industries-and-innovation/
Government of Iceland. 2019. Organisational chart. Accessed 20 December 2019.	https://www.stjornarradid.is/default.aspx?PageID=c2a9c95f-ec71-11e6-9417-005056bc530c
Government of Iceland. 2019. Statement on Responsible Fisheries in Iceland. Accessed 20 December 2019.	https://www.government.is/news/article/2018/05/15/Fisheries/
Government of Iceland. Management Strategy and Harvest Control Rules. May 2018, updated after October 2019.	https://www.government.is/news/article/?newsid=cf30e5ad-584f-11e8-9429-005056bc4d74
Government of Iceland., Ministry of Industries and Innovation. May 2018.	https://www.government.is/news/article/2018/05/15/Fisheries/

Government of Iceland., Ministry of Industries and Innovation. May 2018. Statement on Responsible Fisheries in Iceland.	https://www.government.is/news/article/2018/05/15/Fisheries/
Guðjón M. Sigurðsson, Ólafur K. Pálsson, Höskuldur Björnsson, Áslaug Eir Hólmgeirsdóttir, Sævar Guðmundsson og Þórhallur Ottesen. Discards of cod and haddock in demersal Icelandic fisheries 2014-2015.	https://www.hafogvatn.is/is/midlun/utgafa/haf-og-vatnarannsoknir/maelingar-a-brottkasti-thorsks-og-ysu-2014-201
Hagstofa. 2019. Exports by commodity categories (Statistics by category) and processing industries 2002-2018. Hagstofa Islands	http://px.hagstofa.is/pxis/pxweb/is/Efnahagur/Efnahagur__utanrikisverslun__1_voruvidskipti__01_voruskipti/UTA06103.px/?rxid=99bab12c-8dcf-4c61-a6a7-ff575972563b
Hagtidindi. 2018. Profitability in fishing and fish processing 2017. Agstofa Islands. Accessed 20 December 2019.	http://hagstofan.s3.amazonaws.com/media/public/2019/ddeaeeb9-de47-4295-ac6d-ea586375218d.pdf
Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. 2008. Phocoena phocoena. The IUCN Red List of Threatened Species 2008: e.T17027A6734992. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en.	https://www.iucnredlist.org/species/17027/6734992
Hampidjan. 2018. Better Selectivity with four-panel T90 codend. Accessed 20 December 2019.	http://www.hampidjan.is/news/news-article/better-selectivity-with-four-panel-t90-codend1
Hampidjan. 2019. Clear advantages of flying doors. HAMPIÐJAN GROUP. Accessed 20 December 2019.	http://www.hampidjan.is/news/news-article/clear-advantages-of-flying-doors
Homrum, E. í, Hansen, B., Jónsson, S. Þ., Michalsen, K., Burgos, J., Righton, D., Steingrund, P., Jakobsen, T., Mouritsen, R., Hátún, H., Armannsson, H., and Joensen, J. S. 2013. Migration of saithe (Pollachius virens) in the Northeast Atlantic. – ICES Journal of Marine Science, 70: 782 – 792.	https://academic.oup.com/icesjms/article/70/4/782/726798
ICEFISH. 2019. Better redfish selectivity with four panel codend. Accessed 20 December 2019.	https://www.icefish.is/news101/better-redfish-selectivity-with-four-panel-codend
Iceland Application for Membership to the EU: Chapter 13 the Coast Guard. Powerpoint Presentation.	https://slideplayer.com/slide/4644333/
ICES 2018. Section 1.2.6 Fisheries management strategy evaluations in General context of advice, in Advice 2018, Introduction to Advice. International Council for the Exploration of the Sea.	http://www.ices.dk/community/advisory-process/Pages/Basis-for-ICES-Advice.aspx
ICES 2019. Iceland request to evaluate the current management plan for saithe in Icelandic waters, input data, and stock assessment. International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/Special_Requests/iceland.2019.08.pdf

ICES 2019. Stock Annex: Saithe (Pollachius virena) in Division 5a (Iceland grounds). International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/pok.27.5a_SA.pdf
ICES 2019. ICES Advice on fishing opportunities, catch, and effort Greenland Sea and Icelandic Waters ecoregions Published 13 June 2019 Saithe (Pollachius virens) in Division 5.a (Iceland grounds). International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/pok.27.5a.pdf
ICES. 2018. ICES Advice Saithe (Pollachius virens) in Division 5.a (Iceland grounds). International Council for the Exploration of the Sea.	http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pok.27.5a.pdf
ICES 2017. ICES Advice Saithe (Pollachius virens) in Division 5.a (Iceland grounds). International Council for the Exploration of the Sea.	http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/pok.27.5a.pdf
ICES 2019. Report of the North Western Working Group (NWWG), Section 8 Icelandic saithe. International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/Fisheries%20Resources%20Steering%20Group/2019/NWWG/10%20NWWG%20Report%202019_Sec%2008_Icelandic%20Saithe.pdf
ICES. 2005. AREA A ICELAND GREENLAND Ecosystem Overview. International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2005/may/Iceland%20and%20East%20Greenland.pdf
ICES. 2013. Overview on ecosystem, fisheries and their management in Icelandic waters: ICES NWWG REPORT 2013. International Council for the Exploration of the Sea.	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
ICES. 2013. Report of the Workshop on Guidelines for Management Strategy Evaluations (WKGMSE), 21 - 23 January 2013, ICES HQ, Copenhagen, Denmark.	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2013/WKGMSE/Report%20of%20the%20Workshop%20on%20Guidelines%20for%20Management%20Strategy%20Evaluations.pdf
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
ICES. 2017. 2017 Icelandic Waters ecoregion – Ecosystem overview. International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf

ICES. 2017. ICES fisheries management reference points for category 1 and 2 stocks. International Council for the Exploration of the Sea.	http://ices.dk/sites/pub/Publication%20Reports/Guidelines%20and%20Policies/12.04.03.01_Reference_points_for_category_1_and_2.pdf
ICES. 2017. ICES WGBYC REPORT 2017. Report of the Working Group on Bycatch of Protected Species (WGBYC) ICES CM 2017/ACOM:24. Woods Hole, Massachusetts, USA	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGBYC/wgbyc_2017.pdf
ICES. 2017. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 20–24 March 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:25. 121 pp.	http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGDEC/wgdec_2017.pdf
ICES. 2018. 2018 Icelandic Waters ecoregion – Ecosystem overview. International Council for the Exploration of the Sea.	https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/IcelandicWatersEcoregion_EcosystemOverview.pdf
ICES. 2018. Common skate complex (Blue skate (Dipturus batis) and flapper skate (Dipturus intermedius)) in Subarea 6 and divisions 7.a–c and 7.e–k (Celtic Seas and western English Channel). International Council for the Exploration of the Sea.	http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/rjb.27.67a-ce-k.pdf
ICES. 2018. Common skate complex (Blue skate (Dipturus batis) and flapper skate (Dipturus intermedius)) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters). International Council for the Exploration of the Sea.	http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/rjb.27.89a.pdf
ICES. 2018. ICES REPORT WGBYC 2018. Report from the Working Group on Bycatch of Protected Species (WGBYC) ICES CM 2018/ACOM:25. Woods Hole, Massachusetts, USA	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGBYC/wgbyc_2018.pdf
ICES. 2018. ICES WGEF REPORT 2018 Greenland shark Somniosus microcephalus in the Northeast Atlantic. International Council for the Exploration of the Sea.	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGEF/26%20WGEF%20Report%202018_Section%2024%20Greenland%20shark_NEA.pdf
ICES. 2019. Basis for ICES advice. International Council for the Exploration of the Sea. Accessed 20 December 2019.	http://www.ices.dk/community/advisory-process/Pages/Basis-for-ICES-Advice.aspx
ICES. 2019. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports. 1:51. 163 pp. http://doi.org/10.17895/ices.pub.5563	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/HAPISG/2019/ICES%20WGBYC%20Report%202019.pdf
ICES. 2019. Workshop on the benchmark assessment and management plan evaluation for Icelandic haddock and saithe (WKICEMSE). ICES Scientific Reports. 1:10. 107 pp.	http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2019/WKICEMSE/WKICEMSE%20Report%202019.pdf
ICETRA. 2019. Ships and cargoes. Icelandic Transport Authority.	https://www.icetra.is/maritime/ships-and-cargoes/
ICG. 2019. Icelandic Coast Guard home page	http://www.lhg.is/english

ICG. 2019. Icelandic Coast Guard. Accessed 20 December 2019.	http://www.lhg.is/english/
ICG. 2019. The Icelandic Coast Guard "Always Prepared". Icelandic Coast Guard. Accessed 20 December 2019.	http://www.lhg.is/media/LHG80/Landhelgisgasla_Islands_enska2_.pdf
Iglésias S.P., Toulhoat L., Sellos D.Y. 2009. Taxonomic confusion and market mislabelling of threatened skates: important consequences for their conservation status. Aquatic Conservation: Marine and Freshwater Ecosystems. Vol 20, Issue 3.	https://onlinelibrary.wiley.com/doi/abs/10.1002/aqc.1083
Ingólfsson, Ó. A., Einarsson, H. A., & Løkkeborg, S. (2017). The effects of hook and bait sizes on size selectivity and capture efficiency in Icelandic longline fisheries. Fisheries Research, 191, 10–16. doi:10.1016/j.fishres.2017.02.017	https://www.sciencedirect.com/science/article/abs/pii/S0165783617300541
Jaworski A., Ragnarsson S., A. Feeding habits of demersal fish in Icelandic waters: a multivariate approach. ICES Journal of Marine Science, Volume 63, Issue 9, 1 January 2006, pp 1682–1694, https://doi.org/10.1016/j.icesjms.2006.07.003	https://academic.oup.com/icesjms/article/63/9/1682/699283
Kovacs, K.M. 2015. Pagophilus groenlandicus. The IUCN Red List of Threatened Species 2015: e.T41671A45231087. http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T41671A45231087.en	https://www.iucnredlist.org/species/41671/45231087#conservation-actions
Kovacs, K.M. 2016. Cystophora cristata. The IUCN Red List of Threatened Species 2016: e.T6204A45225150. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T6204A45225150.en	https://www.iucnredlist.org/species/6204/45225150
Kulka, D.W., Sulikowski, J., Gedamke, J., Pasolini, P. & Endicott, M. 2009. Amblyraja radiata. The IUCN Red List of Threatened Species 2009: e.T161542A5447511. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161542A5447511.en. Downloaded on 09 April 2019.	https://www.iucnredlist.org/species/161542/5447511#assessment-information
Kyne, P.M., Sherrill-Mix, S.A. & Burgess, G.H. 2006. Somniosus microcephalus . The IUCN Red List of Threatened Species 2006: e.T60213A12321694. https://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T60213A12321694.en.	https://www.iucnredlist.org/species/60213/12321694
Lowry, L. 2016. Phoca vitulina. The IUCN Red List of Threatened Species 2016: e.T17013A45229114. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T17013A45229114.en	https://www.iucnredlist.org/species/17013/45229114
Marine and Freshwater Research Institute 2009. Manuals for the Icelandic bottom trawl surveys in spring and autumn.	https://www.hafogvatn.is/static/research/files/fjolrit-156.pdf

Marine and Freshwater Research Institute 2019 Muppet_HCR: Multi Use Pre Programmed Ecosystem Toolbox.	https://github.com/Hafro/Muppet_HCR
MFRI. 2019. Saithe technical report 2019. Marine and Freshwater Research Institute	https://www.hafogvatn.is/static/extras/images/10%20NWWG%20Report%202019_Sec%2008_Icelandic%20Saithe1141714.pdf
Marine and Freshwater Research Institute Publications	https://www.hafogvatn.is/is/midlun/utgafa/ritaskra
Marine and Freshwater Research Institute. Home page	https://www.hafogvatn.is/en
Marine and Freshwater Research Institute: Listing of Short time closures in real time.	https://www.hafogvatn.is/is/skyndilokanir
MFRI. 2016. Measurements of cod and haddock discharges 2014-2015. HV 2016-003. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/is/midlun/utgafa/haf-og-vatnarannsoknir/maelingar-a-brottkasti-thorsks-og-ysu-2014-2015
MFRI. 2017. 2017 Harbour seal advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/Landselur277.pdf
MFRI. 2017. Aerial census of the Icelandic harbour seal (Phoca vitulina) population in 2016: Population estimate, trends and current status. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/research/files/hv2017-009pdf
MFRI. 2018. 2018 Anglerfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/Skotuselur_2018729534.pdf
U5 cMFRI. 2018. 2018 Icelandic Ecosystem Overview. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/files/Veidiradgjof/2018/vistkerfi_2018.pdf
MFRI. 2018. 2018 Plaice advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/23-Plaice%20(1)1141499.pdf
MFRI. 2018. BYCATCH OF SEABIRDS AND MARINE MAMMALS IN LUMPSUCKER GILLNETS 2014-2017. Marine and Freshwater Research Institute, March 2018.	https://www.hafogvatn.is/static/files/skjol/techreport-bycatch-of-birds-and-marine-mammals-lumpsucker-en-final-draft.pdf
MFRI. 2018. MFRI Organisational Chart. Marine and Freshwater Research Institute. Accessed 20 December 2019.	https://www.hafogvatn.is/static/files/enska/skipurit_hafrannsoknastofnun_enska.pdf
MFRI. 2018. Working Document to ICES Working Group on Widely Distributed Stocks (WGWIDE, No. 05), Havstovan, Tórshavn, Faroe Islands, 28. August – 3. September 2018 Cruise report from the International Ecosystem Summer Survey in the Nordic Seas (IESSNS) 30th of June – 6 th of August 2018.	https://www.hafogvatn.is/static/files/skjol/wd05_iessns_survey_report_2018.pdf
MFRI. 2019. 2019 Anglerfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/14-Anglerfish1141525.pdf

MFRI. 2019. 2019 Atlantic halibut advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/21-AtlanticHalibut1141466.pdf
MFRI. 2019. 2019 Atlantic wolfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/09-AtlanticWolffish%20(1)1141514.pdf
MFRI. 2019. 2019 Blue ling advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/Blalanga_2018729178.pdf
MFRI. 2019. 2019 Demersal beaked redfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/61-DemersalSmentella%20(1)1141508.pdf
MFRI. 2019. 2019 Golden redfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/05-GoldenRedfish%20(1)1141506.pdf
MFRI. 2019. 2019 Greater silver smelt advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/19-GreaterSilverSmelt1141531.pdf
MFRI. 2019. 2019 Greenland halibut advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/22-GreenlandHalibut%20(1)1141512.pdf
MFRI. 2019. 2019 Haddock advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/02-Haddock%20(1)1141504.pdf
MFRI. 2019. 2019 Lemon sole advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/24-LemonSole%20(1)1141520.pdf
MFRI. 2019. 2019 Ling advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/06-Ling1141517.pdf
MFRI. 2019. 2019 Mackerel advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/Makrill1097054.pdf
MFRI. 2019. 2019 Megrim advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/26-Megrim%20(1)1141522.pdf
MFRI. 2019. 2019 Norway lobster advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/040-Humar1118193.pdf
MFRI. 2019. 2019 Saithe advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/03-Saithe%20(1)1141505.pdf
MFRI. 2019. 2019 Spotted wolffish technical report. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish_TR1141496.pdf
MFRI. 2019. 2019 Spotted wolfish advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/13-SpottedWolffish%20(1)1141515.pdf
MFRI. 2019. 2019 Starry ray advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/12-StarryRay1141533.pdf

MFRI. 2019. 2019 Tusk advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/08-Tusk1141519.pdf
MFRI. 2019. 2019 Witch advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/25-Witch%20(1)1141521.pdf
MFRI. 2019. 2019 Witing advice. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/04-Whiting1141527.pdf
MFRI. 2019. By-catch of birds and marine mammals in the Icelandic lumpfish fishery in 2014-2018. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/extras/images/hrognkelsi_20191128223.pdf
MFRI. 2019. Marine and Freshwater Research Institute. Accessed 20 December 2019.	https://www.hafogvatn.is/en/about/mfri
Ministry of Industries and Innovation. Atvinnuvega- og nýsköpunarráðuneyti:	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/20213
MRI. 2010. Manuals for the Icelandic bottom trawl surveys in spring and autumn. Hafrannsóknir nr. 156. Marine Research Institute.	http://www.hafro.is/Bokasafn/Timarit/fjolrit-156.pdf
MRI. 2019. LANDSELUR – HARBOUR SEAL Phoca vitulina advice. Marine Research Institute.	https://www.hafogvatn.is/static/extras/images/utselur_20191125514.pdf
MRI. 2019. ÚTSELUR – GREY SEAL Halichoerus grypus advice. Marine Research Institute.	https://www.hafogvatn.is/static/extras/images/landselur_191145061.pdf
Muppet_HCR: Multi Use Pre Programmed Ecosystem Toolbox.	Requires sign in to GitHub. This is a site under development.
NAFO. 2019. Northwest Atlantic Fishery Organisation.	http://www.nafo.int/
NAFO. 2019. Northwest Atlantic Fishery Organisation.	http://www.nafo.int/
NAFO. 2019. Northwest Atlantic Fishery Organisation. Accessed 20 December 2019.	https://www.nafo.int/About-us/History
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
NAMMCO 2019. North Atlantic Marine Mammal Commission	http://www.nammco.no/
NAMMCO. 2017. Iceland PROGRESS REPORT ON MARINE MAMMALS IN 2017, NAMMCO/ 26/NPR-I-17.	https://nammco.no/wp-content/uploads/2018/07/report_by-catch_wg_may_2017.pdf
NAMMCO. 2018. Report of the 25th Scientific Committee Meeting, 13-16 November, Norway.	https://nammco.no/wp-content/uploads/2017/01/sc-report-2018_270519_cor250619_rec-walrus.pdf
NAMMCO. 2019. Iceland Progress Report on Marine Mammals in 2018. Compiled by Marine and Freshwater	https://nammco.no/wp-content/uploads/2019/04/2018-iceland_progress_report_final2.pdf

Research Institute (MFRI), Reykjavík Iceland. North Atlantic Marine Mammal Commission.	
NAMMCO-North Atlantic Marine Mammal Commission (2018) Report of the NAMMCO Scientific Working Group on By-catch. Available at https://nammco.no/topics/sc-working-group-reports/	https://nammco.no/wp-content/uploads/2019/01/bycwg-october_2018_final-report_291118.pdf
National Audit Office. 2018. Monitoring of the Directorate of Fisheries. Report to Parliament. Icelandic National Audit Office, December 2018.	https://rikisendurskodun.is/wp-content/uploads/2019/01/Eftirlit-Fiskistofu-Stjornsysluuttekt.pdf
NEAFC. 2019. North East Atlantic Fisheries Commission.	http://www.neafc.org/
NEAFC. 2019. North East Atlantic Fisheries Commission. Accessed 20 December 2019.	https://www.neafc.org/about
NI. 2019. Æður (Somateria mollissima). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27107
NI. 2019. Álka (Alca torda). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27099
NI. 2019. Dílaskarfur (Phalacrocorax carbo). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27105
NI. 2019. Fýll (Fulmarus glacialis). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/26962
NI. 2019. Hnísa (Phocoena phocoena). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27406
NI. 2019. Landselur (Phoca vitulina). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27368
NI. 2019. Langvía (Uria aalge). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27097
NI. 2019. List of Mammals. Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/midlun/utgafa/valistar/spendyr/valisti-spendyra
NI. 2019. Lundi (Fratercula arctica). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27101
NI. 2019. Súla (Morus bassanus). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27100
NI. 2019. Útselur (Halichoerus grypus). Icelandic Natural Organisation. Accessed 20 December 2019.	https://www.ni.is/node/27369
NOVASARC. 2013. Nordic Project On Vulnerable Marine Ecosystems And Anthropogenic Activities In Arctic And Sub-Arctic Waters. Second workshop in 2017 20 – 24 November in Torshavn, Færøyene.	https://novasarc.hafogvatn.is/docs/NovasArc_report_workshop_4.pdf

NOVASARC. 2019. Nordic Project On Vulnerable Marine Ecosystems And Anthropogenic Activities In Arctic And Sub-Arctic Waters. Accessed 20 December 2019.	https://novasarc.hafogvatn.is/project/
Ólafur K. Pálsson, Höskuldur Björnsson, Ari Arason, Eyþór Björnsson, Guðmundur Jóhannesson and Þórhallur Ottesen. Discards in demersal Icelandic fisheries 2007. Marine Research Institute, report series no. 142.	https://www.hafogvatn.is/static/research/files/fjolrit-142pdf
Ólafur K. Pálsson, Þorvaldur Gunnlaugsson and Droplaug Ólafsdóttir. 2015. By-catch of sea birds and marine mammals in Icelandic fisheries. Marine and Freshwater Research Institute.	https://www.hafogvatn.is/static/research/files/fjolrit-178pdf
Polar Fishing Gear. 2019. Bottom trawl doors. Polar Fishing Gear, Grandagardur 16 / IS-101 Reykjavik / Iceland. Accessed 20 December 2019.	http://polardoors.com/trawl-doors/bottom-trawl-doors/
Promote Iceland. 2019. Fisheries. Accessed 20 December 2019.	https://www.iceland.is/trade-invest/fisheries
Ragnarsson, S. (2003). Spatial distribution of otter trawl effort in Icelandic waters: comparison of measures of effort and implications for benthic community effects of trawling activities. ICES Journal of Marine Science, 60(6), 1200–1215. doi:10.1016/s1054-3139(03)00143-7	https://academic.oup.com/icesjms/article/60/6/1200/652072
Reglugerð um möskvastærðir- og útbúnað varpna til veiða á botnfiski, rækju og humri. (Regulation 543/2002 on mesh size in bottom trawl)	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavaroglandbunadar/nr/4032
Reglugerd. 2002. Regulation No. 543, July 22, 2002, on mesh sizes and equipment for catching bottomfish, shrimp and lobster. The Ministry of Industry and Innovation. Accessed 20 December 2019.	https://www.reglugerd.is/reglugerdir/allar/nr/543-2002
Reglugerd. 2006. Regulation 115/2006 on cod fishing. The Ministry of Industry and Innovation. Accessed 20 December 2019.	https://www.reglugerd.is/reglugerdir/allar/nr/115-2006
Reglugerd. 2006. Regulation 202/2016 on lumpfish fishing. The Ministry of Industry and Innovation. Accessed 20 December 2019.	http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/20032
Reglugerd. 2014. Regulation amending Regulation no. No. 557, June 6, 2007, on catch books, with subsequent amendments no. 126/2014. The Ministry of Industry and Innovation.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/sjavarutvegsraduneyti/nr/18967
Reglugerd. 2016. Regulation 745/2016 on weighing and registration of marine catch. The Ministry of Industry and Innovation. Accessed 20 December 2019.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0745-2016

Reglugerd. 2018. Ban on fishing for spiny dogfish, Porbeagle sharks and Basking shark no. 456/2017. Ministry of Fisheries and Agriculture.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/0456-2017
Reglugerd. 2018. Regulation on halibut hunting no. 470/2012. Ministry of Fisheries and Agriculture.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/18302
Reglugerd. 2019. Regulation amending the Regulation on the practices of the Registry of Vehicles, no. 79 January 30, 1997. Ministry of Justice.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/domsmalaraduneyti/nr/1154
Reglugerd. 2019. Regulation on commercial fishing in the fishing year 2019/2020. Ministry of Industry and Innovation. Accessed 20 December 2019.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/21565
Reglugerd. 2019. Regulation on mesh sizes and equipment no. 543/2002. Ministry of Justice. Accessed 20 December 2019.	https://www.reglugerd.is/reglugerdir/allar/nr/543-2002
Regulation 752/2005: 'On the Control of the Search and Rescue in the Search and Rescue Region of Iceland For a Maritime- and Aeronautical Rescue'.	https://www.reglugerd.is/reglugerdir/eftir-raduneytum/samgonguraduneyti/nr/10355
Results of a working group for auditing a regulatory framework for the use of fishing gear, fishing grounds and protection areas in Icelandic waters - final report to the Minister of Fisheries and Agriculture. 2018	https://www.stjornarradid.is/lisalib/getfile.aspx?itemid=0b53db18-ba77-11e8-942c-005056bc530c
Seafish. 2019. Gillnets. Seafish. Accessed 20 December 2019.	https://www.seafish.org/gear/gear/profile/gill-nets
Seafish. 2019. Longline. Seafish. Accessed 20 December 2019.	https://www.seafish.org/gear/gear/profile/long-line
Seafish. 2019. Semi-Pelagic Trawl. Seafish. Accessed 20 December 2019.	https://seafish.org/gear-database/gear/semi-pelagic-trawl/
Seaiceland. 2019. Greenland Shark. Accessed 20 December 2019.	https://seaiceland.is/what/fish/sharks-and-skates/greenland-shark
Sigurðsson, G. M., Pálsson, Ó. K., Björnsson, H., Hólmgeirsdóttir, Á. E., Guðmundsson, S., and Ottesen, Þ. 2016. Discards of cod and haddock in demersal Icelandic fisheries 2014-2015. HV- 2019-26.	https://www.hafogvatn.is/static/research/files/hafogvatn2016_003.pdf
Sobel, J. 1996. Hippoglossus hippoglossus. The IUCN Red List of Threatened Species 1996: e.T10097A3162182. http://dx.doi.org/10.2305/IUCN.UK.1996.RLTS.T10097A3162182.en.	https://www.iucnredlist.org/species/10097/3162182
Statice. 2019. Statistic Iceland. Business Sector–Fisheries. Accessed 20 December 2019.	https://www.statice.is/statistics/business-sectors/fisheries/

Stjornarradid. 2019. Fisheries Management 2019/2020 - Laws and Regulations. Ministry of Industries and Innovation. Accessed 20 December 2019.	https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/09/13/Stjorn-fiskveida-2019-2020-Log-og-reglugerdir/
Stjornartidind. 2019. Regulation 1012/2013 on trap fishing. Ministry of Justice. Accessed 20 December 2019.	https://www.stjornartidindi.is/Advert.aspx?RecordID=024102ac-de04-45ce-99e3-5e83af6d6aae
Stjornartidind. 2019. Regulation 1070/2015. Ministry of Justice. Accessed 20 December 2019.	http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/19883
Stjornartidind. 2019. Regulation No. 923/2010 on monkfish fishing. Ministry of Justice. Accessed 20 December 2019.	https://www.stjornartidindi.is/Advert.aspx?RecordID=437308e0-8ad1-4009-98cb-10266317ed3e
Stjornartidindi. 2016. Regulation on logbooks No. 746/2016. Accessed 20 December 2019.	https://www.stjornartidindi.is/Advert.aspx?RecordID=42a16a67-60a7-4ae7-ad7c-0f53fc254654
Stjornartidindi. 2018. Regulation 674/2018. Accessed 20 December 2019.	https://www.stjornartidindi.is/Advert.aspx?RecordID=4819cdde-0a89-4f80-b21a-46bb071dd15f
Sturludottir, E., Desjardins, C., Elvarsson, B., Fulton, E. A., Gorton, R., Logemann, K., and Stefansson, G. 2018. End-to-end model of Icelandic waters using the Atlantis framework: Exploring system dynamics and model reliability. Fisheries Research, 207: 9–24.	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
Thyboron. 2019. Semipelagic trawldoors. Thyborøn Skibssmedie A/S, Denmark. Accessed 20 December 2019.	http://thyboron-trawldoor.dk/products/semipelagic-trawldoors/
Um friðun hrygningarþorsks og skarkola á vetrarvertíð. (Maps showing permanent closures to protect spawning cod and plaice according to regulation 30/2005)	https://www.slideserve.com/abel/regluger-nr-30-2005-um-fri-un-hrygningar-orsks-og-skarkola-vetrarvert
UN. 1992. Agenda 21 of the Rio Declaration. A/CONF.151/26 (Vol. IV). United Nations. Accessed 20 December 2019.	http://www.un.org/documents/ga/conf151/aconf15126-4.htm
UN. 2018. Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements. United Nations.	https://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm
UN. 2019. Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements. United Nations. Page last updated: 08/04/2019	https://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm
UN. 2019. Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements. United Nations. Page last updated: 08/04/2019	https://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm

United Nations. Institutional Aspects of Sustainable Development in Iceland	https://www.un.org/esa/agenda21/natlinfo/countr/iceland/inst.htm
UNU. 2009. A MODEL OF TRACEABILITY OF FISH PRODUCTS FOR THE DOMESTIC MARKET IN CHINA BASED ON TRACEABILITY STUDIES IN ICELAND AND CHINA. Mechanical Engineering Institute, Dalian Fisheries University. Updated 20 September 2019	http://www.unuftp.is/static/fellows/document/pan09prf.pdf
UST. 2001. Regulation on hydrothermal vents nr. 249/2001.	https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/hverastrytur_eyjafirdi_249_2001.pdf
UST. 2007. Regulation on hydrothermal vents nr. 510/2007.	https://www.ust.is/library/Skrar/Einstaklingar/Fridlyst-svaedi/Auglysingar/Hverastrytur_Arnarnesnofum_kort.pdf
Vonin. 2019. Storm - Semi Pelagic Trawl Door. Vónin // Bakkavegur 66 // FO-530 Fuglafjørður // Faroe Islands	https://www.vonin.com/en/fishing/trawl-doors/semi-pelagic-trawl-doors/storm-semi-pelagic-trawl-door/

13. Appendix 1. Assessment Team Bios

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

Vito Romito (Lead Assessor)
Vito has almost 10 years of expertise in fisheries certification. He's an ISO14001 Certified Lead Auditor and MSC FCR v.2.0 and FCP v.2.1 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 worked for a year in Tanzania, carrying out comparative biodiversity assessments of pristine and dynamited coral reef 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 fishery assessments in Alaska, Iceland and Louisiana. Vito has also carried out several 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 assessments involving 40+ different species including salmonid, groundfish, pelagic, flatfish, crustacean and cephalopod species in Europe, North and South America, and SE Asia. For three years, as a senior fisheries consultant and then manager with RS Standards Ltd., he was involved in the development and testing of a Data Deficient Fisheries framework and v.2.0 fisheries standard for the ASMI Alaska RFM Scheme, and IFFO RS Improver/FIP projects related to South East Asia multispecies bottom trawl fisheries. Vito re-joined the SAI Global Fisheries Team in 2018 and has since been involved in fisheries assessments in the Baltic Sea, Canada, Iceland, Alaska and Louisiana.

Dankert Skagen, MD, (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.

Sveinn Agnarsson, PhD, (Assessor)
Dr. Sveinn Agnarsson holds undergraduate degrees in history and economics from the University of Iceland, and a Phd in economics from Gothenburg University, Sweden. He joined the Institute of Economic Studies (IoES), University of Iceland in 1997, and in 2010 became director of the Institute. Since 2012, Agnarsson has held a position as Associate Professor at the School of Business, University of Iceland where he teaches on Icelandic fisheries and economics. Sveinn has worked on numerous fisheries projects, both Icelandic and international, including the EU-financed projects on fisheries, Deepfishman and Ecofishman, as well as MareFrame, PrimeFish and ClimeFish. In the past 20 years he has published extensively on topics regarding economics and fishery resource management in Iceland, the Faroese, Europe and internationally. His other areas of interest include regional development and economic history.

14. Appendix 2. Peer Review Team Bios

Dr. Giuseppe Scarcella

Giuseppe Scarcella is an experienced fishery scientist and population analyst and modeller, with wide knowledge and experience in the assessment of demersal stocks. He is author and co-author of more than 30 scientific papers in peer reviewed journals and more than 150 national and international technical reports, most of them focused on the evolution of fish assemblages in artificial habitats and stock assessment of demersal species. He holds a first-class degree in Marine Biology and Oceanography (110/110) from the Unversità Politecnica delle Marche, Italy, and a Ph.D. in marine Ecology and Biology from the same university, based on a thesis "Age and growth of two rockfish in the Adriatic Sea". In 2008 he was offered a job as project scientist in several research programs about the structure and composition of fish assemblage in artificial reefs, off-shore platform and other artificial habitats in the Italian Research Council – Institute of Marine Science of Ancona (CNR-ISMAR). During the years of employment at CNR-ISMAR he has gained experience in benthic ecology, statistical analyses of fish assemblages evolution in artificial habitats, fisheries ecology and impacts of fishing activities, stock assessment, otholith analysis, population dynamics and fisheries management. During the same years he attended courses of uni-multivariate statistics and stock assessment. He is also actively participating in the scientific advice process of FAO GFCM in the Mediterranean Sea. At the moment he is member of the Scientific, Technical and Economic Committee for Fisheries for the European Commission (STECF). Giuseppe has been involved in MSC assessments in Iceland (e.g. ISF Greenland Halibut, ISF lemon sole) as well as RFM assessments in Alaska (e.g. Atka mackerel and rockfish fishery, Flatfish complex) as a stock assessment expert.

Dr. Geir Hønneland

Dr. Geir Hønneland is Director at the Fridtjof Nansen Institute in Oslo, Norway, and adjunct professor at the University of Tromsø, Norway. He holds a PhD in political science from the University of Oslo and has studied international fisheries management (with main emphasis on compliance issues), international environmental politics and international Arctic politics. Among his recent books are Arctic Politics, the Law of the Sea and Russian Identity(Palgrave, 2014), Making Fishery Agreements Work (Edward Elgar, 2012), International Environmental Agreements (Routledge, 2011), Arctic Politics and International Cooperation (Routledge, 2007) and Law and Politics in Ocean Governance: the UN Fish Stocks Agreement and Regional Fisheries Management Regimes (Martinus Nijhoff,2006). He worked in the Norwegian Coast Guard from 1988 to 1994, where he was certified as a fisheries inspector. Geir also has a wide range of evaluation and consultancy experience, e.g. for the FAO and OECD, relating to responsible fisheries management. He has been involved in MSC assessments since 2009 (covering cod, blue whiting, haddock, herring, mackerel and shrimp fisheries in the Northeast Atlantic and krill in the Southern Ocean) and was certified as MSC Team Leader in 2014. Geir has also been involved in IRFM demersal/pelagic fisheries assessments since 2019.

Deirdre Hoare

Deirdre Hoare is an independent fisheries consultant with more than 10 years of experience working in a wide range of projects associated with marine biodiversity and the sustainable use of living aquatic resources. Her principal area of expertise is in relation to stock assessment and ecosystem impacts of both artisanal and commercial fisheries. Her work currently involves evaluation and verification of fisheries management and sustainability against international standards. She also performs fish stock assessments, evaluates data and outlines the limitations. From 2005 to 2010 she worked as a Fisheries Assessment Analyst and as a Scientific and Technical Officer for the Marine Institute in Ireland. This work involved fisheries research and stock assessment for ICES working groups. The work also involved coordination and management of a Fisher Self sampling program in the Irish Sea, with particular emphasis on spatial and temporal discard measurement tools. As well as having worked as a researcher, she completed many trips on commercial fishing vessels in the capacity of scientific observer in the NAFO area, North West Atlantic and Irish Coast. She has also experience on finfish and shellfish aquaculture that she gained working in Scotland. She has been involved with FAO

Responsible Fisheries Management and Marine Stewardship Council assessments in both Iceland, Alaska and Ireland.

