



**FAO-BASED RESPONSIBLE FISHERIES MANAGEMENT
CERTIFICATION FULL ASSESSMENT AND CERTIFICATION REPORT**

For The

Icelandic Cod Commercial Fishery

Applicant Group

The Federation of Icelandic Fishing Vessel Owners (LÍÚ)

The Federation of Icelandic Fish Processing Plants (SF)

The National Association of Small Boat Owners, Iceland (NASBO)

Facilitated by

Fisheries Association of Iceland

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Table of Contents

- I. Summary and Recommendations 4
- II. Schedule of Key Assessment Activities 7
- III. Assessment Team Details..... 8
- IV. Acronyms..... 9
- 1. Introduction 10
 - 1.1 Recommendations of the Assessment Team 11
- 2. Fishery Applicant Details 12
- 3. Background to the Fishery 13
 - 3.1 Species Biology 13
 - 3.2 Fishery Location and Method 15
 - 3.3 Fishery Management History and Organization..... 22
 - 3.4 Stock Assessment Activities..... 23
 - 3.5 Historic Biomass and Removals in the Fishery 24
 - 3.6 Economic Value of the Fishery 26
- 4. Proposed Units of Assessment 29
- 5. Consultation Meetings 30
 - 5.1 On-Site Witnessed Assessment and Consultation Meetings 30
- 6. Assessment Outcome Summary 33
 - Section 1: Fisheries Management 33
 - Section 2: Compliance and Monitoring 37
 - Section 3: Ecosystems Considerations 40
 - 6.1 Conformity Statement..... 41
- 7. Fishery Assessment Evidence..... 42
 - Section 1: Fishery Management 42
 - 1.1 Fisheries Management System and Plan for stock assessment, research, advice and harvest controls..... 42
 - 1.2 Research and Assessment..... 66
 - 1.3.1 The precautionary approach..... 81
 - 1.3.2.1 Harvesting rate and fishing mortality 87
 - 1.3.2.2 Stock biomass 88
 - 1.3.2.3 Stock biology and life-cycle (Structure and resilience)..... 91
 - 1.4. External scientific review 97
 - 1.5 Advice and Decisions on TAC..... 99
 - SECTION 2: COMPLIANCE AND MONITORING 106
 - 2.1 Implementation, compliance, monitoring, surveillance and control 106
 - 2.2 Concordance between actual catch and allowable catch. 109
 - 2.3.1 Vessel registration and catch quotas..... 113
 - 2.3.2 Fishing vessel monitoring and control systems 115
 - 2.3.3 Catches are subtracted from relevant quotas..... 122
 - 2.3.4 Rules are enforced 124
 - 2.3.5 Analysis is carried out 125

SECTION 3: ECOSYSTEM CONSIDERATIONS 127

 3.1 Guiding principle..... 127

 3.2.1 Information gathering and advice 168

 3.2.2 By-catch and discards 173

 3.2.3 Habitat Considerations 180

 3.2.4 Considerations 190

8. External Peer Review..... 192

9. Non-Conformances and Corrective Actions..... 223

10. Recommendation and Determination 225

11. References..... 226

Appendix 1 234

Appendix 2 236

I. Summary and Recommendations

The Fisheries Association of Iceland on behalf of the organisations named [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 assessment of the Icelandic Cod commercial fishery to the FAO-Based Icelandic Responsible Fisheries Management (IRFM) Certification Program.

The initial application for Full Assessment was made in November 2013. Assessment commenced in February 2014 with the fishery review before proceeding to Full Assessment in March 2014 and final certification determination recorded on Tuesday, October 7th 2014.

The certification covers the Iceland cod (*Gadus morhua*) commercial fishery employing demersal trawl, Danish seine net, gillnet, longline, hook and line, and gears from other Iceland fisheries also landing cod (indirectly) under the management of the Icelandic Ministry of Industries and Innovation and by international agreement, a very small number of Faroese and Norwegian vessels.

The full assessment (**report code ICE/COD/001/2013**) was conducted according to the Global Trust Certification procedures for FAO – Based Icelandic Responsible Fisheries Management Certification using the FAO – Based IRFM Specification (version 1, revision 1) as the standard for assessment.

The assessment was conducted by a team of Global Trust appointed Assessors comprising three externally contracted fishery expert and Global Trust internal staff. Details of the assessment team are provided in Appendix 1. Peer Reviewer details are provided in Appendix 2.

The main key outcomes have been summarized in **Section 6 “[Assessment Outcome Summary](#)”**.

Recommendation of the Assessment Team

The assessment team recommends that the management system of the applicant fishery, the Icelandic Cod (*Gadus morhua*) commercial fishery fished within the 200 mile Icelandic Exclusive Economic Zone (EEZ) by all Icelandic registered vessels using all gear types directly (demersal trawl, long-line, Danish seine net, gill net, hook and line) and indirectly (Nephrops trawl, shrimp trawl and pelagic trawl), under the management of the Icelandic Ministry of Industries and Innovation, is awarded certification to the FAO-Based Icelandic Responsible Fisheries Management Certification Programme.

Peer Reviewers Summaries and Recommendations

Peer Reviewer A Comments and Recommendations

Having reviewed the assessment carried out on the Icelandic Cod Fishery I am in support of the assessors view that certification should be awarded. Where I have made critical comments I believe most of these can addressed by clarifying the evidence already presented.

The ecosystem effects of the cod fishery have been thoroughly explored and, where a deficiency has been noted, processes have been put in place to fill this gap within the next year. The compliance and enforcement measures in effect for this stock have been comprehensively set out and clearly provide a robust and flexible suite of tools for the management of the stock, with a good balance of carrot (e.g. carry-over of quota from year to year, ITQs, constraint on the magnitude of TAC change, etc.) and stick (e.g. at-sea inspections, catch traceability, VMS / e-logbooks, real-time closures to protect juveniles, etc.) measures.

The section describing the management objectives is a little more mixed. The information going into the assessment and the assessment itself are clearly described and fit for purpose. An agreed management plan has been in place for several years, and the goals and objectives of this plan meet all the criteria set out in the clauses of the document, however the response is a little confused on some areas and needs a bit of cleaning up to make this more apparent. The plan has been assessed by ICES as being precautionary, with a low risk of the stock being reproductively impaired in the medium term (i.e. within the duration of the management plan). Biological limit reference points have been established by empirical means: B_{lim} is set at the lowest observed spawning stock biomass, a proxy B_{pa} is a trigger value established by the management plan at roughly twice the limit level, levels of fishing mortality and biomass consistent with maximum sustainable yield are not well known, however the F_{target} implied by the $0.2B_{4+}$ harvest control rule is a conservative value therefore F_{lim} and F_{pa} are not required. Sections 1.1.6 and 1.1.7 in particular need some revision to highlight these facts more clearly. It is unfortunate that we are conducting this exercise in the final year of a five-year harvest control rule, when the rule for the years ahead has not yet been agreed, but should it be along the lines of what is currently in place, I would have no hesitation in endorsing the certification of this stock.

The background information presented on the fishery provides a clear context in which the assessment can be framed. Citations are provided for sources of evidence. Where I have indicated no comment I believe the assessment team have done a comprehensive job and I have nothing to add.

Peer Reviewer B Comments and Recommendations

The report contains adequate description of the biology of cod and the status of the stock (past and present), also the fishery and its management.

It would be helpful to have a summary table to give an overview of confidence ratings assigned to sections and clauses. Section 1 (management) was assigned high scoring in evidence rating and conformance for all clauses and the same was for section 2 (compliance and monitoring). One clause in section 3 (ecosystem considerations) received medium evidence rating and minor non-conformance, clause 3.1.1, but the rest received high score.

The information presented for management (section 1) and compliance and monitoring (section 2) provide sufficient information to support a broad understanding of the general history, development and main management entities and management systems in use by the fishery. I support the confidence ratings assigned to clauses in sections 1 and 2.

The proposed unit of certification includes six types of fishing gear (subunits) which differ in level of impacts on non-target species and benthic habitats. Therefore, the information in section 3 (ecosystem considerations) should be presented accordingly and the impact of individual gear assessed independently. This might result in different ratings by gear for evidence and conformance. It is argued that medium confidence rating should be given for clause 3.1.1 (all gears), 3.1.2 (demersal trawl), 3.2.2.2 (gillnets) and 3.2.3.1 (demersal trawl).

II. Schedule of Key Assessment Activities

Assessment Activities	Date (s)
Application Date	November 2013
Appointment of Full Assessment Team	March 2014
On-site Witnessed Assessment and Consultation Meetings	April 2014
Draft Assessment Report	June 2014
External Peer Review	July 2014
Final Assessment Report	August 2014
Certification Review/Decision	October 2014

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IV. Acronyms

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}	The biomass that can produce the maximum sustainable yield
B4+	Biomass of 4 years and older fish
EEZ	Exclusive Economic Zone
EU	European Union
FAO	United Nations Food and Agriculture Organization
FMP	Fishery Management Plan
HCR	Harvest Control rule
ICES	International Council for the Exploitation of the Sea
ICG	Icelandic Coast Guard
ITQ	Individual Transferable Quota
IWC	International Whaling Commission
kt	kilo tonnes
MII	Ministry of Industries and Innovation
MRI	Marine Research Institute
MSY	Maximum Sustainable Yield
NAFO	North Atlantic Fisheries Organization
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
$SSB_{trigger}$	The spawning stock biomass level that acts as a trigger when the stock fall below a certain level
TAC	Total Allowable Catch
VMS	Vessel monitoring system
VMEs	Vulnerable Marine Ecosystems

1. Introduction

The Icelandic cod commercial fishery [defined as the Icelandic cod fishery pursued within the 200 mile Icelandic Exclusive Economic Zone (EEZ), fished by all Icelandic registered vessels using all gear types directly and indirectly under the management of the Icelandic Ministry of Industries and Innovation] was assessed against the requirements of the FAO-Based Icelandic Responsible Fisheries Management (IRFM) Certification Programme. The application was made by the Fisheries Association of Iceland and representative organisations on behalf of the fishery and was validated as appropriate representative bodies on behalf of fishery management organisations and interests.

The assessment was conducted according to the Global Trust procedures for FAO – Based IRFM certification using the Icelandic Responsible Fisheries Management Specification (Version 1, Revision 1, March 2014). The IRFM Specification 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, in particular the 1982 UN Convention on the Law of the Sea, the 1995 UN Fish Stocks Agreement, related documentation including the 2001 Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem, as well as various other relevant documents from ISO and other sources.

The Certification and Accreditation Programme is based on internationally accredited, ISO/IEC 17065 Standards, which assure consistent, competent and independent certification practices.

ISO/IEC 17065 accreditation by an IAF (International Accreditation Forum) Accreditation body (formally awarded in September 2014) gives the Programme recognition 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.

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 requirements under 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 assessment comprised stages of application, application review, literature review, assessment planning, full assessment, peer review and certification. One site visit was made to the fishery during full assessment in April 2014. Assessors comprised of both external contracted fishery consultants and Global Trust internal staff. This report is the final report of the assessment and documents each step in the assessment process. It contains the proposed recommendation made by the assessment team to the certification committee of Global Trust who presided over the certification decision according to the requirements of ISO65 accredited certification. The assessment team has confirmed the recommendation post the peer review stage in the assessment. Any omissions/comments/critique noted by the peer reviewers were rectified by the assessment team in this final version of the full assessment report. Responses to the peer reviewer’s comments are detailed in the peer review reports in section 8.

1.1 Recommendations of the Assessment Team

The assessment team recommends that the management system of the applicant fishery, the Icelandic Cod (*Gadus morhua*) commercial fishery fished within the 200 mile Icelandic Exclusive Economic Zone (EEZ) by all Icelandic registered vessels using all gear types directly (demersal trawl, long-line, Danish seine net, gill net, hook and line) and indirectly (Nephrops trawl, shrimp trawl and pelagic trawl), under the management of the Icelandic Ministry of Industries and Innovation, is awarded certification to the FAO-Based Icelandic Responsible Fisheries Management Certification Programme.

2. Fishery Applicant Details

Applicant Contact Information			
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3. Background to the Fishery

Cod is Iceland's most valuable fish resource, and since fisheries are the backbone of Iceland's economy, surveillance and management of this stock is a high priority issue that has been developed and refined over many years.

3.1 Species Biology

Cod (*Gadus Morhua*) is a medium life span gadoid that grows to well over a meter and 10-20 kg or more. It matures typically at ages 7-9. The assumed natural mortality is 0.2, and the Figure 1 below shows the typical weights at age and maturity at age.

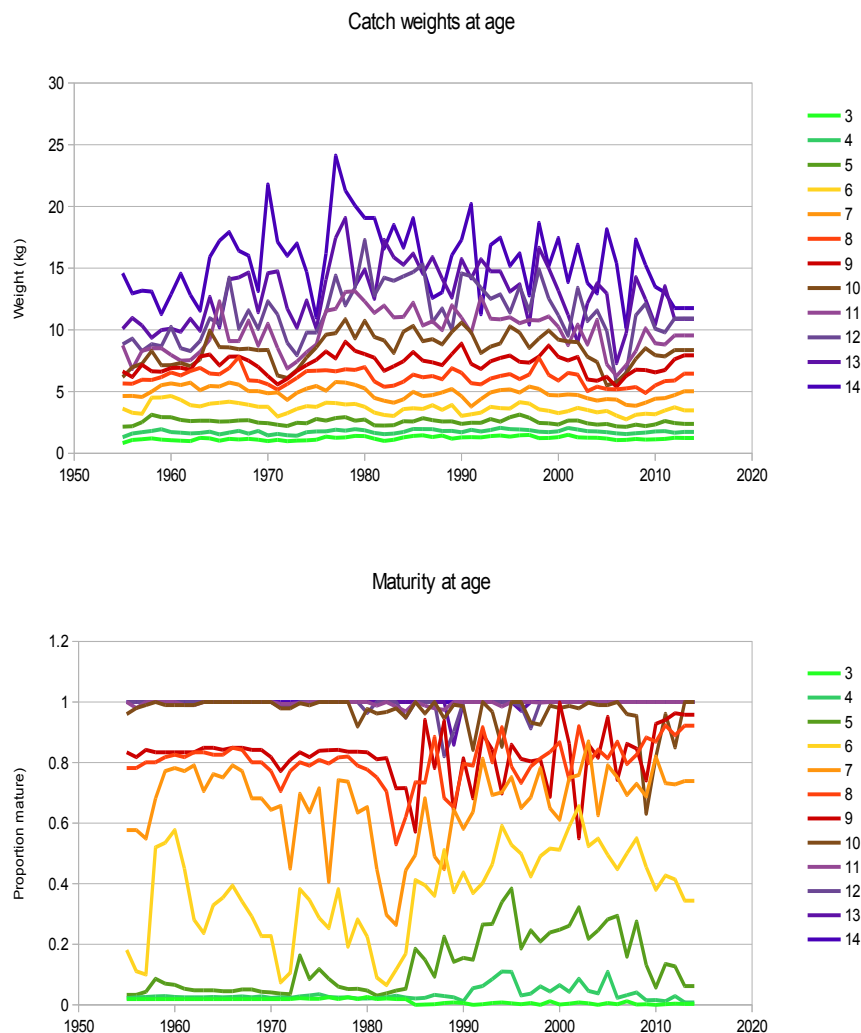


Figure 1. Weight at age in the catch (left) and proportion mature at age (right). Figure made from Tables 9.2.3 and 9.2.5 in NWWG 2013.

Cod comes gradually into the fishery at ages 4-6, and there are regulations (mesh size 130-155 mm in the trawl fisheries and active use of closed areas) to minimize catch of younger fish. Figure 2 shows the fishing mortality at age according to the assessment in 2013.

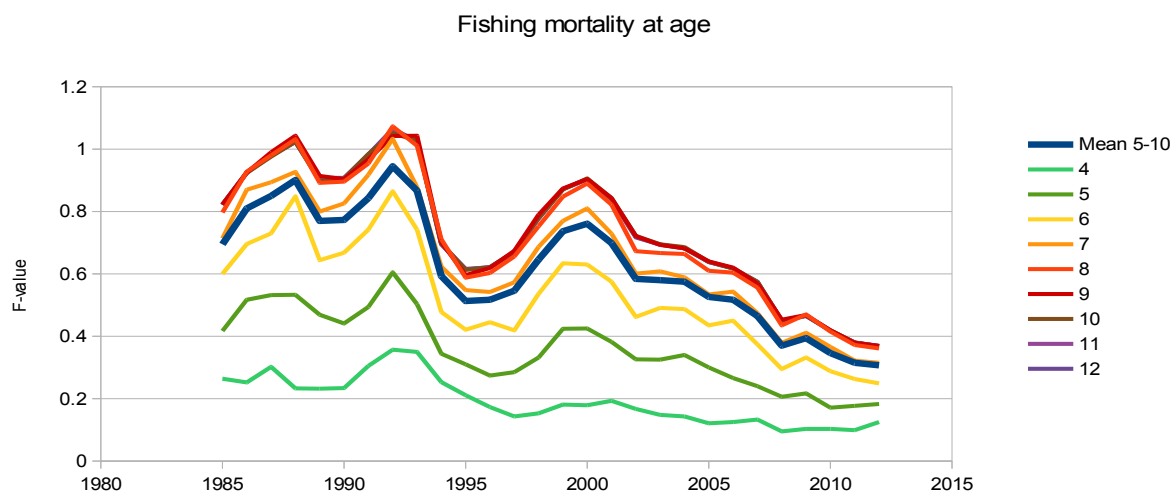


Figure 2. Fishing mortality at age, as assessed by NWWG in 2013. Figure made from Table 9.4.4 in NWWG 2013.

Cod is an omnivorous predator in the ecosystem, with capelin, shrimps, sandeel and smaller crustaceans as important prey. The weight at age of Icelandic cod has varied with the capelin abundance, although that relation has been less apparent in recent years. The shrimp stock seems to be sensitive to the cod abundance (http://www.hafro.is/undir_eng.php?ID=12&REF=2). Adult cod may potentially be prey for sea mammals, although the impact is not known. Apart from that, cod is not a prey species in the system.

The cod in Icelandic waters is considered as a local stock, with minor exchange with other cod stocks. Its distribution is confined to the Icelandic shelf. For practical purposes, it coincides with the Icelandic EEZ and with ICES Division Va, although these areas are not exactly equal. There is no fishery on Icelandic cod of any importance outside the Icelandic EEZ. Tagging data have revealed some traffic between Iceland and the Faroes, which is considered of minor importance (Neuenfeldt & al, 2013). There is however, some exchange with Greenland waters. Some larvae drift over to Greenland, and adult cod may in occasional years migrate from Greenland to Iceland (NWWG 2013). The last recognizable migration event was made by the 2002 and 2003 year classes in 2009. The management does not assume such migration every year. When it happens, it is taken as a bonus.

There are some indications of diversity in stock structure. A slight but significant genetic difference has been observed between the cod spawning in the northern waters vs cod spawning in the southern waters (Pampoulie et al 2007) and there are indications that different behavioural type (shallow vs. deep migration) may be found within cod spawning in the same areas (Pampoulie et al 2008). Both these information indicate that management measures operating on a finer scale may be warranted (NWWG 2013), but for practical purposes it is presently managed as a single homogenous stock.

Cod is found all around the Iceland. The main spawning grounds are in the South-West with spawning in late winter, and from there, the larvae drift clockwise to the nursery areas on the North

coast. The hydrographic conditions around Iceland have changed over the last 15-20 years, with increased inflow of Atlantic water, leading to higher temperatures and salinity. The capelin stock has shifted northwards and may be less available as food for the cod. Weight at age of cod was negatively correlated with capelin abundance previously, but this relation is less apparent in recent years. Recruitment of cod has not appeared to be sensitive to the changes in hydrography so far.

The food of cod is very diverse, and this might be one of the reasons for its success. The main food of the juveniles is various zooplankton species; the most important being copepods, krill and capelin larvae. When it grows larger and starts a demersal existence, the main food becomes various benthic invertebrates. At the size of 20 to 30 cm the main food is northern shrimp, although many other prey species are also found in the diet. At larger size an increasing share becomes other fishes, mainly capelin, when cod is up to about 90 cm in length. At a later stage, however, many larger species are added to the diet, such as redfishes, blue whiting or smaller cod.

3.2 Fishery Location and Method

The cod fishery has long traditions in Iceland. The figure 3 below shows Icelandic catches since 1905.

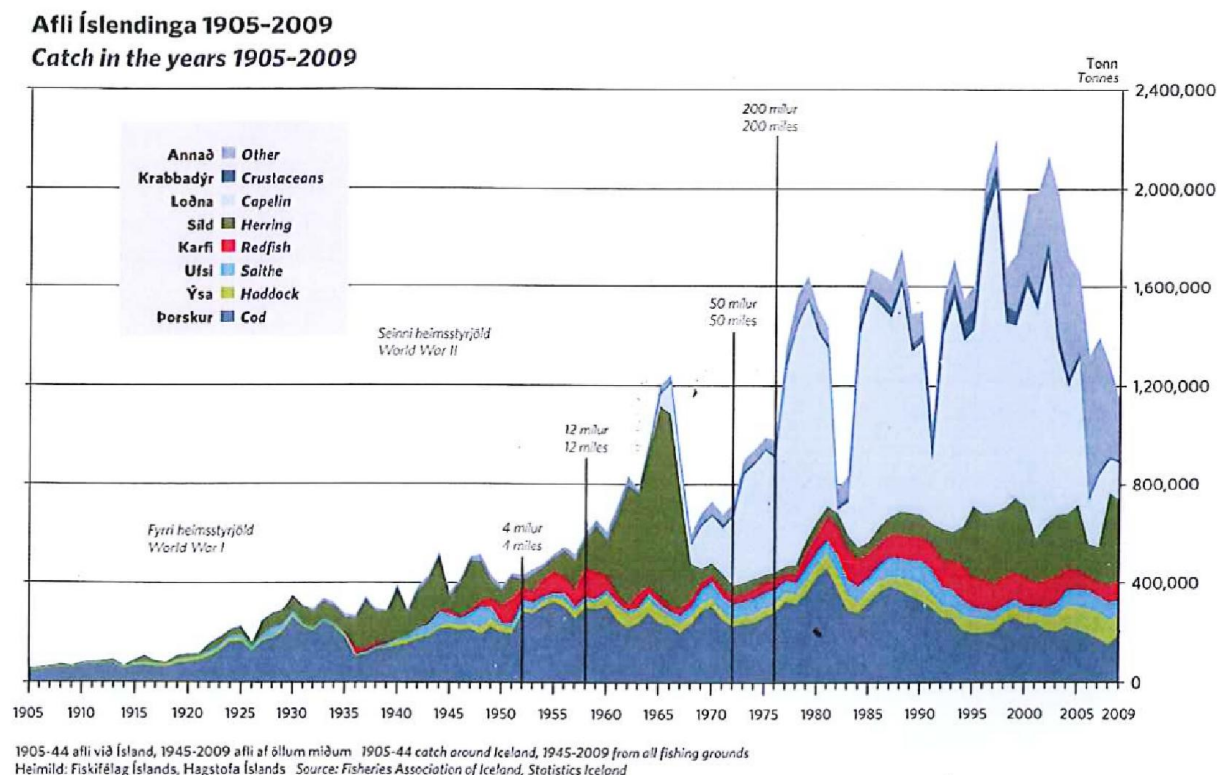


Figure 3. Icelandic catch since 1905, cod is the blue field at the bottom. Copied from: Jóhann Sigurjónsson - 2013, **From John the Learned to harvest control rules for fish stocks.** ICES Insight [50:36-43](#)

Cod is fished all year round and all around Iceland, with the exception of closed areas. The fishery is on the shelf and the shelf break (Figure 4).

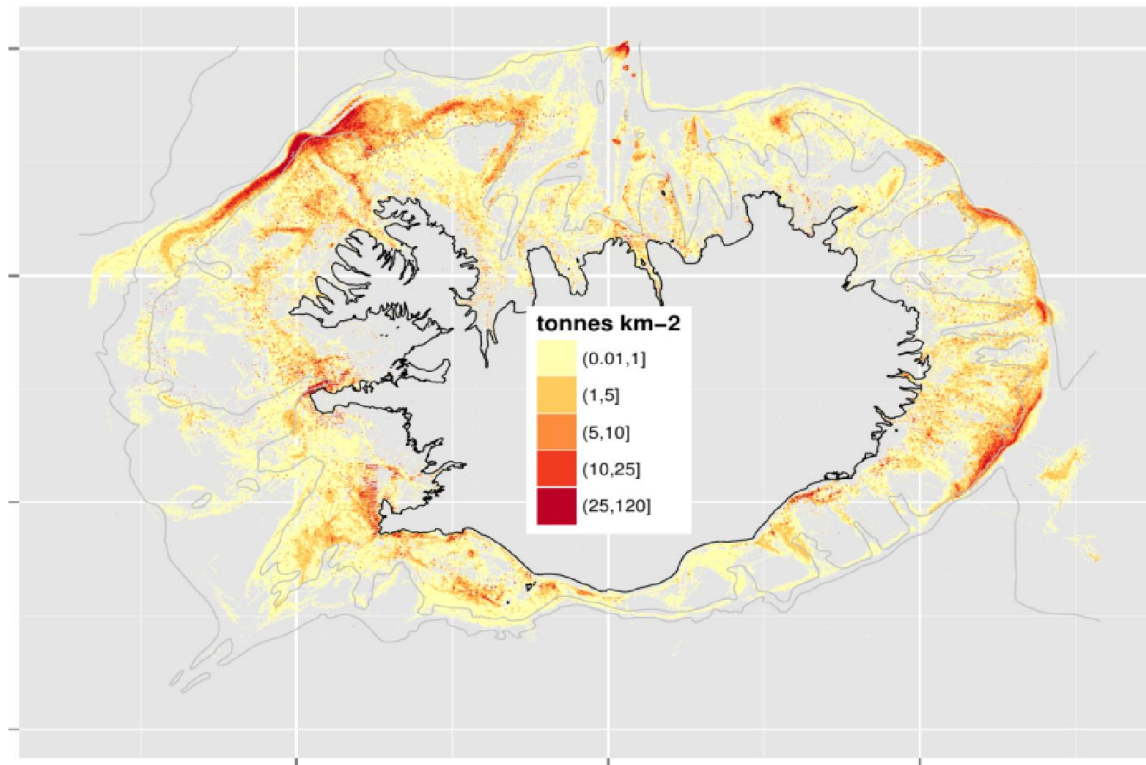


Figure 4. Distribution of cod catches 2013.

The fishery is by demersal trawl, longline, gillnet and to a lesser degree by Danish seine and jigging. Landings by fleet are shown in Figure 5. All fishery is regulated by TACs, in an ITQ system. The TAC year runs from September to August. In addition, closed areas (temporary or permanent) are used extensively. There are also access limitations in the sense that vessels have to be licensed to be allowed to take part in the fishery. Licensing is mostly to ensure vessel quality and qualified crew.

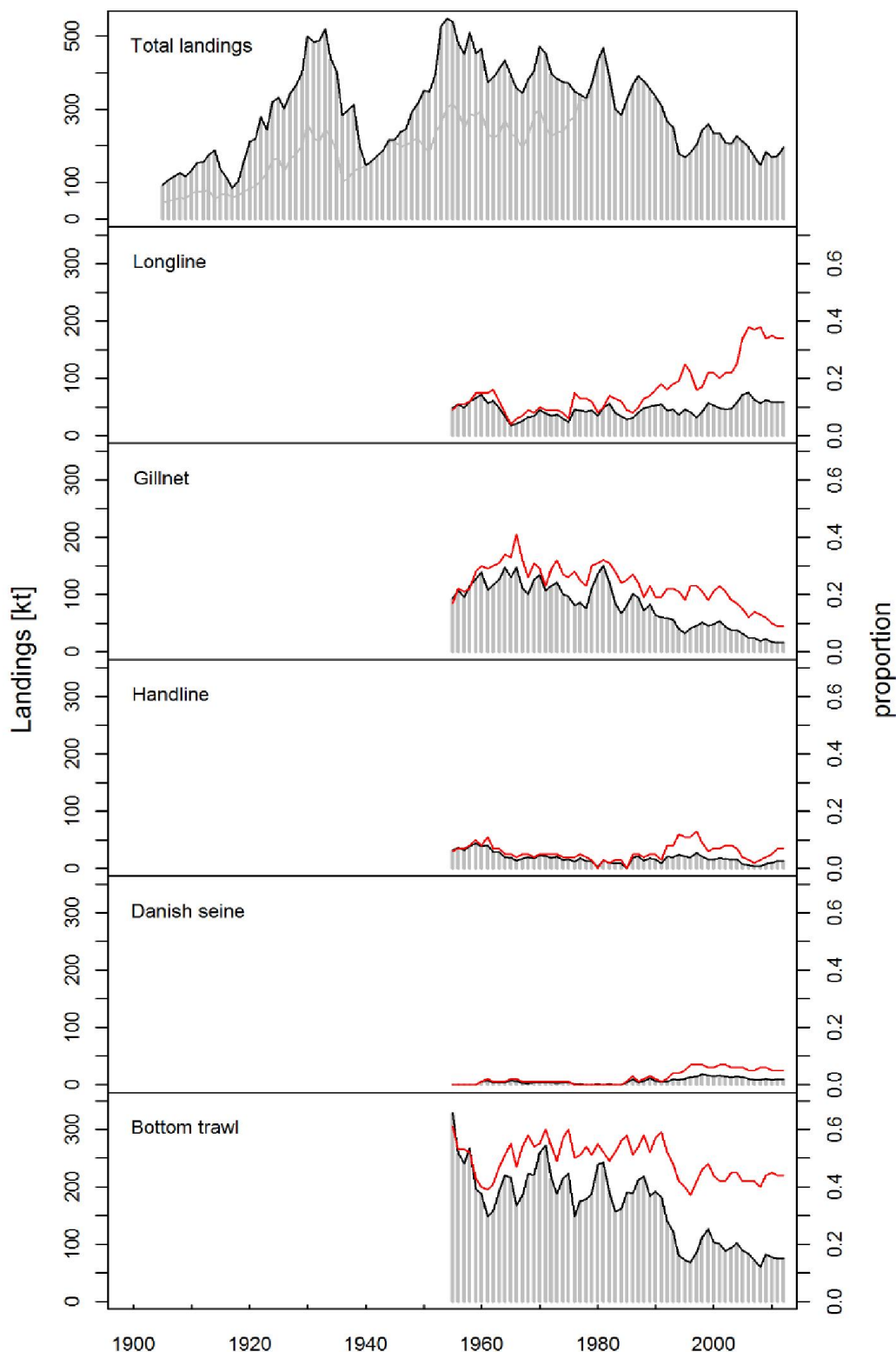


Figure 5. Landings by gear in absolute terms (black line) and in relative terms (red line). From NWWG 2013.

Landing are only allowed in designated ports (about 70 around the coast) and are controlled by weighers appointed by port authorities. (Regulation No. 224, 14 March 2006, on Weighing and Recording of Catch (<http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/>)).

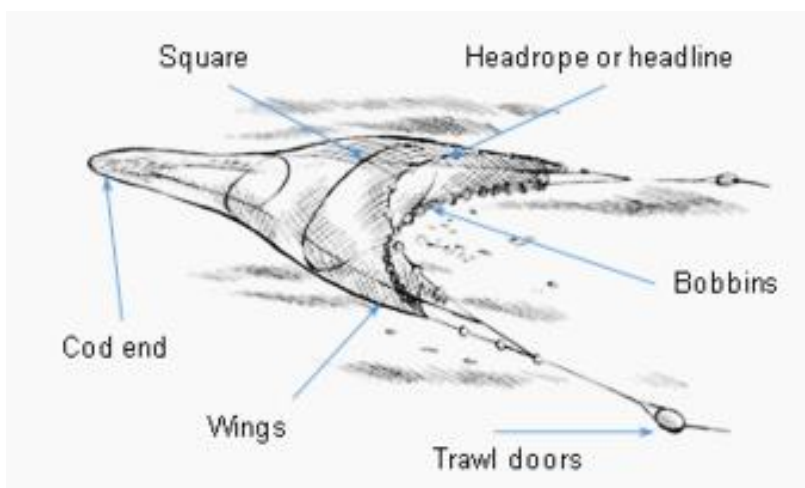
Discards of species is prohibited, and all cod (and other marketable species) has to be brought ashore. Discards are monitored by MRI by comparing length distributions in landings from otherwise comparable trips with and without inspectors on board. Discards of cod, and other species, has declined over the years. In recent years, total discards of cod have been < 0.5% by weight, highest in the Danish seine fishery (Pálsson & al, 2012).

Control of the fishery is through the landings, by the Coast guard at sea and by remote control and by inspectors from the Directorate of fisheries, both in ports and as observers at sea. VMS is compulsory for all fishing vessels and actively monitored by the Coast guard. Other involved institutions also have ample access to the VMS data. Log books are compulsory and there is an electronic log-book system in operation. The primary source of catch statistics is the landings.

Gear Description

Bottom trawl

Trawls are funnel shaped bags of nets that are dragged (trawled) horizontally in the ocean. 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. 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 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.

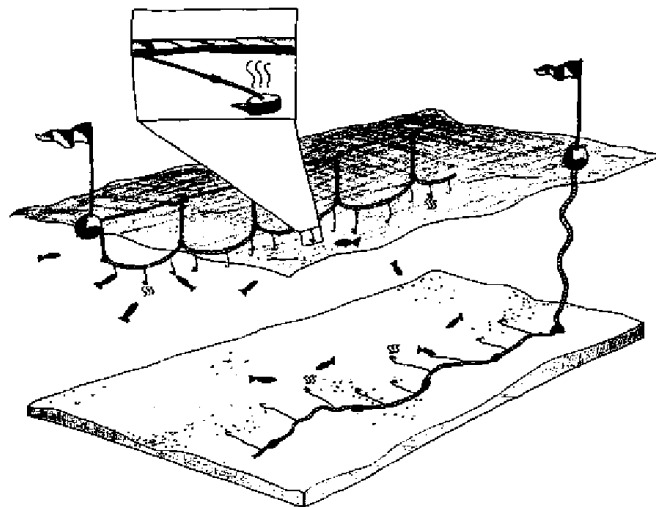
Longline

The longlines used in Iceland are almost exclusively bottom long lines which originally developed from hand lines. They are much more effective, but more difficult and expensive to operate. Bait is required for this gear and is therefore used on larger boats, mainly decked vessels. Long lines are used throughout the year, but catches are lowest during the summer.

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. 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 long lines may be as long as 20 km and have up to 16,000 hooks. 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 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.



Source: <ftp://ftp.fao.org/docrep/fao/004/y3427e/y3427e00.pdf>

Hand lines

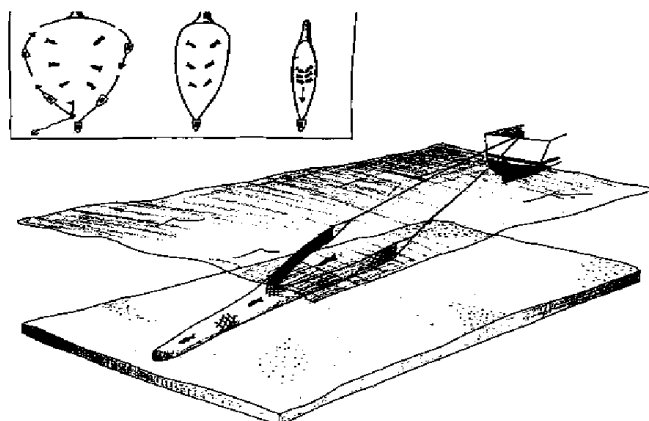
The hand line is the oldest type of fishing gear in Iceland and the line itself has changed from wool, to hemp, to nylon and the hook has also evolved to become more effective. The use of computer controlled electronic jigging reel by most hand line boats and have made the fishery easier and much more efficient. The reels are attached to the ship's side. The line is often 50-200 m long with a 6-8 m extension of fine twine containing four to eight hooks. The hooks are often 10 cm long containing rubber bait to mimic prey. The line is let out and the reel automatically senses the

bottom. The hook is moved up and down by the automatic reel and is reeled in when the reel senses the set minimum weight of fish on the line.

By having a computer control the jigging activity, one man can now easily operate many hand lines as the fisherman only has to release the fish from the hook and then push a button for the reel to start fishing again. The number of hand lines per boat can be up to 12 in larger boats but are usually 3 to 5. If the reels are too many, and therefore too close together, the lines can get entangled. In addition, many modern small boats are equipped with fish finders, radar and GPS linked to a computer. Hand lines are used by the small open boats usually of less than 6 grt. capacity in inshore waters all around Iceland. The hand line is primarily a summertime fishing gear as more than 90% of the catch is from May to August. Hand line fishermen have increasingly been using bait on the hooks. The bait is most often herring, mackerel, capelin, imported saury (*Cololabis saira*), sandeels or squid pieces and lately artificial bait.

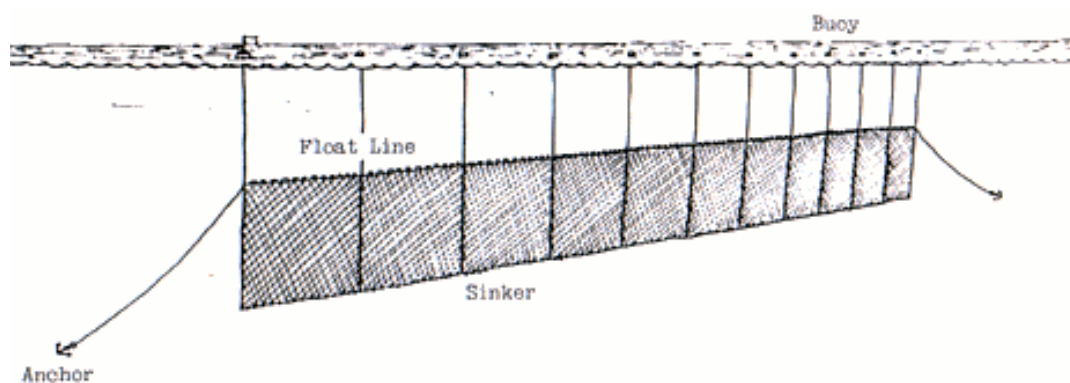
Danish seine

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. The Danish seine is operated with a set of warps (towing-lines, drag-lines), one on each side, usually kept on large drums. The procedure of Danish seining (fly dragging) is first to set out the end of a warp on a buoy, usually the starboard warp. While the warp is set out, the boat sails in a half circle. The wing of the seine is then set out, followed by the net bag and the other wing, followed by the backboard warp when the boat heads back to the buoy. The track of the boat during this procedure forms either a circular, pear shaped, or triangular pattern. Once the buoy has been taken aboard, the towing lines made equal and fastened, the boat starts to pull the gear at a certain speed. During towing the warps are gradually pulled together, herding the fish in front of the seine. As the warps are pulled together the seine moves over the bottom, capturing the herded fish. Once the warps have come together, they are hauled in on the warping drums and the seine is taken aboard using a power block. The Danish seine has certain disadvantages compared to trawls. It cannot work on such rough grounds as otter trawls, it demands relatively calm weathers and low currents, it is difficult to use during the night or in fog and the workload of the fishers is higher. Finally, it demands better navigational skills, since when it is set out it cannot be moved to another ground except by hauling it in first. The advantages of the Danish seine are, however, that it does not need much power to operate (low fuel consumption per catch); it is much cheaper and less bulky than a trawl and can, therefore, be used on much smaller boats. 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; trawlers cannot operate there but Danish seiners can.



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.



Source: <ftp://ftp.fao.org/docrep/fao/004/y3427e/y3427e00.pdf>

3.3 Fishery Management History and Organization

The annual cod catch is at present close to 200 000 tonnes (Figure 5 and 6). The stock was heavily exploited in the 1970's, when foreign, notably British fleets had access to the fishing grounds, but also in the following years. In that period, catches amounted to about 400 000 tonnes, sometimes even more. After extension of the limits first to 50 nm and then to 200 nm in 1976, the exploitation came under Icelandic control. Since then, the management system has been gradually developed and refined. The current management system has been in place, with some refinements, since 2006. There seems to be consensus among informants that a shift of attitude has taken place over the last 10-20 years, from emphasis on catching as much as possible to maximizing the long term yield, leading to emphasis on quality, stability of the catches, and a strong internal discipline in the fishing sector.

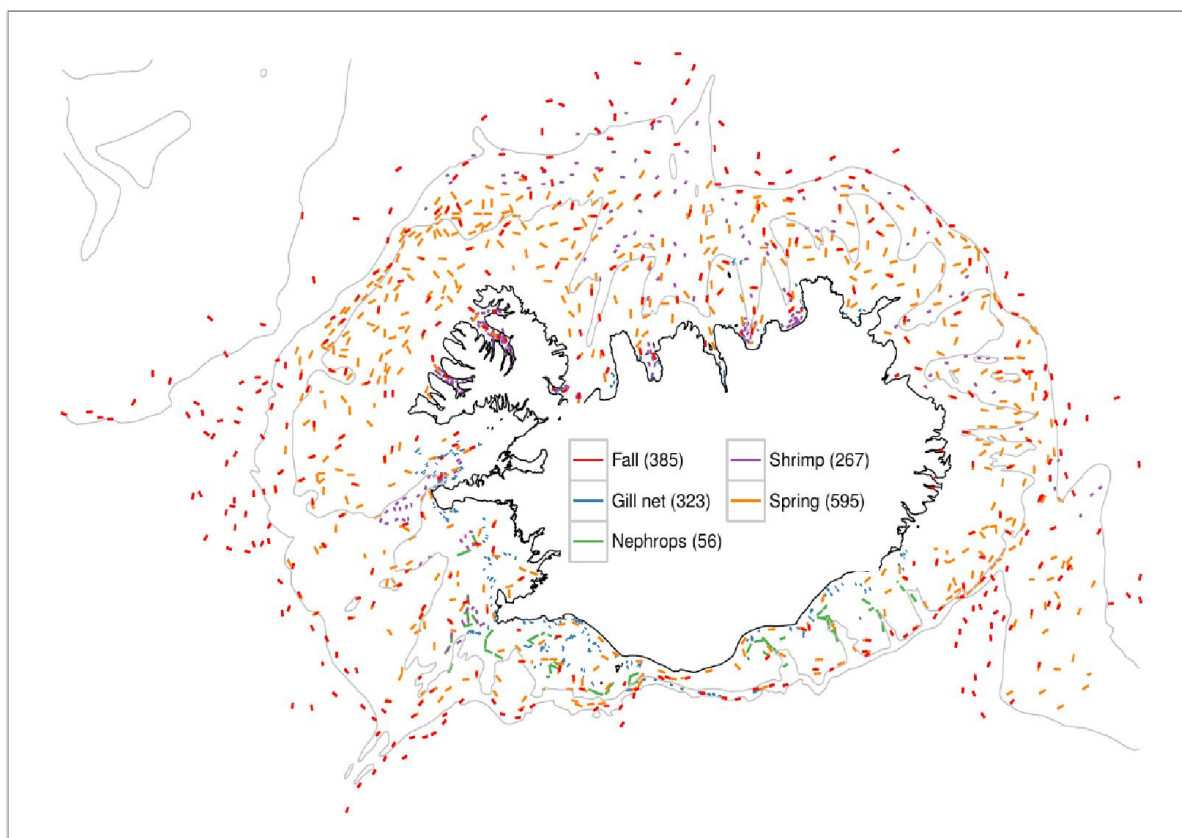
The key legislation is the Act. no. 116-2006 on Fisheries Management (<http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/>). The Icelandic parliament lays, by legislation, the fundamental rules to base the fisheries management upon. The Ministry of Fisheries and Agriculture is responsible for the overall management of the fisheries, the issuing of regulations and long term planning. Eight organisations are based under The Ministry of Fisheries and Agriculture. They are The Marine Research Institute, Icelandic Food Research, The Icelandic Food and Veterinary Authority, The Directorate of Fisheries, Institute of freshwater Fisheries, Agricultural Economics Institute, Central Bureau of Applied Research and The Freshfish Price Directorate.

The fishery is regulated through a system of Individual Transferable Quotas (ITQs). The Directorate of Fisheries issues *annual catch quotas* (kgs) 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 (25 species) and they represent approx. 95-97% of the total annual catch value. Quotas can be transferred between vessels with some limitations, under surveillance of the Directorate. There are specific rules for landing of fish without having a quota - either a quota can be bought or the fish is paid a low price, some of which goes into a fund for supporting research. The flexibility in the ITQ system is designed both to reduce incentives for discarding and to allow a rational use by the vessels. The Minister of Fisheries and Agriculture is ultimately responsible for managing the fishery. The overall TACs are set by the Minister based on advice from the Marine Research Institute (MRI), which is state owned and the dominating fisheries research institution. For most of the important stocks, including cod, TACs are derived according to a harvest rule from the assessment estimate of stock abundance. These harvest rules have been approved by ICES (The International Council for Exploration of the Sea) in 2009 as being in accordance with the Precautionary Approach. The current harvest rule for cod, which has been gradually developed over many years, sets a 'primary' TAC as a percentage (20%) of the estimated stock biomass for ages 4+ at the start of the fishing year. The final TAC is set by a '50-50-rule' midway between the 'primary' TAC and the TAC in the previous year. This rule was chosen to be simple to understand and explain, and the purpose of '50-50 rule' is to reduce the influence of noise in the annual assessments. The TAC is set for the fishing year, which is from September 1st to August 31th. There are plans to re-evaluate the harvest rule in 2015.

3.4 Stock Assessment Activities

Stock assessment is done within the framework of ICES by the North-Western Working Group (NWWG) and subsequently used by the ICES Advisory Committee (ACOM) to produce a formal ICES advice. The advice from ICES is taken over by the MRI, who is the formal adviser to Icelandic government. Unless there is good reasons to deviate from it, MRI advice will be identical to the ICES advice.

Stock assessment is done with ADCAM, which is a forward running statistical catch at age model (NWWG report 2013, Stock annex for Icelandic cod). The fishing mortality is allowed to deviate from separability using a random walk penalty in the objective function. The program is written in AD-model builder. The data that go into the assessment is total catches in numbers at age, based on samples from the landings, and two age structured bottom trawl survey index series, one in the spring and one in the autumn. Both surveys are extensive and cover the whole shelf (stations shown below).



A forward projecting extension of the model is used for calculating the TAC and for evaluating harvest rules. The assessment has been stable and consistent in recent years, and is approved by ICES. There is, however, some conflict in the mortality signals in the data that causes some concern. The assessment is scheduled for a benchmark evaluation by ICES in 2015.

3.5 Historic Biomass and Removals in the Fishery

The spawning biomass (SSB) reached a historical low in 1993 (point estimate 120 kt) but has since then increased and estimated to be 479 kt at present (Figure 6). This is the highest estimate since the early 1960 s. The decline in spawning biomass until the early 1990s can to some extent be attributed to reduced growth, but not to reduced recruitment. The main factor determining the spawning biomass is the fishing mortality. Hence, the recent increase in spawning biomass is mainly caused by reduced fishing mortality.

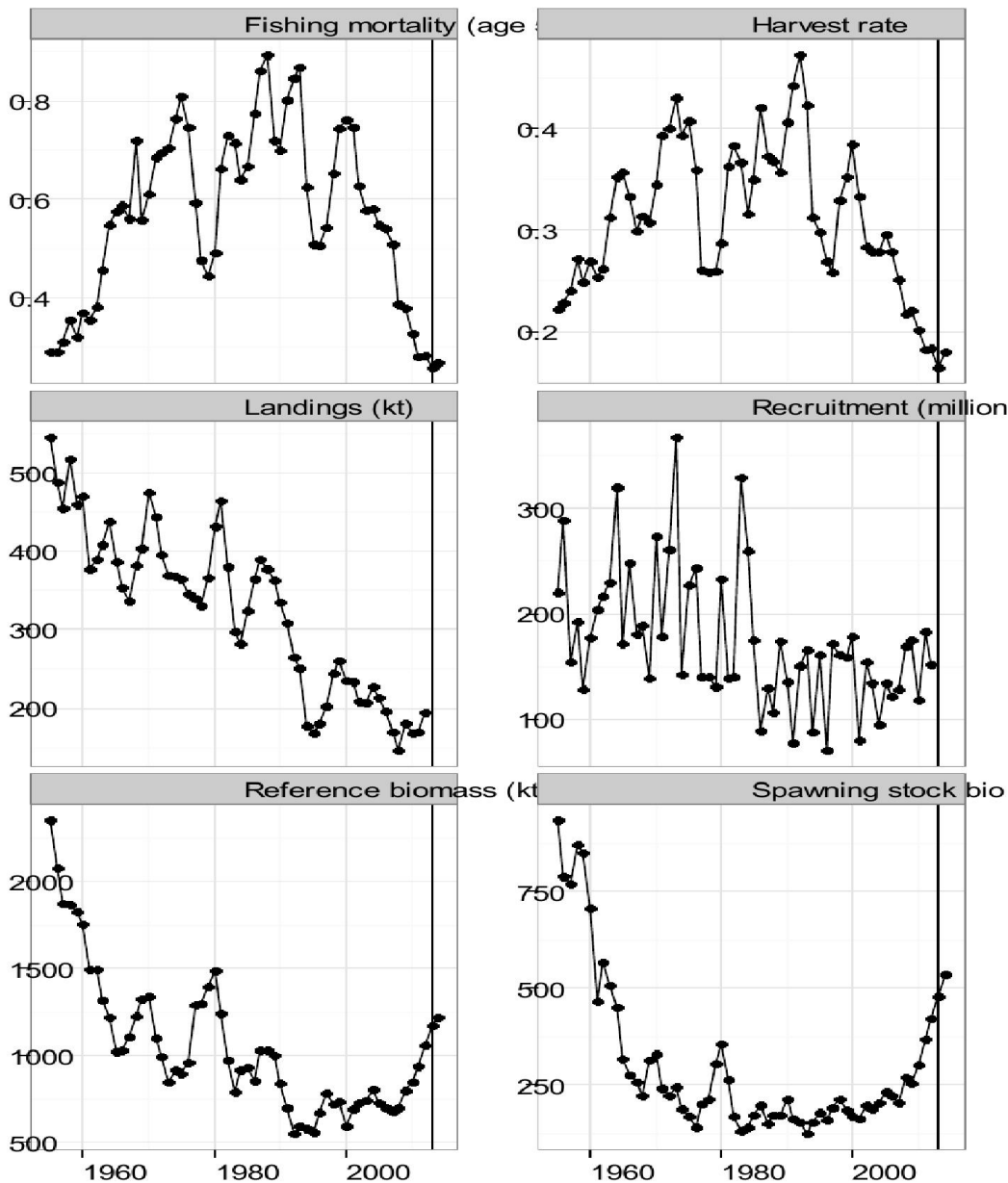


Figure 6. Summary of stock assessment results (from NWWG 2013)

The catches under the present harvest rule have been in the order 170-190 kt. Previously they were much higher, but declined gradually, despite an increasing fishing mortality (Figure 6). With the average recruitment, which has been quite stable over time, the equilibrium yield can be expected to fluctuate between 170 and 300 kt (Figure 7), which is near the maximum with a low risk of recruitment failure.

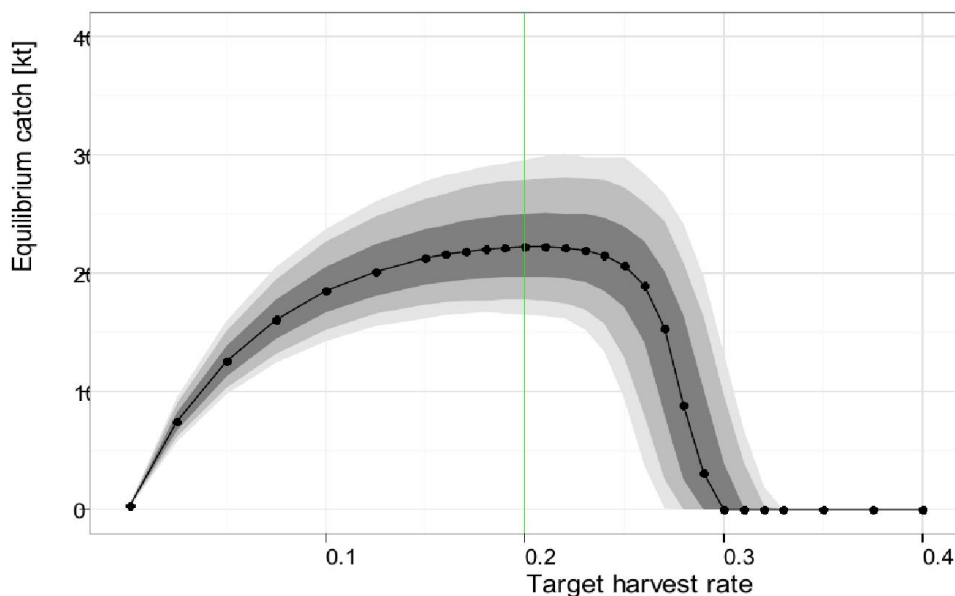


Figure 7. Stochastic equilibrium yield (from NWWG 2013)

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Pampoulie, Cristophe, Daniel E. Ruzzante, Valérie Chosson, Þóra Dögg Jörundsdóttir, Lorna Taylor, Vilhjálmur Þorsteinsson, Anna Kristín Daníelsdóttir, Guðrún Marteinsdóttir – 2007. The genetic structure of Atlantic cod (*Gadus morhua*) around Iceland: insight from microsatellites, the */Pan /I* locus, and tagging experiments. *Canadian journal of fisheries and aquatic sciences* 63: 2660-2674.

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3.6 Economic Value of the Fishery

The seafood industry is one of the key industries in Iceland and it has been estimated that the contribution of the fisheries sector and related industries, or the so-called fisheries cluster, to the GDP in the year 2010 is 26%. This industry employs around 9.000 people, or 5.3% of the total workforce in Iceland. In 2012 the export value of marine products amounted to ISK 269 billion (€ 1.7 billion) for a total of 749'000 t of product. Export value of marine products has never been higher than in 2012. Marine products account for approx. 42% of the value of exported goods. The total value of export production of marine products from Iceland in 2013 was ISK 272 billion.

More specifically to the cod resource in Iceland, Sigurðardóttir et al. (2014) reports that historically, the seafood sector has been the single most important industry in the Icelandic economy with cod fishery as its backbone. National accounts show that in the year 2011, exported seafood accounted for more than 40% of total exports, with cod explaining more than 12%. In 2011 the export production of marine products amounted to ISK 252 billion and increased in value by 14.4% from previous year. The figure below shows value of exported seafood and cod as a percentage of total exports.

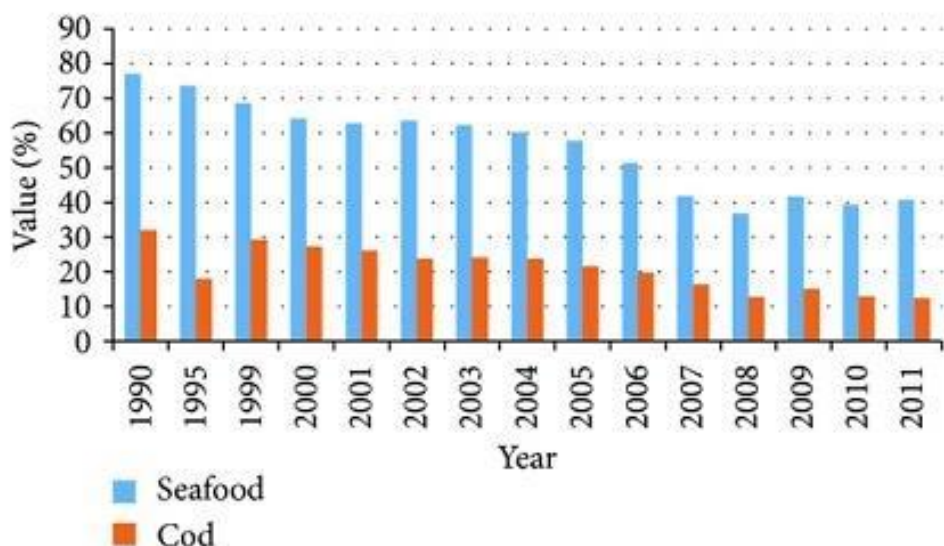


Figure 8. Ratio of seafood of total value of exports and ratio of cod in total value of seafood during 1990–2011.

Nowadays most of the Icelandic cod is captured in bottom trawls or with longlines (Figure 9). Use of gillnets used to be more widespread than of longlines but that has changed as the figure below confirms. In 2011 46% of the total allowable catch for cod was captured with bottom trawls and 32% with longlines.

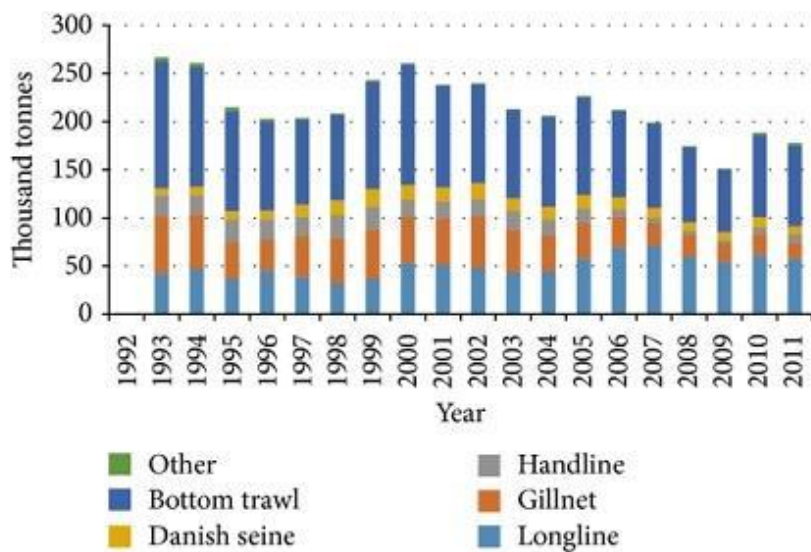


Figure 9. Total landings (thousand tonnes) of cod by fishing gear during 1993–2011.

Data from operating accounts of fishing companies collected by Statistics Iceland reveal that the larger vessels are more economically viable. During the years 2002–2007, the operation of smaller vessels was unstable, partly due to external factors such as high interest rates and strong exchange rate of the Icelandic krona. Economic performance is measured by multiplying revenue with the ratio of net profit and revenue. This information is available from Statistics Iceland for different vessel types and shows the economic performance of the four different vessel types during 2006–2011. This shows that small vessels have been more economically unstable than larger vessels (longliners and trawlers respectively).

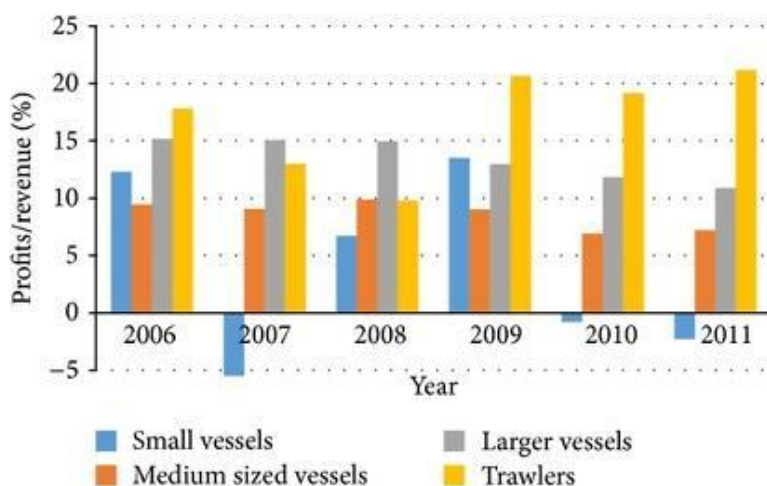


Figure 10. Profits as a ratio of total revenue by vessel type.

Sigríður Sigurðardóttir, Björn Johansson, Sveinn Margeirsson, and Jónas R. Viðarsson, “Assessing the Impact of Policy Changes in the Icelandic Cod Fishery Using a Hybrid Simulation Model,” *The Scientific World Journal*, vol. 2014, Article ID 707943, 8 pages, 2014. doi:10.1155/2014/707943

<http://www.hindawi.com/journals/tswj/2014/707943/>

<http://www.responsiblefisheries.is/seafood-industry/>

<http://www.statice.is/Statistics/Fisheries-and-agriculture/Export>

<http://www.responsiblefisheries.is/files/pdf-skjol/baeklingar/export-markets-for-icelandic-seafood-products.pdf>

4. Proposed Units of Assessment

The following are the proposed units of assessment and certification for the cod fisheries in Iceland.

	Fish Species (Common & Scientific Name)	Geographical Location of Fishery	Gear Type	Principal Management Authority
1.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Demersal trawl	Ministry of Industries and Innovation (formerly the Ministry of Fisheries and Agriculture)
2.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Long-line	Ministry of Industries and Innovation
3.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Danish Seine net	Ministry of Industries and Innovation
4.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Gill net	Ministry of Industries and Innovation
5.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Hook and line by small vessels	Ministry of Industries and Innovation
6.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Nephrops Trawl ¹	Ministry of Industries and Innovation
7.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Shrimp Trawl ¹	Ministry of Industries and Innovation
8.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Pelagic Trawl ¹	Ministry of Industries and Innovation
9.	Atlantic cod (<i>Gadus morhua</i>)	Icelandic Exclusive Economic Zone (200 nm)	Purse Seine ¹	Ministry of Industries and Innovation

¹ Indirect landings, very small percentage (less than 1% per gear).

5. Consultation Meetings

5.1 On-Site Witnessed Assessment and Consultation Meetings

On-site visits for the full assessment took place in April 2014. The schedule of on-site activities is provided in the table below with a summary of the activity, meeting and discussion. Meetings were used to document information that both confirmed clarified or substantiated aspects of the assessment and provided an opportunity for organizations to contribute information to support the assessment. The on-site witnessed assessment and consultation meetings were conducted by Vito Ciccio Romito, Gisli Svan Einarsson and Dankert Skagen.

Table 1. On Site Witnessed Assessment and Consultation Meetings

Date	Organization	Summary of Meeting
22nd April 2014, 09.00 am	Fisheries Association of Iceland Kristján Þórarinnsson, Chair, Fisheries Association of Iceland	The role of the FAI is to be a common venue for organisations within the fisheries and seafood sector in Iceland for the benefit of the fishing industry. The main objectives are to promote progress in the Icelandic fishing industry, and to offer services requested to governmental bodies and other stakeholders as appropriate. The objectives are pursued by carrying out tasks that involve the fishing industry as a whole based on general agreement among its members. The unit of confirmation was discussed and confirmed. Also, the assessment timelines were discussed and the procedure to address non-conformances should they arise was explained.
22nd April 2014, 10.30 am.	Fish Auction meeting Örn Smárason General Manager	There is one central electronic auction system operated in Iceland. The process was reviewed. Witness fish landing, transfer to the auction, weighing, tipping and re-icing and sales of fish across the electronic auction system. Labelling of catch for traceability reviewed. All tubs labelled by vessel number (Auction No.), species, fish age (days at sea), weight. This information is transferred to the auction system.
22nd April 2014, 14.00 pm	Marine Research Institute Jóhann Sigurjónsson, Director General/Marine Research Institute	The meeting focused upon the role of the MRI in Icelandic cod fishery data gathering and assessment including consultation with stakeholders, coastal fisheries, short, long term and other closures, spawning closures, stock survey and assessment methods; species biology and distribution, stock status, the application of the precautionary in drafting the FMP; upcoming FMP review, the process of scientific advice to management, recording of seabirds and marine mammal fishery interactions, retained catches, non commercial species bycatch, bottom trawl impacts on the seabed, ETP species interactions, foodweb dynamics and other fishery ecosystem interactions and concerns.
23rd April 2014, 10.00 am	Icelandic Coast Guard Ásgrímur L. Ásgrímsson, Chief of	The meeting focused on the inspections carried out by the Icelandic Coast Guard, the overall level of compliance, the methods for control and surveillance, electronic monitoring of the fleet, monitoring of foreign vessels in Icelandic waters, monetary and operational penalties for serious infractions and surveillance and enforcement of close areas. Further verification of the information gathered on the level of discarding reported in the fishery (recent estimates) and the method of monitoring of discards were discussed.

	Operations	
<p>23rd April 2014, 13.30 pm</p>	<p>Directorate of Fisheries Dalshrauni 1 220 Hafnarfjordur Eyþór Björnsson Director of Fisheries/ Directorate of Fisheries</p>	<p>Discussions involved the accounting of catch, landings and discards, catch analysis, improvement of data collection for seabirds and marine mammals, coastal fisheries quota system, quota flexibility measures for juveniles and to avoid discarding, short and long term closures, commercial species and bycatch of non commercial species, seabird avoidance methods used by longliners, measures taken to protect hydrothermal vents and stony coral areas, Directorate's at sea inspection program, and catch inspection of foreign vessels.</p>
<p>23rd April 2014, 04.00 pm</p>	<p>TrackWell Steingrímur Gunnarsson, Sales Manager</p>	<p>Discussions included an overview of TrackWell activities and products in support of fisheries management in Iceland, generation and availability of eLogbook information to MRI, Directorate and Coast Guard for fisheries management, use of this eLogbook information to map the fleet trawling effort in the Icelandic EEZ and compliance with Icelandic regulation for vessel monitoring.</p>

6. Assessment Outcome Summary

The following sections provide a summary of the evidence that formed the rationales to the assessment outcome for each of the three main Sections of the Icelandic Responsible Fisheries Management Specification (Version 1, Revision 1, March 2014) used to evaluate fishery management conformity. Section 7 provides the outcome of the more detailed analysis of evidence and conformance of the applicant fishery to each individual clause of the Specification.

Section 1: Fisheries Management

The Fisheries Management System

There is a structured fisheries management system adopted within Iceland for the management of ground fish species such as cod. The management of the fishery is supported in law by the principal fisheries management Act (*No 116/2006*) and a number of supporting Acts and Regulations. There are a number of inter-related government agencies within the system; under the direction of the Ministry of Fisheries and Innovation which has ultimate responsibility. Policies incorporate a number of International Agreements, including; UN Convention of the Law of the Sea, Agenda 21 of the Rio Declaration, FAO Code of Conduct for Responsible Fisheries and the International Plan of Action to prevent, deter and eliminate Illegal, Unregulated and Unreported Fishing. Policy and objectives are directed toward responsible utilization of the cod resource and allocation and control of fishing opportunities is undertaken via a structured system of rights based entitlement. The system has built in controls to allow equitable use and flexibility which supports compliance to management measures and regulations.

The annual catch is limited by a Total Allowable Catch (TAC) derived from a Harvest Control Rule. The Marine Research Institute (MRI) advises the Ministry of the TAC based on scientific evidence collected through survey and fishing logbook data. The Ministry through consultation with the various agencies and fishing associations sets the TAC which forms the basis of the quota allocation to each of the registered vessels according to individual quota shares.

Management measures can be divided into the following categories:

- Total Allowable Catch based on scientific advice and Individual vessel quotas
- Fishery access is limited by license per vessel and allocated via an ITQ system for each vessel.
- Technical measures are implemented by regulation including; gear specifications (mesh size and technical conservation measures such as square mesh panels), seasonal, permanent and temporary closed areas.

Measures are implemented via regulations. The Directorate is the principal implementation agency and is supported by the Coast Guard through monitoring and enforcement and also by the Port Authority by recording of landings. The MRI plays the lead role in the implementation of temporary

closed areas (fast shut downs) which can be implemented virtually instantaneously on the results of undersized catches in landings. The principal objectives of Icelandic policy on the ocean are to maintain the ocean's health, biodiversity and productive capacity, in order that its living resources can continue to be utilised sustainably.

Legal Instruments are in force which specify 'legal gears' for each method of fishing. (Act 57/1996) also requires the regulation of fishing gear to reduce damage to catch and also to allow confiscation of gear not retrieved in a proper manner, found in closed areas, fishing illegally or being illegal. Also Article 9 of Act No. 79 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.

The Fisheries Management Plan

There is an established Fisheries Management Plan for Icelandic Cod. The Plan is documented and available on the Icelandic Ministry of Fisheries and Innovation website. The Fisheries management plan details relevant information; The management unit; specification of stock or component stocks of "stock under consideration"; jurisdiction areas and the respective competent authorities for the entire range of component stock(s) of "stock under consideration"; 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.

The Fisheries Management Plan for Icelandic Cod details a long-term harvesting policy, and ICES have evaluated the plan for consistency with achieving optimum utilisation in 2010, and with the precautionary approach to fisheries management. A review of the management plan and harvest control rule is planned for 2015.

The fisheries management plan has been developed with due consideration to managing the input, output controls for the fishery. The evidence presented throughout the assessment has provided a high level of confidence in the ability of the management system to ensure that the effective harvest rate does not deviate significantly from the harvest control rule and evidenced by a robust vessel catch allocation, monitoring and recording system (ITQ). There is a high level of reporting apparent within the Icelandic fleet.

The Fisheries Management Plan for Icelandic Cod considers specific management methods, supporting measures, details the institutions responsible for providing stock assessment and advice, describes the decision making process for TACs, describes the consultation process with the fishing industry, describes the provisions for monitoring, control, and enforcement and describes the management measures relevant to ecosystem effects of the fishery.

Research and assessment

The Marine Research Institute of Iceland, reporting directly to the Ministry of Fisheries and Agriculture is the principle research agency that collects and compiles the necessary data and carries out scientific research and assessment of the state of fish stocks and the condition of the ecosystem. The MRI is supported in its research by the Directorate of Fisheries.

There is effective data collection/compilation for successful execution of stock assessment for stock management purposes. These are adequate to ensure that sufficient internal expertise and external expert consultation is present within the system to ensure the integrity of scientific assessment for fishery stock management purposes and that it continues to be scrutinised, challenged and improved.

Provisions are in place for integration of traditional fisherman's information into research and stock assessment processes.

There are several approaches. Formal consultation is undertaken annually between management organizations and fishery associations prior to the TAC being set. There is also a special consultation group between MRI and industry (fleet managers/skippers) that considers industry knowledge and information in tandem with the fishery independent survey operations. Fishermen contribute information on an on-going basis with respect to providing location of juvenile fish when encountered and also comments of fishermen contributing with location of hard corals. Log book data, transmitted electronically and through manual means is continually supplied and provides a major component of fishery dependent data used by MRI. MRI also undertake field sampling onboard vessels and are supported through Directorate observer programming which provides further points of information and data exchange.

The most prominent International collaboration for Icelandic cod stocks occurs with ICES. Evidence is available that demonstrates on-going and formal interactions between the MRI/Icelandic Management System and a variety of ICES Committees. Whilst assessment methods and interpretation are subject to scientific debate, there is sufficient evidence presented to verify 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.

Icelandic cod is largely within the 200 mile EEZ (Va) and is not described as straddling of shared. Iceland has quota under International Agreements in other cod stocks, namely Norway and Greenland outside of Icelandic territorial waters.

Estimates for discarding

Icelandic fishery law prohibits the discarding of all commercial stocks. All fishing vessels are obliged to report catch and by-catch in log books. MRI undertakes annual assessment of discard estimates for the major species including cod. Estimates are reported to be low (1-2%).

The Precautionary Approach

The Precautionary approach is implemented through the harvest strategy for cod which the Ministry uses to set annual TAC's. Precautionary reference points, representing landmarks where action should be taken to avoid reaching the limit points are implicitly defined and are appropriate. There is international evidence that this meets the requirements of the precautionary approach such as is qualified in documentation provided by ICES.

The Icelandic cod stock is not considered to be overfished to a level causing recruitment overfishing. Nor is it considered that overfishing is occurring. As of 2013/2014, the stock is estimated to be above the target reference point (SSB Trigger) and increasing for more than 7 years.

Management Targets and Limits

Management targets and limits are defined by the management rules in the cod management plan. The MSY B_{trigger} 220,000 t. The HCR sets out the rate of reduction in harvestable biomass as 0.2 of B_{4+} stock. In the event of SSB falling below the trigger, the rate reduction is determined by the fractional reduction (SSB/SSBtrigger). ICES (2009) noted a possible candidate for Blim (123,000 t) the lowest observed biomass but in effect, the harvest control rule works to avoid a significant reduction below the trigger biomass. A major review of the FMP and HCR is planned for 2015.

The management strategy for Icelandic cod 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. The medium term management strategy is to ensure that the spawning stock biomass (SSB) in 2015 will be above 220 000 tonnes (estimated size in 2009) with high probability. In accordance with this general aim the harvest control above rule was adopted by Icelandic authorities in June 2009 for the next period of 5 years. This aims at 20% catch rate of 4-year and older cod. This harvest rate is equivalent to a target fishing mortality.

Stock Biomass

The medium term target of the management plan is to ensure that SSB is above 220kt in 2015. Currently, the SSB for 2014 was estimated at 426kt. The long term target is stated as: 'to increase the size of the cod stock towards the size that generates maximum sustainable yield'. Blim is set at the lowest observed spawning biomass, which is standard ICES practise when there is no clear relationship between SSB and recruitment in the historical data series. There is a very high probability that Blim will not occur under the current Fishery Management Plan (FMP) and management system.

Stock Biology and life-cycle

The stock assessment approach focuses directly on the structure and composition of the cod stock. Management measures are in place in the form of temporary and permanent closures and mesh size restrictions to protect spawning components of the stock. A comprehensive and strategically allocated set of gear specific regulations are available to support the protection of juvenile fish stock for cod in both cod directed fisheries and in other fisheries that encounter cod as a bycatch.

External scientific review

ICES have developed routines for in-depth review of assessment methods and data that go into the assessment (benchmark assessments). Ideally, these should be done approximately every 5 years, or if there are reasons to alter the assessment practises. The initiative may come from ICES itself, from the assessment Working Group responsible for the stock, or from managers.

Advice and Decisions on TAC

Fisheries research is undertaken by the Marine Research Institute (MRI) of Iceland. The MRI together with ICES provide the fisheries management authority with fisheries advice on the harvesting of the stock under consideration. ICES advice includes the appropriate values for precautionary reference points.

The TAC is set by the Minister of Fisheries and Agriculture according to the management plan which covers the Icelandic EEZ. The stock is largely, but not exclusively, confined to that area. There is consideration by research and management organizations of the minor catches of cod taken by Faroese fishing vessels.

Management measures for conservation and sustainable use of the stock under consideration are specified in laws and regulations. The Directorate of Fisheries is responsible for the implementation of the Act on Fisheries Management and related legislation, and for day-to-day management of fisheries and for supervising the enforcement of fisheries management rules.

Section 2: Compliance and Monitoring

Implementation, compliance, monitoring, surveillance and control

There is a clearly established legal framework, with regulations and rules that give powers to the Ministry, the Directorate, the Coast Guard and the MRI. These are enforced principally by the Directorate on a day to day basis through powers to collect levies, monitor, inspect, report and gather evidence for prosecution purposes where violations are expected.

Concordance between actual and allowable catch

The system of recording catch is controlled and includes both at sea (e-logbook records), standard paper based log-books and verification of catch through physical weighing at accredited landing stations registered by the Directorate. The Coast Guard also carries out 24-7 surveillance of all vessels in Iceland's EEZ. There are requirements for transmitting position, VMS transmitting, and for reporting catch for vessels entering/leaving Icelandic waters. The ITQ system has rules and flexibilities to allow for corrective management measures and adjustments to be incorporated. Resources of the Icelandic Coast Guard include two vessels Tyr and Ægir and a new vessel Þór, taken into service in 2011, and also the vessel Baldur that is used for hydrographic surveying during the summer time. The Coast Guard also operates helicopters and the maritime surveillance aircraft TF-SIF which can take off from short airfields giving maximum flexibility with regards to coastline coverage. There are over 140 staff at the Coast Guard.

Monitoring , Control and Penalties

Quotas conform to the current decision on TAC, through the individual vessel quota share system. All commercial fishing operations are subject to a permit from the Directorate of Fisheries. There is a system for recording the catch quota of each vessel for each species within the central database held by the Directorate. A register of permitted vessels is maintained by the The Minister of Transport and Communications and the Icelandic Maritime Administration (IMA). By regulation only Icelandic licensed vessels (and those under specific agreement) are permitted to fish in Iceland EEZ. Information on number, size, composition of the fleet is available.

Monitoring and control of fishing vessel activities by the Icelandic Coastguard is in place to prevent fishing by unauthorised vessels. The Act on the Icelandic Coast Guard No. 52, June 14th 2006 defines the legal, mandated roles and responsibilities of the Coast Guard. Fishing gear can be inspected by the Coast Guard, as well as the composition of the catch and its handling onboard the fishing vessels. Vessels of all description entering, leaving and transiting through Icelandic waters must report to the Coast Guard. At the operational centre of the Coast Guard, surveillance continues 24-7 based on VMS satellite and radio technology. Areas closed from fishing are monitored by the Coast Guard.

Catch amounts by species and fishing area are recorded in fishing logbooks on-board the fishing vessels. Fishing logbooks are subject to unannounced inspection. The correct recording of catches in fishing logbooks are monitored by comparing the recorded catch amounts with the catch stored aboard the vessel at time of inspection. Discarding of catch is prohibited by Icelandic fishery law except for damaged or fish in poor health. There is a by-catch allowance for cod in other fisheries which forms part of the quota management system for cod. Monitoring and control measures are in place. Authorised landing Ports are designated by the Ministry and landings controlled by the Directorate. Landings are monitored. Harbour officials and fisheries inspectors monitor the correct weighing and registration of the catch. Discrepancies/deviations during weighing are recorded. The reasons for deviations are analysed and corrections made to reduce the likelihood of recurrence. Deviations can be typographical error as well as anomalies relating to yield calculation discrepancies of reported figures between fishery participants and export figures. These are investigated through inspection and yield observation/calucation by Directorate staff both at sea and ashore. The Directorate at sea observation covers 20% of fishing trips for larger trawlers and one trip per year for other vessels.

Landed catches are subtracted from the relevant quotas (allowable catch) of the vessel or the vessel group. Limited allowance is 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. When a vessel's quota is used up, additional quota must be transferred to the vessel from other vessels or the vessel stops fishing. Transfer of quota between vessels takes effect only after it has been authorised and recorded to the official central data base. Information on each vessels catch quota and quota is regularly updated and made public and accessible to all on the official website. Analysis includes the comparison of catch figures with figures for the amounts of sold or exported products in order to ensure independent checking of the accuracy of information about the catches that are brought ashore. If analysis reveals discrepancies 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.

Traceability can be demonstrated using logbook data – which, unless mixing of fish occurs on landing will allow for species by catch area by vessel for date of capture. This information is transmitted to the Directorate’s website and also with the fish to the buyer.

Breaches of the law and regulations on fisheries management are subject to fines or revoking of the fishing permit, irrespective of whether such conduct is by intent or negligence. Major or repeated intentional offenses are subject to up to six years imprisonment.

If the catch of a vessel exceeds the allowable catch of the said vessel of individual species, the relevant fishing company must obtain an additional catch quota for the relevant species. If this is not done within a certain timeframe, the fishing permit may be revoked as well as a charge having to be paid for the illegal catch.

Section 3: Ecosystems Considerations

Guiding Principle

The MRI is the principle marine research agency that monitors and researches the marine environment including the ecosystem components. There is a clear programme of monitoring and research into the changes in physical parameters within the waters of Iceland as the basis of understanding the effects of these changes on the productive fisheries in Iceland. The MRI is also developing expertise and understanding of the ecosystems approach to fisheries management.

Specific Criteria

Information gathering and advice

There is information available on the legal specification of fishing gear for cod for each fishing method. Highly selective gear may result in lower impact on certain aspects of the ecosystem such as lower incidence of by-catch. Commonly caught species such in the cod fisheries are also subject to ITQ management and hence are recorded and landed as part of the vessel catch in the logbook and through the reporting structure in the Directorate's databases.

Long-liners are reported to use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. By-catch avoidance methods are employed on a voluntary basis although no data was available to determine the absolute use and effectiveness in Iceland. The results of research in Norway have demonstrated effective reduction in by-catch of seabirds. Requests for further clarification on the substantiation of considered effectiveness in Iceland has been made.

Reporting of seabirds and marine mammal by-catch in the Icelandic fishery is now mandatory as for logbook regulation issued in 2014. Data is currently been collected and a report on the effects of the cod fisheries on marine mammals and seabirds bycatch is expected in 2015/2016. The MRI continues to conduct research into the distribution, population and feeding ecology, of important whale species. Major survey work commenced in 1989 and a formal research plan involving international collaboration continues today. This information is being used to continue the development of multi-species modelling in the support of development of ecosystems based management of fisheries such as cod. The observation/inspector scheme carried out by the Directorate covers roughly 20% of the larger trawler fleet.

Most non-target species landed in cod fisheries are themselves subject to survey, stock assessment and TAC as part of the management of Icelandic fisheries. There are a number of species noted of lower abundance; Atlantic halibut, atlantic wolffish and grey skate. Non target catches are landed and hence there is good knowledge of frequency and location of catches. Closure rules are available to the Ministry to limit impacts on non target species and habitat if deemed appropriate through scientific evaluation by MRI. There is no evidence of serious risk of extinction of by-catch species resulting from the activities of cod fisheries.

Area closures are a commonly employed management tool to protect spawning grounds, essential fish habitat, stony coral areas and thermal vents. In the past 27 years, about 2000 temporary

closures have come into effect, mostly off the Westfjords. Most of the closures concern cod fishing and often they have been limited to bans on bottom trawling or long lining.

Habitat Considerations

Studies are undertaken, principally by the MRI on both the identification and measurement of abundance/species diversity of sensitive habitats such as corals and also the effects of fishing on the benthic environment. The MRI is carrying out mapping research aimed at identifying all the habitats present on the Icelandic shelf. More than 50% of the entire Icelandic shelf is closed to trawl gear.

Considerations

Cod is not a major prey species in the system, although cetaceans may prey on cod. Rather it is a major predator, and the magnitude of the cod stock is likely to have an inverse impact on capelin, and probably herring. A review of the capelin and cod FMPs are planned for 2015 and it is expected that further attention and consideration will be given to the relationship between the two species. 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. This is achieved through closed areas.

6.1 Conformity Statement

The assessment team recommends that the management system of the applicant fishery: the Icelandic Cod (*Gadus morhua*) commercial fishery fished within the 200 mile Icelandic Exclusive Economic Zone (EEZ) by all Icelandic registered vessels using all gear types directly (demersal trawl, long-line, Danish seine net, gill net, hook and line) and indirectly (Nephrops trawl, shrimp trawl and pelagic trawl) under the management of the Icelandic Ministry of Industries and Innovation, is awarded certification to the FAO-Based Icelandic Responsible Fisheries Management Certification Programme.

FAO-Based Icelandic Responsible Fisheries Management Program

7. Fishery Assessment Evidence

Section 1: Fishery Management

1.1 Fisheries Management System and Plan for stock assessment, research, advice and harvest controls

CLAUSE: 1.1.1 A structured fisheries management system, sufficient to fulfil the management tasks specified in this Specification, shall be adopted and implemented.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE:				
<p>There is a structured fisheries management system adopted within Iceland for the management of ground fish species such as cod. There is a principal Act (<i>last amended No 116/2006</i>)¹ and a number of supporting Acts and Regulations for the management of the fishery. 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. Policies incorporate a number of International Agreements, including; UN Convention of the Law of the Sea, Agenda 21 of the Rio Declaration, FAO Code of Conduct for Responsible Fisheries and the International Plan of Action to prevent, deter and eliminate Illegal, Unregulated and Unreported Fishing. Policy and objectives are directed toward responsible utilization of the cod resource and allocation and control of fishing opportunities is undertaken via a structured system of rights based entitlement. The system has built in controls to allow equitable use and flexibility which supports compliance to management measures and regulations.²</p>				
EVIDENCE				
<p>The Management System³ is operated by the government in close consultation with the Industry, predominantly via the Industry Associations. The Government Agencies that have primary responsibility over fisheries governance include; the Ministry of Industries and Innovation with ultimate responsibility through the Icelandic Fisheries Minister; the Directorate of Fisheries (Fiskistofa) with the principle responsibility for implementation of Policy, Regulations on fisheries management and for reporting on a day to day operational basis; the Icelandic Marine Research</p>				

¹ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-116-2006-on-Fisheirs-Management.pdf>

² <http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/>

³ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>

Institute (MRI) which is the Government Research Organisation tasked with the collection and scientific assessment of fishery data from survey and fishing data and the provision of advice to the Ministry for the management of fishery resources. The MRI also has responsibility for some day to day fishery management and regulatory roles for the closure of fishing areas.

Monitoring and enforcement happens at sea, under the Icelandic Marine Coast Guard and ashore, under the remit of the Directorate through a network of regional offices and fishery control staff. The Directorate also manages an at sea observer program. Observers form part of the information gathering and reporting for decisions on temporary closures. Strict rules are in place for adherence to closures and vessels can be spot fined if found to infringe on the boundaries of such areas.

Iceland has developed a Marine Policy, which identified 4 Ministries with responsibilities for the Marine environment; Minister of Industries and Innovation, Minister of Environment, Minister of the Interior, Minister for Foreign Affairs. Principally, the Minister of Industries and Innovation is responsible for the management of fisheries. The Policy acknowledges and has been developed in accordance with key International Agreements including; UN Convention of the Law of the Sea, Agenda 21 of the Rio Declaration, FAO Code of Conduct for Responsible Fisheries and the International Action Plans for Management of Sharks, Fishing Capacity, the International Plan of Action to prevent, deter and eliminate Illegal, Unregulated and Unreported Fishing and reducing incidental catch of Seabirds in Long-line Fisheries. The UN Fish Stocks Agreement, The Ecosystems Approach and the Precautionary Approach to fisheries management are also cited 'as policy' within the document.

There is a legal basis to the structure of fisheries management under the Fisheries Management Act No 116, August 2006 which superseded much of the Fisheries Management Act 1990. The fishing season is set from Sept 1 to August 31 for most species, including cod.

The Icelandic Fisheries Management System includes International Agreements (although not required for the Icelandic cod stocks) including participation in North East Atlantic Fisheries Commission and Northwest Atlantic Fisheries Organisation. Iceland also has access through a quota arrangement by Agreement for Norwegian cod and Russia for Barents Sea cod.

The fisheries are managed by a catch quota system. The annual quota is allocated to individual vessels (in accordance to the vessel's fixed quota share of the species subject to TAC, these can be large and small vessels) or vessel groups (coastal fisheries, that only fish in the summer) 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; discarding is prohibited by law.⁴

Procedurally, the coastal fisheries quota is subtracted from the overall TAC, with the remaining TAC being distributed to the small and large ITQ vessels. The coastal fisheries quota for 2014 has been set to 7500 tonnes. The small boat ITQ system fishes year round, and part of them fishes for specific species with handline (cod, haddock, saithe and redfish). Single vessels participating in the coastal fisheries are allowed to fish no more than 650 kg of cod or cod equivalents a day. Haddock, saithe

⁴ According to law no 57/1996 all catch has to be landed and provisions on discard are also in regulation no 601/2003.

and other species are translated into cod equivalents. Cod equivalents is calculated by the MRI based on a number of parameters including export value of the fish resource. The small boat ITQ system can also fish in the coastal fisheries in the summer if properly permitted.

Many of the vessels taking part in coastal fisheries have also ITQs, but they are not allowed to fish in both systems simultaneously. In 2013, 674 boats had license to take part in the coastal fisheries. 486 of them did also have quota and were engaged in other fisheries during the rest of the year.

http://www.fiskistofa.is/media/utgefid_efni/aflahefti2012_2013.pdf

To be able to participate in coastal fisheries a special license is needed; coastal fisheries are only allowed during the summer. A quota is issued and distributed between four defined areas and months, with the quota distributed fairly evenly between these months. Detailed regulations (daily allowance of catches, cod equivalents, days and daily hours allowed, number and type of gear in each fishing trip, permits and authorizations) are issued for the management of coastal fisheries.

<http://www.fiskistofa.is/fiskveidistjorn/umfiskveidistjornunarkerfid/strandveidar/>

The catch fished in these fisheries is not counted against the vessel's ITQ but against the coastal fisheries overall quota. In the coastal fisheries everybody is fishing from the same quota and when that quota is finished everybody has to stop fishing at the same time. This differs from the ITQ system.⁵

Financing for the System

The Icelandic fisheries management program is based on a cost recovery approach to financing based on resource rent tax. The owners of vessels holding harvesting rights are required to pay two kinds of fishing fee. 1. General fishing fee. General fishing fee is 9.50 kr. for each cod equivalent kilo. 2. Special fishing fee. The amount of the Special fee for each fishing year is based on the average lending prices during recent 12-month period before the start of the fishing year. Revenue from the fishing fee accrues to the State Treasury.⁶ (These fishing fees have been increasing in recent years and now amount to some 10 billion's Ísl. krónur in 2014.)⁷

⁵ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-57-1996-Treatment-of-Commercial-Marine-Stocks.pdf>

⁶ <http://www.althingi.is/lagas/143a/2012074.html>

⁷ <http://www.fjarmalaraduneyti.is/frettir/2013/09/11/nr/17178>

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The annual catch is limited by a TAC derived from a Harvest Control Rule. The MRI advises the Ministry of the TAC based on scientific evidence collected through survey and fishing logbook data. The Ministry through consultation with the various agencies and fishing associations sets the TAC which forms the basis of the quota allocation to each of the registered vessels according to individual quota shares. Catches are limited closely to the TAC (refer to table below). The Directorate is primarily tasked with monitoring of catches with support from Port Authorities, registered weighers and electronic logbooks. The Icelandic Coastguard also plays a major role in ensuring catches are recorded accurately at sea and reported according to the location.				
EVIDENCE				
<p>The Management system is based on the Individual Transfer Quota System (ITQ).⁸ The Fisheries Management Act is the principal legislative instrument that defines how the ITQ system is administered for vessels and how the quota can be transferred and purchased by other vessels (the transfer). There are well defined rules and requirements for quota allocation, transfer and reporting that must be met. The Act sets the fishing year from September 1 to August 31st of the following year.</p> <p>The Directorate is principally responsible for the physical recording of catch and registering this information against the allocated ITQ per vessel for each species, including for Cod. All vessels are legally obliged to have their landings officially declared and verified. Declaration is principally via the electronic logbook which is automatically transmitted to the Directorate. The smaller segment of the fleet (6 GRT) do not report via the electronic logbook, principally since they do not carry the necessary electronic infrastructure at this time, although they are obliged to report catch information in written logbook format from each fishing trip to the Directorate. Logbook information must be reported to the Directorate at least on a monthly basis.</p> <p>This information collected on the logbook is collected in the central database and is an important tool for measuring the quota allocation to each and every vessel above 6GRT. N.B. The final weighing of catch is the value that is used in the central database. The recording of catch and transfer of quota is recorded and monitored by the Directorate. The reporting system is transparent and allows anyone to view the quota allocation via the Directorate website, catch against that quota at any point in the fishing season and also transfers of quota for each vessel individually.</p> <p>How the system operates is briefly described:</p> <p>Catches are recorded by the vessel skipper at the end of each fishing event in the electronic logbook. Data is transmitted from the logbook automatically and is received by the Directorate for recording in the central database. Trackwell is the service provider of the technology. During the site visit in April 2014, a meeting with Trackwell, who are contracted to manage the technical</p>				

⁸ <http://www.fisheries.is/management/fisheries-management/individual-transferable-quotas/>

operation of the IT system, was held. The system was described and the support measures for server storage and support. Businesses engaged in purchasing and/or selling catches are obligated to present reports to the Directorate of Fisheries, containing information on the purchase, sale and other disposition of fish catches.

The Directorate has the authority to obtain information and access the premises and data bases of those involved in fish trading. If discrepancy materializes in the database of the Directorate of Fisheries between the information stated in the reports and the information received from the harbour weighing, corrective or enforcement measures are taken when this is deemed appropriate.

Should a fishing vessel catch less than 50% of its total catch quota, measured in cod equivalents, during two consecutive fishing years its quota share shall be cancelled and the quota shares of other vessels in the species concerned increased accordingly. There is also a requirement that within the year, the net transfer of quota from any vessel must not exceed 50% and a fishing company cannot own more than 12% of the total Cod quota share.⁹

There is a separate small boat quota (<15GT) only allowed to fish using hand-lines or long-lines. The system contains many other rules. There is a legal obligation for all vessels landings of fresh fish to be separately weighed on landing by Officials authorised by the Directorate. These can include harbour officials, accredited staff of processing establishments and Directorate staff, directly. The official catch weight is cross compared with the e-logbook recorded weights entered at the time (or within a period) after capture for verification. Information is stored in central database held on servers operated by the Directorate and access is also provided to the Ministry and the Marine Research Institute. For vessels landing processed fish prepared and frozen at sea, the Directorate undertakes analysis of the nominated yield factors proposed by the Operator and verifies these by sample weighing at sea during observer trips to ensure that accurate conversion of filleted fish to live weight equivalent can be made. For the case of factory freezer vessels, the logbook entry is for final processed weights and not round weight/live weight values. For official purposes, the official weight is the weight registered on landings by the official of the Directorate.

The official landing weights for each species are subtracted from the ITQ for the catching vessel and the remaining quota available for each species is electronically up-dated. The Directorates web site allows access to third parties to view this information. Normally, the information presented is up-dated continually and within 24 hours of landing declarations. There is a statement that information is subject to change allowing the Directorate to correct any data where necessary allowing for checking and removal of errors before figures are finally registered. The system can be described as highly effective at providing near real time situation of the landed proportion of the quota. Historical comparisons of catches (Figure 5) give an overview of the accuracy of official landings against the allocated quota.

If a vessel has overfished its quota for a species it must engage in transferring quota within a maximum of 3 days in order to re-address the imbalance. The Directorate is principally responsible for the administration, allocation, recording and the day to day monitoring of ITQ, (and directing where necessary) the ITQ trade and rent system. Monitoring oversight is provided and the Directorate has the authority to intervene in cases where quota is not transferred to the vessel.

Vessels can rent cod quota from other vessels, can trade cod for other species but cannot convert

⁹ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>

other species for cod quota, e.g. they cannot convert saithe quota for cod quota. There are built in tolerances within the overall system to allow fishing above quota to be landed and declared (rather than discarded).

However, the profits from fish caught beyond quota go to fund fisheries projects termed 'Verkefnasjóður sjávarútvegsins' within limitations set out in the Fisheries Management Act. No 116/2006.

The Ministry manages the regulatory framework for adequacy and advises the Minister on any amendments to the regulations and for the initial setting of TAC's for each species at the beginning of the fishing year. Iceland sets the quota allocation commencing from 1st September for a 12 month period.

Table 2. Cod in division Va (Icelandic cod). ICES Advice, management and landings. Note that ICES landings for fishing year are in line with the fishing year set by the Icelandic authorities. Catch in 2013 was 223 kt. The small TAC overage that can be seen between TAC and actual catch is likely due to the flexibility rules related to the catch of juveniles (to avoid their discards) and to the response time of the catch accounting system. All catches are accounted in the yearly stock assessment process of the MRI.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES landings for the fishing year	ICES landings for the calendar year
1988 ¹	National advice	300	350		378
1989 ¹	National advice	300	325		356
1990 ¹	National advice	250	300		335
1991 ¹	National advice	240	245		309
1991/1992 ²	National advice	250	265	274	274
1992/1993 ²	Reduce F by 40%	154	205	241	241
1993/1994 ²	Reduce F by 40%	150	165	197	197
1994/1995 ²	Reduce F by 50%	130	155	165	169
1995/1996 ²	Apply catch rule	155	155	170	182
1996/1997 ²	Apply catch rule	186	186	202	203
1997/1998 ²	Apply catch rule	218	218	227	243
1998/1999 ²	Apply catch rule	250	250	254	260
1999/2000 ²	Apply catch rule	247	250	257	236
2000/2001 ²	Apply catch rule	203	220 ³	221	235
2001/2002 ²	Apply catch rule	164	190 ³	217	209
2002/2003 ²	Apply catch rule	183	179 ³	198	206
2003/2004 ²	Apply catch rule	210	209	225	226
2004/2005 ²	Apply catch rule	205	205	214	214
2005/2006	Apply catch rule	198	198	209	196
2006/2007	Apply catch rule	187	193 ⁴	187	170
2007/2008	Apply catch rule	152	130	140	147
2008/2009	Apply F _{max}	< 124	160 ⁵	168	181
2009/2010	Apply F _{max}	< 135	150 ⁶	168	169
2010/2011	Apply catch rule	160	160	165	165
2011/2012	Apply catch rule	177	177	185	196
2012/2013	Apply catch rule	196	196		
2013/2014	Apply catch rule	215			

Weights in thousand tonnes.

¹ Calendar year.

² National fishing year ending 31 August.

³ Amended catch rule.

⁴ Catch rule 2006.

⁵ Initial TAC set to 130 according to the catch rule, raised to 160 in January 2009.

⁶ Set according to the catch rule.

<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2013/2013/cod-iceg.pdf>

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE:				
<p>Management measures can be divided into the following categories:</p> <ul style="list-style-type: none"> • Total Allowable Catch based on scientific advice and Individual Vessel Quotas (large and small vessels); • Fishery access is limited by license per vessel and allocated via an ITQ system for each vessel and a quota shared among the hand line hook vessels with restrictions on daily catch (650 kgs cod/day); • Technical measures are implemented by Regulation including; gear specifications (mesh size and technical conservation measures such as square mesh panels), seasonal, permanent and temporary closed areas). <p>The Directorate is the principal implementation agency and is supported by the Coast Guard through monitoring and enforcement and also by the Port Authority by recording of landings. The MRI plays the lead role in the implementation of temporary closed areas (fast shut downs) which can be implemented virtually instantaneously on the results of undersized catches in landings.</p>				
EVIDENCE:				
<p>Total Allowable Catch based on scientific advice and Individual vessel quotas</p> <p>The catch limitation system is at the basis of the Icelandic fisheries management system. The system is intended to limit the total catch and to prevent more fishing from the fish stocks than the authorities allow at any given time. The TAC is based on Scientific Advice. Scientific Advice is provided by the Marine Research Institute which carries out research on the ocean’s commercial stocks and provides the authorities with fisheries advice. The Marine Research Institute is an independent institution that falls under the auspices of the Ministry of Fisheries and is the main research body in Iceland conducting marine and fisheries research. Stock assessments are based on systematic research of the size and productivity of the fish stocks and the marine ecosystem. Active collaboration with international scientific organisations (principally ICES) is undertaken and provides feedback and collaboration on research methods that provide the best available information on the condition of the fish stocks around Iceland. The ITQ management has three pillars, the general individual transferable quota system (ITQ), secondly the small vessels ITQ, where there are restrictions on use of gear and selling of quota is limited to that part. Thirdly, there are regional policy instruments, where a limited quantity of quota is allocated to vessels in communities that are dependent on fisheries and have been adversely affected by national fluctuations or other stocks. There is a high level of compliance to the TAC and substantial tracking and reporting on compliance in a transparent manner, noticeably via the website of the Directorate. The catch limitation system is based on the catch share allocated to individual vessels. Each vessel is allocated a certain share of the total allowable catch (TAC) of the relevant species. The catch limit of each vessel during the fishing year is thus determined on basis of the TAC of the relevant species and the vessel’s share in the total catch. The catch share may be divided and transferred to other vessels, with certain limitations.</p>				

Fishery Access Licenses

All commercial fishing operations are subject to a permit from the Directorate of Fisheries. The total registered number of vessels reported by the Directorate in their 2013 Report for 2012/2013 fishing season lists 1.292 vessels and smaller boats.¹⁰ Certain fisheries require special permits, such as Danish seining, inshore shrimping, specific fisheries by Icelandic vessels in distant waters as well as the fishing of foreign vessels within the Icelandic exclusive economic zone (EEZ). Article 4 of the Fisheries Management Act 1996¹¹ states that 'No one may pursue commercial fishing in Icelandic waters without having a general fishing permit'. General fishing permits are of two types, i.e. a general fishing permit with a catch quota and a general fishing permit with a hook-and-line catch quota. 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. A fishing permit shall also be cancelled if a fishing vessel is removed from the registry of the Icelandic Maritime Administration or if its owners or operators do not satisfy the conditions of Article 5.

Catch per gear type

In 2013 49% of cod was caught with demersal trawl, 33% on long line, 9% in gill net, 4% in Danish seine and 3% on handline.¹²

Technical Measures (gear, season, permanent and temporary closed areas)

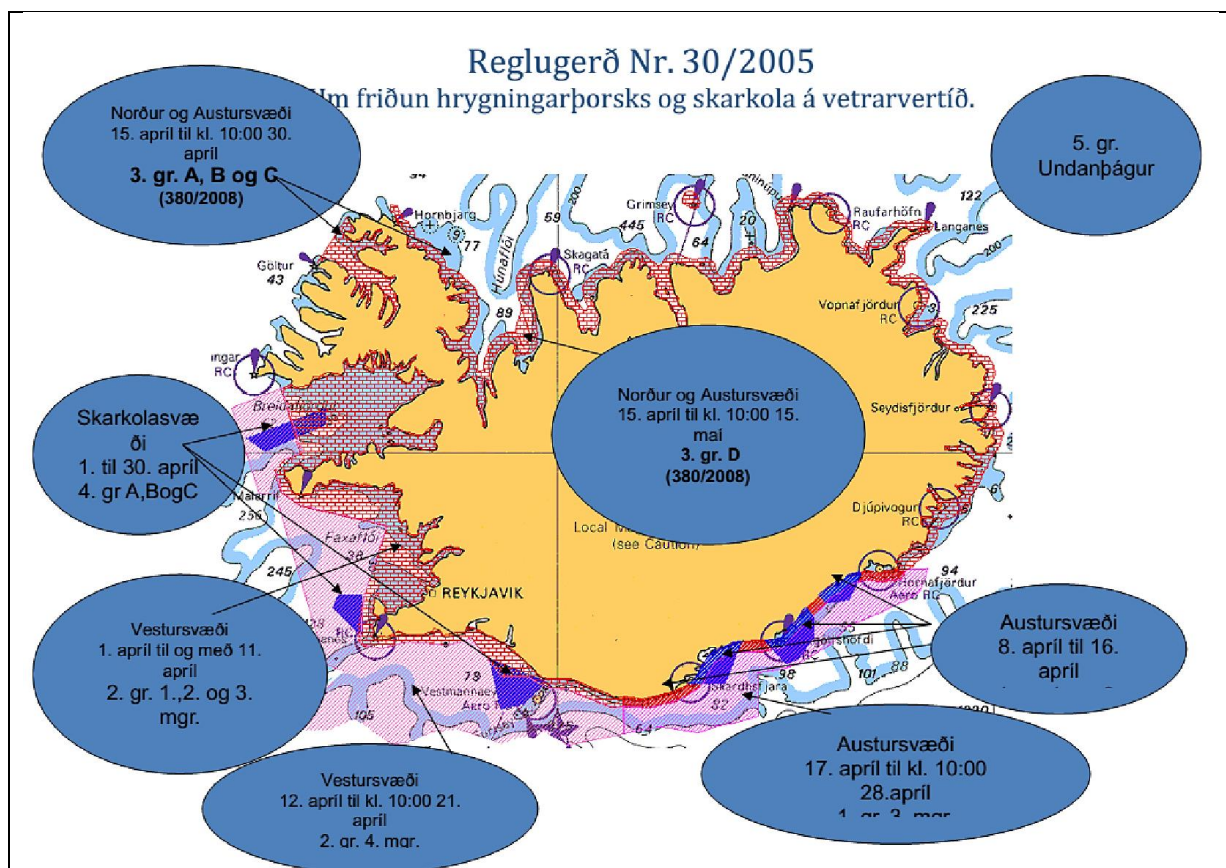
Effort is restricted through a number of technical measures. There are regulations concerning the type of fishing gear permitted, e.g., the minimum mesh size for trawlers fishing for cod is 155 mm. Fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. The following chart is available on the Directorate website and illustrates the extent of area closures in the Icelandic Fishery. Since 2005 each area has different closure-days because the spawning occurs at different times in different areas. The red areas tend to be largely for cod protection while the blue ones on the bottom left to protect spawning plaice.

<http://www.fisheries.is/management/fisheries-management/area-closures/>

¹⁰ http://www.fiskistofa.is/media/arsskyrslur/veidileyfi_uthlutanir_2013.pdf

¹¹ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>

¹² Information from the Directorate of Fisheries „ Catch per gear type“



13

Figure 11. Spawning closures in Iceland.

On top left Norður og Austursvæði closed between 15 April and 30 April
 Below on left Skarkolasvæði/ Plaice-areas (pointing at blue areas) closed 1 to 30 April
 Below Vestursvæði West-area 1 April to 11 April
 Bottom left Vestursvæði(the most important) West-area 12 April to 21 April
 Bottom right Austursvæði East-area 17. April 28 April
 Above Austursvæði East-area 8 April to 16 April
 Middle Norður og Austursvæði North- and East-areas

Sorting grids in fishing gear are mandatory to avoid by-catch of juvenile fish in the shrimp fisheries. Extensive provisions are made for scheduled, routine and temporary closures of fishing areas to protect spawning fish from all fishing. In addition, the Marine Research Institute (MRI) has the authority to close fishing areas temporarily without prior notice if the proportion of small fish in the catch exceeds certain limits (25% or more of <55 cm cod and saithe, 25% or more of <45 cm haddock and 20% or more of <33 cm redfish). There are a number of Regulations which form the basis to the implementation of Policy and providing powers of enforcement to the Directorate. These are published each year in a booklet made available to all registered vessels.

¹³ <http://www.fiskistofa.is/fiskveidistjorn/veidibann/hrygningarstopp/>
 and http://www.fiskistofa.is/media/veidiswaedi/Hrygningarstopp_2.pdf

CLAUSE: 1.1.4 The Specification does not recognise fishing practices that are prohibited such as dynamiting, poisoning and other comparable destructive fishing practices.			
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/> Critical <input type="checkbox"/>
<p>SUMMARY: The principal objectives of Icelandic policy on the ocean are to maintain the ocean’s health, biodiversity and productive capacity, in order that its living resources can continue to be utilised sustainably. Whilst, regulations do not specifically state that certain fishing practices are prohibited, only legal gears are allowed.</p> <p>Legal Instruments are in force which specifies ‘legal gears’ for each method of fishing. (Act 57/1996) also requires the regulation of fishing gear so as to reduce damage to catch and also to allow confiscation of gear not retrieved in a proper manner, found in closed areas, fishing illegally or being illegal. Also Article 9 of Act No. 79 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.</p>			
<p>EVIDENCE:</p> <p>The Icelandic Ocean Policy (developed by the Ministries of Fisheries, Environment and Foreign Affairs) states: ‘The principal objectives of Icelandic policy on the ocean are to maintain the ocean’s health, biodiversity and productive capacity, in order that its living resources can continue to be utilised sustainably. This means sustainable utilisation, conservation and management of the resource based on research, technology and expertise, directed by respect for the marine ecosystem as a whole.’</p> <p>Legal Instruments are in force which specifies ‘legal gears’ for each method of fishing. (Act 57/1996) also requires the regulation of fishing gear so as to reduce damage to catch and also to allow confiscation of gear not retrieved in a proper manner, found in closed areas, fishing illegally or being illegal. Also Article 9 of Act No. 79¹⁴ 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. Fishing gears in operation for cod fishing include: demersal trawl, Danish seine, gill netting, automatic lining and hand lining. Dynamiting, poisoning and other comparable destructive fishing practices are illegal in Iceland.</p>			

¹⁴ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-79-1997-Fishing-in-Iceland-Exclusive-Fishign-Zone.pdf>

The Fisheries Management Plan

CLAUSE: 1.1.5 Fishing for the “stock under consideration” shall be managed by the competent authorities in accordance with a documented and publicly available Fisheries Management Plan.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Fishing for Cod in the Icelandic EEZ is regulated by law. There is an established Fisheries Management Plan for Icelandic Cod, documented and endorsed by the Minister of Fisheries. It is publicly available at the Icelandic Ministry of Industries and Innovation website (http://www.fisheries.is/main-species/cod/management_plan/nr/349).				
EVIDENCE				
<p>There is an established Fisheries Management Plan (FMP) for Icelandic Cod, documented and endorsed by the Minister of Fisheries. The Plan is documented and available on the Icelandic Ministry of Industries and Innovation website (http://www.fisheries.is/main-species/cod/management_plan/nr/349).</p> <p>Primary laws and regulations regarding Icelandic fisheries management include:</p> <ul style="list-style-type: none"> • The Act on Fisheries Management as subsequently amended No 116/2006. • The Act concerning the Treatment of Commercial Marine Stocks as subsequently amended No 57/1996. • The Act on Fishing in Iceland’s Exclusive Fishing Zone as subsequently amended No 797/1997. <p>Regulations are issued annually with amendments. Primary regulations are:</p> <ul style="list-style-type: none"> • Regulation no 742/2008 on commercial fisheries, which is issued every year with amendments. • Regulation no 601/2003 on utilisation of catch and by-products. A Regulation on the utilization of catch and by-products was issued in 2011, No. 810, 26th August 2011. The Article 1 states that “It is mandatory to bring everything caught to shore”. • Regulation no 557/2007 on logbooks with an update Nr. 126/2014, making it compulsory to record catches of birds and sea mammals. • Regulation no 224/2006 on weighing of catch as subsequently amended. <p>The cod fishery management plan (FMP) contains specifications about the following items:</p> <ul style="list-style-type: none"> • Management unit; • Harvesting Policy; • Limits with respect to precautionary management; • Fisheries management system; • Support measures; • Scientific advice; • Process for making decisions on TAC; • Consultation with stakeholders in fisheries; 				

- The means of implementing the management approach; including main provisions for monitoring; control; surveillance and enforcement and management measures relevant to ecosystem effects of the fishery.

The plan includes a Harvest Control Rule, by which a total TAC is derived from an assessment of the state of the stock, precautionary limit reference points, the management system based on individual transferable quotas (ITQ) and support measures. The TAC is decided based on scientific advice from the Marine Research Institute (MRI), in collaboration with ICES.

The Ministry has the authority to deviate from the plan. This has not happened in recent years. The current management plan is temporary with goals to be reached by 2015. A process to revise the rule is ongoing. Changes to the rule are being discussed, but no decisions have been made so far.

CLAUSE: 1.1.6 The Fisheries Management Plan developed and adopted by the competent authorities shall be formulated with due consideration to the following:

- **1.1.6.1 The management unit;**
- **1.1.6.2 Specification of stock or component stocks of “stock under consideration”;**
- **1.1.6.3 Jurisdiction areas and the respective competent authorities for the entire range of component stock(s) of “stock under consideration”;**
- **1.1.6.4 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.**

The Fisheries Management Plan shall specify:

- **1.1.7.1 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;**
- **1.1.7.2 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.)¹⁵, as well as remedial action to be taken if limits are approached or exceeded;**
- **1.1.7.3 The Specification of the applicable harvest control framework or harvest control rule, as appropriate.**
- **1.1.7.4 The primary approach applied to managing the fisheries (e.g. input controls, output controls, etc.).**

¹⁵ [F_{lim} can be explicit, or implicit in cases where harvest rate is set annually to a precautionary F_{target} (or its proxy)]

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
<p>SUMMARY EVIDENCE 1.1.6 and 1.1.7: There is a management plan in place, that specifies management units, stock under consideration, harvesting policy, objectives and reference points. The primary approach to managing fisheries is yearly TACs, distributed as individual transferable quotas. Supporting measures include area closures, gear restrictions, discard ban and extensive control of landings. The management plan is temporary, valid until 2015. A potentially revised plan is being discussed, but no decisions have been made so far. A review of the FMP is planned for 2015.</p>				
<p>EVIDENCE</p> <p>1.1.6.1 The management unit;</p> <p>The Fisheries Management Plan for Icelandic Cod describes the Management Unit of Icelandic Cod as:</p> <p><i>'Management unit:</i> Cod fishing (<i>Gadus morhua</i>) in the Icelandic Exclusive Economic Zone (EEZ). Icelandic authorities (Minister of Fisheries and Agriculture) manage fisheries within the Icelandic EEZ, which is mainly within ICES area Va. Current distribution of the stock is primarily within the Icelandic EEZ'.</p> <p>This is under the sole control of Iceland, under the Management System with ultimate responsibility held by the Ministry of Industries and Innovation but with devolved powers to other Ministries and Agencies.</p> <p>1.1.6.2 Specification of stock or component stocks of “stock under consideration”;</p> <p>The Icelandic Cod Fisheries Management Plan states that the current distribution of the stock is primarily within the Icelandic Exclusive Economic Zone (EEZ). According to ICES 2013 (http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2013/NWWG/NWWG%202013.pdf), the Icelandic cod stock is distributed all around Iceland. In the assessment cod within Icelandic EEZ waters it is assumed to be a single homogenous unit. The main spawning grounds are off the Southwest coast. The pelagic eggs and larvae drift clockwise around the island to the main nursery grounds off the North coast.</p> <p>Minor catches are reported from Faroese waters. These catches are included in the stock assessment, and contribute to the biomass estimate of the stock. In principle, if the TAC derived from estimates of the whole stock is allocated only to the Icelandic EEZ, catches in other areas will be in excess of the TAC according to the management rule. At present these catches are extremely small (about 0.4% of the total), and their contribution to the total stock estimate and the TAC can be considered negligible. Larvae from the Icelandic stock may drift into the Greenland Zone and grow up there. In some years, some of these fish migrate back to the Icelandic waters as adults. Prior to 1970, when the Greenland stock was in a better condition, such events were common. The last</p>				

event was in 2009, which increased the abundance of the 2003 year class by about 20%. Such fish is accounted for in the stock assessment of Icelandic stock when they appear in Icelandic waters (ICES NWWG 2013: Quality Handbook Stock Annex – Cod in Icelandic waters (Division Va)). In the simulations done when evaluating the current management plan, future migration events were not explicitly assumed (Report of the Ad hoc Group on Icelandic Cod HCR Evaluation (AGICOD). ICES CM 2009\ACOM:56)

There does not seem to be any opportunity to separate potential migrants in Greenland catches. At present the catches in Greenland waters are small (13000 t out of which 2000 tonnes were from East Greenland) as the Greenland cod stock is in a poor condition. A fishery on these fish while they are in Greenland waters would have a negligible impact on the fishing opportunities in Iceland, while the fishery in Iceland hardly affects fishing opportunities in Greenland. Extensive tagging studies have revealed some movement between Iceland and the Faroes, which is considered of minor importance (Neuenfeldt & al, 2013), and no significant exchange with other areas. The cod stock in Icelandic waters is regarded as such for management purposes.

There are subtle, but significant genetic differences between fish spawning North and South of the island. Depletion of local components might become a problem if the fishery were concentrated in small areas. This is not the case however; as the fishery is spread fairly evenly around the whole island.

Reference: S. Neuenfeldt, D. Righton, F. Neat, P. J. Wright, H. Svedang, K. Michalsen, S. Subbey, P. Steingrund, V. Thorsteinsson, C. Pampoulie, K. H. Andersen, M. W. Pedersen and J. Metcalfe (2013): Analysing migrations of Atlantic cod *Gadus morhua* in the north-east Atlantic Ocean: then, now and the future. *Journal of Fish Biology* (2013) 82, 741 – 763: doi:10.1111/jfb.12043, available online at wileyonlinelibrary.com.

1.1.6.3 Jurisdiction areas and the respective competent authorities for the entire range of component stock(s) of “stock under consideration”;

The stock is confined to the Icelandic shelf, which for practical purposes coincides with the 200 mile EEZ of Iceland under the jurisdiction of the Ministry of Industries and Innovation, and also with ICES Division Va. The cod in ICES area Va is regarded as a unit stock, separate from other cod stocks. It is distributed in all parts of the Icelandic zone, and is restricted to that area with minor exceptions, as outlined under clause 1.1.6.2.

1.1.6.4. 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.

A Harvest Control Rule has been developed for the annual TAC for Icelandic Cod. This plan is an amendment and improvement of plans that have been developed since the mid 1990's. ICES has evaluated the Iceland cod plan. The Marine Research Institute in Iceland was commissioned to carry out analyses and produce a working document that was the basis for the evaluation of the HCR by ICES, 2009b.

ICES considered the (ICES Advice 2010, Book 2, Section 2.3.3.1) request for evaluation of the Icelandic cod fisheries management plan¹⁶ and advised that the management plan had a high probability of resulting in an increase in the size of spawning stock from the current estimated level by 2015 and beyond. In addition, the plan was deemed consistent with the precautionary approach (low probability of the stock declining to a level where future productivity of the stock may be impaired) and the medium-term projected fishing mortality was also defined as consistent with international commitments to achieve maximum sustainable yield (high long-term average yield, $F_{max} = \sim 0.3$).

The Icelandic Government has adopted a management plan for the Icelandic cod stock for the next five fishing years, starting with the 2009/2010 fishing season. The main objective of the management plan is to ensure that the spawning stock biomass (SSB) will, with high probability (>95%), be above the 2009 size of 220 thousand tonnes by the year 2015. This will be achieved by applying the following harvest control rule (HCR) to calculate the total allowable catch (TAC): $TAC_{y+1} = (\alpha B_4 + y + TAC_y)/2$, where y refers to the assessment year, B_4 to the biomass of 4-year and older cod, and α to the harvest rate. α is set to 0.2 when SSB_y is higher than 220 thousand tonnes (SSB_{BMP}^*), but set to $\alpha = 0.2 SSB_y / SSB_{BMP}$ when SSB_y is lower. *ICES interprets SSB_{BMP} as $B_{trigger}$. The TAC would start decreasing if the SSB would go lower than 220 thousand tonnes.

The rule aims at 20% catch rate of 4-year and older cod. A process to revise the rule is ongoing.

Biological reference points have not been defined for this stock. The 2009 ICES' assessment and advice, indicates that the SSB in 1993 was the lowest in the time series. This gives an estimated B_{loss} at ~ 123 kt. The estimated SSB for 2009 is ~ 220 kt ($\sim 1.8 \times B_{loss}$) which is the reference biomass for the management plan. ICES' evaluation of the management plan indicates a projected SSB in 2015 that has a high probability (> 95%) of being above the estimated SSB for 2009. This statement implies a low probability (< 5%) that the projected SSB for 2015 will be below B_{loss} (a candidate value of B_{lim}) and hence, ICES' evaluates the management plan to be precautionary. The high probability of the stock being above $B_{trigger}$ and the very low probability of being below B_{loss} provides quantitative evidence of the validity of the two chosen reference points.

The exact conditions leading to MSY are not well known, and may depend on external conditions. The expected decrease in fishing mortality should increase stock biomass closer to that producing maximum sustainable yield. The projected management plan catch fraction of ~ 0.2 on average is similar to common proxies for F_{MSY} .

The evaluation of the HCR is documented in 'Report of the Ad hoc Group on Icelandic Cod' (ICES CM 2009\ACOM:56) Stock modelling utilises age-structure data derived from catches and two bottom trawl surveys., as described in Clause 1.1.8.3

Implementation error (i.e., the difference between the TAC generated by the harvest control rule and the quantity of fish that die due to fishing) can arise from a number of sources, including deviations from the rule and removals in excess of the TAC. ICES in its evaluation of the harvest rule assumed that the removals from the stock equal the TAC corresponding to the rule.

16

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

The tolerance for implementation error is small without jeopardizing the success of the management plan.

ICES also stated that 'The analyses were based on a commonly adopted approach that does not fully evaluate all aspects of structural uncertainty (how the real world differs from what is assumed in the assessment model) and thus, the assessment error and amount of bias applied in the current analysis are likely underestimates. To have more confidence in the robustness of the harvest control rule, a full management strategy evaluation would have to be conducted in which the assessment is simulated in more detail. A full management strategy evaluation will also facilitate the examination of suspected sources of structural uncertainty'.

In the analyses considered, the tails of the distributions are generally not well-defined (i.e. very sensitive to assumptions) and therefore consideration might be given to using a lower reference level such as 90% probability. For the purposes of this assessment, there remains a high probability that SSB will be above the lowest value observed (123,000 tonnes in 1993) ICES has adopted this value (rounded to 125 000 tonnes) as Blim.

Since the management plan was implemented in 2010, the spawning stock biomass has increased well above the target value of 220 000 tonnes. The estimate in 2013 was 478000 tonnes, and the predicted SSB for 2015 assuming the current harvest rule was 600000 tonnes (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2013/2013/cod-iceg.pdf>). It is worth pointing out that increase in biomass may not be fully due to the measures taken within the management plan.

1.1.7.1. 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;

The management strategy for Iceland cod 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. The current medium term management strategy is to ensure that the spawning stock biomass (SSB) in 2015 will be above 220000 tonnes (estimated size in 2009) with high probability. In accordance with this general aim a harvest control rule (HCR) was adopted by Icelandic authorities in June 2009 for the next period of 5 years. The rule aims at 20% catch rate of 4-year and older cod.

The current management plan is temporary with goals to be reached by 2015. A process to revise the rule is ongoing. Changes to the rule are being discussed, but no decisions have been made so far.

The harvest control rule (HCR) calculates the TAC in the next year as the mean of the TAC in the current year and 20% of the biomass of 4 year and older cod in the assessment year, as follows:

$$TAC_{y+1} = (\alpha B_{4+,y} + TAC_y)/2,$$

where y refers to the assessment year, B_{4+} refers to biomass of 4 year and older cod and α (the catch rate) is set as 0.2 when $SSB > 220.000$ tonnes.

If the spawning stock biomass (SSB) falls below 220 000 tonnes ($SSB_{trigger}$), the catch rate α shall be

reduced and will be calculated using $\alpha=0.2 * SSB/220000$

This HCR has been evaluated by ICES and found to be consistent with the precautionary approach. ICES has noted that although the harvest control rule meets the management objective, there is little tolerance for deviations from the assumptions. (ICES Advice 2010, Book 2, Section 2.3.3.1 Icelandic request on evaluation of the Icelandic cod management plan: (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf>).

If the effective harvest rate exceeds that derived from the rule, as it has in the past, the management objective may not be reached. It was also noted that if the 2008 year class, which at the time had been observed in surveys only once and appeared to be relatively strong, should turn out to be only at the recent average, the probability of increasing the SSB by 2015 compared to 2009 will be somewhat less than 95%.

Since the management plan was implemented in 2010, the spawning stock biomass has increased well above the target value of 220 000 tonnes. The estimate in 2013 was 478000 tonnes, and the predicted SSB for 2015 assuming the current harvest rule was 600000 tonnes (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2013/2013/cod-iceg.pdf>).

1.1.7.2 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.), as well as remedial action to be taken if limits are approached or exceeded;

A limit point for spawning stock biomass (Blim) is in place, at 125000 tonnes. This is a rounded value of the lowest observed SSB (in 1993).

No limit value for the fishing mortality has been defined, as it is deemed redundant with the fixed Harvest Rate (HR) in the HCR. The HR of 0.2 implies a fishing mortality well below any candidate for a limit fishing mortality.

A target biomass is not defined explicitly, but the objective of having a high probability of increasing the biomass from the current level by 2015 is regarded as a preliminary target, which also reflects the uncertainty with regard to the optimal future level of biomass (B_{MSY}) for this stock.

A biomass associated with MSY is expressed as a long term target. According to ICES Advice (http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2013/2013/1.2_General_context_of_ICES_advice_2013_June.pdf), the exact conditions leading to MSY are not well known, and may depend on external conditions. The recent decrease in fishing mortality should increase stock biomass closer to that producing maximum sustainable yield. The projected management plan HR 0.2 on average corresponds to common proxies for F_{MSY} .

For its MSY-related advisory framework ICES has adopted an MSY trigger biomass of 220 000 tonnes, and an MSY harvest rate at 0.2, both taken from the management plan (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2013/2013/cod-iceg.pdf>). According to ICES standards, ICES in its advice according to the MSY framework will recommend to reduce

fishing mortality (or equivalently harvest rate) if the estimated SSB is below the MSY trigger biomass. The current HCR has such reduction in place.

Apart from a rule for reducing the HR at low SSB, the management plan does not describe explicit measures to be taken if limits are approached. According to the evaluation of the plan such events would be very unlikely unless natural conditions change or the fishery gets out of control, and measures would have to be adopted to the prevailing situation. The Ministry has the authority to take strong remedial actions using legislative processes to cease fishing activity for any stock in danger of collapse.

1.1.7.3 The Specification of the applicable harvest control framework or harvest control rule, as appropriate.

The key instrument to regulate removals from the stock in the management plan is the harvest control rule. The harvest control rule (HCR) calculates the TAC in the next year as the mean of the TAC in the current year and 20% of the biomass of 4 year and older cod in the assessment year, as follows:

$$TAC_{y+1} = (\alpha B_{4+,y} + TAC_y)/2,$$

where y refers to the assessment year, B_{4+} refers to biomass of 4 year and older cod and α (the catch rate) is set as 0.2 when $SSB > 220.000$ tonnes.

If the spawning stock biomass (SSB) falls below 220 000 tonnes ($SSB_{trigger}$), the catch rate α shall be reduced and will be calculated using $\alpha = 0.2 * SSB / SSB_{trigger}$.

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

The evidence presented throughout the assessment has provided a high level of confidence in the ability of the management system to ensure that the effective harvest rate does not deviate significantly from the harvest control rule as evidenced by the robustness of the vessel catch allocation, monitoring and recording system (ITQ), the reduction of discarding and high level of reporting - that would appear to be present within the Icelandic fleet.

There are small differences between reported official catch and the TAC over recent years according to management and science based sources (MRI, Directorate). There are regulations and technical conservation measures in other fisheries that reduce and limit the incidence of cod by-catch in those fisheries.

There is a high level of reporting in the Icelandic cod fishery and official statistics indicate that compliance to the TAC set for cod, based on this HCR is high. The reporting system is transparent, verified through Directorate shore side weighing stations, and allows for very near time monitoring of landed volumes and hence the management measures can be pre-emptive with respect to cod quota management. To support reporting the system has built in features:

- No discards policy (discards of cod and all other commercial species) are prohibited except

- for diseased/damaged fish).
- Reported by-catch and by-catch reduction measures (e.g. Nordmøre grids). The by-catch of cod is very low in other fisheries such as shrimp (0.3% in recent years).
 - Min. mesh size in codends for cod (135mm).
 - Min. reference size for cod of 50cm (circa. Age 4+) with an upper limit by weight of cod under reference size.
 - Undersized cod is counted at 50% quota (to encourage landing and hence reporting).
 - As part of the closed area system, MRI can close temporarily on short notice areas where undersized cod is caught.

CLAUSE: 1.1.8 The fisheries management plan shall also consider the following:

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

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The management plan and the legal and organizational framework has specifications corresponding to all clauses 1.1.8.1-7

EVIDENCE
1.1.8.1 The specific management method/approach or measures, according to fleet or jurisdiction or other relevant variables as appropriate;

The fisheries are managed by a catch quota system. The Directorate of Fisheries allocates quotas to individual vessels (in accordance to the vessel’s fixed quota share of the species subject to TAC) or vessel groups (coastal fisheries) 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; discarding is prohibited by law.¹⁷

Special coastal fisheries are allowed. To be able to participate in coastal fisheries a special license is needed; coastal fisheries are only allowed during the summer. A quota is issued and distributed between four defined areas and months. Detailed regulations are issued on number of gear, fishing days and allowable catch in each fishing trip. The catch fished in these fisheries is accounted against a common quota for these fisheries, not against individual vessel quotas.

1.1.8.2 Any further measures which support meeting the management objectives;

Real time area closures: A short-term sudden closure system has been in force since 1976 with the objective to protect juvenile fish. If, in a given area, there are several consecutive sudden closures, the minister of Fisheries can issue a regulation to close the area for a longer time period, thus directing the fleet to other areas. The Directorate of Fisheries and the Coast Guard supervises these closures in collaboration with the MRI.

Temporary area closures: The major spawning grounds of cod are closed during the main spawning season. In addition there are gear and mesh size restrictions in place. The restrictions are mainly to protect juvenile fish but also to decrease the effort towards bigger spawners.

Permanent area closures: Many areas have been closed permanently. These closures are based on knowledge of the biology of various stocks with the aim of protecting juveniles and vulnerable marine ecosystems, e.g. coldwater corals.

Also, to support reporting the system has built in features:

- No discards policy (discards of cod and all other commercial species) are prohibited except for diseased/damaged fish).
- Reported by-catch and by-catch reduction measures (e.g. Nordmøre grids). The by-catch of cod is very low in other fisheries such as shrimp (0.3% in recent years).
- Min. mesh size in codends for cod (135mm).
- Min. reference size for cod of 50cm (circa. Age 4+) with an upper limit by weight of cod under reference size.
- Undersized cod is counted at 50% quota (to encourage landing and hence reporting).
- As part of the closed area system, MRI can close temporarily on short notice areas where undersized cod is caught.

¹⁷ According to law no 57/1997 all catch has to be landed and provisions on discard are also in regulation no 601/2003.

1.1.8.3 The institution(s) or arrangement(s) responsible for providing stock assessment and advice;

Scientific advice, including advice on the TAC is provided by the MRI. Stock assessments are done within the framework of ICES by the ICES North Western Working Group (NWWG). ICES Advisory Committee (ACOM) formulates the formal ICES advice based calculations made by the ICES NWWG. Both ICES and the MRI also advise on research and harvesting policy in general.

The NWWG is one of many assessment working groups in ICES, and covers Icelandic, Faroese and Greenland waters. The members are scientists from the relevant countries. NWWG meets once a year and performs assessments of the major stocks in the area. The data that go into the assessment of Icelandic cod are catches in numbers at age and survey indices at age from the spring and autumn surveys, as well as weights and maturities at age. The age structured data are provided by MRI, by combining catch statistics from the Directorate and samples from the fishery supervised and analysed by MRI. Supplementary data from other nations are included as appropriate. The data are used with the assessment tool ADCAM, to assess the state of the stock and derive next years' TAC. It is a forward projecting separable population model with some variation in the selection at age, written in AD Model Builder. It was developed and is maintained by MRI. This type of methods is widely used and accepted. It assumes a model for the fishing mortalities and that the abundance indices from surveys are relative measures of true stock numbers at age, and it fits this model to the data according to statistical criteria. This method is used by the ICES North Western Working Group, and is quality checked through the standard advisory process in ICES. The calculations are reviewed by external reviewers before they are presented to ACOM. The comments by the reviewers are attached to the NWWG report. The result of the analysis is an estimate of the stock biomass, from which the corresponding TAC is derived according to the harvest rule.

1.1.8.4 A description of the process for making decisions on Total Allowable Catch (TAC) – how and on what basis management decisions are made;

A total TAC is set by the Ministry. The Ministry is advised by MRI. The MRI advice is based on the advice from ICES' Advisory Committee (ACOM). The ACOM advice includes a prediction of the catch in the coming year according to the HCR, based on a stock assessment performed by the ICES North-Western Working Group NWWG.

MRI will largely follow the ACOM advice, unless there are good reasons to deviate from it. Such reasons can be errors in the calculations or new information that has arrived after the NWWG meeting took place.

The Ministry will when setting the TAC take into account input from the fishing industry and other relevant input, and has the legal right to deviate from the scientific advice. However, in recent years the advice has been followed very closely. In the past however, this has not always been the case.

1.1.8.5 Provisions for considerations and consultation with the fishing industry

A special consultation group of the MRI meets every year and reviews different sources and information regarding the cod stock and cod fisheries in the Icelandic EEZ. One of the more important sources of information used by MRI in its research is logbooks from skippers which are sent to the MRI. Account is taken of these sources and information in research, quantification and advice as appropriate. The consultation group consists of experts from the MRI 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.

Provisions for consultation with the fishing industry are set out both by legislative measures – for example, Article 8 of Act No 79 Fishing in Iceland’s Exclusive Fishing Zone states that “Before decisions on such distribution of fishing regions are made (referring to the proposal by the Minister to prohibit fishing by certain gears in certain areas for a specific period), the Minister shall seek the opinion of those associations of vessel operators and fishermen who can be expected to be primarily affected such measures”. There are specific consultation groups that meet annually in December allowing fishermen (captains) to describe the fishing experience of the year and make comparisons with those previously. MRI also publishes short newsletters regularly providing updates on stock analysis and related research outcomes.

1.1.8.6 The means of implementing the management approach, including main provisions for monitoring, control, surveillance and enforcement;

The Icelandic Directorate of Fisheries is an independent administrative body responsible to the Minister. The Directorate is responsible for the 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. The Directorate of Fisheries works in accordance to law no 36/1992, no 116/2006 and no 57/1996. Accordingly, the Directorate of Fisheries issues fishing permits to vessels and allocates catch quotas. Other duties include imposing penalties for illegal catches. The Directorate supervises the transfer of quotas and quota shares between fishing vessels, controls the reporting of data on the landings of individual vessels and monitors the weighing of catches. The Directorate provides supervision on board fishing vessels and in ports of landing, which involves inspecting the composition of catches, fishing equipment and handling methods.

The Icelandic Coast Guard’s main tasks are fisheries inspection at sea and monitoring of the EEZ and reception of required notifications from vessels.

All catches have to be landed in authorized ports. There are approximately 70 such ports around the island. The catches are sorted and weighted by species by authorized staff, appointed by the port authorities. Most of the catch is sold through a common auction system, and there is an efficient transport system in place to bring the fish from port to buyer.

Discards are prohibited. Landings of undersized or low quality fish is paid for by special rules, designed to reduce incentives for discarding. Some of the payment goes to the fisher, some to funds for research.

During the site visits, Eythor Bjornsson (Director of Fisheries at the Directorate) confirmed that it is required to record all the vessel's catch in the fishing logbook, including the "non commercial" species.

1.1.8.7 The objectives and management measures relevant to ecosystem effects of the fishery.

Relevant management measures are stated in http://www.fisheries.is/main-species/cod/management_plan/nr/349 as:

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

1.2 Research and Assessment

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.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: There is evidence that the MRI is a research institute with competence to carry out the required tasks with a high scientific standard.				
EVIDENCE				
<p>The Marine Research Institute of Iceland (MRI), reporting directly to the Ministry of Industries and Innovation is the principle research institute that collects and compiles the necessary data and carries out scientific research and assessment of the state of fish stocks and the condition of the ecosystem¹⁸. The Directorate of Fisheries and the Coast Guard have supporting roles in data collection, research and assessment.</p> <p>MRI's activities are organized into three main sections: Environment Section, Resources Section and Advisory Section. The Environment Section's work deals with environmental conditions (nutrients, temperature, salinity in the sea, marine geology, and the ecology of algae, zooplankton, fish larvae, fish juveniles, and benthos). The Marine Resources Section undertakes investigations on the exploited stocks of fish, crustaceans, mollusks and marine mammals. The major part of the work involves estimating stock sizes and the total allowable catch (TAC) for each stock. The Fisheries Advisory Section scrutinizes stock assessments and prepares the formal advice on TACs and sustainable fishing strategies for the government.</p> <p>Among projects undertaken within the Environmental Section are investigations on surface currents using satellite monitored drifters, assessment of primary productivity, overwintering and spring spawning of zooplankton, studies on spawning of the most important exploited fish stocks.</p> <p>The Marine Resources Section performs annual ground fish surveys covering the shelf area around Iceland and surveys for assessing inshore and deep-water shrimp, lobster, and scallop stocks. The pelagic stocks of capelin and herring are also monitored annually in extensive research surveys using acoustic methods. Further, in recent years an extensive program concentrating on multi-species interactions of exploited stocks in Icelandic waters has also been carried out.</p> <p>MRI undertakes both spring and fall surveys in addition to an on-going discard assessment programme. The groundfish survey was started over 20 years ago. Four trawlers are hired in spring and autumn for a systematic survey of the fishing grounds. Their main targets are cod and haddock.</p>				

¹⁸ <http://www.hafro.is>

A total of approximately 15,000 cod are sampled each year for length, weight and age distribution. A wide range of physical, oceanographic and bathymetric data is collected on a routine basis to support the broader understanding of environmental changes on the cod and other commercial fisheries.

Important supporting departments are the Modelling Department, the Electronic Department and the Fisheries Library. The Modelling Department deals with fisheries and ecologically related mathematical models and is also involved in projects concerning methodological problems in fish stock assessment.

There have been regular surveys since the mid-1950's including transects for temperature, salinity and phytoplankton monitoring (4 times per year) and reported by the MRI through Condition of the Environment Reports. Evidence is available of the MRI research activities into the ecosystem and wider environmental/climatic monitoring and changes. The monitoring of the marine environment is extensive, and assembled in annual reports since 1994. These reports cover the hydrography and plankton communities around Iceland, as well as selected topics over a wide range. Measurement of ocean temperatures is also undertaken during stock surveys where bottom sea temperature data is monitored for trends and correlation with spatial abundance of stocks including cod.

MRI has a good publication record in the field of marine environment. An overview (publications list) can be found at <http://www.hafro.is/undir.php?REFID=20&ID=35&REF=3>

The MRI is involved in several research projects in the EU 7th Framework Programme on various aspects of ecosystem management.

The available data on fishing effort of the Icelandic fleet is very accurate and have made it possible to map in detail the distribution of otter trawl effort around Iceland. Over the next few years priority will be given to map the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances. Such information will be important in order to predict which species and habitats are being at risk of being damaged by fishing activities and for protection of important marine habitats in the future (http://www.hafro.is/undir_eng.php?ID=16&REF=2).

The Directorate of Fisheries (<http://www.fiskistofa.is/>) has an HQ in Hafnarfjörður, just outside of Reykjavik and offices at 6 locations in the country, where the staff are in the field of fisheries management and monitoring of Fisheries and secretariat, as necessary. A total staff of 70 are involved in fisheries management. They note (in consultation meetings) that the strategy of local, area offices based in the fishing regions provides the best form of intelligence, support from industry to respect and follow the control rules and provide a conduit for information from fishers' to government on the performance of fishing at any point in time. Operationally, the Directorate of Fisheries is responsible for the implementation of Fishery Regulations on behalf of the Ministry. A large part of the at sea surveillance falls directly under the responsibility of the Icelandic Coast Guard. Key functions for the Directorate include:

- Implementation of regulations
- Collection and collation of fishery catch data
- Supporting research, survey work

- Supporting Coastguard and surveillance activities
- Managing and policing the Icelandic ITQ system

All catches of Icelandic fishing vessels must be weighed and recorded at the port of landing by a certified official weigher. The port authorities record the catch in a computer that is directly linked to a centrally located database at the Directorate of Fisheries. Thus the 60 ports where landings occur in Iceland send electronic data daily to the Directorate. A total of approximately 50,000 landings are registered in the system every year. 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 if vessels have exceeded their quotas. Excess catches can result in a revocation of fishing licenses and fines. The Statistics Iceland then receives copies of the data for the production of economic statistics.

The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitors fishing within the zone in consultation with the Marine Research Institute and Ministry of Fisheries. 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 SW, S and East of Iceland. The Coast Guard is also responsible for rescue operations in the Icelandic Search and Rescue Region which is an area of 1.9 million square kilometers, or 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.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Assessment is done with state of the art model tools. The data required for the analysis are available and of good standard.

EVIDENCE

The assessment of the stock is a synthesis of data from two sources: catches, expressed as numbers caught at age, and relative measures of stock abundance over time, here measured as abundance at age by regular scientific surveys of the stock. In addition, measurements of weight and maturity at age are needed to convert numbers of fish to biomass and vice versa. All these data are of high quality, based on extensive systematic sampling and extensive surveys. The assessment method is

adapted to such data, and the data are considered sufficient for a reliable assessment.

Catch data. Data on landings are provided by the Directorate of Fisheries. The primary source of information is the landings as recorded by the authorized weighers in the ports. Other sources include buyers reports and logbooks. These data are used by the Directorate as supplement and for cross-checking.

Biological samples: The sampling protocol by the staff of the Marine Research Institute has in the last years been linked to the progression of landings within the year. The system is fully computerized (referred to as “Sýnó” by the natives) and 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.

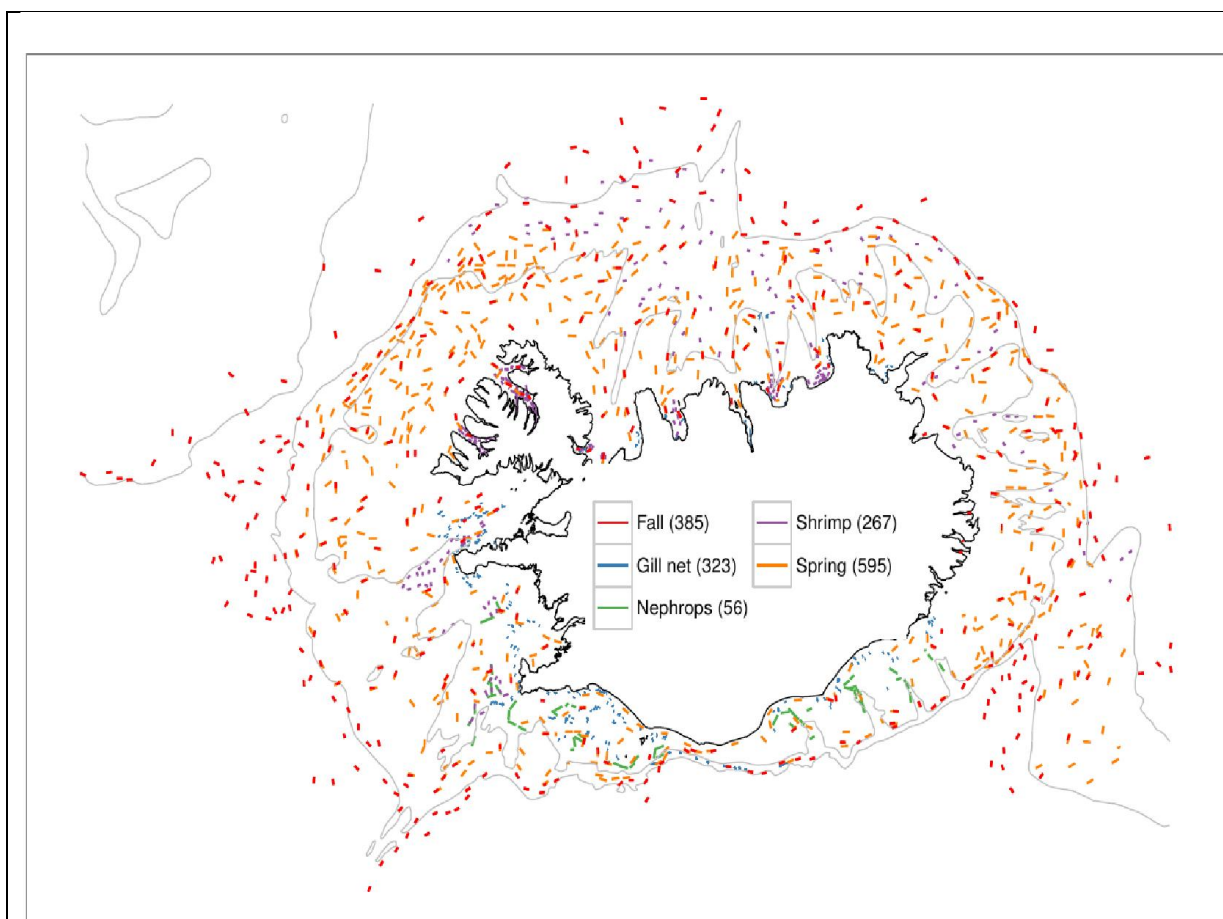
Length measurements are converted to age using representative age-length keys. Weights at age are calculated from length distributions and a Fulton condition factor with parameters estimated for each area, season and fleet.

The sampling is extensive, as indicated by the table below, showing the number of samples and individual fish examined by fishery. The numbers are from 2013, provided by the MRI.

Gear	n_1samples	n_lengths	n_osamples	n_otoliths
Long line	559	82101	57	2847
Gill net	627	3765	286	5001
Hooks	156	30582	16	801
Danish seine	468	2614	7	329
Trawl	600	72210	208	4330

Scientific surveys. MRI has extensive survey activities. Two major surveys are relevant for assessing the cod, a bottom trawl survey in the spring, and one in the autumn. Both surveys cover the whole Icelandic shelf, and are conducted by research vessels and commercial trawlers in cooperation, as outlined in Clause 1.2.3. below.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: There is a well organized and controlled system for recording commercial catches. Two very extensive and well standardized bottom trawl surveys are conducted each year that provide input to the stock assessment. Biological sampling is extensive of both the commercial and survey catches.				
EVIDENCE				
<p>Assessment of stock structure and productivity is based on annual (on-going) data collection and survey activities. These relate to both fishery independent methods (research vessel surveys) and fishery dependent methods (sampling catches and landings). The combination of these activities is used to assess population size, dynamics and structure and provide advice to management on fishing rates and forecasts.</p> <p>To be adequate for stock assessment, the catch data must cover all removals from the stock due to the fishery, including discards and other loss due to fishing operations. This is discussed under clause 1.2.4, where it is concluded that the deviations are minor. Minor deviations will have minor effect, but large deviations, in particular if they vary from year to year, will be detrimental to the quality of the assessment and TAC advice. Sampling must be adequate to provide a realistic estimate of the age distribution of the catches in the whole fishery.</p> <p>Catches are sampled regularly according to a protocol that automatically selects catches to be sampled, linked to the day-to-day reporting of catches. Discards are prohibited in the cod fishery, as in all Icelandic fisheries. Discards have been estimated annually since around 2000 (Pálsson et al, 2012, see clause 1.2.4.1) and found to be negligible in the cod fishery.</p> <p>There is a spring groundfish survey and an autumn groundfish survey, both covering the whole Icelandic EEZ. These surveys are more extensive than most surveys that are used for routine assessments (530 stations in the spring survey, 380 stations in the autumn survey), see map below showing all hauls in the scientific surveys in 2013 (Provided by the MRI).</p>				



An extensive survey protocol is available (<http://www.hafro.is/Bokasafn/Timarit/fjolrit-156.pdf>). A spawning survey is also carried out and smaller surveys for some specific species such as lobster and shrimp. The groundfish surveys are used to determine the abundance of the year classes present in the stock relative to previous year classes. The sampling protocol for the surveys require that at least 5 and at most 25 cod are randomly sampled for age determination from each haul. A larger number is length measured, basically 4 times the length range in cm in each haul.

The information about incoming year classes (in particular ages 3-4) are strongly dependent on the quality of the surveys. The perception of the strength of a year class later on is modified in subsequent assessments, when more information about the year class is collected as the fish gets older. The consistency in early and subsequent estimates of abundance ('retrospective error') is widely used as a quality measure. For Icelandic cod it is very good, well below 10% deviation with the current methodology. Although the retrospective error is well below 10%, the retrospective pattern looks to be one of slightly underestimated SSB and slightly overestimated fishing mortality, therefore errs on the side of caution rather than posing a risk to the fishery.

The stock assessment is the basis for predicting the effect of management measures, in particular the TAC on the future development of the stock. Simulations of harvest rules is a continuation of such predictions over a longer time, where the decision rules are tested for a range of plausible scenarios, where uncertainty with respect to future biology, as well as the uncertainty embedded in future assessments, leads to a range of possible outcomes of the rule. For a rule to be satisfactory, only a minor fraction of the plausible outcomes should be outside the range considered acceptable. The simulations done for evaluating the present harvest rules were considered acceptable by ICES.

The productivity of the stock depends on recruitment, growth and exploitation. The effect of exploitation is shown by the NWWG as stochastic yield per recruit (figure below) which indicates that the exploitation according to the current harvest rule is near optimal with respect to long term average yield.

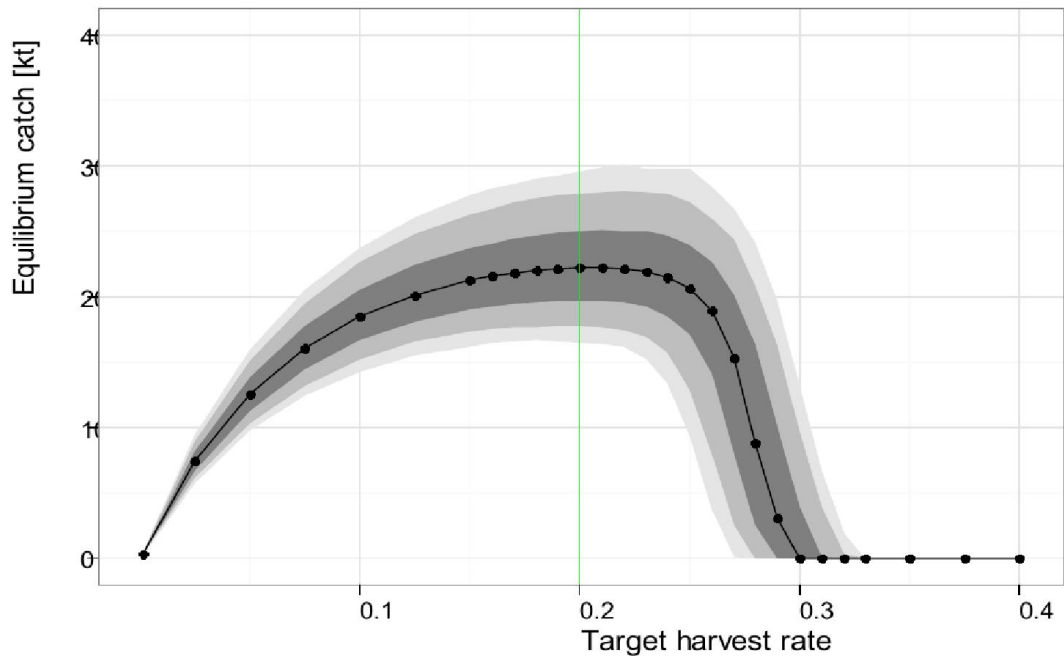


Figure 12. Target harvest rate vs equilibrium catch in kt.

The growth, expressed as weight at age, has varied over time. The figure below shows how weight at age each year deviates from the long term mean. Since around 2003, the growth has been slow, although there is some improvement in the last few years. Previously, there was a clear association between growth and the abundance of capelin. In more recent years, this has not been the case, and the reasons for the present slow growth are not clear. The evaluation of the harvest rule was done under the assumption of weights at age in the low range.

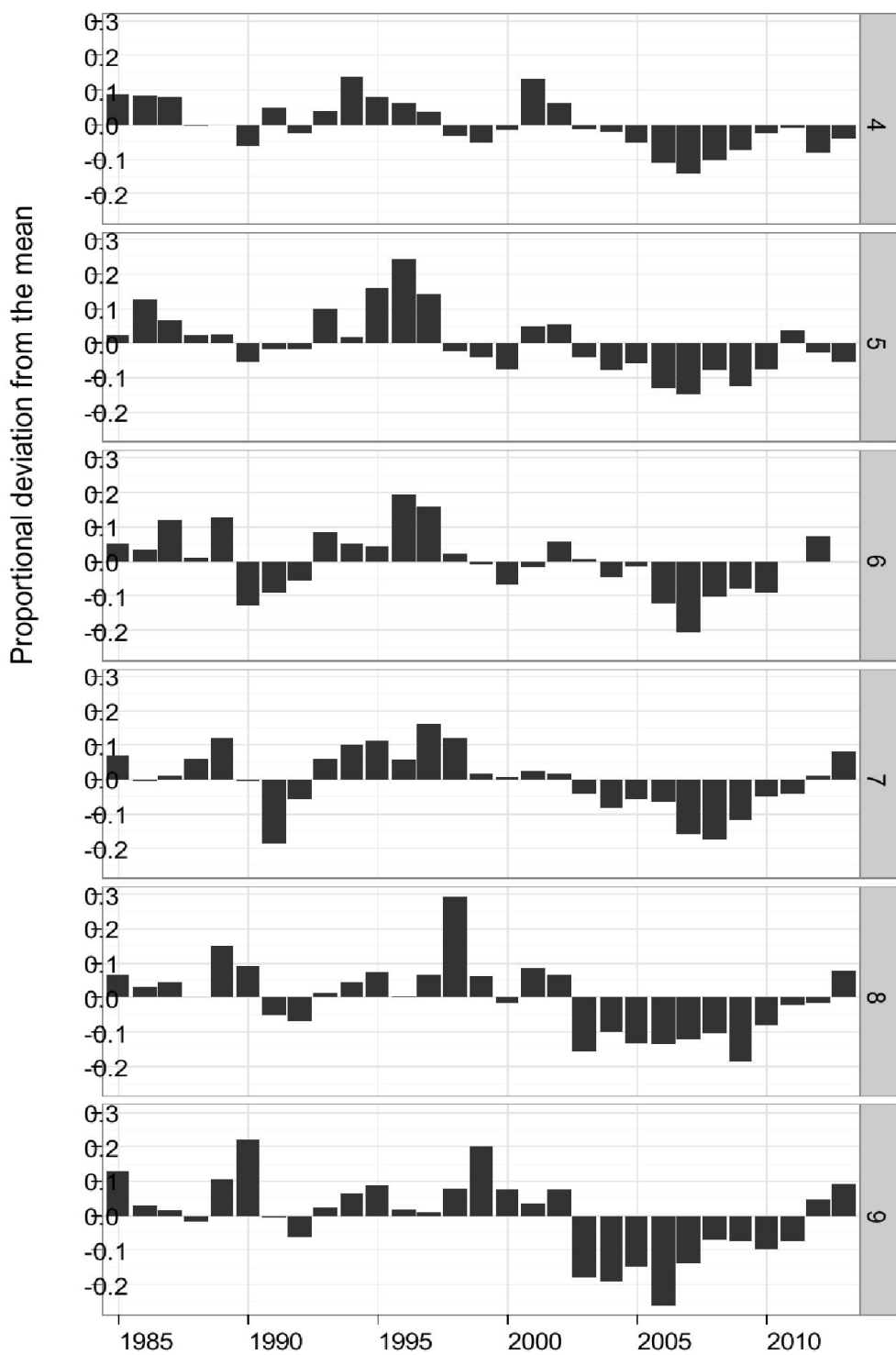


Figure 13. Weight at age for Icelandic cod relative to the long term mean. Each panel represents the time course of relative weights for one age (indicated to the right).

The recruitment has varied around a stable mean since 1985 (see figure below, from the NWWG report 2013). The reason for the shift in 1985 is not clear, but some earlier apparently strong year classes may represent influx of adult cod from Greenland. The evaluation of the

harvest rule was done assuming the current low recruitment regime.

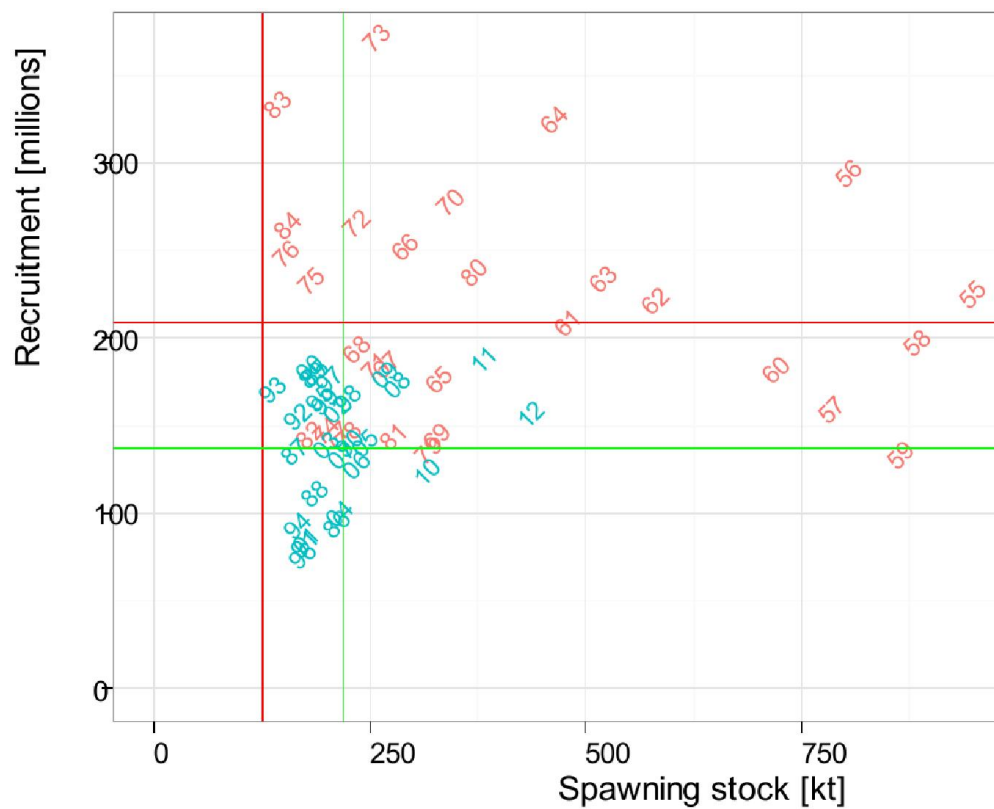


Figure 14. Spawning stock biomass and corresponding recruitment at age 3. The numerical values refer to year class with the horizontal lines referring to mean recruitment for year classes 1954-1984 (red line) and 1985-2011 (green line). Vertical lines refer to Blim (=Bloss, red) and Btrigger (green).

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:
 Discards of marketable fish is prohibited. The amount discarded is estimated regularly, and is <0.5% by weight for cod. The legislative framework for fisheries governance, the management system in place with built-in flexibility as well as the transparency of the system discourages unrecorded landings, and the evidence indicates that this is a minor problem. Landings in foreign ports is only permitted if it is sold at an official fish auction market whose weighing practices and surveillance are recognised by the Directorate of Fisheries.

EVIDENCE
1.2.4.1. Estimates of discards.

Discards of marketable fish is prohibited, and all cod (and other marketable species) has to be brought ashore. Discards are monitored by MRI by comparing length distributions in landings from otherwise comparable trips with and without inspectors on board. Discards of cod, and other species, has declined over the years. . Since 2001, discards of cod have been estimated at 1.3-4.3% of numbers landed and 0.5-1.8% of weight landed. In 2012, total cod discards were 0.41% of landed catch (Pálsson & al, 2012: Ólafur K. Pálsson, Höskuldur Björnsson, Hrefna Gísladóttir, Guðmundur Jóhannesson and Þórhallur Ottesen. (2012) Discards of cod and haddock in demersal Icelandic fisheries 2001-2010. Marine Research in Iceland, 160; available at (http://www.hafro.is/undir_eng.php?ID=20&REF=3).

These relatively low discard rates compared to what is generally assumed to be a side effect of a TAC system may be a result of the various measures, including the flexibility within the Icelandic ITQ system. Since the time series of discards is relatively short, and the discards are small it is not included in the assessments.

1.2.4.2. Unobserved and incidental mortality & 1.2.4.3. Unreported catches and catches in other fisheries.

Unreported catches: There is evidence that the level of non-reporting is very low, hence the estimates used are small. The legislative framework for fisheries governance and the management system in place supports this. The management system is conducive to encouraging reporting of landings through certain built in tolerances for landings small cod, landing over quota and by-catch

allowances. Cod size <50cm should not be targeted but it is compulsory to land and there are upper limits of the percentage of fish that can be landed below min. size- these account for 50% of quota by weight, again to encourage reporting through landing. The fisherman generally only gets 20% of the value of catch that is over quota. The rest goes to the MRI research fund.

From a fishery management/regulatory perspective there are key Articles within the suite of Fisheries Acts which reduce through limiting their discard the level of unobserved fishing mortality. Article 2 Chapter II of Act No. 57/1996 and amended by Act no. 144/2008 states that *'All catch obtained by the fishing gear of a vessel must be retained and landed. The Minister may, in a Regulation, decide that live catch which is under a specific length or weight, or which is caught using certain types of fishing gear, must be released.'*

There are some exceptions possible (Act No. 57/1996): 'The Minister may also decide, in a Regulation¹⁾ that fish of no value, together with entrails, heads and other waste resulting from processing aboard fishing vessels, may be discarded at sea.' If fish is discarded because it cannot be sold, the burden of proof is on the captain (clarified at site visit to the Directorate). However, the intention of this Act and others is focused upon a clear strategy to eliminate discarding and hence unaccounted fishing mortality and promote a high level of reporting and declaration of catches.

The same Act (57/1996) also regulates fishing gear so as to reduce damage to catch and also to allow confiscation of gear not retrieved in a proper manner, found in closed areas, fishing illegally or being illegal.

The Weighing of Marine Catch Article 5 also regulates the landing place of catches. 'All catch which Icelandic vessels harvest from stocks which are found partly or fully within Iceland's exclusive economic zone must be landed in Iceland and weighed in a domestic port. The Minister may, in a Regulation, authorise that iced catch be landed in foreign ports, provided it is sold at an official fish auction market whose weighing practices and surveillance are recognised by the Directorate of Fisheries.

Landing in Foreign Ports

Also under Act No 65/2004, Article 1, the Minister may also authorise, in a Regulation, that catch from stocks which are found partly within Iceland's exclusive economic zone be landed abroad, provided that surveillance of its landing and weighing is considered satisfactory.

Several foreign Ports have been governed by the Directorate as to having a suitable, equivalent catch landing, weighing and recording system in place as required by Icelandic Fisheries Acts. Articles 6-12 of Act 57/1996 also provides for the weighing of all catch at landing on designated accredited scales by accredited scale operators.

With respect to catches in other fisheries, Icelandic vessels fishing under a party agreement with other Nations such as Norway are subject to the conditions and regulations of that fishery management system.

Fishery by foreign vessels

Act No. 79/1997 Article 3 prohibits the foreign vessels fishing within Iceland's exclusive fishing zone unless specifically allowed by International Agreement.

Act No. 22/1988 Article 1 legislates for the eligibility of Icelandic and non Icelandic vessels to fish in Icelandic territorial waters.

'Only the following parties may pursue fishing and process marine catch aboard vessels in Iceland's exclusive fishing zone, as defined in Act No. 79/1997, concerning fishing in Iceland's exclusive fishing zone:

1. Icelandic nationals and other Icelandic parties;
2. Icelandic legal entities, fully owned by Icelandic parties or legal entities which fulfil the following requirements:
 - a. are under the control of Icelandic parties;
 - b. ownership by foreign parties does not exceed 25% of share capital or initial capital. If the holding of an Icelandic legal entity in a legal entity pursuing fishing or processing in Iceland's exclusive fishing zone does not exceed 5%, the holding of foreign parties may amount to up to 33%;
 - c. are in other respects owned by Icelandic nationals or Icelandic legal entities under the control of Icelandic parties.'

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. Article 5, 6 and 7 also legislates for foreign vessels allowed by International Agreement through permitting by the Directorate and regulating fishing activity in the same way as for Icelandic vessels with regard to fishing gear, catch recording, weighing at landing.

Hence, discarding and unreported catches by foreign vessels should be minimised in the same way as for the National Fleet. Articles 8-15 legislate for the withdrawal of permits and the penalties and fines associated with violations of the fishery acts.

Cod as by-catch in other fisheries:

There are by-catch tolerances for fisheries not targeting cod prescribed within the Fisheries Management Act (§11). Cod outside quota, in the event that quota for cod is not available, has to be landed and can be sold at full price at the auction but the fishermen only gets 20% of the value, the rest goes to a MRI research fund. There have been studies and regulations within fisheries where juvenile cod may form part of the by-catch (e.g. Prawns). In these fisheries, it is mandatory to include devices that allow for escapement of juvenile fish. Prawn fisheries utilise technical conservation devices/selective fishing gears including grids (Nordmøre Grids) to support juvenile fish escapement.

Essentially, cod cannot be landed from a fishery without quota being available for the vessel. For cod caught as by-catch in other fisheries, the vessel must have access to cod quota, already in its possession or through the ITQ system from available quota. However, the system has some flexibility built into it and controlled through registered landings and the TAC allocation (refer to page 13 Allocation of Fishing Entitlements).

It is permitted to fish up to 5% in excess of a vessels catch quota. The excess catch is in such instances withdrawn from next fishing years quota of the vessel. Juvenile fish is only partially withdrawn from catch quotas (50% of quota for cod). It is permitted to land catch (max 5%) excessive to quotas as long as the catch is auctioned and the bulk of the value of the catch goes to the Marine Research Institute.

Rules on fishing gear selectivity properties are described in section 1.3.2.3.3

The impact of catches of Icelandic cod in the Faeroese and Greenland zones is described under Clause 1.1.6.2 Catches in the Faroese zone are negligible and are included in the stock assessment and in the TAC advice derived from the assessment. In the Greenland cod fishery, catches of presumable Icelandic cod cannot be separated. Such catches are not included in the stock assessment and fish that may be of Icelandic origin but is recruited to the fishery in Greenland waters are not accounted for in the Icelandic management.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: MRI has annual regular consultations with the fishing industry. Regulations made by MRI (closed areas and some gear restriction) are decided in communications with involved fishermen. 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.

EVIDENCE
 A special consultation group of the MRI meets every year and reviews different sources and information regarding the cod stock and cod fisheries in the Icelandic EEZ. One of the more important sources of information used by MRI in its research is logbooks from skippers which are sent to the MRI. Account is taken of these sources and information in research, quantification and advice as appropriate. The consultation group consists of experts from the MRI 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.

The MRI may invoke a temporary closure based on the information provided by at least 3 skippers (Article 10-11 of Act No. 79/1997) that harmful fishing is taking place (fish in the catch exceeds reference levels for undersized limits determined by Minister upon receipt of the proposals from MRI). Article 8 of Act No 79 1997 also requires that the Minister seeks the opinion of vessel operators and fishermen on decisions prohibiting certain types of fishing gear. All of the major organisations in the Icelandic fisheries nominate participants to Fiskiping (Parliament of Fisheries), being the authority in all matters regarding fisheries. Fiskiping are held each year.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:
Assessment and advice is provided by close cooperation between MRI and ICES. Methods and procedures are reviewed and approved by ICES.

EVIDENCE
 The assessment of Icelandic cod is done by the ICES North-Western Working Group where Iceland participates. The MRI advice to managers is based on the advice provided by the ICES advisory system. The research methods utilised by Iceland are acknowledged and interrogated through the ICES advisory system. Additionally, since much of the Icelandic stock research and assessment activities and outcomes are published it is subject to scrutiny internationally. Iceland is also a member of NAFO and NEAFC for other stocks. Iceland also participates in numerous other ICES Working Groups.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

Summary evidence: For all practical purposes, Icelandic cod is not a shared stock. Minor catches of Icelandic cod are recorded in other areas. If catches from the Icelandic stock in these areas become substantial in the future, this has to be taken into account in the management of the stock.

EVIDENCE
 Icelandic Cod within the 200 mile EEZ (Va) is not described as straddling or shared. Iceland has quota under International Agreements in other cod stocks, namely Norway and Greenland outside of Icelandic territorial waters. Catches of presumably Icelandic cod have been reported from the Faroese zone, close to the border. These catches are negligible compared to the total catch of Icelandic cod (500 tonnes vs. 183 000 tonnes). There is evidence that cod larvae in some years drift into Greenland waters and that mature fish in some years migrate back to Icelandic waters to spawn. It is not clear how the fishery in Greenland waters interferes with the Icelandic cod stock. At present, the fishery in Greenland waters is small (13000 t, out of which 2000 t were from East Greenland) as the Greenland cod stock is in a poor condition. If catches from the Icelandic stock in these areas become substantial in the future, this has to be taken into account in the management of the stock.

1.3 Stock under consideration, harvesting policy and the precautionary approach

1.3.1 The precautionary approach

CLAUSE: 1.3.1.1 The precautionary approach ¹⁹ shall be implemented to protect the stock under consideration.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The precautionary approach is implemented through a harvest rule, which has been shown to carry a low risk of reducing the stock below the set biomass limit. There is international evidence that this meets the requirements of the precautionary approach such as is qualified in documentation provided by ICES. There is a past record of good management performance, and the experience after the harvest rule was adopted is that the stock has increased as expected.				
EVIDENCE				
The Precautionary approach is implemented through the harvest strategy for cod which the Ministry uses to set annual TAC's. There is international evidence that this meets the requirements of the precautionary approach such as is qualified in documentation provided by ICES:				
<i>ICES advised that the management plan had a high probability of resulting in an increase in the size of spawning stock from the current estimated level by 2015 and beyond. In addition, the plan is consistent with the precautionary approach (low probability of the stock declining to a level where future productivity of the stock may be impaired) and the medium-term projected fishing mortality is consistent with international commitments to achieve maximum sustainable yield (high long-term average yield, $F_{max} \sim 0.3$).</i>				
http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf				
A past record of good management performance is available and forms supporting evidence of the adequacy of the management measures and the management system. There is an appropriate scientific assessment, up-dated annually through fishery dependent/independent methods using accepted modelling tools and effectively managed by suitably qualified professionals, as detailed in Clause 1.2.3.				

¹⁹ Referring to clause 29.6 of the FAO Eco-labelling Guidelines for Fish and Fishery Products from Marine Capture Fisheries

CLAUSE: 1.3.1.2 The stock under consideration shall not be overfished to a level causing recruitment overfishing²⁰.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>
		Critical <input type="checkbox"/>	

SUMMARY EVIDENCE: The biomass limit is set at the lowest observed level. The recruitment has not been impaired at that level. The exploitation when applying the harvest rule implies a low risk of reducing the stock below the limit.

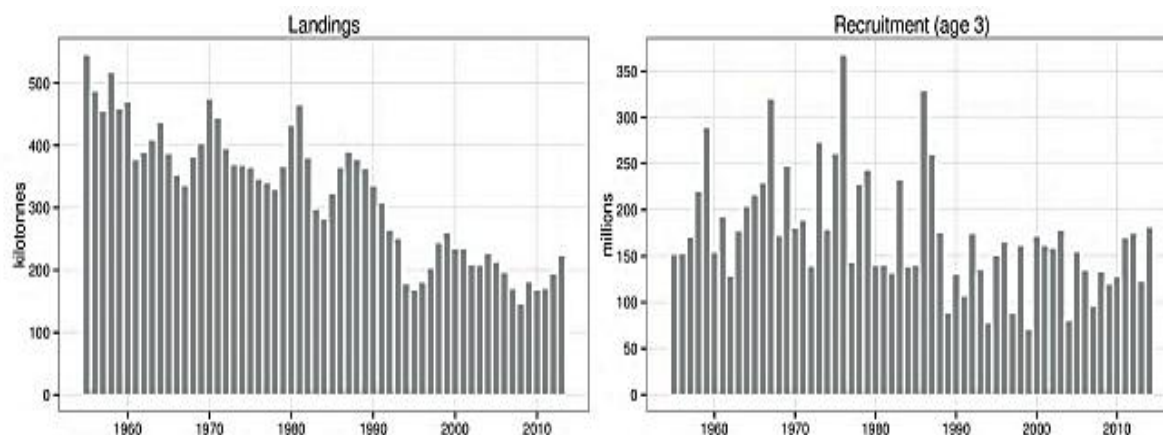
EVIDENCE

The biomass limit reference point B_{lim} as defined by ICES represents the spawning biomass below which recruitment is impaired or recruitment dynamics are unknown. For Icelandic cod, the B_{lim} value is set at the lowest observed spawning biomass (125 kt). This value occurred in 1997, within the “low recruitment” phase of the stock-recruitment trajectory and can therefore be considered conservative.

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management plan	$MP_{B_{trigger}}$	220 000 t.	Set by managers, consistent with ICES MSY framework.
	Harvest rate MP	0.2	Set by managers, consistent with ICES MSY framework.
MSY framework	$MSY_{B_{trigger}}$	220 000t.	Trigger point in HCR considered consistent with ICES MSY framework.
	F_{MSY}	Not relevant.	
Precautionary approach	B_{lim}	125 000 t.	B_{loss}
	B_{pa}	Not defined.	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

(Last changed in: 2011)

There is no evidence that the recruitment is reduced towards the low end of the historical range of SSB. Hence, for Icelandic cod the B_{lim} represents a biomass below which recruitment dynamics are unknown. The spawning biomass is currently estimated to be some 3.8 times this size (478kt in 2013). Since the harvest rule was introduced, the stock has been safely above the limit biomass. The retrospective error in stock assessment model probably accounts for some of the difference between harvest rate and fishing mortality.²¹



²⁰ 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.

²¹ <http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/cod-iceg.pdf>

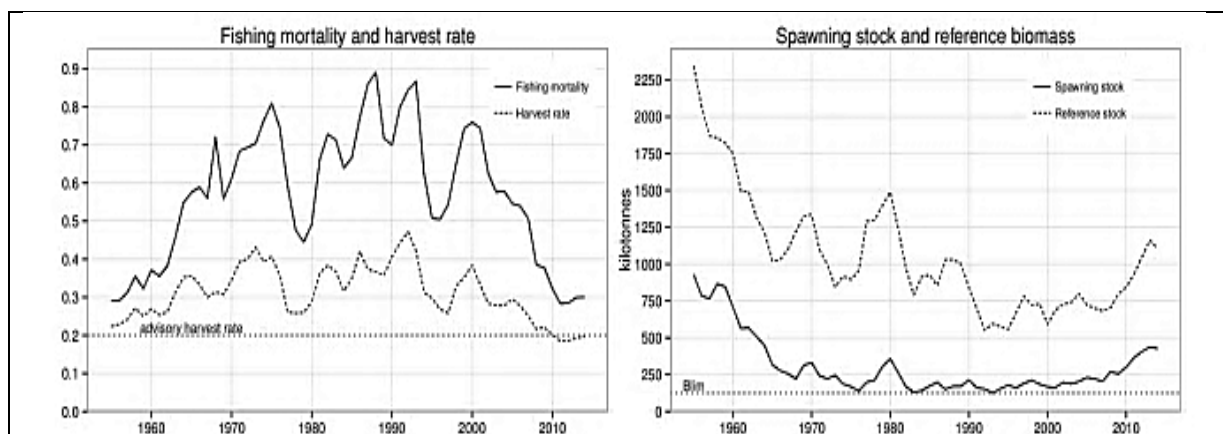


Figure 15. Cod in Division Va (Icelandic cod). Summary of stock assessment (weights in thousand tonnes).

CLAUSE: 1.3.1.3 Relevant uncertainties shall be taken into account through a suitable method of risk assessment.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Such uncertainties were taken into account when designing and evaluating the harvest rule. The uncertainty in the stock assessment is low.

EVIDENCE

In the evaluation of the harvest rule, uncertainty with respect to future recruitment, weight at age, maturity at age and future assessments was included, and the basis for evaluation of the harvest rule was the probability that the objectives should be reached taking these uncertainties into account. Natural mortality was assumed at 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. The risk evaluation employed are described as suitable although ICES notes that the approach does not fully evaluate all aspects of structural uncertainty which may cause underestimation of the assessment error. ICES also noted that although the harvest control rule meets the management objective, there was little tolerance for deviations from the assumptions. If the above assumptions do not hold true then ICES advises that the HRC is revisited. (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf>). If the harvest rate exceeds that derived from the rule (as it has in the past) management objective may not be reached. ICES also noted that if 2008 year class would not turn out to be only as average, then the probability of achieving SSB by 2015 will be less than 95%. The stock assessment is very stable, with a retrospective error of <10% for both biomass and mortality. In the evaluation of the rule, such uncertainty was taken into account.

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 specified²².

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor <input type="checkbox"/>	NC	Major NC <input type="checkbox"/>
				Critical <input type="checkbox"/>

SUMMARY EVIDENCE: A limit biomass has been defined. A limit fishing mortality is considered unnecessary, as the harvest rule sets a harvest rate, which is equivalent to a fishing mortality. Remedial actions include a reduction in harvest rate starting well above the biomass limit. The Minister has legal authority to take further remedial action if needed.

EVIDENCE

A limit reference point B_{lim} at 125 kt has been defined by ICES for the spawning stock biomass. A limit reference has not been formally defined for fishing mortality, but may be considered redundant as its function is superseded by the rules in the management plan. Following ICES standards, a limit fishing mortality should represent the exploitation level that will lead the SSB to B_{lim} in the long term. Scientifically, defining a precise limit value for the fishing mortality (or harvest rate) for the Icelandic cod according to this criterion is problematic, as it is sensitive to assumptions about recruitment dynamics below the lowest observed. However, the evaluation of the management plan provides strong evidence that such levels of SSB will not be reached when the plan is followed. Thus, under the current management plan, the harvest rate will not be set deliberately above any realistic candidate level for a harvest rate limit. The management plan has a rule to reduce the harvest rate if the SSB is below 220 000 tonnes, which will imply a further protection if the stock is reduced more than expected. If even that fails, the Minister has legal authority to take drastic action if needed.

Target reference points are embedded in the management plan, as a harvest rate of 0.2 is equivalent to a fishing mortality target, and there is a SSB target of 220 kt to be achieved with high probability in 2015. Precautionary reference points, representing landmarks where action should be taken to avoid reaching the limit points have been defined as a function of the HCR, in terms of a reduction in the harvest rate if $SSB < 220$ kt. The Fisheries Management Plan for cod is established for 5 year plan and in consultation with the Ministry, revisions will be based on scientific evaluation and ensure that the long-plan objective is maintained. Confirmation was also received that any proposed revisions to the plan will only take place once ICES evaluation has been undertaken.

²² FAO Code of Conduct for Responsible Fisheries, Article 7.5.2.

CLAUSE: 1.3.1.5 The long-term harvesting policy shall be stated in the Fisheries Management Plan.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The management strategy for Iceland cod 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. The medium term management strategy is to ensure that the spawning stock biomass (SSB) in 2015 will be above 220 000 tonnes with high probability. The current management plan is temporary, and expires in 2015. Work is ongoing to evaluate and potentially revise the plan, but no conclusions have been reached yet.				
EVIDENCE				
<p>In order to calculate the annual Total Allowable Catch (TAC) a harvest control rule (HCR) is used based on the mean of the TAC in the current year and 20% of the biomass of 4 year and older cod in the assessment year, as follows:</p> $TAC_{y+1} = (\alpha B_{4+,y} + TAC_y)/2,$ <p>where y refers to the assessment year, B₄₊ refers to biomass of 4 year and older cod and α (the catch rate) is set as 0.2 when SSB > 220.000 tonnes.</p> <p>If the spawning stock biomass (SSB) falls below 220 000 tonnes (SSB_{trigger}), the catch rate α shall be reduced and will be calculated as α=0.2 SSB/ SSB_{trigger}.</p> <p>This HCR has been evaluated by ICES and found to be consistent with the precautionary approach.²³</p> <p>The management strategy for Iceland cod 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. The medium term management strategy is to ensure that the spawning stock biomass (SSB) in 2015 will be above 220 000 tonnes (estimated size in 2009) with high probability. In accordance with this general aim the harvest control above rule was adopted by Icelandic authorities in June 2009 for the next period of 5 years. The current management plan is temporary, and expires in 2015. Work is ongoing to revise the plan, but no conclusions have been reached yet.</p>				

²³http://www.fisheries.is/main-species/cod/management_plan/nr/349

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The precautionary approach is implemented by adopting a management plan that has been evaluated by ICES to be in accordance with the precautionary approach.				
EVIDENCE The Minister of Fisheries, having obtained the recommendations of the Marine Research Institute, shall issue a regulation determining the total allowable catch (TAC) to be caught for a designated period or fishing season from the individual exploitable marine stocks in Icelandic waters for which it is deemed necessary to limit the catch. Harvest rights provided for by law 116/2006 are calculated on the basis of this amount. The precautionary approach is implemented through the adoption of the HCR which is the basis for the MRI advice to the Minister. Implementation of the precautionary approach entails having a rule for setting catches under “normal circumstances”, reducing fishing pressure once the stock falls below a threshold (220kt) and stopping it once a limit reference level has been exceeded (125kt). Closing of fisheries is one of the powers of the ministry. This rule has been evaluated by ICES and found to be in accordance with the precautionary approach, as it implies a low risk of stock depletion and is expected to lead to a fishing mortality rate and spawning stock biomass within the likely levels corresponding to a maximum sustainable yield. The HCR has been evaluated to be in accordance with the Precautionary approach, and the stock and mortality are at present safely inside precautionary limits.				

1.3.2 Management targets and limits

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 ²⁴ .				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The management plan does not specify a long term target, but a medium term target of a spawning biomass above 220 000 tonnes by 2015.				
EVIDENCE The management plan states a target fishing mortality proxy ($F_{target} \sim 20\% B_{4+}$), precautionary (B_{pa} SSB = 220 kt) and limit (B_{lim} SSB= 125 kt) reference points for biomass, and defined courses of action should these reference points are breached. The management plan has been assessed by ICES as precautionary, and fishing at a level consistent with F_{target} gives a low risk (<5%) of failing to meet the objectives of the management plan ($B_{2015} > B_{2009}$) therefore there is no requirement to establish and react to an F_{lim} value. The management plan has a target harvest rate that is equivalent to a target fishing mortality, that is evaluated to be precautionary. The ICES guideline is to set the limit fishing mortality to a level which would lead to an SSB at Blim. If the plan works as expected, a limit fishing mortality is functionally redundant, because such levels would not be reached.				

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 ²⁵ .				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: There is no limit fishing mortality defined, as a safe fishing mortality is set by the harvest rule. There is the legal framework and suite of control measures available to management to take further action if needed.				
EVIDENCE The function of a limit point would be to provide a safeguard in such situations. The requirement to define an upper limit for the fishing mortality would be met if proper criteria for deviating from the				

²⁴ F_{lim} can be explicit, or implicit in cases where harvest rate is set annually to a precautionary F_{target} (or its proxy)

²⁵ FAO Guidelines (2009), par. 30.2. See also previous footnote.

harvest control rule and for revising it were established. There is the legal framework and suite of control measures available to management to take further action if needed. The stock is currently well above the established limit reference point. In order to calculate the annual Total Allowable Catch (TAC) a harvest control rule (HCR) is used based on the mean of the TAC in the current year and 20% of the biomass of 4 year and older cod in the assessment year, as follows:

$$TAC_{y+1} = (\alpha B_{4+,y} + TAC_y)/2,$$

where y refers to the assessment year, B₄₊ refers to biomass of 4 year and older cod and α (the catch rate) is set as 0.2 when SSB > 220.000 tonnes.

If the spawning stock biomass (SSB) falls below 220 000 tonnes (SSB_{trigger}), the catch rate α is reduced and will be calculated as α=0.2 SSB/ SSB_{trigger}.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The management plan does not specify a long term target, but a medium term target of a spawning biomass above 220 000 tonnes by 2015.

EVIDENCE
The Icelandic policy on ocean issues is based on maintaining the future health, biodiversity and sustainability of the ocean surrounding Iceland, in order that it may continue to provide resources that sustains and promotes the nation’s welfare. This means sustainable utilisation, conservation and management of the resource based on scientific information and applied expertise guided by respect for the marine ecosystem as a whole. The health of the ocean and sustainable utilisation of its living resources provides the main basis for Iceland’s economic welfare. In view of the importance of the waters surrounding Iceland, the government considers ocean issues to be central to its activities for the foreseeable future (<http://www.fisheries.is/management/government-policy/>).

The Management plan does not specify a long term target. However, a long term target is stated as: 'to increase the size of the cod stock towards the size that generates maximum sustainable yield'. In accordance with its temporary nature, the current plan has a temporary target, which is to ensure that the spawning biomass is above 220 000 tonnes by 2015. The Fisheries Management Plan for Icelandic Cod states that ‘If the spawning stock biomass (SSB) falls below 220 000 tonnes (SSB_{trigger}),

the catch rate α shall be reduced and will be calculated as $\alpha=0.2 \text{ SSB} / \text{SSB}_{\text{trigger}}$.

The medium term target is likely to be reached with the current harvest rule, according to the evaluation by ICES. The biomass that generates maximum sustainable yield is scientifically problematic to define. This is partly because it is highly sensitive to how the stock will respond to its own magnitude, which is not clear, and partly because there appears to have been shifts in productivity over time, for reasons that are not well known. However, ICES advises that ' the medium-term projected fishing mortality is consistent with international commitments to achieve maximum sustainable yield (high long-term average yield, $F_{\text{max}} = \sim 0.3$).'

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: There is no indication that recruitment is impaired at the limit level of SSB. The target harvest rate in the harvest rule implies a low risk of reaching the limit biomass

EVIDENCE
The limit reference spawning stock biomass is defined as the lowest observed in the time series (125000 tonnes). There is no indication in the time series that recruitment is impaired at that level of SSB. The target harvest rate implies a very low risk of reaching the limit biomass.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The B_{lim} represents the lowest observed biomass. This is common practice in ICES, for stocks where no recruitment impairment has been observed historically.

EVIDENCE
The limit reference spawning stock biomass is defined as the lowest observed in the time series (125000 tonnes). ICES uses that value as a B_{lim} if there is no indication in the time series that recruitment is impaired at that level of biomass. For Icelandic cod, that is the case.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The harvest rule prescribes a reduction in harvest rate if the spawning stock becomes less than 220 000 tonnes. There is the legal framework and suite of control measures available to management to take further action if needed, which will depend on the reasons for the decline in biomass.

EVIDENCE

The action stated in the management plan is to reduce harvest rate if the SSB goes below 220 000 tonnes, which is well above the limit point, to a level $HR = 0.2 * SSB / 220\ 000$. According to the evaluation of the harvest control rule, the likelihood of reaching even the trigger value of 220 000 tonnes is low. There is the legal framework and suite of control measures available to management to take further action if needed; which will depend on the reasons for the decline in biomass. Such measures can include, inter alia

- Reduction in TAC through a revision of the HCR
- Area closures (short and long-term) for juvenile fish and other grounds
- Further spawning area closures during spawning season
- Gear modifications (e.g. Gill nets and trawl mesh sizes)
- Fleet restructuring

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 ²⁶ .				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Resilience of the stock is achieved by keeping the fishing mortality low. The current harvest rule has led to a reduction in fishing mortality and an increased proportion of older fish in the stock.				
<p>Resilience of the stock is achieved by keeping the fishing mortality low. That allows year classes to stay longer in the stock, changing the age composition towards older ages. This may also be advantageous for the recruitment. The reduction in fishing mortality following the introduction of the current management plan has resulted in such shift in age composition. The ontogenetic changes in maturity at age (fish maturing older) is a feature of gadoid stocks recovering from periods of overfishing, and the increased viability of eggs/larvae produced by these older females (“BOFF” hypothesis).</p> <p>The figure below shows the normalized survey indices by age (indicated to the right) over the years in the spring (SMB) survey and autumn survey (SMH). The colours follow the year classes. In particular, a strong increase in in recent years in the indices for age 8-9 and older is indicated.</p>				

²⁶ 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.

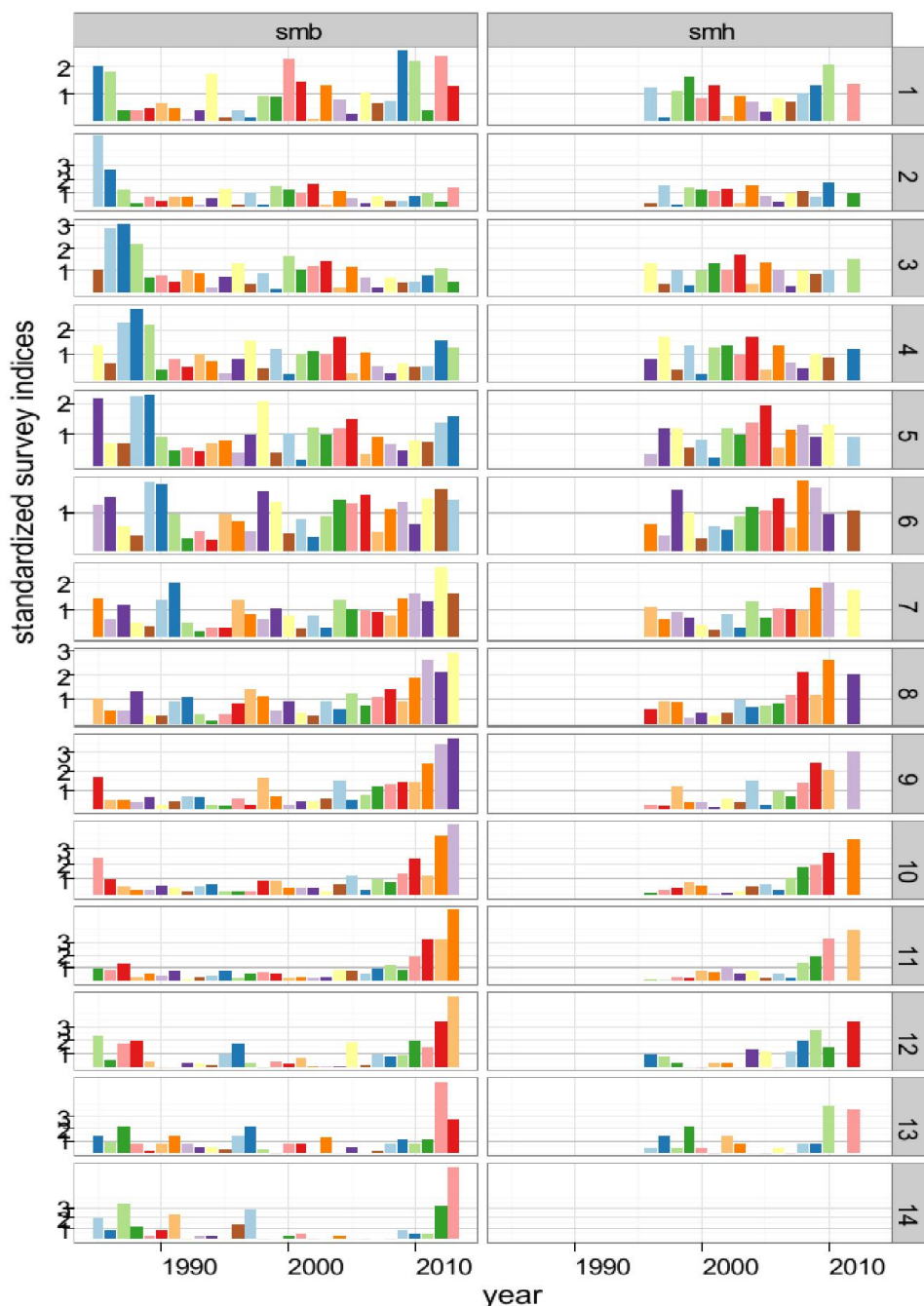


Figure 16. Normalized survey indices by age (indicated to the right) over the years in the spring (SMB) survey and autumn survey (SMH). Colours follow the year classes.

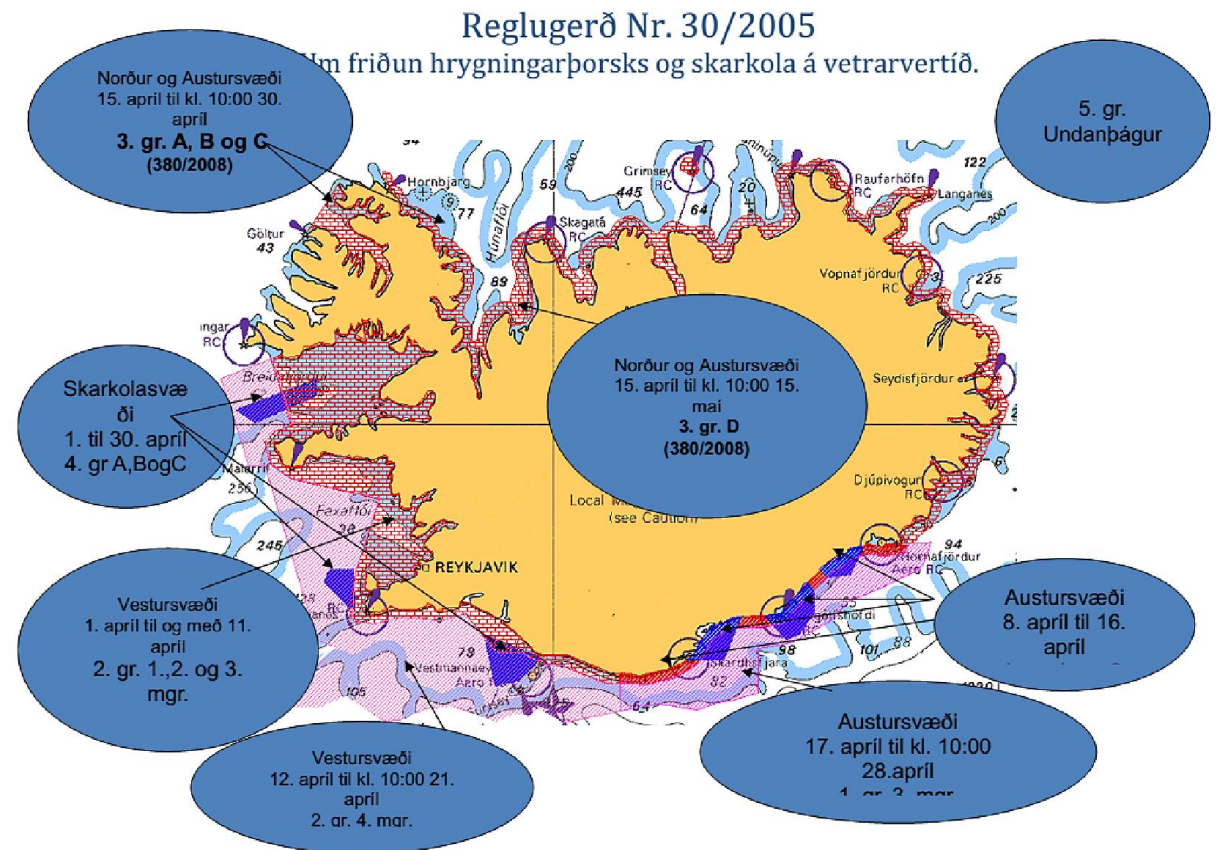
The trade-off between maximizing long term yield and stabilizing catches is subject to discussions with the fishing industry in preparation of revision of the management plan. The current plan has a stabilizing element in the rule that the TAC is set mid-way between the TAC the year before and what emerges by applying the harvest rate of 0.2 to the current biomass. The intention with this element is to reduce some effect of noise in the assessment, and to smote transitions to higher or lower TACs.

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}). ²⁷				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Area closures aiming at avoiding exploitation of spawners are in effect in Iceland. Spawning stock biomass is well above the limit reference point.				
EVIDENCE The harvesting policy in place for Icelandic cod is designed explicitly to avoid the stock from following towards the limit reference point. If the spawning stock biomass (SSB) falls below 220 000 tonnes ($SSB_{trigger}$), the catch rate shall be reduced and will be calculated as $a=SSB/SSB_{trigger}$. At present, the HCR has been successful at maintaining the Icelandic cod SSB well above $SSB_{trigger}$. http://www.fisheries.is/main-species/cod/management_plan/nr/349 There are rules within Act No 127, 1997 (Article 8) which prohibit the use of certain types of fishing gear in a certain area for a specific time. Article 9 refers to taking measures to prevent fishing practices which can be regarded as harmful to the efficient utilisation of the commercial stocks. The mesh size in the codend in the trawling fishery was increased from 120 mm to 155 mm in 1977. Since 1998 the minimum codend mesh size allowed is 135 mm, provided that a so-called Polish cover is not used. Mesh size and gear restrictions are also mandated to protect both juvenile stocks (trawl mesh size 135mm with separator panel) and spawners (gill net mesh size 8 inches). A number of regulations concerning gear design and specification are enforced. In relation to cod fisheries: <u>Regulation No. 881/2009</u> Regulation of specific line and nets. <u>Regulation. no. 724, 28 August 2006</u> Regulation of construction and sorting grids/meshes and use of 155 mm mesh in the trawl bag. <u>Regulation. no. 115, 13 February 2006</u> <u>Regulation. no. 543, 22 July 2002, the escape panels for the demersal fish, in shrimp nets.</u> <u>Regulation. no. 739, 13 October 2000, the preparation and construction of small fish escape panels.</u> <u>Regulation. no. 24, 15 January 1998, the mesh and measuring the implementation of mesh measurement.</u> The following link provides full access to all Regulations currently applicable to Icelandic fisheries. http://www.sjavarutvegsraduneyti.is/log-og-reglugerdir/reglugerdir/Ymsar_veidar/ Fishing with trawls is prohibited in large areas near the coast which serve as spawning and nursery areas. The following chart is available on the Directorate website and illustrates the extent of area closures in the Icelandic Fishery. Since 2005 each area has different closure-days because the spawning occurs at different times in different areas. The red areas tend to be largely for cod				

²⁷ FAO Guidelines (2009), par. 30.3.

protection while the blue ones on the bottom left to protect spawning plaice. All fisheries are closed within 12 miles along the south and west shore and within 6 miles along the north and east shore for two weeks during Easter to protect the spawning of cod.

<http://www.fisheries.is/management/fisheries-management/area-closures/>



28

Figure 17. Spawning closures in Iceland.

- On top left Norður og Austursvæði closed between 15 April and 30 April
- Below on left Skarkolasvæði/ Plaice-areas (pointing at blue areas) closed 1 to 30 April
- Below Vestursvæði West-area 1 April to 11 April
- Bottom left Vestursvæði(the most important) West-area 12 April to 21 April
- Bottom right Austursvæði East-area 17. April 28 April
- Above Austursvæði East-area 8 April to 16 April
- Middle Norður og Austursvæði North- and East-areas

Sorting grids in fishing gear are mandatory to avoid by-catch of juvenile fish in the shrimp fisheries. Extensive provisions are made for scheduled, routine and temporary closures of fishing areas to protect spawning fish from all fishing. In addition, the Marine Research Institute (MRI) has the authority to close fishing areas temporarily without prior notice if the proportion of small fish in the catch exceeds certain limits (25% or more of <55 cm cod and saithe, 25% or more of <45 cm haddock and 20% or more of <33 cm redfish). There are a number of regulations which form the

²⁸ <http://www.fiskistofa.is/fiskveidistjorn/veidibann/hrygningarstopp/>

basis to the implementation of Policy and providing powers of enforcement to the Directorate. These are published each year in a booklet made available to all registered vessels. It is not clear to what extent designing these regulations has been based on actual measurements of selectivity. However, measures like large mesh size clearly will reduce the catch of small fish, and can be regarded as a supplement to area closures which also aim at protecting juveniles.

CLAUSE: 1.3.2.3.3 Rules on fishing gear used in fishing for stock under consideration shall specify relevant selectivity properties for the protection of juvenile fish of stock under consideration, as appropriate.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: There are numerous rules and regulations concerning gear design and specification, aiming *inter alia* at avoiding catching juvenile fish.

See Clause 1.3.2.3.2 for evidence.

CLAUSE: 1.3.2.3.4 Consideration shall be given to measures designed to limit fishing mortality of juvenile fish, e.g. through temporary closures to fishing of areas containing a high proportion of juveniles of stock under consideration, with the objective to reducing the likelihood of growth overfishing and increasing the contribution of year classes to the spawning stock.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Area closures (temporary and permanent) are used extensively to protect juveniles.

EVIDENCE

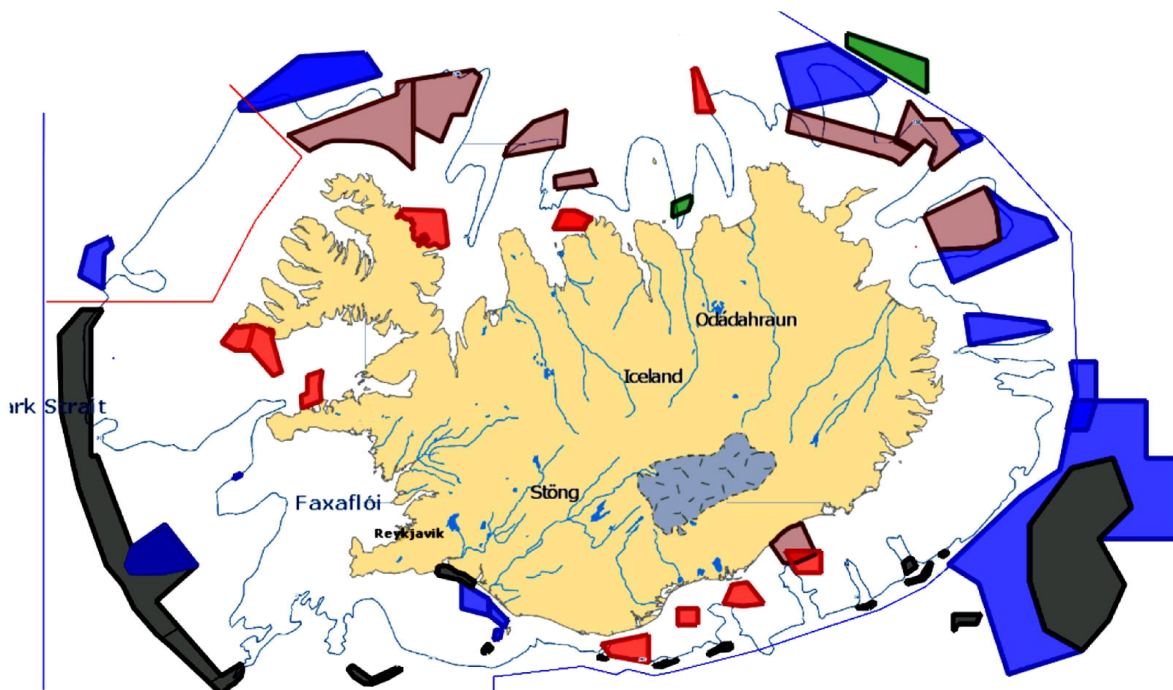
The management system utilizes a series of closures, temporary for spawning season and additionally in a reactive sense for short term area closures when juvenile fish in catches are reported (legally landed within the ITQ system). Mesh size and gear restrictions are also mandated to protect both juvenile stocks (trawl mesh size 135mm with separator panel) and spawners (gill net mesh size 8 inches).

MRI can close areas temporarily on short notice if there are indications of much juvenile fish in the catches. Such closures occur frequently. Areas that are closed regularly are turned into regulation areas, with permanent full or partial closure administered by the Directorate of Fisheries. The figure below gives an overview of the closures as May 2014. Areas with restricted fishing as of May 1st

2014. Shadings indicate different levels of restriction and type of gear involved, ranging from temporary (e.g. time of day, season) to permanent closure.

Regulations and conserved areas in Icelandic waters, from top to bottom (Reglugerðir og friðunarsvæði við Ísland)

Green areas
Shrimp fishing ban Rgl.: 766/2004;335/2012
Blue areas, north of Iceland
Trawls must be equipped with separators Rgl.:749/2006 amended by Regulation 534/2013
Brown areas,
Protected areas against trawling and line fishery Rgl.: 310/2007
Red areas, north of Iceland
Line and trawling ban Rgl.: 68/2003
Red areas (coastal)
Line and handline Rgl. 742/2009
Blue area east of Iceland
Blue whiting fishing ban unless bycatch separators are used Rgl. 696/2005
Dark area east of Iceland
Blue whiting fishing ban Rgl.794/2004
Red areas off the south coast
Coral Protection rgl.: 1140/2005. rgl. 1095/2011
Dark area west of Iceland
Conservation area were trawling is prohibited rgl. 310/2007
Blue area west of Iceland
Trawling ban but open for trawling from 20.00-8.00 o'clock from 1.10 – 1.4 incl. both days



<http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/>

1.4. External scientific review

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Annual stock assessments and calculation of TAC according to the harvest rule is done within ICES. These calculations are reviewed within ICES. The assessment method is reviewed at benchmark workshops at 3-5 years intervals. The next benchmark for Icelandic cod is scheduled for 2015. The evaluation work for the current management plan for Icelandic cod was done by MRI, and reviewed by ICES.

EVIDENCE

ICES is considered to be the appropriate international scientific body.

The annual stock assessments and short term predictions are performed by the ICES North-Western Working Group, and reviewed routinely as part of the ICES advisory process. This is done according to the Memorandum of Understanding between ICES and NEAFC. ICES have developed routines for more in-depth review of assessment methods and data that go into the assessment (benchmark assessments). Ideally, this should be done approximately every 5 years, or if there are reasons to alter the assessment practises. The next benchmark is scheduled for 2015. The initiative may come from ICES itself, from the assessment Working Group responsible for the stock, or from managers.

Evaluation of management plans are done at the request of responsible managers. ICES has no permanent staff to do such work, but relies on scientists from its member nations. Depending on what is feasible, evaluation work may be done by an *ad hoc* group appointed by ICES, scientific institutions under supervision of scientists appointed by ICES, or evaluations may be done by scientific institutes or others and presented for review to ICES.

The evaluation work for the current management plan for Icelandic cod was done by MRI, and reviewed by ICES through an *Ad hoc* Group on Icelandic cod (AGICOD: ICES CM 2009\ACOM:56) in 2009, which also acted as a 'shadow group' during the work. ICES' Advisory Committee on Management (ACOM) provided the advice based on the work by MRI and AGICOD (<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf>). The reviews were undertaken with respect to its consistency with the precautionary approach, its consistency with the MSY approach and its ability to reach the target biomass in 2015 as the main objectives.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: There is a formalized system of reviewing ICES reports and requests to examine the assessment reports undertaken by the MRI of Iceland. The review process has an inclusive approach regarding the management organisations and an industry/participant consultation process.				
EVIDENCE				
<p>The initiative for an external review of the harvesting policy was directed to ICES, officially from the Ministry although with significant interaction from MRI. Criteria for triggering a review process have not been explicitly prescribed although the Cod Fisheries Management Plan does state that an annual review shall take place. A review of the current management plan when it expires in 2015 is being prepared.</p> <p>The MRI advises the Minister of Fisheries and Agriculture on the exploitation of the cod stock in June each year; ICES provides advice as well; both ICES and the MRI advise on research and harvesting policy in general.</p> <p>There is a formalized system of reviewing ICES reports and requests to examine the assessment reports undertaken by the MRI of Iceland. The review process has an inclusive approach regarding the management organisations and an industry/participant consultation process.</p>				

1.5 Advice and Decisions on TAC

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.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The formal adviser to the government is the MRI. MRI is mandated by the Ministry of Industries and Innovation and this is specified in the Icelandic legal framework for fisheries management.				
EVIDENCE Fisheries research is undertaken by the Marine Research Institute (MRI) of Iceland. MRI is mandated by the Ministry of Industries and Innovation and this is specified in the Icelandic legal framework for fisheries management. The Marine Research Institute (MRI), established in 1965, is a government institute under the auspices of the Ministry of Fisheries. The institute has around 170 employees, 2 research vessels, 5 branches around Iceland and a mariculture laboratory. MRI runs two research vessels: Bjarni Sæmundsson (55 m) and Árni Friðriksson (70 m). Management has previously set the annual TAC higher than that recommended by the scientific advice which formed the point of discussion in meetings. The FMP for Icelandic cod has been defined in a public form, the harvest control rule mechanism for setting the TAC which is based on advice from the MRI.				

CLAUSE: 1.5.2 Advice shall include the appropriate value(s) for precautionary reference points.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Relevant precautionary reference points have been set by ICES. Fishing mortality reference points are substituted by the specifications of harvest rate in the HCR.				
EVIDENCE The routine ICES advice has the following table of reference points (ICES 2010d): MSY trigger at 220,000 t and harvest rate MSY have been elected as candidate target reference points by management.				

Reference points			
	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management plan	MP _{Btrigger}	220 000 t.	Set by managers, consistent with ICES MSY framework.
	Harvest Rate _{MP}	0.2	Set by managers, consistent with ICES MSY framework.
MSY	MSY B _{trigger}	220 000t.	Trigger point in HCR considered consistent with ICES MSY framework.
Framework	F _{MSY}	Not relevant.	
	B _{lim}	125 000 t.	B _{loss}
Precautionary Approach	B _{pa}	Not defined.	
	F _{lim}	Not defined.	
	F _{pa}	Not defined.	

(unchanged since 2011)

Fishing mortality reference points are not defined because the harvest rate is specified in the HCR.

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The management plan and the TAC set according to that plan cover the Icelandic EEZ. The stock is largely confined to that area. Catches in other areas are negligible in comparison.

EVIDENCE
 The management plan and the TAC set according to that plan cover the Icelandic EEZ. The annual TAC is set by the Minister of Industries and Innovation (competent authority). The stock is largely, but not exclusively, confined to that area. This is described in detail under clause 1.1.6.2. Minor catches are reported from Faroese waters. These catches are included in the stock assessment, and contribute to the biomass estimate of the stock. In principle, if the TAC derived from estimates of the whole stock is allocated only to the Icelandic EEZ, catches in other areas will be in excess of the TAC according to the management rule. At present these catches are extremely small (About 0.3% of the total), and their contribution to the total stock estimate and the TAC is negligible.

CLAUSE: 1.5.4 For Shared Stocks the setting of TAC shall take into consideration international agreements and scientific advice.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Icelandic cod is not considered a shared stock.				
EVIDENCE Icelandic cod is not considered a shared stock in that it is found entirely within the management zone - Icelandic EEZ is within the exclusive management of Iceland and under the full control of the Icelandic management system. Exchange with the Faroese and Greenland is considered negligible. Iceland does take part in International fora on fisheries management and does have access to a small quota share in the Barents Sea cod quota.				

CLAUSE: 1.5.5 The competent fisheries management authority shall decide on TAC within the boundaries set by the adopted harvesting policy.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: The Minister of Fisheries and Agriculture decides on the TAC of the cod stock for each fishing year (Sept-Aug) in accordance to law (Fisheries Management Act 116), based on, but not bound by, HCR and scientific advice.				
EVIDENCE <i>Process for making decisions on TAC</i> The Minister of Fisheries and Agriculture decides on the TAC of the cod stock for each fishing year (Sept-Aug) in accordance to law (Fisheries Management Act 116), based on HCR and the advice mentioned below. Since the introduction of the HCR in 2010/2011, the scientific advice has been the scientific advice has been according to the rule, and the TAC set equal to the advice. <i>Scientific advice</i> The MRI advises the Minister of Fisheries and Agriculture on the exploitation of the cod stock in June each year; ICES provides advice as well; both ICES and the MRI advise on research and harvesting policy in general. The recommendation given by the MRI is peer reviewed by the Advisory Committee (ACOM) of ICES every year.				

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: There are numerous laws and regulations in effect, that altogether cover the management measures for conservation and sustainable use of the stock.				
<p>EVIDENCE</p> <p>Primary laws and regulations regarding fisheries management:</p> <p><i>The Act on Fisheries Management as subsequently amended No 116/2006.</i></p> <p><i>The Act concerning the Treatment of Commercial Marine Stocks as subsequently amended No 57/1996.</i></p> <p>Regulation No 57/1997 all catch has to be landed and provisions on discard are also in regulation no 601/2003.</p> <p><i>The Act on Fishing in Iceland’s Exclusive Fishing Zone as subsequently amended No 797/1997.</i></p> <p>Regulations are issued annually with amendments. Primary regulations are:</p> <p><i>Regulation no 742/2008 on commercial fisheries, which is issued every year with amendments.</i></p> <p><i>Regulation no 601/2003 on utilisation of catch and by-products.</i></p> <p><i>Regulation no 557/2007 on logbooks (and updated in early 2014 for recording marine mammal and seabird interactions/bycatch).</i></p> <p><i>Regulation no 224/2006 on weighing of catch as subsequently amended.</i></p> <p><i>Regulation No 384/2010 on coastal fishing 2009/10</i></p> <p>Fisheries management system</p> <p>The fisheries are managed by a catch quota system. The annual quota is allocated to individual vessels (in accordance to the vessel’s fixed quota share of the species subject to TAC) or vessel groups (coastal fisheries) 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; discarding is prohibited by law.</p> <p>Special coastal fisheries are allowed. To be able to participate in coastal fisheries a special license is needed; coastal fisheries are only allowed during the summer. A quota is issued and distributed between four defined areas and months. Detailed regulations are issued on number of gear, fishing days and allowable catch in each fishing trip. The catch fished in these fisheries is not counted</p>				

against the vessel's individual quota.

Support measures

Real time area closures: A short-term sudden closure system has been in force since 1976 with the objective to protect juvenile fish. If, in a given area, there are several consecutive sudden closures, the minister of Fisheries can issue a regulation to close the area for a longer time period, thus directing the fleet to other areas. The Directorate of Fisheries and the Coast Guard supervises these closures in collaboration with the MRI.

Temporary area closures: The major spawning grounds of cod are closed during the main spawning season. In addition there are gear and mesh size restrictions in place. The restrictions are mainly to protect juvenile fish but also to decrease the effort towards bigger spawners.

Permanent area closures: Many areas have been closed permanently. These closures are based on knowledge of the biology of various stocks with the aim of protecting juveniles and vulnerable marine ecosystems, e.g. coldwater corals.

CLAUSE: 1.5.7 Practical implementation shall be the task of (a) designated competent institution(s).

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: The operational implementation of the fisheries legislation is done by the Directorate of Fisheries and the Coast Guard. MRI has a supervising role on some aspects of the regulations.

EVIDENCE
The means of implementing the management approach, including main provisions for monitoring, control, surveillance and enforcement

The Icelandic Directorate of Fisheries is an independent administrative body responsible to the Minister. The Directorate is responsible for the 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. The Directorate of Fisheries works in accordance to law no 36/1992, no 116/2006 and no 57/1996. Accordingly, The Directorate of Fisheries issues fishing permits to vessels and allocates catch quotas. Other duties include imposing penalties for illegal catches. The Directorate supervises the transfer of quotas and quota shares between fishing vessels, controls the reporting of data on the landings of individual vessels and monitors the weighing of catches. The Directorate provides supervision on board fishing vessels and in ports of landing, which involves

inspecting the composition of catches, fishing equipment and handling methods.

The Icelandic Coast Guard’s main tasks are fisheries inspection at sea and monitoring of the EEZ and reception of required notifications from vessels. MRI keeps track of catch composition and can close areas with juvenile fish on short notice if needed.

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.

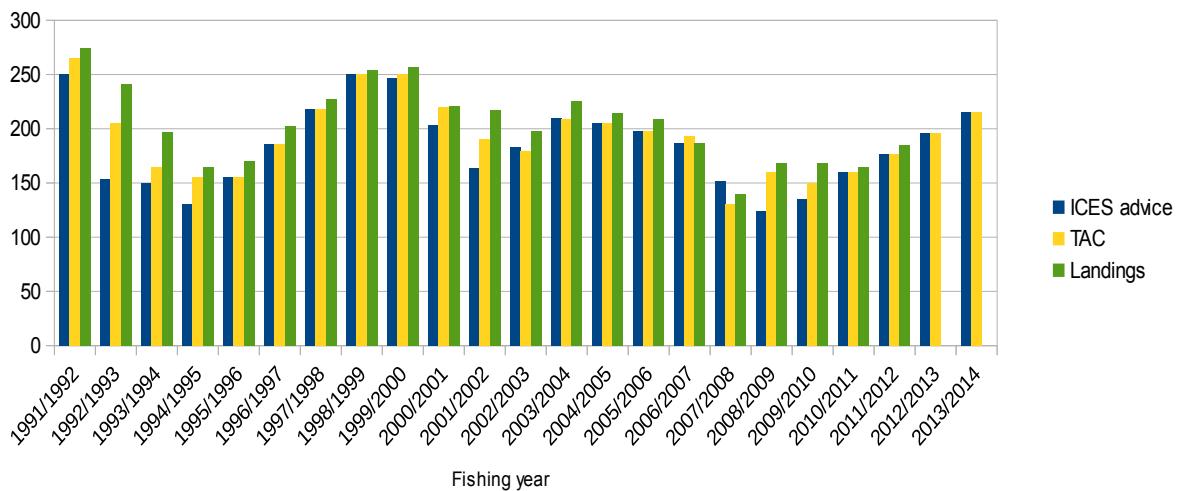
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:

Since the introduction of the present management plan, the TAC has been set close to the scientific advice. The TAC has been over-fished in the range of 3-5% in recent years.

EVIDENCE

The figure below is made from table 2.4.4.1 in the ICES advice for 2013, and shows the ICES advice, the actual TAC and the landings as reported to ICES. In recent years, the advice, which has been according to the current harvest rule since 2010/2011, has been followed. Landings exceeded TAC with 3% in 2010/2011 and 5% in 2011/2012.



The small TAC overage that can be seen between TAC and actual catch is likely due to the flexibility rules related to the catch of juveniles (to avoid their discards) and to the response time of the catch accounting system to closing the fisheries. All catches are accounted in the yearly stock assessment process of the MRI.

CLAUSE: 1.5.9 Management agreements reached in the competent Regional Fisheries Management Organization (RFMO) (s) or arrangements, relevant to the stock under consideration, shall be implemented by states and effectively and uniformly executed.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Icelandic cod is regarded as a national stock, managed by Iceland.				
EVIDENCE Icelandic cod is regarded as a national stock, managed by Iceland. Foreign vessels can be allowed to operate in Icelandic waters with permission from Icelandic authorities. The Fisheries Advisory Section of the MRI is responsible for the presentation of stock assessments and prepares the formal advice on TAC's and sustainable fishing strategies for the Ministry of Industries and Innovation. The Ministry sets an annual TAC based on the advice of the MRI in accordance with the HCR. Practical implementation is tasked to principally, the Directorate of Fisheries, The Icelandic Coast Guard and the MRI for the direction of temporary area closures.				

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 fisheries²⁹.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Clause not relevant for Icelandic cod.				
EVIDENCE The data available for the Icelandic cod are fully sufficient for assessment and advice. Generic data from other stocks are not needed in a management context, although comparative studies of cod stocks has considerable scientific interest.				

²⁹ FAO Guidelines (2009), para. 30.4.

SECTION 2: COMPLIANCE AND MONITORING

2.1 Implementation, compliance, monitoring, surveillance and control

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.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
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.				
EVIDENCE: The principal Act (Fisheries Management Act No.116/2006) ³⁰ which supersedes the Fisheries Management Act 1990 establishes the requirements for vessel permits (the initial legal requirement) without which a vessel is not entitled to obtain quota to fish for Icelandic stocks. Two permits are possible; general permit with quota and a general permit with a hook-and-line quota. The Icelandic Maritime Administration maintains a Register of Vessels. Principle requirements to obtain a permit refer to the Act on Investment by Foreign Parties in Industrial Operations and on the Act on Fishing and Processing by Foreign Vessels in Iceland’s EEZ (Act No 22 1998). The Act on Fishing in Iceland’s Exclusive Fishing Zone No. 79/1997 ³¹ establishes the Icelandic ITQ system giving powers to the Minister for its administration, fees, provision of powers to the Directorate, penalties for violations and temporary provisions. This Act also provides for the efficient utilisation of commercial stocks, specifies the Icelandic EEZ and prohibits foreign vessels from fishing within Iceland’s EEZ (unless by Agreement). Vessels are classified under 3 classes. The Act among other things, makes provisions for the Minister to limit certain gear types, fishing areas, fishing for certain stocks, prevent harmful fishing (fishing where undersize fish in the catch exceeds the reference levels determined by the Minister), set rules for min. size of marine animals. The Act also specifies the sanctions for violations against the Act including imprisonment for up to 6 months, gear and catch confiscation, suspension of licenses and fines for violations (ISK 4,000,000) and repeat violations (>ISK 400,000 < ISK 8,000,000). The Act concerning the Treatment of Commercial Marine Stocks No 57/1996 establishes the principle requirement of no discarding and that fishing cannot take place unless the vessel has sufficient quota. Also the Act establishes the requirement for the landing of fish from Iceland EEZ (or in part thereof) at Icelandic ports and for official weighing or in foreign ports officially recognised				

³⁰ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-116-2006-on-Fisheirs-Management.pdf>

³¹ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-79-1997-Fishing-in-Iceland-Exclusive-Fishign-Zone.pdf>

by the Directorate. Act No. 55 respecting Control and Inspection of Fish and Fish Produce 1968, establishes the hygiene conditions for The provisions for catch separation, recording, tracking of quota allocations, accredited weighing stations within 2 hours of landing (**Regulation No 224/2006 on Weighing and Recording of Catch**)³², exemptions for in house and auction weighing permission, processing at sea weight registration, and transfer of quotas is included in the Act.³³

During the on-site visit assessors witnessed fish landing, transfer to the auction, weighing, tipping and re-icing and sales of fish across the electronic auction system. Labelling of catch for traceability was also reviewed. Sold and registered weights are the official weights across the calibrated scales which are submitted to the central database.

Each vessel weighing generates a weighing receipt containing the following information:

- Name of Vessels, registration number and district number;
- Port of landing and date of landing;
- Name of seller, buyer and recipient of the catch or fish auction;
- Weighted quantity of catch by species;
- Undersize in catch;
- Number, type and weight of tubs, boxes, barrels;
- Fishing gear;
- Total number of Pallets of platforms ;
- Registration number and tare of transport vehicle;
- Whether catch is to be re-weighted;
- Whether any un-gutted catch will be weighed after gutting or converted using coefficients provided by Directorate.

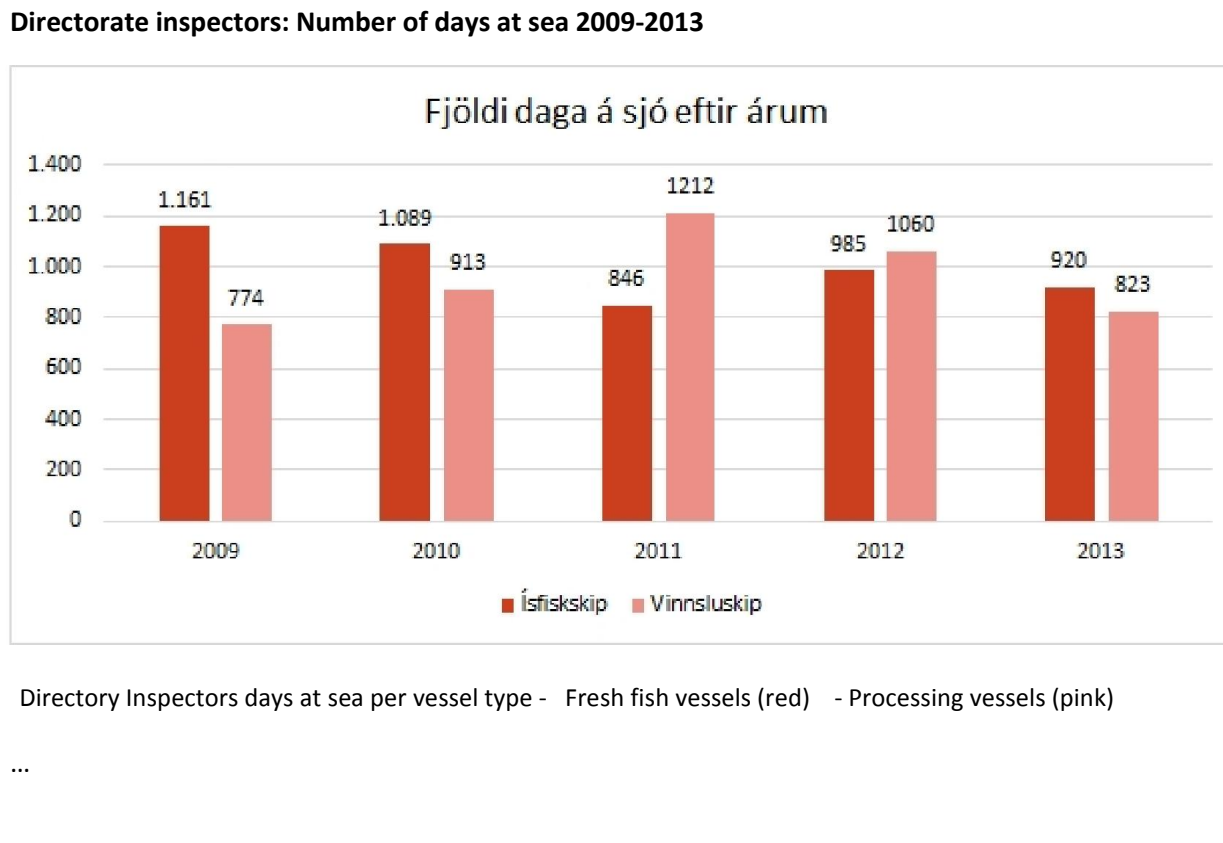
The scale operator must enter the info within the Directorates catch registration system without delay. Operationally, the Directorate of Fisheries is responsible for the implementation of Fishery Regulations although a large part of the at sea surveillance falls directly under the responsibility of the Icelandic Coast Guard. The Directorate has a HQ in Hafnarfjörður and offices at 6 locations in the country. Where the staff are in the field of fisheries management and monitoring of Fisheries and secretariat, as necessary. A total staff of 70 are involved in fisheries management.

Surveillance is a big part of the Directorate works and play key role in monitoring fisheries. The project is a comprehensive and includes the monitoring of fishing, processing fish on board, quotas position of ships, weighing and recording of catch, fish, whales, salmon and trout fishing and gravel income. Monitoring takes place either on the ground, sea and land, or electronically at the Directorate.

Last year, inspectors took a total of 395 (405 in 2012) trips, stayed 1743 (2045 in 2012) days on-board fishing vessels. Inspectors took 40 trips with processing vessels a total of 823 days and 355 trips on-board other ships lasting a total of 920 days.

³² <http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/>

³³ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>



34

³⁴ <http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit/>

2.2 Concordance between actual catch and allowable catch.

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 verification³⁵.

2.2.2 Monitoring, surveillance and information feedback shall be used to collate information on actual catch.

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.

2.2.4 Participating companies shall:

2.2.4.1 Ensure that they have been issued with all the 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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:
Evidence available demonstrated a high level of compliance between TAC and actual catch of cod based on official landings. The role of the Directorate of Fisheries is to implement laws and regulations on fisheries management and to control all aspects of fishing³⁶

EVIDENCE:

2.2.1
 The system of recording catch is controlled and includes both at sea (e-logbook records), standard paper based log-books and verification of catch through physical weighing at accredited landing stations registered by the Directorate.

2.2.2
 Trackwell, an electronic systems based service company, developed and service the Directorate and

³⁵ 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.

³⁶ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>

Industry with a number of IT based monitoring, reporting and recording systems including:

- Vessel monitoring systems and Electronic Reporting System (legal requirements) which were developed in close cooperation with the Coastguard and Fisheries Authorities.
- Electronic logbook and Reporting System, which generates mandatory reports to the Directorate as well as providing a valuable management reporting system for fleet management.

The vessel log book system requires that the operator of a vessel registers the following information:

Haul no., fishing date, time of fishing, lat/long at haul, fishing zone, dept, wind direction, m/s, wind speed, seafloor, twin trawls, name of person registering information, and information on transmitting to the Directorate. The system has other components- Fleet Manager, analysis tools and a labelling/traceability component allowing catch to be linked to fishing zone for labelling purposes.

The distribution of information is managed by a central server which transmits to the Directorate (and MRI), fleet managers and a traceability system. The server enables secure data encryption protocol and backup server of the transmitted data. The distribution server integrates with other database systems using XML via web services.

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 cod 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. Weighed recorded landings are the main source of catch documentation. Logbook data is used as a secondary source to cross check landings. Any transfer under the ITQ system for each vessel is also monitored to ensure that any additional quota requirements are rented from other vessels within a 3 day period. The reporting system is not real time but is very near real time (circa. 24 hours).³⁷

In some cases, an approved in house company or auction weighing system is used which has been verified by Directorate staff. The system works for all official Icelandic weighing stations and auctions and also for foreign ports with an official designation from the Directorate [Toftum (Faroe Islands), Grimsby (UK), Hull (UK) and Bremerhaven (Germany)]. 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.

³⁷ <http://eng.atvinnuvegaraduneyti.is/media/reglugerdir/Regulation-224-2006-on-weighing-and-recoding-of-catch.pdf>

2.2.3

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.

The Coast Guard also undertakes at sea boarding to confirm that registrations are made correctly and for the correct fishing zones. The Coast Guard also carries out 24-7 surveillance of all vessels in Iceland's EEZ. There are requirements for transmitting position, VMS transmitting, and for reporting catch for vessels entering/leaving Icelandic waters. Based on the visit to the HQ of the Coastguard by the assessors and a tour and review of the monitoring system it can be described as comprehensive and effective.

The ITQ system has rules and flexibilities to allow for corrective management measures and adjustments to be incorporated. These include:

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%.

A separate small boat quota system (krókaflamarkskerfi) is available for boats less than 15 GT. These are only allowed to fish with handlines or longlines. These boats get quotas for all the major demersal species and can freely transfer the quota within this system. However to prevent consolidation of fishing rights these quotas cannot be transferred to the common quota system. Currently about 430 boats are fishing within the small boat system.³⁸

Each fishing year the Minister shall have available harvest rights amounting to up to 12,000 tonnes of ungutted demersal species, which he may use:

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.

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, and the

³⁸ <http://www.fiskistofa.is/ymsaruppl/tilkynningar/nr/1090>

excess catch of each demersal species may not exceed 2% of the total value of the demersal quota. This authorisation does not, however, apply to fishing in excess of the allocated catch quota of cod. Vessels may also fish up to 5% in excess of the catch quota for each demersal species, herring and deepwater shrimp and 3% in excess of their catch quota for offshore shrimp and scallops with the result that the excess catch will be deducted from their allocated catch quota for the following fishing year.

2.2.4

There are specific rules for allowance of fisheries (e.g. ITQ system) and for limiting the combined quota share of fishing vessels owned by individual parties, whether natural or legal persons, or owned by connected parties. The limit of share of the cod quota for any such combination of quota entitlements is 12% of the total.³⁹

³⁹ <http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/>

2.3 Monitoring and Control

2.3.1 Vessel registration and catch quotas

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.

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

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.

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 fishery⁴⁰;**
- 4) For the stock under consideration, the allowed catch by species for each vessel or vessel group shall be specified.**

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:

Quotas conform with the current decision on TAC, through the individual vessel quota share. All commercial fishing operations are subject to a permit from the Directorate of Fisheries. There is a system for recording the catch quota of each vessel for each species within the central database held by the Directorate. A register of permitted vessels is maintained by the Minister of Transport and Communications and the Icelandic Maritime Administration (IMA). By regulation only Icelandic licensed vessels are permitted to fish in Iceland EEZ. Information on size, composition of the fleet is available by vessel type.⁴¹

2.3.1.1

Quotas conform with the current decision on TAC, through the individual vessel quota share.

2.3.1.2

All commercial fishing operations are subject to a permit from the Directorate of Fisheries.

⁴⁰ 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.

⁴¹ <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-22-1998-Fishing-and-Processing-by-Foreign-Vessels-in-Iceland.pdf>

2.3.1.3

There is a system for recording the catch quota of each vessel for each species within the central database held by the Directorate.

2.3.1.4

A register of permitted vessels is maintained by the Minister of Transport and Communications and the Icelandic Maritime Administration (IMA). By regulation only Icelandic licensed vessels (with some exceptions) are permitted to fish in Iceland EEZ. A small number of Norwegian and Faroese Islands vessels are allowed to fish for cod in the Icelandic EEZ, with strict regulations in place. Information on size, composition of the fleet is available by vessel.⁴²

⁴² <http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-22-1998-Fishing-and-Processing-by-Foreign-Vessels-in-Iceland.pdf>

2.3.2 Fishing vessel monitoring and control systems

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.

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.

2.3.2.3 Areas closed from fishing shall be monitored by the Authorities.

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.

2.3.2.5 Fishing logbooks shall be subject to unannounced inspection.

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.

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.

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).

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).

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.

2.3.2.11 In cases of mixed species catches, all commercial species shall be landed.

2.3.2.12 Landings shall be monitored. Harbor officials and fisheries inspectors shall monitor the correct weighing and registration of the catch.

2.3.2.13 Catch shall be weighed by species at landing.

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).

2.3.2.15 There is systematic monitoring of landing, weighing and registration of catches and discrepancies/deviations shall be recorded.

2.3.2.16 Reasons for deviations shall be analysed and corrections made to reduce the likelihood of recurrence.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:

Monitoring and control of fishing vessel activities by the Icelandic Coastguard is in place to prevent fishing by unauthorised vessels. Fishing gear can be inspected by the Coast Guard, as well as the composition of the catch and its handling onboard the fishing vessels. Areas closed from fishing are monitored by the Coast Guard. Catch amounts by species and fishing area are recorded in fishing logbooks on-board the fishing vessels. Fishing logbooks are subject to unannounced inspection by the Coast Guard. The correct recording of catches in fishing logbooks are monitored by comparing the recorded catch amounts with the catch stored aboard the vessel at time of inspection. Discarding of catch is prohibited by Icelandic fishery law except for damaged fish or fish in poor health. There is a by-catch allowance for cod in other (non groundfish) fisheries. Monitoring and control measures are in place and are conducted in a manner to encourage compliance. Authorised landing Ports are designated by the Ministry and landings controlled by the Directorate. Landings are monitored. Harbour officials and fisheries inspectors monitor the correct weighing and registration of the catch. Discrepancies/deviations during weighing are recorded. The reasons for deviations are analysed and corrections made to reduce the likelihood of recurrence.

EVIDENCE:

2.3.2.1

The Icelandic Coastguard administers the VMS for all Icelandic vessels and for all foreign vessels (including fishing vessels) that enter Icelandic waters.

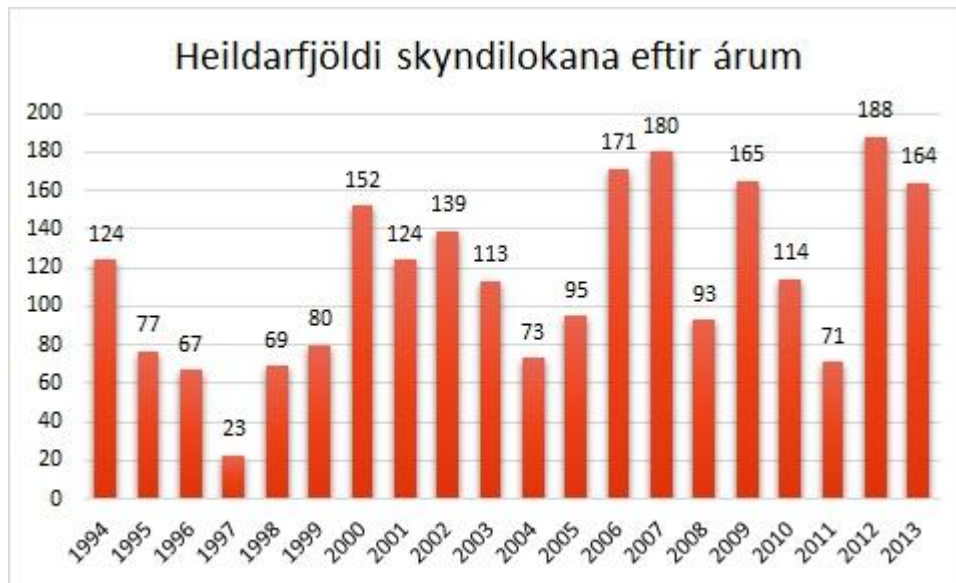
2.3.2.2

The Coastguard conduct vessel boarding's in order to inspect gear, catch and catch records.

2.3.2.3

Short term closures are established by the MRI and monitored by the ICG.

Total number of Fast Shutdown by year⁴³



Number of Fast Shutdown by species⁴⁴



Cod – saithe – tusk – herring - shrimp

⁴³ <http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit/>

⁴⁴ <http://www.fiskistofa.is/umfiskistofu/arsskyrsla-2013/eftirlit/>

Information on temporary closures are available online for access by fishermen.⁴⁵ The Coast Guard receives immediate notification of closures and can direct attention from patrol vessels to these areas when vessels are present. The system was reviewed during the site visit.

2.3.2.4

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.

2.3.2.5/6

Log books are subject to unannounced vessel boarding inspections by Coast Guard and at port boarding's by the Directorate. The table below shows targeted vessel boarding activity by the Coast Guard in 2012 and 2013. Boarding of vessels by Coast Guard and Directorate staff includes a review of catch compared to logbook information. Having fish catch onboard in excess of a vessels quota fall under the "catch" category.

Number of targeted inspections by the LGH 2012-2013		
	2012	2013
Control, number of vessels / inspections	185	182
Comments, number of vessels	94	73
Equipment, number of vessels	30	29
Catch	16	9
Logbook	12	20
Fishing permit	22	22
Fishing gear/seaworthiness	14	14
Muster, registration	18	11
Lack of right to practice	12	14
Number of prosecutions against the master	15	33
Number of reprimands against the master	28	98

Comments:

Coast Guard Vessels	47
Leiftur (other vessels not employed by ICG)	26

⁴⁵ <http://www.hafro.is/undir.php?ID=18&REF=3>

Baldur (other vessels not employed by ICG)	0
Total	73
Reprimands:	
Coast Guard Vessels	12
Analysis departm. and FMC	86
Total	98
Prosecutions:	
Fisheries	6
Out of communication range	6
Muster, registration	9
AIS not shining	5
Fishing permit	2
Certificate of seaworthiness	2
Fishing logbook	2
Rest regulations	1
Total	33

(A. L. Ásgrímsson, ICG Chief of operations, February 2014, *pers. comm.*).

The Act on the Icelandic Coast Guard No. 52, June 14th 2006, enables the current operations of the ICG.

<http://www.fisheries.is/management/fisheries-management/enforcement/>

http://www.lhg.is/media/LHG80/Landhelgigasla_Islands_enska2_.pdf

<http://eng.innanrikisraduneyti.is/laws-and-regulations/nr/6612>

2.3.2.7

Discarding of catch is prohibited by Icelandic fishery law except for damaged or fish in poor health. There is a by-catch allowance for cod in other fisheries.

From ICES NWWG Report 2009 'Estimates of annual cod discards (Pálsson et al 2006, Pálsson et al 2009, in press) since 2001 are in the range of 1.4-4.3% of numbers landed and 0.4-1.8% of weight landed. Mean annual discard of cod over the period 2001-2008 was around 2 kt, or just over 1% of landings. In 2008 estimates of cod discards amounted to 1.1 kt, 0.8% of landings, the third lowest

value in the period 2001-2008. Discards rate are estimated by the MRI by comparing the size composition of catches between vessels with and without Directorate inspectors, fishing on same days and sites to minimise variability. The method used for deriving these estimates assumes that discarding only occurs for high grading reasons since larger fish is usually (but not always) higher priced. In recent years misreporting has not been regarded as a major problem in the fishery of this stock. The MRI report on discard report NO. 154 2010⁴⁶ and the MRI report on discard NO. 160 2012⁴⁷ "Discards of cod and haddock in demersal Icelandic fisheries 2001-2010" also provides qualification of very low discarding estimates derived through the annual assessment- described in the MRI report NO. 171 2013.⁴⁸

New Regulation for Recording of Marine Mammals and Sea Birds

A new amendment to existing regulations requiring that data submitted in logbooks includes seabirds and marine mammal's number and species was issued in February 4 2014.

Nr. 126/2014	4 February 2014
REGULATION	
Amending Regulation no. 557, 6 June 2007 on logbooks, as amended. ⁴⁹	
Article 1.	
First paragraph. Article 6. added two paragraphs which read as follows:	
<ol style="list-style-type: none"> 1. Seabirds on the number and species. 2. Marine mammals on the number and species. 	
Article 2.	
This Regulation is issued under the provisions of Act no. 116, 10 August 2006, the Fisheries Management as amended, and Act. 151, 27 December 1996, for fisheries under the jurisdiction of Iceland, to take effect immediately.	
<i>Industries and Innovation Ministry, 4 February 2014.</i>	
F. h. Ministry of Fisheries and Agriculture,	
Johann Gudmundsson. ⁵⁰	

⁴⁶ <http://www.hafro.is/Bokasafn/Timarit/fjolrit-154.pdf>

⁴⁷ <http://www.hafro.is/Bokasafn/Timarit/fjolrit-160.pdf>

⁴⁸ <http://www.hafro.is/Bokasafn/Timarit/fjolrit-171.pdf>

⁴⁹ <http://www.reglugerd.is/interpro/dkm/WebGuard.nsf/key2/557-2007>

⁵⁰ <http://www.stjornartidindi.is/Advert.aspx?ID=9bc42c49-4617-4fa3-a4f5-424936339ff0>

2.3.2.8/9

The Icelandic 'management model' has been designed to promote compliance through reporting. The system is transparent in that it is very public with respect to performance of vessels in the fleet. A rapid reporting system also encourages transparency - near real time information of catch for each vessel, quota allocation, transfers. Also price at market information of fish is available. The system has a number of features that support reporting of landings which relate to the ITQ system structure. In addition to permits, vessel ITQ, effort is controlled using gear restrictions and also through the fishing area closure system administered by MRI. ICES NWWG (2009) reported that whilst there may be opportunity for discrepancies, unpublished reports from the Directorate of Fisheries, partly based on investigation comparing export from fish processing plants with the amount of fish weighed in the landing process indicate that this bias may be of the order of single digit percentages and not in double digits.

2.3.2.10/12

Authorised Ports are designated by the Ministry and landings controlled by the Directorate. Ports must have official designations for catch weighing by the Directorate staff or one of the other approved systems in place - Auctions, in-house for fresh fish/processed at sea fish using approved yields and at Fish Auctions. A number of foreign ports also have approved status where there is an official weighing and reporting structure that meets the requirements of the Directorate.⁵¹ All commercial species are separated and declared by logbook and landed weight. During the on-site assessment activities at the landings to auctions and to the processing factories, and registrations by the accredited weighers at auction, Port Authorities and individual company official weighers was observed.

2.3.2.13/14

The weight (whole weight or gutted weight) by species of all catches of "stock under consideration" and by-catch species is measured by accredited harbour officials at landing and recorded in the official central data base (date, vessel, location, species, and amount).

2.3.2.15

All catches of Icelandic fishing vessels must be weighted and recorded at the port of landing by an official weigher (who is certified and has signed an oath). The port authorities record the catch in a computer that is directly linked to a centrally located database at the Directorate of Fisheries. Thus 70 ports of landings in Iceland send electronic data daily to the Directorate. A total of approximately 50.000 landings are registered in the system every year.

2.3.2.16

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 if vessels are approaching the end of their quotas. Excess catches can result in a revocation of fishing licenses and fines. The Statistics Iceland then receives copies of the data for the production of statistics of the economy. There is a specific factor calculated by the MRI used to translate gutted to ungutted weight.

⁵¹ <http://eng.atvinnuvegaraduneyti.is/media/reglugerdir/Regulation-224-2006-on-weighing-and-recoding-of-catch.pdf>

2.3.3 Catches are subtracted from relevant quotas

CLAUSE:

2.3.3.1 Landed catches shall be subtracted from the relevant quotas (allowable catch) of the vessel or the vessel group.

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.

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.

2.3.3.4 Transfer of quota between vessels must take effect only after it has been authorised and recorded to the official central data base.

2.3.3.5 Information on each vessels catch quota and quota use shall regularly updated and made public and accessible to all on the official web-site, thus ensuring transparency.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:

Landed catches are subtracted from the relevant quotas (allowable catch) of the vessel or the vessel group. Limited allowance is 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. When a vessel’s quota is used up, additional quota must be transferred to the vessel from other vessels or the vessel stops fishing. Transfer of quota between vessels takes effect only after it has been authorized and recorded to the official central data base. Information on each vessels catch quota and quota is regularly updated and made public and accessible to all on the official web-site.

EVIDENCE: Principally, 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. Quota transfer is mainly intended to promote rationalisation and thus increase profitability in the industry.⁵² Exceptions include: Community quotas (not based on vessel’s quota share, all other provisions apply; limited amount); summer inshore hand line (jigging) fishery

⁵² <http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/>

so called Coastal fisheries (Strandveiðar). The Cod quota for Coastal fisheries is 7.500 tons the fishing year 2013/2014⁵³

2.3.3.1

The Directorate controls the administration of the ITQ system. Examples of the forms that vessel owners are obliged to complete to register and transfer quotas are available on the Directorate's website and were reviewed during the onsite meeting with the Directorate. Information is received into the database in several ways. The electronic logbook system allows automated entry although there is continuous checking of consistency by staff. Manual entry is also possible as in the case for non-electronic logbook carrying vessels such as the hand lining fleet. In this case each trip must be manually recorded in the vessel log and recorded at landing, again using official, calibrated scales. The catches for small and liners that are permitted to fish from the common (community) cod quota allocation are subtracted on an on-going basis in the system.

2.3.3.2

Vessels must have available quota in order to continue fishing once quota is used up. The system is monitored by the Directorate. It is possible to transfer from cod quota to another species but not the reverse. So cod equivalent quota can be used to get quota for say haddock or saithe or redfish. Monitoring of quota uptake by vessels is scaled as the catches are recorded in verified harbors. The catch then is subtracted and made available on the internet by the Directorate.

2.3.3.3

In order to facilitate matching of the species composition of the catch and the quota portfolio for individual fishing vessels or companies, and also to reduce incentives for discard, a variety of flexibility provisions are in place. In addition to quota transfer, are the following: a provision allowing the use of catch quota for one species to count against a limited catch amount of another species although it is prohibited to exchange other species for cod quota which instead must be obtained directly through the quota renting system.

Other items allowing flexibility:

It is permitted for the year's catch to exceed the year's quota by 5% in some species; the excess is then deducted from the following year's quota. This is permitted to each vessel. It is permitted to postpone fishing for part of the quota and to transfer up to 33% of the year's quota to the following fishing year; postponement of fishing is considered beneficial to the growth of long-lived fish stocks. This is permitted to each vessel.

2.3.3.4/2.3.3.5

Current quota share, allocation and remaining quota can be obtained from the Directorates website for any vessels. The system is very transparent. Documentation that must be submitted for quota share transfers is available on the website and must be transmitted directly to the Directorate for authorization of the transfer. Except if fishing company has two or more vessels they can transfer directly between their vessels (of course within all laws and regulations)⁵⁴.

⁵³ http://www.atvinnuvegaraduneyti.is/media/Skyrslur/Stjorn-fiskveida-2013-2014_4prof.pdf

Article 2 page 51

⁵⁴ <http://www.fiskistofa.is/eydublod/flutningurveidiheimilda/>

2.3.4 Rules are enforced

CLAUSE: 2.3.4.1 Rules shall be enforced. There shall be penalties for serious infractions.			
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>
SUMMARY EVIDENCE: There is a clearly established legal framework, with regulations and rules that give powers to the Ministry, the Directorate, the Coast Guard and the MRI. These are enforced by principally the Directorate on a day to day basis through powers to collect levies, monitor, inspect, report and gather evidence for prosecution purposes where violations are expected.			
EVIDENCE There is a clearly established legal framework, with regulations and rules that give powers to the Ministry, the Directorate, the Coast Guard and the MRI. These are enforced by principally the Directorate on a day to day basis through powers to collect levies, monitor, inspect, report and gather evidence for prosecution purposes where violations are expected. All prosecutions are carried out through the Icelandic legal process (Ministry of Justice and Human Rights). Other at sea monitoring and inspection duties reside with the Coastguard. The MRI also has legal powers to close fishing grounds within the remit of the overall Ministry of Industries and Innovation. The following information was submitted by the Icelandic Coast Guard on the number of vessel inspections which took place in 2013. Out of a total of 182 boardings, the Inspector made comments on a total of 73 observations (note that these inspections were targeted towards vessels where infringements were suspected). Out of this activity, a total of 33 (18%) of inspections resulted in a prosecution of the master of the vessel with respect to a violation of Icelandic fishery laws.			
Number of targeted inspections by the LGH 2013			
Eftirlit, fjöldi skipa /skoðana	Control, number of vessels / inspections	182	
Athugasemdir, fjöldi skipa	Comments, number of vessels	73	
Búnaður, fjöldi skipa	Equipment, number of vessels	29	
Afli	Catch	9	
Fiskidagbók	Logbook	20	
Veiðileyfi	Fishing permit	22	

Veiðarfæri/haffæri	Fishing gear/seaworthiness	14
Lögskráning/vöntun atv.skírt.	Muster, registration	11
Vöntun réttindamanna/réttindi	Lack of right to practice	14
Fjöldi kæra á skipstjóra	Number of prosecutions against the master	33

(A. L. Ásgrímsson, ICG Chief of operations, February 2014, *pers. comm.*).

The Act on the Icelandic Coast Guard No. 52, June 14th 2006, enables the current operations of the ICG.

2.3.5 Analysis is carried out

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 adopted when indicated.

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.

2.3.5.3 There shall be full traceability from catch, through processing, export and delivery on the market.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE:

There is an integrated and systematic procedure in place for analysing catch records. It commences with a comprehensive recording system using a combination of vessel generated data and official landing data, supported by verification audits at processing plants for yield confirmation. All purchases must be made by registered buyers (Directorate) and also processors must be approved for hygienic handling and processing. Permanent records of purchases and sales must be available and periodically submitted (monthly) to the Directorate for official registration purposes. The Directorate compares data on official landings, with purchase information, sales and exports and cross compares data with information collected on a vessel by vessel basis from official reports and boardings made by the Icelandic Coast Guard.

EVIDENCE**2.3.5.1**

Export documentation provides an independent comparative check on catch quantities for different species. Analysis includes the comparison of catch figures with figures for the amounts of sold or exported products in order to ensure independent checking of the accuracy of information about the catches that are brought ashore. If analysis reveals discrepancies between the information stated in the reports and the information received from the harbour weighing, corrective measures are taken as appropriate.

2.3.5.2

All processors making purchases of fish (at auction, or directly) are obliged to report purchases on a monthly basis to the Directorate. The Fish Market also reports directly into the Directorate for fish catches.

2.3.5.3

There are effective systems in place that can manage the traceability of catch through processing, export and delivery to market. Traceability can be demonstrated using electronic logbook data – which, unless mixing of fish occurs on landing will allow for species by catch area by vessel for date of capture. This information is transmitted to the Directorates website and also to the buyer. Essentially, there is an official registration of landed weight in all cases which also contains information on the registered vessels, species, and fish quantity using identifiers that allow traceability to vessel. In most cases, the unique vessel identifier remains with the batch throughout production and often on the final pack. For wet fish sales, from the auction, a vessel unique number is registered within the central e-auction for tracking purposes. This full traceability is possible but not all buyers require the full traceability report from the boat to the final product.

SECTION 3: ECOSYSTEM CONSIDERATIONS

3.1 Guiding principle

CLAUSE: 3.1.1 Adverse impacts of the fishery on the ecosystem shall be considered and appropriately assessed and effectively addressed ⁵⁵ .				
EVIDENCE RATING:	High <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	
NON CONFORMANCE:	High <input type="checkbox"/>	Minor NC <input checked="" type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE:				
<p>The MRI is the principle marine research agency that monitors and researches the marine environment including the ecosystem components. There is a well established and extensive science programme of both monitoring and research into the changes in physical parameters within the waters of Iceland. Direct and indirect impacts of fisheries are assessed and effectively address through conservation measures. A minor non conformance was identified here by the assessment team regarding cod-capelin predator-prey interactions. After issuing the non conformance to the client representative, the MRI responded formally, as part of corrective action, that an in-depth ICES benchmark assessment of the capelin stock occurring in the area around East Greenland, Iceland and Jan Mayen and harvested by Iceland, Greenland and Norway will be carried out in the first half of 2015. In the first surveillance assessment for this fishery (due in October 2015) the assessment team will reassess this issue taking into account 1) the results of the ICES capelin assessment benchmark and 2) the relative management actions and harvest decisions taken by the Icelandic authorities. After reassessing this issue in the first surveillance, the assessment team may agree to request further corrective action, if the conditions require, or close the non conformance.</p>				
<p>Iceland has developed a comprehensive Marine Policy ‘The Ocean, Iceland’s Policy’. The document has been developed and ratified through the Ministry’s of Environment, Fisheries and Foreign Affairs (2005). Iceland's policy on sustainable development, ‘Welfare for the Future’ Iceland’s National Strategy for Sustainable Development 2002–2020’, lays down the principles and general policy for sustainable development in Iceland. It discusses the sustainable utilisation of living marine resources and preservation of biodiversity.</p> <p>Gathering knowledge of the marine ecosystem is a key role that has been assigned to the Marine Research Institute (http://www.fisheries.is/ecosystem/). There is also comprehensive research which forms the basis of the fisheries management implemented in Iceland to harvest the stocks in a responsible manner, in order to ensure and maintain maximum long-term productivity of all marine resources. The MRI monitors and researches the marine environment including the ecosystem components. There is a clear programme of monitoring and research in:</p> <ul style="list-style-type: none"> • Oceanographic and physical data recording and analysis to support improved 				

⁵⁵ FAO Code of Conduct for Responsible Fisheries, Article 7.2.

understanding of the effects of oceanographic and climatic changes on the cod commercial fisheries and ecosystems.

- Direct measurement of **retained catches** of other species within the cod fishery. To the most part, other retained commercial species are quota species and all vessels have a specific ITQ for these species. Information on all catches is maintained. Discarding is illegal and the MRI undertakes ongoing assessments of potential discard rate to provide quantification and level of compliance. Discards are not included in the assessment. Discards in 2013 were low, as they have been in most years since 2001. (ICES, 2014⁵⁶)
- **Bycatch** and interactions of fishing operations of non ETP species and birds.
- **Habitat interactions** in demersal fisheries can be physical interaction of gear on the seabed or interaction of other gears in the water column; hook and line, gill nets and seine nets. As described there are measures in place for the protection of inshore grounds important for nursery areas of fish stocks. Additional closed areas (permanent, seasonal, short notice is also in place for a variety of conservation measures).
- **Endangered, Threatened and Protected Species** with gear interactions.
- **Ecosystem interactions** of the cod fishery- important prey items and food items.

Oceanographic and physical data

The Marine Research Institute has as one of its duties to improve knowledge on the physical - and chemical oceanography of Icelandic waters, particularly in relation to biological resources. The oceanography group at MRI runs various projects that conform with these duties. Among these are some research projects that are monitoring the environment and climate. Since 1950 there have been annual observations of temperature and salinity in spring at a number of fixed positions or stations on the Icelandic shelf in order to trace climatic variations.

After 1970 the institute started to conduct measurements on these fixed stations four times a year, in February/March, May/June, August/September and October/November. Most often this is done in connection with other surveys such as the acoustic capelin assessment in Autumn. (<http://www.fisheries.is/ecosystem/research/oceanography/>).

The MRI biological oceanographic research is carried out during the annual spring survey and produces environmental monitoring data, the most recent for 2013. Long-term trends in hydrography and zooplankton abundance and marine ecological work carried out are recorded in the report **Environmental conditions of Icelandic waters in 2013 by the MRI** (Hafrannsóknir nr. 175) in Icelandic with English summaries). Results showed that in 2013 temperature and salinity in surface waters was close to the long term normal or slightly above the long term average to the south and west of Iceland. Similar to 2011-2012, salinity continued to decrease in 2013. Bottom temperature at station Siglunes 3 remained very stable, but the other monitored stations were relatively high, as it had been since the turn of this century.

Overall, the total zooplankton biomass was below the long term average in May. In the waters to the west of Iceland it was close to the average, but well below the long term average elsewhere around Iceland. <http://www.hafro.is/Bokasafn/Timarit/vist2013.pdf>

⁵⁶ ICES. 2014. Report of the North-Western Working Group (NWWG), 24 April–1 May 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014/ACOM:07. 902 pp.

Climate Change in the North Atlantic

ICES released the Status Report on Climate Change in the North Atlantic in September 2011 (<http://www.ices.dk/pubs/crr/crr310/CRR%20310%20Climate%20Change.pdf>), which reviews the range of climate-change impacts that have been reported from the North Atlantic and discusses potential future changes to the ecological processes of marine systems. The different hydrographic conditions in Icelandic waters are also reflected in the atmospheric or climatic conditions in and over the country and the surrounding seas. These conditions in sea and air have their impact on biological conditions, expressed through the food chain in the waters including recruitment and catches of commercial fishes.

Oceanographic and physical data is comprehensively documented for the waters around Iceland. The marine climatic conditions north of Iceland have been monitored for over 50 years at a hydrographic section across the shelf north of Iceland. South of Iceland, regular monitoring of the hydrographic conditions started in 1970 and during the past decade record high temperatures and salinities have been observed.

<http://vs.en.sigling.is/>

Annual observations of temperature and salinity in spring at a number of fixed positions or stations on the Icelandic shelf have been recorded since 1950 to record climatic trends. From 1970 the MRI started to conduct measurements on the fixed stations four times a year in unison with other surveys such as capelin assessment in Autumn and then used to support studies on the biology of other species. Temperature and salinity are also recorded at other stations. As part of the spring cruise measurements taken on nutrients, primary production of phytoplankton and abundance and species of zooplankton to name a few. Continuous monitoring of the inflow of Atlantic water into the area north of Iceland is also carried out by MRI using moored current meters. Many of the tasks and others are linked to international research projects and climate studies in the North Atlantic.

<Http://www.fisheries.is/ecosystem/oceanography/Temperature-and-salinity/>

Impact of Sea Temperature on Fish Community Structures

While Stefansdottir, *et al* (2010) note that while the overall trends in fish community structures are stable, recent increases in the sea bottom temperatures have resulted in observed changes in species richness in the waters to the southwest and northeast of Iceland. While species diversity in the southwest of Iceland has shown a general increase in species associated with warmer waters temperatures, in the northeast species richness declined. The authors note that abundance of species such as capelin and herring have varied with temperature. Capelin recruitment has fallen to levels since peak levels throughout the 1990's and is now on average around 1/3 of the levels, interspaced with periodic peaks in recruitment.

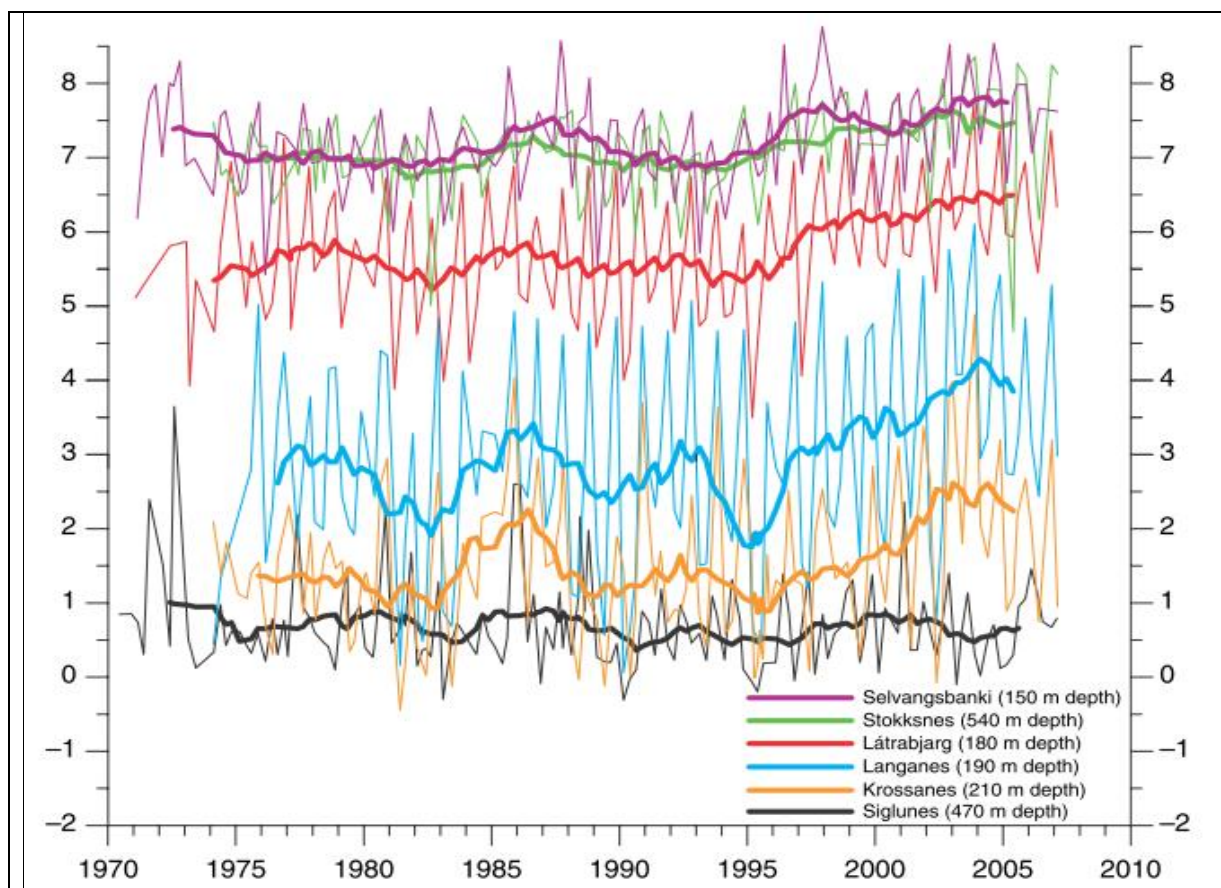


Figure 18. Groundfish species diversity and assemblage structure in Icelandic waters during recent years of warming. Extracted from: Stefansdottir L., Solmundsson J., Marteinsdottir G., Kristinsson K., and Jonasson J. P. (2010), *Fisheries Oceanography*, 19: 42–62.

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2419.2009.00527.x/abstract>

Retained Catch

Icelandic cod catches are predominately associated with trawl (49%) and longlines (33%); and to a lesser extent gillnets (9%) and seine net (4%).

Cod is also by far the most dominant species for all of the four gear types, with cod making up 43% of catches of all species for trawl, 63% for longlines, 78% for gill nets and 40% for the Seine net.

There is also a range of other species caught as non target-retained catch. The species composition varies across gear type and metiers.

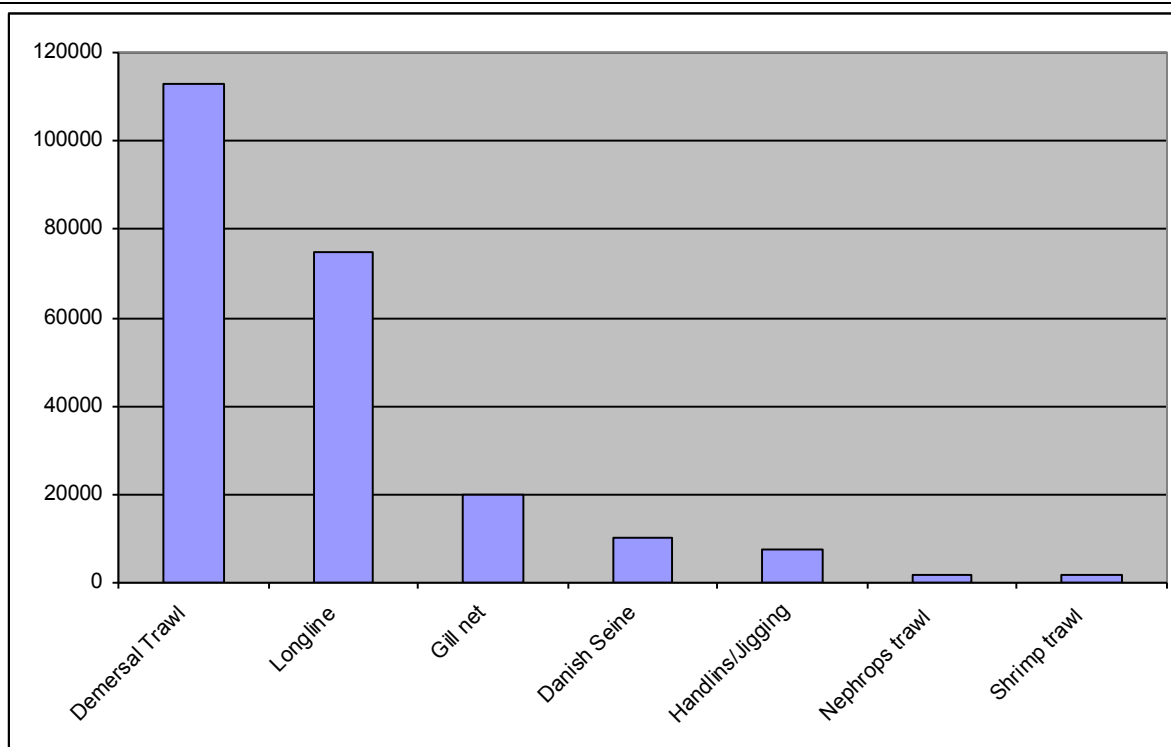


Figure 19. Breakdown of 2013 cod landings (thousands of tonnes) by gear type. (source: Icelandic Ministry of Fisheries).

Table 3. Relative catch composition of TAC regulated species (to cod) associated for each of the main gear types targeting cod.

Species	Demersal Trawl		Longline		Gill net		Danish Seine	
	Catch (t)	% contribution to trawl catches	Catch (t)	% contribution to longline catches	Catch (t)	% contribution to gill net catches	Catch (t)	% contribution to Danish Seine catches
Cod	112,722	42.1%	74,817	63.1%	19,748	77.9%	10,050	40.2%
Haddock	20,734	7.7%	19,187	16.2%	334	1.3%	4,950	19.8%
Saithe	47,841	17.9%	829	0.7%	3,102	12.2%	1,326	5.3%
Whiting	419	0.2%	255	0.2%	3	0.0%	62	0.2%
Golden redfish	46,989	17.5%	1,340	1.1%	143	0.6%	467	1.9%
Ling	1,613	0.6%	6,779	5.7%	345	1.4%	235	0.9%
Blue ling	1,110	0.4%	1,420	1.2%	14	0.1%	34	0.1%
Tusk	75	0.0%	4,875	4.1%	15	0.1%	0	0.0%
Catfish	2,430	0.9%	5,536	4.7%	11	0.0%	721	2.9%
Rock grenadier	83	0.0%	1	0.0%	-	0.0%	-	0.0%
Deep sea redfish	479	0.2%	-	0.0%	-	0.0%	-	0.0%

Starry skate	186	0.1%	1,362	1.1%	4	0.0%	147	0.6%
Spotted catfish	815	0.3%	1,575	1.3%	4	0.0%	2	0.0%
Monkfish	142	0.1%	34	0.0%	33	0.1%	122	0.5%
Common skate	32	0.0%	59	0.0%	2	0.0%	28	0.1%
Dogfish	2	0.0%	2	0.0%	0	0.0%	1	0.0%
Greenland shark	3	0.0%	0	0.0%	-	0.0%	-	0.0%
Mackerel shark	0	0.0%	-	0.0%	0	0.0%	-	0.0%
Greater silver smelt	7,139	2.7%	-	0.0%	-	0.0%	-	0.0%
Halibut	32	0.0%	2	0.0%	1	0.0%	1	0.0%
Greenland halibut	12,489	4.7%	247	0.2%	450	1.8%	0	0.0%
Plaice	1,580	0.6%	179	0.2%	136	0.5%	4,038	16.2%
Lemon sole	378	0.1%	0	0.0%	3	0.0%	1,302	5.2%
Gray sole	39	0.0%	0	0.0%	1	0.0%	653	2.6%
Megrim	50	0.0%	0	0.0%	0	0.0%	98	0.4%
Dab	11	0.0%	5	0.0%	2	0.0%	705	2.8%
Rough dab	32	0.0%	4	0.0%	0	0.0%	50	0.2%
Herring	44	0.0%	-	0.0%	993	3.9%	-	0.0%
Capelin	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Norway pout	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Blue whiting	54	0.0%	-	0.0%	-	0.0%	-	0.0%
Mackerel	678	0.3%	5	0.0%	1	0.0%	0	0.0%
Rabbit-fish	1	0.0%	1	0.0%	0	0.0%	-	0.0%
European lobster	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Deep water prawn	46	0.0%	-	0.0%	-	0.0%	-	0.0%
Common spider crab	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Squid	-	0.0%	-	0.0%	-	0.0%	0	0.0%
Common whelk	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Iceland cyprine	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Arctic wolffish	20	0.0%	0	0.0%	-	0.0%	0	0.0%
Orange roughy	54	0.0%	-	0.0%	-	0.0%	-	0.0%
Redfish	529	0.2%	0	0.0%	-	0.0%	-	0.0%
Deepwater redfish	8,651	3.2%	10	0.0%	-	0.0%	-	0.0%
Onion eye	16	0.0%	0	0.0%	-	0.0%	-	0.0%
Esmark's eelpout	1	0.0%	0	0.0%	-	0.0%	-	0.0%
Forkbeard	0	0.0%	0	0.0%	-	0.0%	-	0.0%

Blue mussel	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Vahl's eelpout	-	0.0%	0	0.0%	-	0.0%	-	0.0%
Fuller's ray	0	0.0%	37	0.0%	0	0.0%	0	0.0%
White hake	0	0.0%	16	0.0%	0	0.0%	0	0.0%
Turbot	0	0.0%	0	0.0%	-	0.0%	0	0.0%
Black dogfish	0	0.0%	1	0.0%	-	0.0%	-	0.0%
Grey gurnard	-	0.0%	-	0.0%	-	0.0%	0	0.0%
Eel	-	0.0%	0	0.0%	-	0.0%	-	0.0%
Deal fish	-	0.0%	0	0.0%	0	0.0%	0	0.0%
Baird's smooth-head	35	0.0%	-	0.0%	-	0.0%	-	0.0%
Black scabbard-fish	323	0.1%	0	0.0%	-	0.0%	-	0.0%
Portuguese dogfish	2	0.0%	-	0.0%	-	0.0%	-	0.0%

Retained Catch Species

The table above and the figures below show the percentage contribution each species makes to the main gears associated with cod landings. For example, cod comprised 63% (by weight) of the total catch made by longline, with whiting being the next most important species for longlines, contributing 16% to the overall catch associated with longlines.

This table shows that for gillnets and longlines, only a few species dominate the total catch, while for trawls and Danish seine, catches are generally more diverse. However, it should be noted that each gear type will contain a number of discrete metiers targeting particular species, meaning that in practice, the diversity would be narrower than implied by the table.

However, the fisheries in Iceland are in practical terms groundfish fisheries, with captains having at their disposal a number of different quotas that allow them to fish for multiple species at once, as well as managing and balancing/targeting more of one species or another one accordingly, throughout the fishing year, depending on quota availability, trading and economic viability.

The following figures show the relative breakdown by species for each of the key gears associated with cod catches.

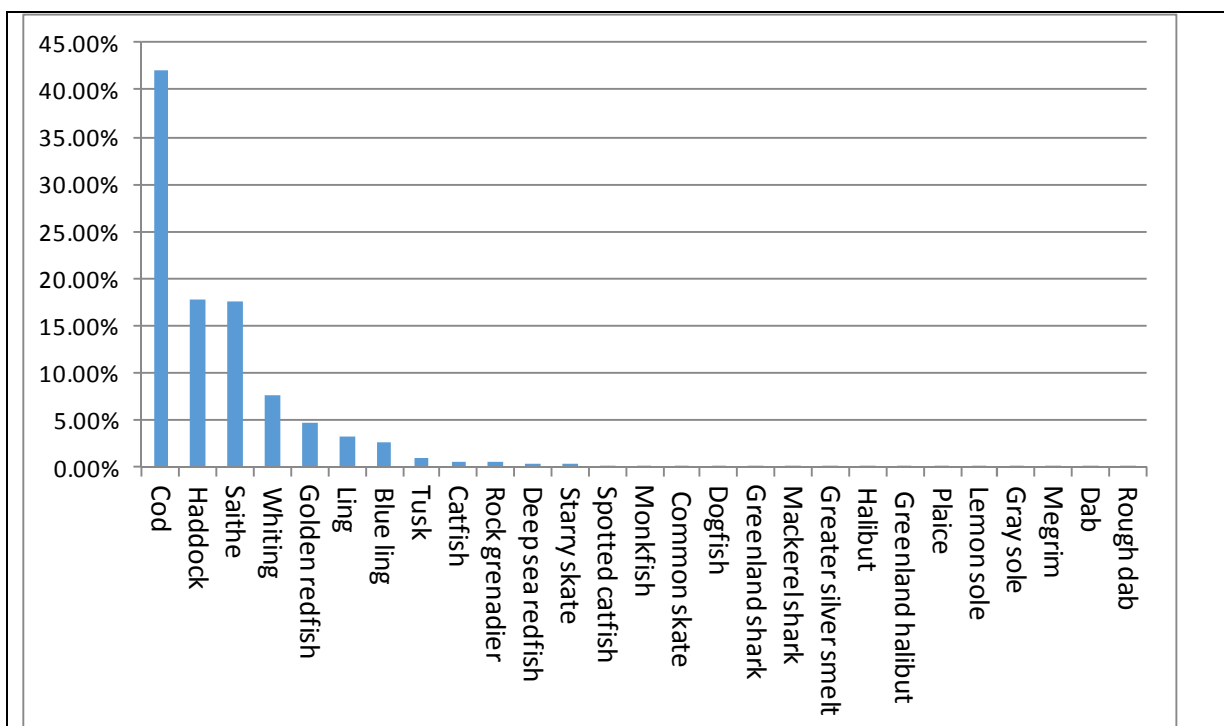


Figure 20. Composition of retained species caught using demersal trawl (source: Directorate)

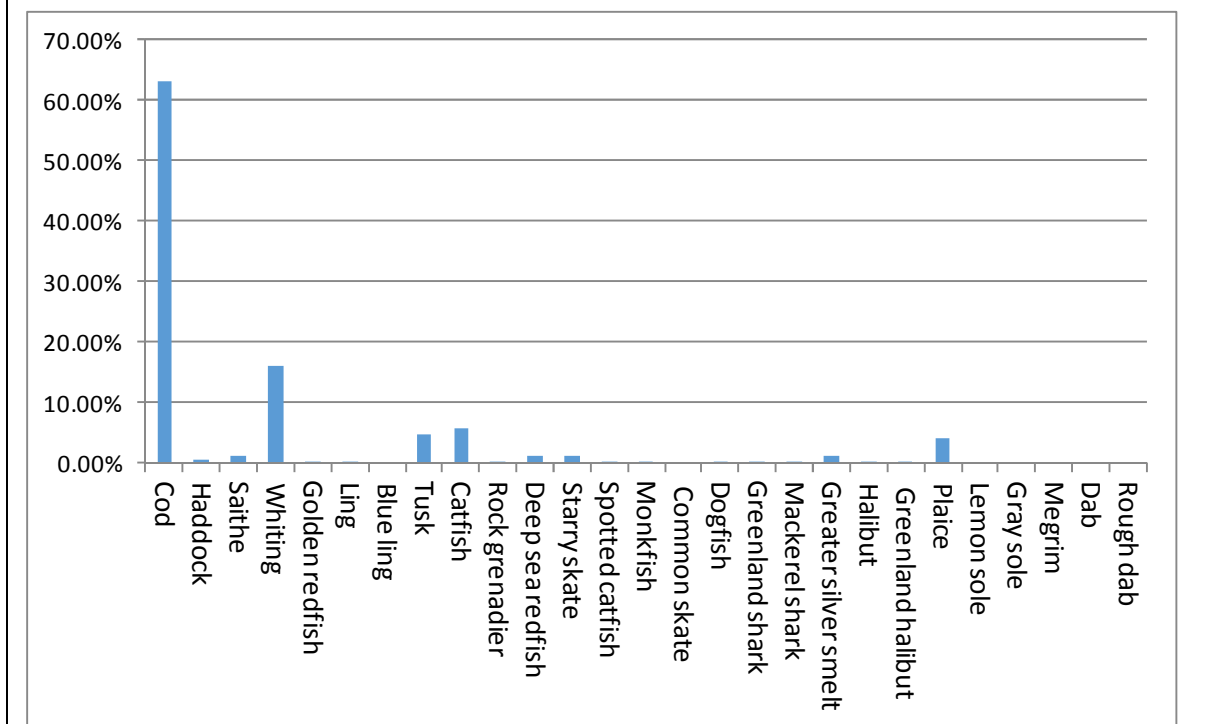


Figure 21. Composition of retained species caught using longlines (source: Directorate)

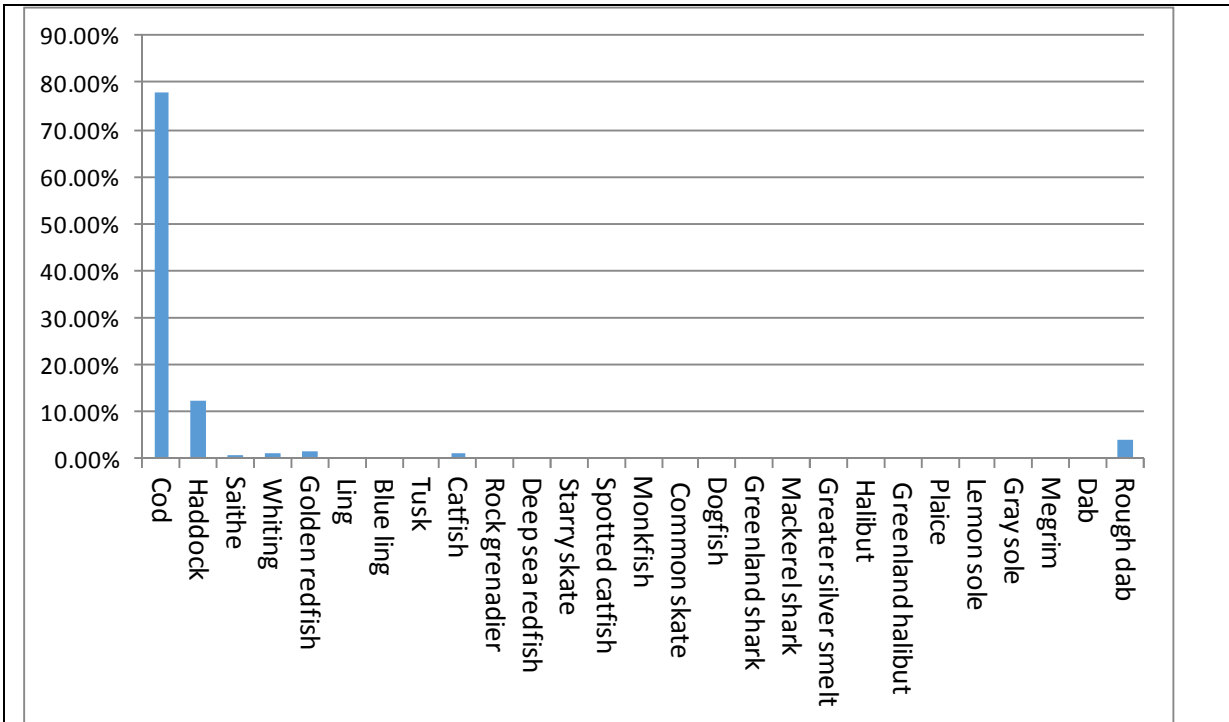


Figure 22. Composition of retained species caught using gillnets (source: Directorate)

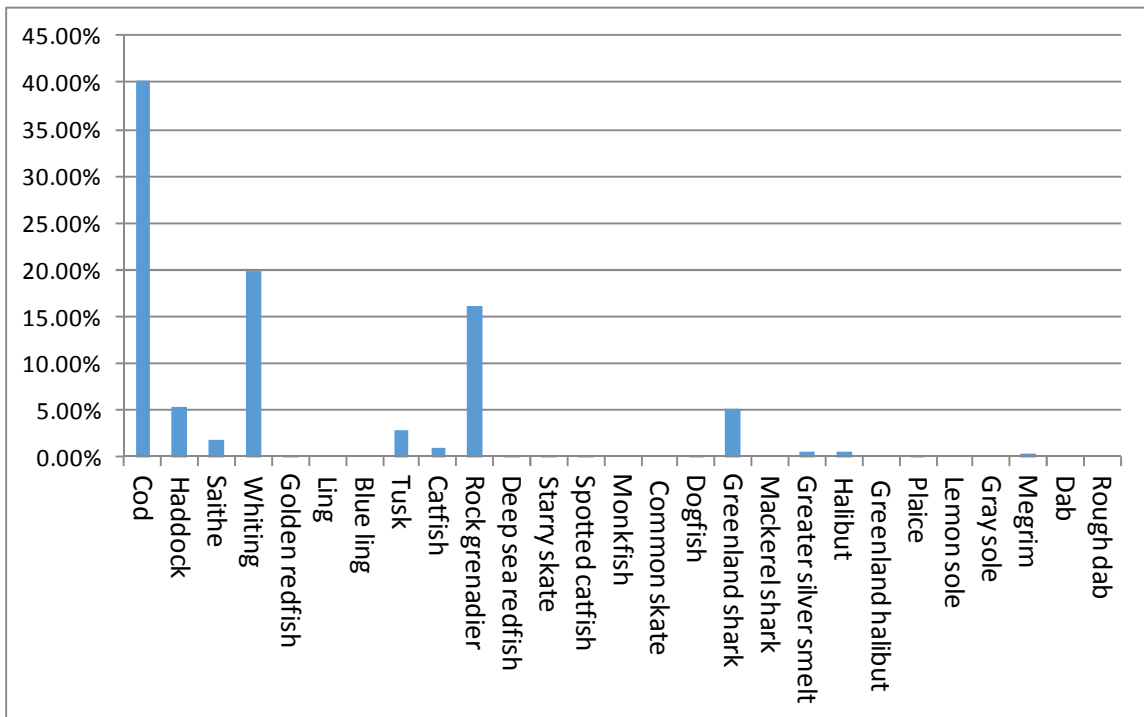


Figure 23. Composition of retained species caught using Danish seine (source: Directorate)

Status of key retained species associated with the cod fishery**Haddock**

In 2012, 46 000 t of haddock (*Melanogrammus aeglefinus*) were landed, compared to 49 000 t in 2011. The advice for the quota year 2012/13 was 32 000 t and the TAC was set at 36 000 t. In March 2013 ICES evaluated a harvest control rule to be precautionary and in conformity with the MSY approach. The rule was adopted by the Icelandic government in April 2013. According to the HCR, TAC for the next fishing year is 40% of the estimated reference biomass (45 cm and larger) in the beginning of the next calendar year. Harvest rate will be reduced below 40% if the spawning stock is estimated to be below 45 000 t. Based on the approved HCR, the MRI recommended a TAC of 38000 t for the quota year 2013/2014. The TAC is expected to decrease in coming years when the year class 2007 and older disappear from the stock. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Saithe

In 2012, landings of saithe (*Pollachius virens*) were 52 000 t, a 700 t increase from 2011. The advice for the quota year 2012/2013 was 49 000 t and the TAC was set at 50 000 t. The reference biomass of age 4 and older was estimated as 321 000 t at the beginning of 2013, with a harvest rate of 17% in 2012, and a fishing mortality of 0.19. In spring 2013, the Icelandic government adopted a management plan for the saithe fishery. ICES has evaluated this management plan and concluded that it is in accordance with the precautionary approach and the MSY framework. It is based on a HCR that sets the upcoming TAC as an average of the last TAC and 20% of the this year's reference biomass. A lower harvest rate is applied if the spawning stock biomass goes below the reference point Btrigger (65 000 t). According to the HCR, the saithe TAC for the quota year 2013/2014 will be 57 000 t. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Whiting

During the period 1984-2013 the landed catches of whiting in Icelandic waters ranged between 100-3000 tons. The catch in 2013 was around 1000 tons. Whiting is mainly a by-catch of other fisheries (bottom trawl gear). Large cohort occurred in 2003 and another well above average in 2007. Fishable biomass index increased in the years 2002-2005 after having been low for a decade until the before. The index has since declined except from that in 2011, when it rose temporarily, seemingly when the 2007 year class came into fishing. The last three years fishable biomass index has been low and recruitment been poor since 2008. Catches decreased significantly in 2012 and 2013 with catches predicted to be the same in 2014. Abundance and productivity of the whiting stock is not known but the current catches are not considered to be significant and detrimental to the overall health of the stock (<http://www.hafro.is/Astand/2014/20-lysa.PDF>).

Golden Redfish

In 2012, approximately 43000 t of golden redfish (*Sebastes norvegicus*) were landed in Iceland, similar to 2011. The spring survey index of the fishable biomass is the highest since 1985 and there are indications from the autumn survey that year classes 1997–2003 are above average. According to an age-length based model (Gadget) the fishable stock has increased since 2005 after a considerable reduction in 1985–1995. MRI recommends a TAC for the quota year 2013/2014 of no more than 52 000 tons which is close to MSY. A fishery management plan and harvest control rule was adopted for the species in mid 2014. This was approved by ICES. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Ling

Landings of ling (*Molva molva*) in 2012 were 11 800 t, having increased steadily since 2001. Survey indices of harvestable biomass have remained high since 2007. In 2012, the exploitation level had decreased and was at a similar level as in 2004–2008, when survey indices were increasing rapidly. MRI recommended a TAC of no more than 14000 t in the quota year 2013/2014, including catches of foreign fleets which have been about 1200 t in recent years. The basis of the advice is to keep exploitation at a similar level as observed in 2004–2008 and in 2011. Exploratory analytical assessment indicates that these catches would result in fishing mortality close to FMSY. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Blue Ling

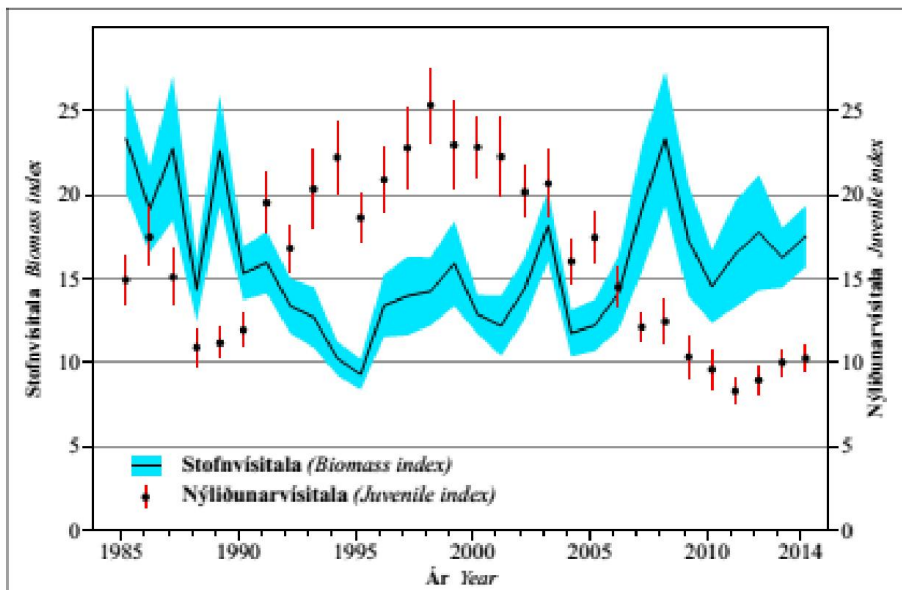
In 2012, 4 400 t of blue ling (*Molva dypterygia*) were landed. In past decades, blue ling has mainly been taken as bycatch in the bottom trawl fishery. In 2008–2011, the proportion caught by longliners increased considerably as a result of targeting of blue ling by that fleet. This trend reversed in 2012 and longlines accounted for 58% of landings in 2012 compared to 70% in 2011. Indices from the autumn survey indicated an increase in biomass and recruitment between 2005 and 2009, but indices from 2010 to 2012 indicate a sharp decrease in stock size. MRI considers the current exploitation level unsustainable and recommends that landings be constrained to no more than 2400 t in the quota year 2013/2014. The advice is to bring the exploitation level down to similar levels as observed in 2002–2009 when the stock size was increasing. Furthermore, a continued closure of known spawning grounds from 15 February–30 April should be maintained. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Tusk

Landings of tusk (*Brosme brosme*) from Icelandic waters were 7800 t in 2012. Indices of fishable biomass in the spring survey have increased considerably since 2001. However, recruitment indices peaked in 2006 but have decreased since then, and were in 2013 at the lowest observed value. The tusk stock assessment is based on the Gadget model as recommended by ICES. The MRI recommended that the catches be no more than 6300 t in the quota year 2013/2014, including catches of foreign fleets. This advice is based on the assumption that $F_{max}=FMSY=0.24$. It was furthermore recommended that the closure of nursery areas off the southeast and south coast be continued. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

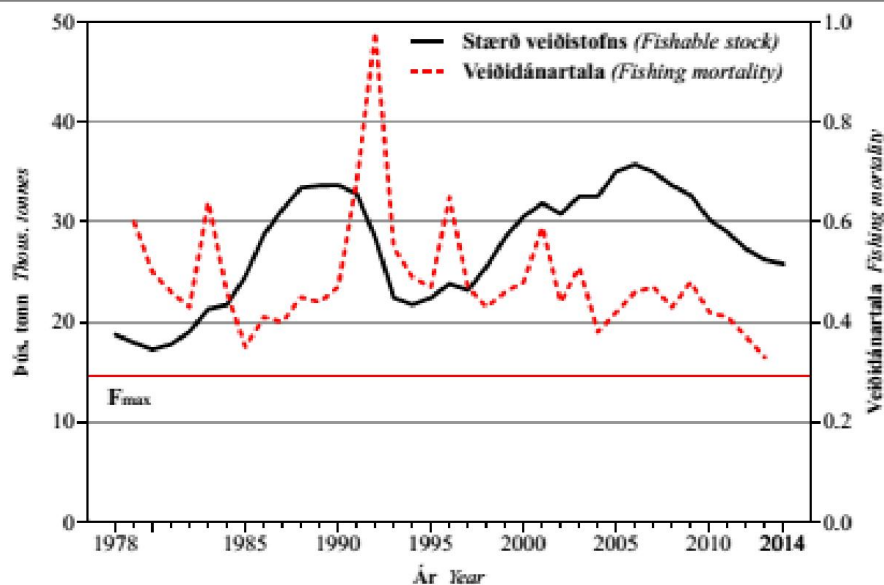
Wolffish (or catfish)

Landings of Atlantic wolffish (*Anarhichas lupus*) in 2013 were around 9000 t, the lowest landings since 1982, despite the MRI recommended setting the TAC as 7500 t for the quota year 2013/2014, based on $F_{max}=0.29$. Despite a general decline in recruitment since the late 1990's, the stock has shown an increasing trend in biomass (survey index) which appears to be partially driven by the continued decline in fishing mortality. While F is still above F_{max} is likely to be well below any potential PA level. Evidence from stock assessment shows the fishing mortality has been decreasing continuously since the past 5 years and appears to be close to reaching the target mortality. Based on this information the management of this stock appears to be improving although not ideal, but not posing significant threats to the stock. Having said that, this stock and its management will be reassessed with attention in the coming years, given the low recruitment levels. Further work is also ongoing to assess specifically the level of wolffish by-catch associated with the targeted cod fishery.



Mynd 2.15.2. **STEINBITUR.** Vísitölur veiðistofns (þyngd, fiskar 60 cm og stærri) og nýliðunar (fjöldi, 20–40 cm) úr stofnmælingu botnfiska í mars, ásamt staðalfrávik.

Fig. 2.15.2. **ATLANTIC WOLFFISH.** Fishable biomass indices (>60 cm) and juvenile abundance indices (20–40 cm) from the annual groundfish survey in March, along with the standard deviation.



Mynd 2.15.3. **STEINBITUR.** Stærð veiðistofns (þús. tónna) 1978–2014 og veiðidánartala 70 cm og stærri steinbits (F) 1979–2013 samkvæmt Gadget líkani.

Fig. 2.15.3. **ATLANTIC WOLFFISH.** Fishable stock size (thous. tonnes) 1978–2014 and F of 70 cm and longer Atlantic wolffish 1979–2013 based on the Gadget model.

<http://www.hafro.is/Astand/2014/15-steinbitur.PDF>

Deep Sea Redfish

In 2012, 12000 t of Icelandic demersal deep sea redfish were landed, similar to 2011. The lack of long-term indices of abundance prevent analytical assessment, but survey indices from the autumn survey since 2000 are used as basis for advice. The index of fishable biomass decreased between 2000 and 2003 and has since then been stable. ICES and MRI recommended that effort should be kept low and the TAC in Icelandic waters not to exceed 10000 t for the quota year 2013/2014. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Common Skate

In 2013 the total catch of common skate (*Dipturus batis*) in Icelandic waters was 121 t. No TAC is available for this species because there is no directed fishery for it. New studies suggest that the common skate *D. batis* is actually a species-complex, split into two nominal species, the blue skate (provisionally called *D. cf. flossada*) and the flapper skate (provisionally called *D. cf. intermedia*) with maximum lengths of 143.2 cm and 228.8 cm respectively (Iglesias *et al.* 2009⁵⁷). This classification confusion has resulted in the depletion of the flapper skate throughout European waters, the more endangered species of the two, being masked in the catch record.

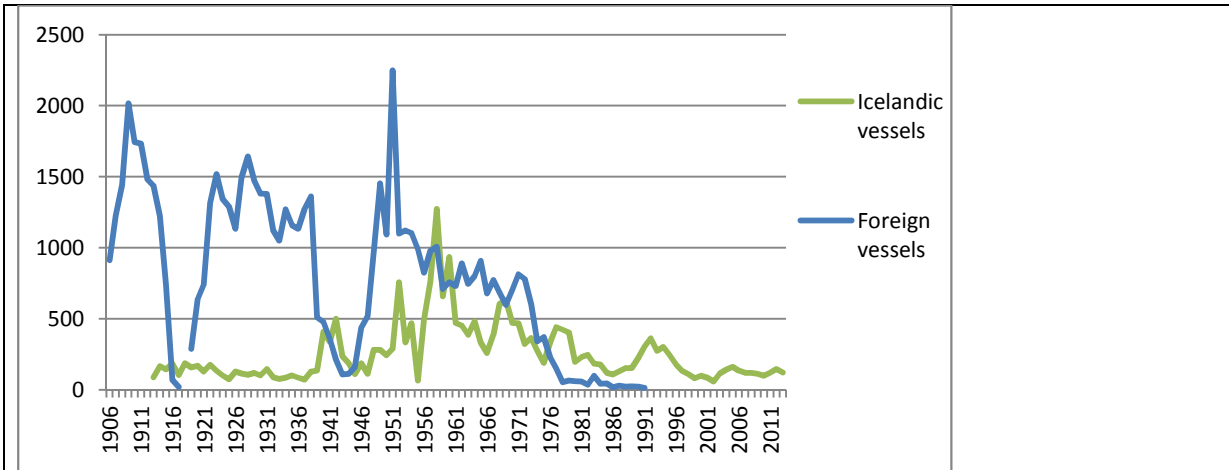
From 2011 onwards, all *Dipturus* specimens caught in the annual lobster survey of the south coast have been carefully examined and compared to the criteria given by Iglesias *et al.* (2009) to differentiate between *Dipturus cf. flossada* and *Dipturus cf. intermedia*. All specimens morphologically examined hitherto belong to *Dipturus cf. flossada*, not *intermedia*. This is also true for other specimens caught in the groundfish surveys.

The largest individuals caught in these cruises was 152 cm long. Identification of sexual maturity stages revealed the onset of maturity at 100 cm length (males) and that all individuals larger than 120 cm were mature. This agrees with what Iglesias *et al.* (2009) found for *Dipturus cf. flossada*. *Dipturus cf. intermedia* is considerably larger when sexually mature.

In 2013, tissues samples for DNA analysis from these skates were sent to Dr Andrew Griffiths at the University of Salford, UK. By the end of the year the largest individuals of the batch were analysed and it was found that the sequences analysed were identical to others previously collected from *D. flossada*. Thus confirming the identification based on morphological characters (MRI and Griffiths, 2013, pers. comm.). Search for archived specimens in Iceland did not reveal a single *Dipturus cf. intermedia*. Thus, there is no indication of occurrence of *D. intermedia* in Icelandic waters.

MRI note that the bottom trawl spring survey will continue to report on incidences and distribution of skate (*Dipturus spp.*) in the survey as they have been doing since the start of the survey in 1985. Also, catches in commercial fisheries will continue to be collected and that the MRI will monitor whether significant changes in quantities landed or in the survey results occur. Currently the catches are stable.

⁵⁷ Iglesias, S. P., Toulhoat, L. and Sellos, D. Y. (2010), Taxonomic confusion and market mislabelling of threatened skates: important consequences for their conservation status. *Aquatic Conserv: Mar. Freshw. Ecosyst.*, 20: 319–333. doi: 10.1002/aqc.1083



The stock is listed as Critically Endangered to Extinction on the IUCN Red list but not officially listed as a stock of concern in Iceland, while the catches and indices of abundance will, as for other stocks, be reviewed to consider if there are potential concerns to the stock status. In fact, the incidence of this species in the MRI surveys has been increasing in recent years (see below). Icelandic catch reports, at present, still go with *Dipturus batis* in terms of nomenclature, as the accepted scientific name. The 'World Register of Marine Species' lists the names *Dipturus cf. flossada* and *Dipturus cf. intermedia* as "Status under discussion". It is still not clear if these will be the officially accepted names.

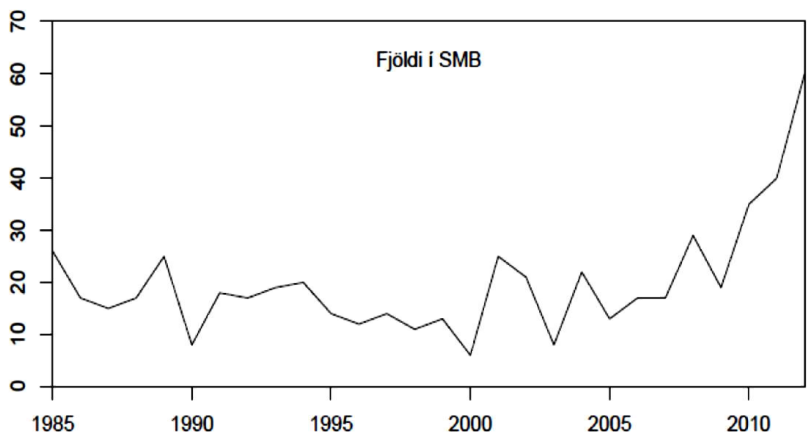
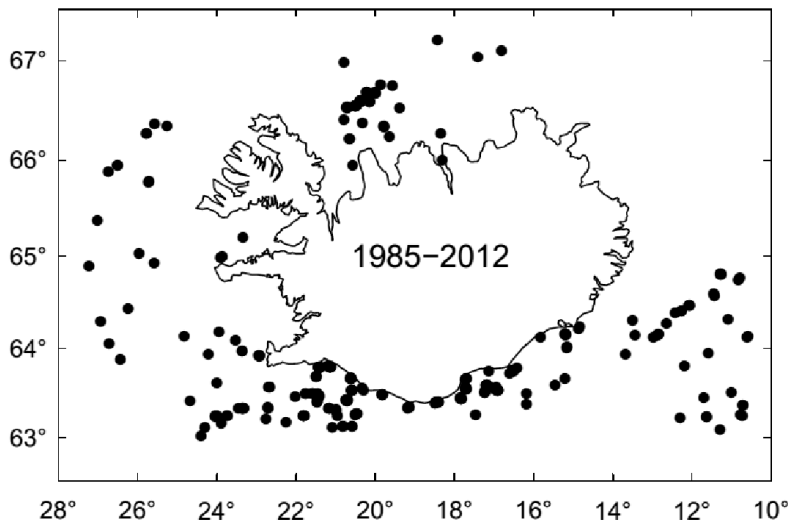


Figure 24. Spring groundfish survey incidence of skate (*D. flossada*) captures per year (1985-2012). The upper figure represents the survey catch locations for the species in question. In the lower figure the Y axis of the bottom graph represents the number of skate caught.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2871835/>

<http://www.sciencedaily.com/releases/2009/11/091117191048.htm>

<http://onlinelibrary.wiley.com/doi/10.1002/aqc.1083/abstract>

Starry skate

The starry skate (*Amblyraja (Raja) radiata*) has always been fished as bycatch in a variety of fishing gear around Iceland and until recently been discarded as trash fish. The increase in landings in recent years can therefore mostly be explained by increased retention (this species has no TAC). The landed catch has grown from virtually nothing in 1980 to more than 1000 tonnes annually after 1995. Catches have declined again in recent years. The starry skate is fairly abundant all around Iceland, but no formal stock assessment is conducted on this species.

<http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Plaice

In 2012, 5 900 t of plaice (*Pleuronectes platessa*) were landed. Survey indices have increased somewhat in recent years, and recruitment measurements from the groundfish survey suggest some improvement in the last few years. Stock assessment results show increasing biomass since 2000 and fishing mortality has also been decreasing since then. The MRI recommended for the catch not exceed 6500 t in the quota year 2013/2014, and to retain regulations regarding area closures on spawning grounds in effect. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Halibut

Currently, the halibut stock seems to be severely depleted, with very little recruitment into the spawning stock in recent years. Recently, the Minister set up a dedicated working group to identify the best management measures to protect the stock. This resulted in closure of the directed fishery. In 2012 a regulation was issued to ban all directed fishery for halibut (*Hippoglossus hippoglossus*) and that all viable halibut must be released in other fisheries (mandatory release). As a consequence, the landings of halibut dropped to 36 and 44 t in 2012 and 2013, respectively, compared to 555 t in 2011. Studies elsewhere indicate that survival is somewhat variable, but with median ranges of ~40 - 60% survival indicating that the measure is likely to reduce fishing mortality. The MRI recommends that these regulations be maintained until clear indications of improvement in the stock are evident. The stock is depleted but management appears to be acting responsibly (ban on directed fishing and release of viable caught halibut). <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Rough Dab

In 2012, 140 t of long rough dab (*Hippoglossoides platessoides*) were landed, compared to the record high of 6 400 t in 1996. Survey indices and CPUE have been near a historical low in recent years. The MRI recommended that the TAC for the quota year 2013/2014 should not exceed what was expected to be landed as bycatch in other fisheries. Considering the state of the stock, that could amount to around 200 t for the 2013/2014 quota year from the defined management area.

<http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Greater silver smelt

In 2012 about 9300 t of greater silver smelt (*Argentina silus*) were landed compared to the historical maximum of 16400 t in 2010. The stock is assessed with limited data and must therefore be harvested with caution. The MRI recommended a precautionary TAC of 8000 t for the quota year 2013/2014. The basis of the advice is the index of fishable biomass from the Autumn survey and preliminary results of the Gadget model. MRI further reiterated last year's advice that the precautionary approach be adopted in the management of the greater silver smelt fishery in order to ensure sustainability of the resource. <http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Greenland shark

Greenland shark (*Somniosus microcephalus*) fisheries have probably been conducted in Icelandic waters from the time of settlement. They reached a large scale in the 18th century, and a zenith in 1867 when 13,100 barrels of shark oil were exported (each barrel is about 62 l). This was probably the most important marine resource in Icelandic waters at the time, and these were the only fisheries by Icelanders prior to the 20th century that can be described as deep-water fisheries. Despite this, they were first conducted in open rowing boats, but later they were the first Icelandic fisheries to use decked sailing boats extensively. Usually only the liver was retained, yielding valuable oil used for lighting up cities in Europe. When whale oil and fuel oil became more available the markets for the shark oil disappeared and direct fisheries for the Greenland shark were over by about 1910. Catches have been low since that time, or about 40 tonnes annually, mostly bycatch in bottom trawls but a few are caught each year in direct longline fisheries. Most of the catches are during spring and early summer.

<http://www.fisheries.is/main-species/cartilaginous-fishes/greenland-shark/>

Rock or roundsnose grenadier

Roundnose grenadier (*Cyropaenoides rupestris*) are fairly large and common enough in Iceland to have sustained minor catches in the past. Catch in 2013 was minimal at 84 tonnes.

<http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Discards

In 1996, a total ban of discards was introduced and any discards are subject to penalty. Practically, this means that if vessels do not have sufficient catch quota for their "bycatch", it is required that sufficient catch quota be transferred from other vessels. 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.

However, the discard ban has some 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 the VS catch is additional to the TAC), on the condition that catches are sold in public fish markets. Only 20% of the revenue of VS catch goes to the fishing company and the crew, and 80% goes to a designated research and development fund (the VS fund, under the auspices of the Ministry). Therefore, the fishing companies have limited incentives and financial motivation to land VS catch. But having the VS catch provisions within the fisheries management system enables the

fishing companies with flexibility to land small catches which are outside their specific quota, prevents discards to some degree, improves the treatment of the fishery resource and promotes more responsible fishing practices. Since 2001, annual cod discards are in the range of 1.3-4.3% in number landed and 0.5-1.8% of weight landed (ICES, 2014). Cod discards in 2010 amounted to 659 metric tons, 0.43% of landings, the second lowest proportion during the period 2001-2010. Over the period 2001-2010 cod mean discards were highest in the Danish seine fishery (2.70%) and in the gill net fishery (1.34%) in terms of percentage of landings but lower in the demersal trawl fishery (0.77%), and in the long line fishery (0.38%). Cod discards in all gear combined were 0.90% of landed catch (1680 t), and haddock discards 2.02% (1488 t). Discards for 2012 were in the range of 1.4–4.3%.

<http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2014/NW/WG/11%20NW/WG%20Report%20-%20Sec%2009%20Icelandic%20Cod.pdf>

Interactions of bottom trawl gear with benthic ecosystem:

Effects of otter trawling have been investigated in Icelandic waters with a manipulative field experiment. A field experiment (Ragnarsson and Lindergarth, 2009 <http://www.int-res.com/articles/meps2009/385/m385p051.pdf>) was conducted to examine the short- and long-term effects of otter trawling on a macrobenthic infaunal community in shallow subtidal waters of Faxaflói Bay (SW Iceland) that had never been trawled before. The experimental design consisted of 4 sites trawled 10 times and 4 areas left undisturbed (controls). Sampling of fauna and sediments was carried out in June 1997, immediately after trawling, and subsequently 2 and 7 months later, in order to investigate longer term impacts of trawling.

A total of 160 taxa representing 138 577 individuals were recorded during the course of the study. Two taxa dominated in abundance, the tube-building polychaete *Myriochele oculata* and bivalves belonging to the genus *Abra*, accounting for 38 and 27% of the total abundance, respectively. The polychaetes *Paraonis* sp., *Cossura longocirrata*, *Scoloplos armiger*, *Pholoe minuta*, *Sternaspis scutata* and *Eteone longa* contributed 25% to the total abundance. Polychaetes, bivalves, crustaceans and other groups comprised 69.6, 29.3, 0.7 and 0.3% of the total abundance, respectively.

Multivariate tests of hypotheses about effects of trawling on the whole benthic community found no significant persistent or temporary effects. The overall qualitative pattern of total abundance and diversity is that all variables increased during the experiment. In contrast to the measures of diversity, there were no persistent long-term effects of trawling on abundances of individual taxa. Furthermore, a significant short-term effect was found only for the bivalve *Thyasira flexuosa*, which was less abundant (70%) in trawled plots immediately after trawling but more abundant in trawled plots at subsequent sampling times (34 and 15%, respectively). Thus, significant long- or short-term effects on average abundance were found for only 1 out of 32 investigated taxa. No significant treatment effects could be detected on total abundance or on multivariate structure, and tests for individual species revealed only a single short-term effect (for the bivalve *Thyasira flexuosa*). However, trawling affected several aspects of diversity with significant short-term reduction in species richness and persistent effects on the Shannon-Wiener index. Power analysis revealed that larger changes were needed to detect changes in abundance compared to measures of diversity. <http://www.int-res.com/articles/meps2009/385/m385p051.pdf>

The available data on fishing effort of the Icelandic fleet is very accurate and have made it possible to map in detail the distribution of otter trawl effort around Iceland (see below).

a) Botnvarpa (Bottom trawl)

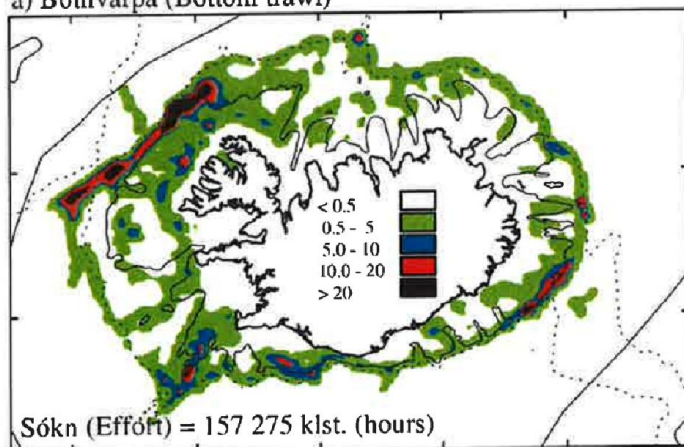


Figure 25. Otter trawl effort in Icelandic waters in 2013. Effort is given as hours travelled per nautical mile.

<http://www.fisheries.is/fisheries/fishing-gear/bottom-trawl/>

Protection of VMEs

Seabed mapping is a one of the Marine Research Institute's projects which started with the launching of the research vessel, Awni Fridriksson, in the year 2000. The vessel is equipped with a multibeam echo sounder which enables a detailed mapping of the seabed. Bathymetrical and backscatter data is used to make different kinds of maps, i.e. contour, sun-illuminated and three dimensional maps, and maps with information of the substrate. The equipment is the first one, owned by Iceland, in an Icelandic vessel. The main emphasis of the project is to do detailed mapping of the seabed inside the exclusive economic zone. The information is useful for research of the marine environment, the physical properties of the ocean and the marine geology. Emphasis has been on mapping fishing grounds and benthic communities and habitats.

The available data on fishing effort of the Icelandic fleet is very accurate and have made it possible to map in detail the distribution of otter trawl effort around Iceland. Over the next few years priority will be given to map the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances. Such information will be important in order to predict which species and habitats are being at risk of being damaged by fishing activities and for protection of important marine habitats in the future.

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

(Ragnarsson and Steingrímsson 2003). The authors suspected that sponge bycatch is lower in areas of high fishing effort as indicated in the Figure below.

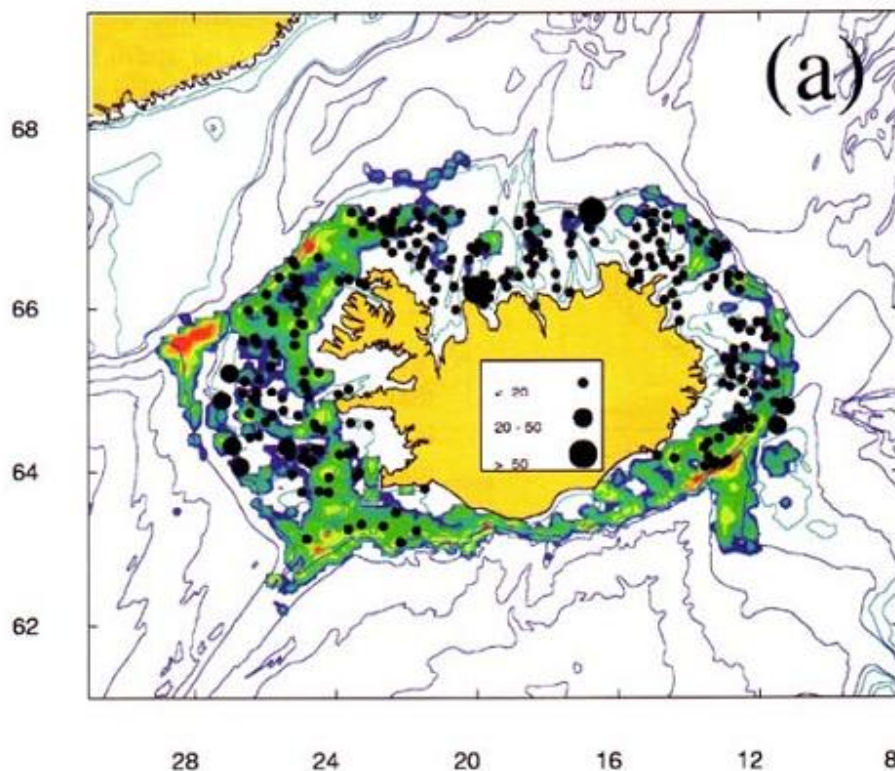


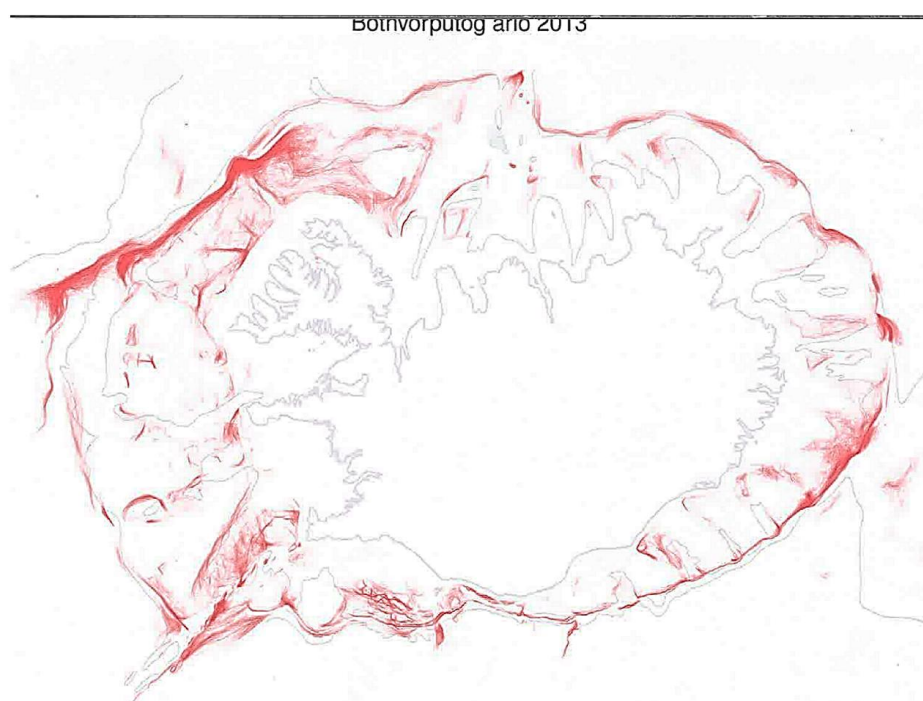
Figure 26. Iceland. Biomass of sponge bycatch in 2002, superimposed on fishing effort as mean annual swept area (nm^2 per 1° latitude x 1° longitude cell). Black dots indicate total biomass (kg/h otter trawl haul) of sponges in the 2002 groundfish survey by the Marine Research Institute.

http://qsr2010.ospar.org/media/assessments/Species/P00485_deep_sea_sponge_aggregations.pdf

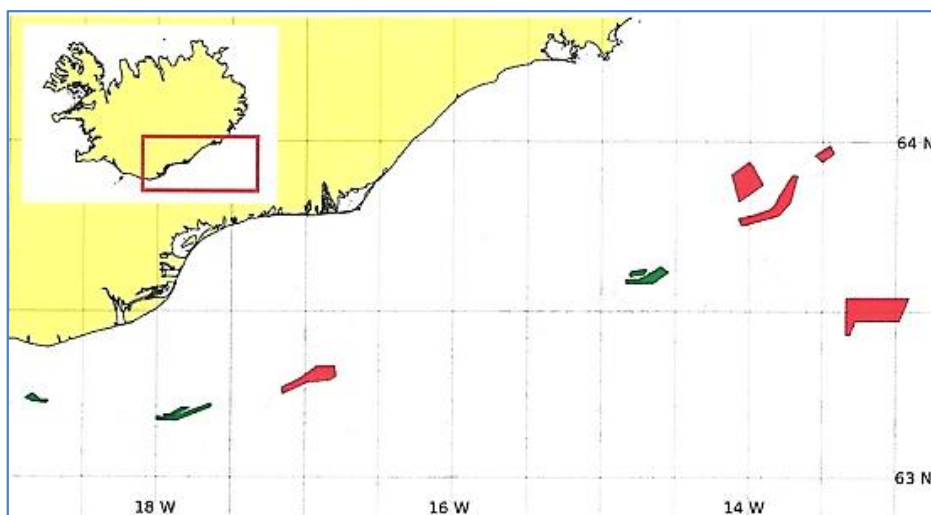
Currently, there are no strategic conservation plans for sponges. However, within Icelandic water outside 12 nautical miles, several permanent regulatory fisheries closures (total area $13,094 \text{ km}^2$) have been established, where fishing with otter trawls and also in most cases long-lines, is banned. The main aim of these closures is to protect nursery grounds of Atlantic cod (*Gadus morhua*) and redfish (*Sebastes spp.*). However, these closures do also *de facto* protect benthic organisms, including sponges. In addition, all coastal areas within 4-12 nautical miles are protected against bottom trawls (total area of $45,290 \text{ km}^2$), while Danish seine are permitted and the area thus practically protected with respect to sponges. Finally, ten closed areas have been established in Icelandic waters to protect cold water corals, see map below) and some of these have considerable abundance of sponges. Within those areas, all activities (including fishing) that can affect the seabed are prohibited. All in all, aside from the coral closures, $58,384 \text{ km}^2$ are protected through trawl closures, while the shelf area⁵⁸ (within which fishing activities occur) is $109,010 \text{ km}^2$. Trawl closures make up more than half of the total fishable area. Furthermore, not all the fishable shelf areas

⁵⁸ <http://www.searoundus.org/eez/352.aspx>

outside closed areas are trawlable, as some parts are too rough or uneven for trawl gear to operate on. This can be seen in the figure below showing trawl effort in Iceland in 2013 (darker areas signify higher effort).



Because of this, it appears that there is suitable protection for sponge communities within the Icelandic shelf area.



The coral (*Lophelia pertusa*) closures protect a species of cold-water coral which grows in the deep waters throughout the North Atlantic ocean. *L. pertusa* reefs are home to a diverse community, however the species is extremely slow growing and may be harmed by destructive fishing practices. In 2004 a research project was started on mapping coral areas off Iceland (using a Remote Operated Vehicle, ROV), based on the results from questionnaires to fishermen on occurrence of such areas. As a result several areas were permanently closed to fishing for protection of coldwater corals (see above, currently there are 10 coral closures).

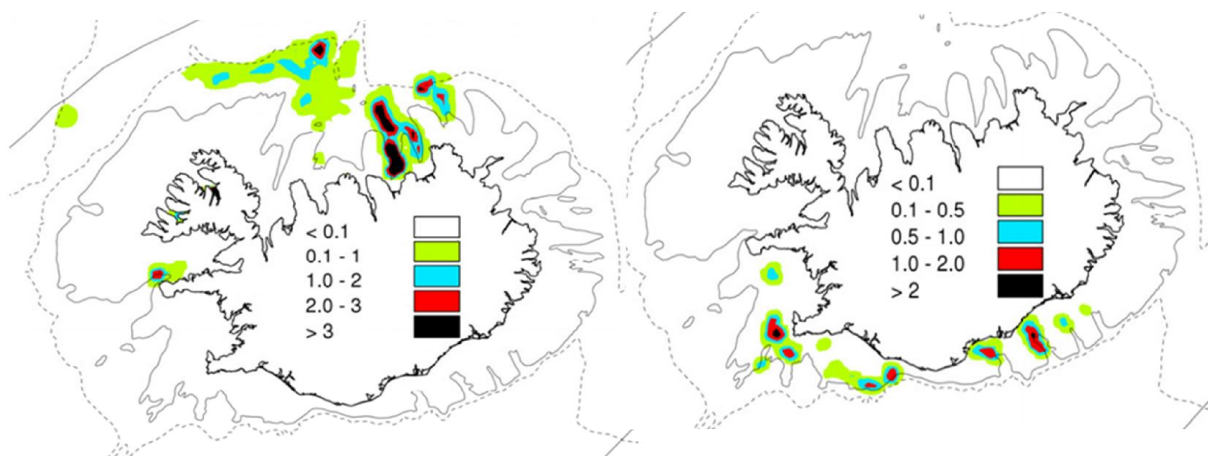
It is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs; cold-water corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. Known cold-water coral reefs and hydrothermal vents are protected through permanent closures. The MRI provides advice on closures to protect VMEs which are promptly processed within the Ministry. Overall, large areas within the Icelandic EEZ are closed for fishing, either temporarily or permanently. These closures are aimed at protecting juveniles and spawning fish and protecting vulnerable marine ecosystems. Restrictions on the use of gear are also in effect. Thus the use of bottom trawl and pelagic trawl is not permitted inside a 12-mile limit measured from low-water line along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels and large bottom trawlers are not permitted to fish closer than 12 nautical miles to the shore.

Other bottom contact gear landing cod indirectly

Icelandic cod is landed also by indirect fisheries targeting Nephrops lobster, shrimp and other using purse seine. The first two use a modified trawl net with a smaller mesh size while those utilising purse seine gear tend to target pelagic species like herring and capelin. As shown above and represented here below, these gears are responsible for a very small percentage of the overall caught Icelandic cod. Purse seine gear catching capelin and herring also catches a very small percentage of the overall cod. The total cod catch by all gear types in 2013 was 228 thousand tonnes. Based on total, all gear catch, the percentage caught by Nephrops trawl, shrimp trawl, pelagic trawl and purse seine is reported below.

Gear	Tonnes	Percentage of total cod catches (all gears)
Humarvarpa/ Nephrops trawl, lobster	1626	0.71%
Rækjuvarpa/ Shrimp trawl	1584	0.69%
Flotvarpa / Pelagic trawl	129	0.06%
Loðnunót/ Purse Seine, capelin	28	0.01%
Síldarnót/ Purse Seine, herring	9	0.003%

Of these gears, the ones with bottom impact are Nephrops and shrimp trawl. The figures below, both representing the footprint of these gears (Northern Shrimp on the left and Nephrops on the right) in 2011 (t/nm²), shows that the geographical impact of these is very limited. These would appear to be not significant, especially so when relative to cod catches.



Pelagic trawl and purse seine do not have contact with bottom habitats and are therefore not considered to have negative effects relative to the cod assessment. None of the indirect gears listed above catches endangered species to the assessment team knowledge.

Interactions with Seabirds and Marine Mammals

The Icelandic government is in the process of improving data collection relating to fisheries interactions and bycatch of marine mammals and seabirds.

Measures taken to date

A Steering group of the Ministry of Industries and Innovation (MII), the Directorate of Fisheries and the MRI has laid out a detailed date-marked operation plan which has the aim of improving the shortcomings which have occurred with respect to the documentation of seabirds and marine mammal bycatch into logbooks in fishing operations. The plan entails increased enforcement of documentation of the bycatch of birds and marine mammals by the fishery inspectors themselves. The returns of data from e-logbooks will also be improved and changes made in paper logbooks to enhance recording possibilities along a revision of the regulation on logbook. The plan furthermore entails an annual compiling and processing of bycatch data and an annual evaluation results obtained with the aim of improving the plan. The plan also provides for an overall appraisal of the operations undertaken and results obtained as well as an evaluation of the magnitude of bycatch before the end of 2015, which will be issued by the Steering group.

Timetable

- January 2013: a Steering group has been created by the Ministry for coordinating the work of the Directorate and the MRI with the objective to ensure effective monitoring of seabirds and marine mammals.
- March 2013: improvement of the Directorate neutral documentation of seabirds and marine mammals bycatch independent of the vessel's logbook when fisheries inspectors operating on board a vessel along with technical improvements of transfer of bycatch data from the Directorate to the MRI.
- April 2013: changes in communication applications which will enable direct automatic transfer of bycatch data into the MRI database.
- Prior to May 15th 2013: the Steering group will have finished a review of Regulation no. 557/2007 on logbook which has objective to evaluate, whether the obligation to register all seabirds and marine mammals into the logbook is clear enough and satisfactorily stipulated.
- Fall 2013: bycatch data will be compiled and processed for final analysis of results.
- January 2014: evaluation of the 2013 bycatch data recording.
- Fall 2014: bycatch data will be compiled and processed for final analysis of results.
- January 2015: evaluation of the 2014 bycatch data recording.

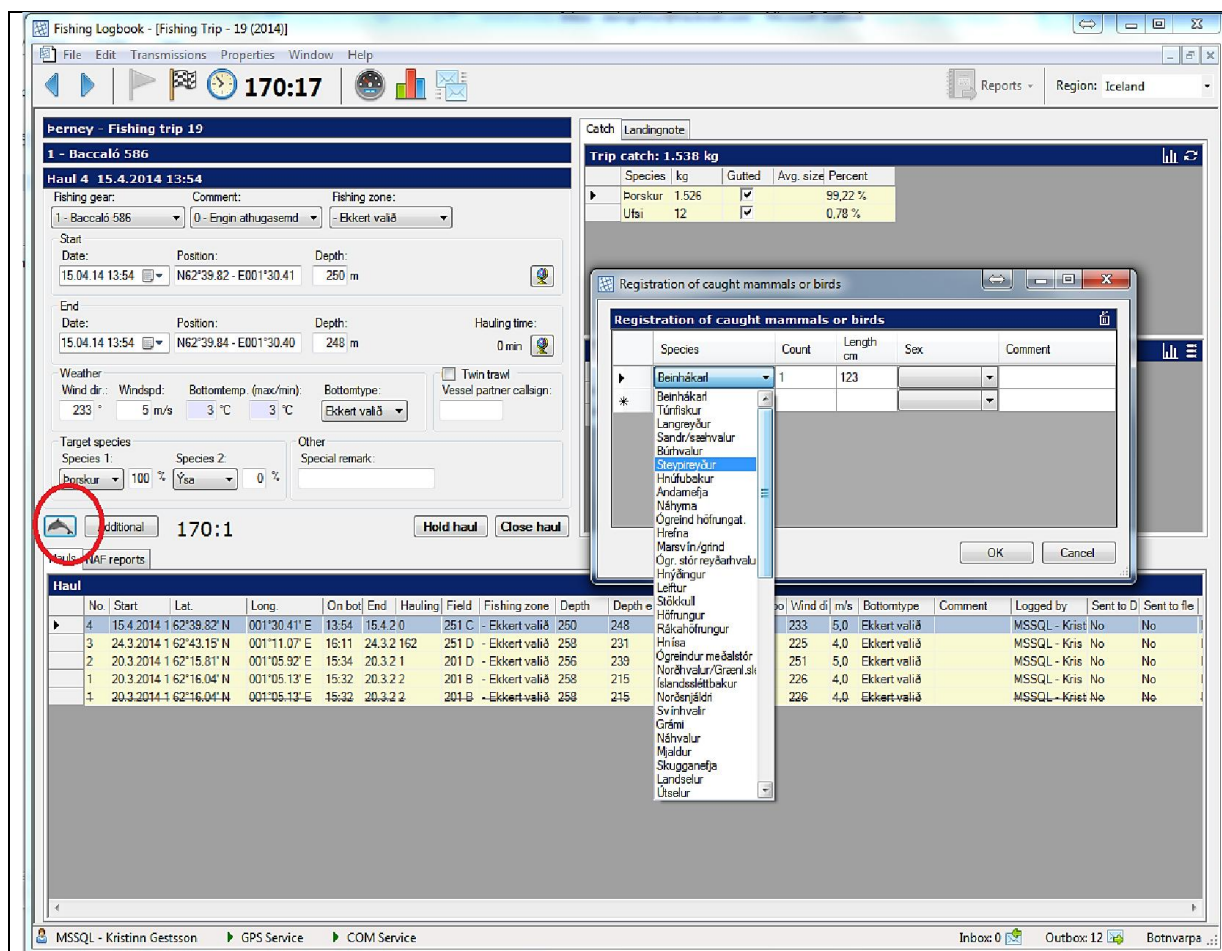
- Fall 2015: bycatch data will be compiled and processed for final analysis of results.
- End of 2015: the Steering group shall make an overall appraisal of the bycatch data recording and report along with an estimate of the bycatch of seabirds and marine mammals in the cod fishery.

A new amendment to existing regulations requiring that data submitted in logbooks includes seabirds and marine mammals number and species was issued in February 4 2014.

Nr. 126/2014	4 February 2014
REGULATION	
amending Regulation no. 557, 6 June 2007 on logbooks, as amended.	
<p style="text-align: center;">Article 1.</p> <p>First paragraph. Article 6. added two paragraphs which read as follows:</p> <ol style="list-style-type: none"> 3. Seabirds on the number and species. 4. Marine mammals on the number and species. <p style="text-align: center;">Article 2.</p> <p>This Regulation is issued under the provisions of Act no. 116, 10 August 2006, the Fisheries Management as amended, and Act. 151, 27 December 1996, for fisheries under the jurisdiction of Iceland, to take effect immediately.</p> <p style="text-align: center;"><i>Industries and Innovation Ministry, 4 February 2014.</i></p> <p style="text-align: center;">F. h. Ministry of Fisheries and Agriculture,</p> <p style="text-align: center;">Johann Gudmundsson.</p>	

<http://www.stjornartidindi.is/Advert.aspx?ID=9bc42c49-4617-4fa3-a4f5-424936339ff0>

The E-logbook designed by Trackwell in force in the Icelandic fisheries has also been recently modified to allow for the recording of marine mammal and seabirds, along with normal catch.



Here below the list of the marine mammals and seabirds programmed in the e-logbook system is presented. This happens when fisheries interact with these animals.

ID Number	Icelandic common name	Species common English name
1	Langreyður	Fin whale
2	Sandreyður/sæhvalur	Sei whale
3	Búrhvalur	Sperm Whale
4	Steypireyður	Blue whale
5	Hnúfubakur	Humpback
6	Andarnefja	Northern Bottle-nosed Whale
7	Háhyrna	Killer whale
8	Ógreind Höfrungat.	Unrecognized type of dolphin
9	Hrefna	Minke whale
10	Marsvín/Grind	Pilot whale
20	Ógr. stór Reyðarhvalur	Unrecognized type of Balaenopteridae
21	Hnýðingur	White-beaked dolphin
22	Leiftur	Atlantic white-sided dolphin
23	Stökkull	Bottle-nosed dolphin
24	Höfrungur	Dolphin
25	Rákahöfrungur	Stenella dolphin
26	Hnísa	Sea hog dolphin

27	Ógreindur meðalstór	Unrecognized whale, medium size
31	Norðdhvalur/Grænsléttb.	Greenland right whale
32	Íslandsléttbakur	Icelandic right whale
33	Norðsnjaldri	North Sea beaked whale, Mesoplodon bidens
34	Svínhvalir	North Sea beaked whale, Mesoplodon bidens
35	Grámi	Grey
37	Náhvalur	Narwhal
38	Mjaldur	White whale
39	Skugganefja	Ziphius cavirostris
51	Landselur	Harbour seal
53	Útselur	Grey seal
55	Hringanóri	Ringed seal
57	Vöðuselur	Harp seal
59	Kampselur	Bearded seal
61	Blöðruselur	Bladdernose
63	Rostungur	Walrus
93	Sæskjaldbaka	Sea turtle
100	Svartfuglar	Guillemot; Auk
101	Langvía	Sea hen
102	Stuttnefja	Brunnich's guillemot
103	Álka	Razorbilled auk
104	Lundi	Puffin
105	Teista	Black guillemot
106	Haftyrðill	Little auk
110	Skarfar	Sea raven; Cormorant
111	Dílaskarfur	Great Cormorant
112	Toppskarfur	Shag
120	Súla	Northern Gannet, Sula bassana
130	Fýll (Múkki)	Fulmar
131	Skrofa	Manx Shearwater (Puffinus puffinus)
132	Gráskrofa	Grey Manx Shearwater
140	Endur	Duck
141	Æðarfugl	Eiderduck
142	Æðarkóngur	King Eider
143	Hávella	Long-tailed duck
144	Hrafnsönd	Common scoter
150	Máfar	Sea gull
151	Ríta	Sea swallow
152	Sílamáfur	Lesser black-backed gull
153	Silfuramáfur	Herring gull
154	Svartbakur	Great black-backed gull
155	Hvítmáfur	Glaucous gull
160	Skúmur	Great skua
161	Kjói	Arctic skua

170	Lómur	Loon; Red-throated diver
171	Himbrimi	Great northern diver

Current knowledge of seabirds interactions with fisheries

The seabird community in Icelandic waters is composed of relatively few but abundant species, accounting for roughly ¼ of total number and biomass of seabirds within the ICES area (ICES 2002). Auks and petrel are the most important groups comprising almost 3/5 and ¼ of both abundance and biomass in the area, respectively. The most abundant species are Atlantic puffin (*Fratercula arctica*), Northern Fulmar (*Fulmarus glacialis*), Common (*Uria aalge*) and Brunnich's (*Uria lomvia*) guillemot, Black-legged kittiwake (*Rissa tridactyla*) and Common eider (*Somateria mollissima*). There are static-gear closed areas in place to protect eider duck during the nesting season. Longline vessels are also required to employ bird scarers (gas cannons) or other similar methods to minimise bird bycatch when shooting their lines. During its most recent reviews of seabird–fishery interactions, neither of the ICES working groups covering this topic highlighted Icelandic fisheries as raising specific concerns above the universal wish to see all seabird bycatch minimised wherever possible (SGBYC, 2010; WGSE, 2010). While self-reporting of seabird by-catches are expected to have led to general underreporting of seabird/gear interactions, it is now mandatory to record all seabird (and mammal) events as part of normal logbook reporting requirements in Iceland.

Current knowledge of marine mammals interaction with fisheries

At least 12 species of cetaceans occur regularly in Icelandic waters, and additional 10 species have been recorded more sporadically. Reliable abundance estimates exist for most species of large whales while such estimates are not available for small cetaceans. In the continental shelf area minke whales (*Balaenoptera acutorostrata*) probably have the largest biomass. Reliable recent abundance estimates exist for the northeastern and central North Atlantic and off West Greenland; these total over 180,000 animals (Source: IWC, 2014). The Icelandic minke whale research programme undertakes studies into feeding ecology (stomach contents, stable isotope ratios, fatty acid profiles), energetics, multi-species modelling, biological parameters, satellite tagging, distribution and abundance, genetics, pollution, parasites and pathology (NAMMCO, 2013). The majority of seal/gear interactions are associated with the gill net fishery for lumpsucker fish, while there are more interactions with harbour porpoise associated with gillnet fishery for cod. Given the estimated population sizes (Stenson, 2003) and relatively low catch rates involved, it is unlikely that these by-catches have detectable impact on population size.

Marine mammal interaction are minimised by the fleet by avoiding sites and adopting fishing and hauling techniques that minimise the interaction between fishing gear and these animals. No other specific measure or practice is currently known to the assessment team. Having said that, the impact of the cod gillnet fisheries does not appear to be significant on pinnipeds and cetaceans.

Icelandic marine ecosystem and the cod fishery

The main spawning grounds of most of the exploited fish stocks in Iceland are in the Atlantic water south of the country while nursery grounds are off the north coast. The physical oceanographic character and faunal composition in the southern and western parts of the Icelandic marine

ecosystem are different from those in the northern and the eastern areas. The former areas are more or less continuously bathed by warm and saline Atlantic water while the latter are more variable and influenced by Atlantic, Arctic and even Polar water masses to different degrees. Mean annual primary production is higher in the Atlantic water than in the more variable waters north and east of Iceland, and higher closer to land than farther offshore. Similarly, zooplankton production is generally higher in the Atlantic water than in the waters north and east of Iceland.

In Iceland, Capelin (*Mallotus villosus*) is the most important pelagic stock and cod (*Gadus morhua*) is by far the most important demersal fish stock. Whales are an important component of the Icelandic marine ecosystem, and Icelandic waters are an important habitat for some of the largest seabird populations in the Northeast Atlantic. In the waters to the north and east of Iceland, available information suggests the existence of a simple bottom-up controlled food chain from phytoplankton through *Calanus spp.*, capelin and to cod. Less is known about the structure of the more complex southern part of the ecosystem. The Icelandic marine ecosystem is highly sensitive to climate variations as demonstrated by abundance and distribution changes of many species during the warm period in the 1930s, the cold period in the late 1960s and warming observed during the recent years.

Cod relation to Capelin

Capelin has a key role in the food chain between zooplankton and larger fish. Most groundfish species, feed on capelin at some stage in their life and it is estimated that capelin may be 40% of the total food of cod. As the stock of capelin migrates to the southwest coast of Iceland in March for spawning, capelin becomes the main food of many species in Icelandic waters, most importantly cod. Pálsson, Ó. K., and Björnsson, H. 2011 note that capelin, northern shrimp, and euphausiids dominate the diet in all years and may be classified as the stable food of Iceland cod. The authors observed long-term, prey-specific patterns in consumption, and significant trophic links were found between cod consumption and stock sizes of capelin and northern shrimp. In March, the correlation between cod consumption on capelin and capelin stock size was highly significant, a type I functional feeding response, but not significant in autumn. The correlation deteriorated in the early to mid-1990s and in the early 2000s. Increased inflow of Atlantic water into north Icelandic waters, and associated changes in capelin distribution, may have contributed to this trend. The interaction between cod consumption on northern shrimp and shrimp stock size showed a highly significant type I functional feeding response in both seasons. Engilbertsson, 2012 notes that the most common fish species in cod's diet were capelin, herring, blue whiting and sandeel. Fish count for 70%-90% of cod's dietary composition and the remaining diet consisted primarily of crustaceans.

While both studies show that species other than capelin such as *Pandalus* and herring are important food sources, it is clear that capelin is the most important prey species (see figure below). Ideally, predator-prey relationships should be considered when setting fishing opportunities for all key species, but given the dominance of capelin in the diet of cod, its short life history and the close correlation between cod growth and the abundance of cod warrants particular attention between the setting of capelin fishing opportunities and the consumption needs of cod.

The Marine Research Institute conducts two acoustic surveys each year during the autumn-winter and during the fishing season to quantify the spawning stock biomass. The current assessment was benchmarked in 2009 but ICES rejected the method and in particular note that the estimates of SSB are uncertain and cannot be reliably estimated and that natural mortality was likely to be

underestimated.

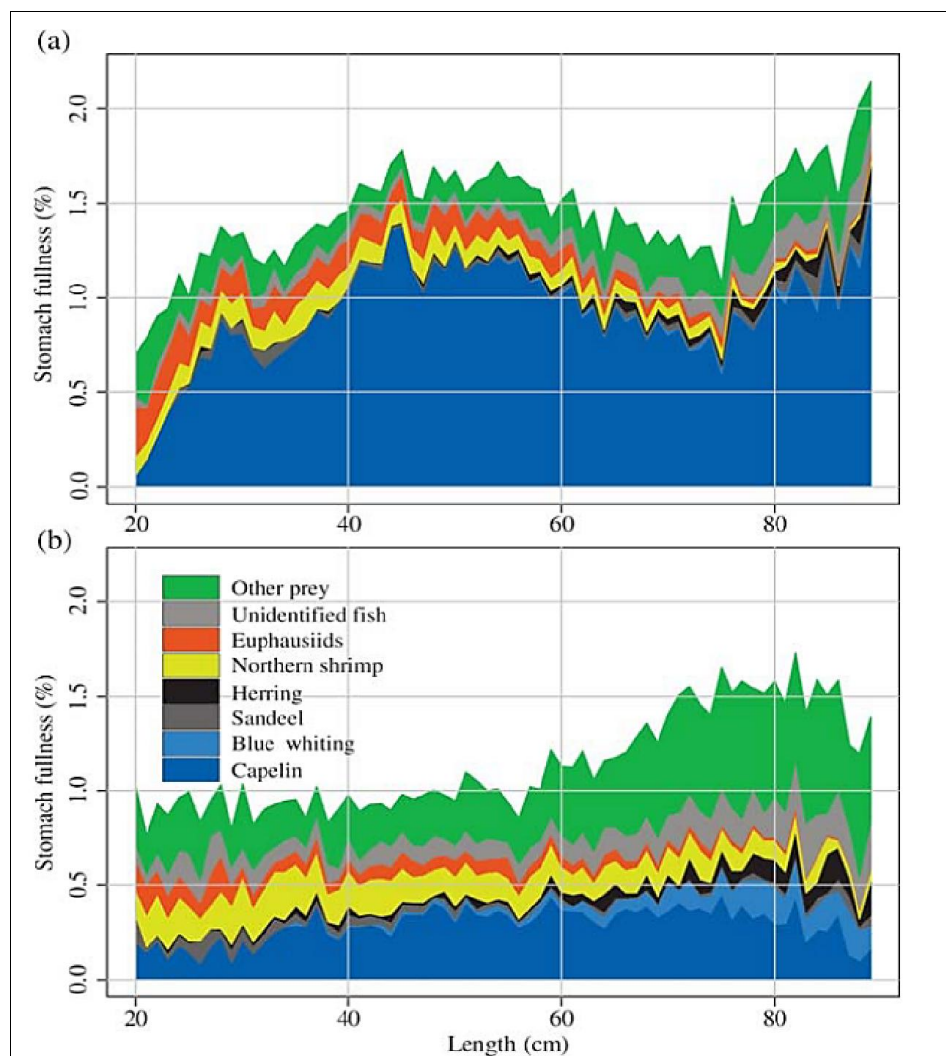


Figure 27. Length dependent changes in diet composition of Iceland cod, 1996–2010, showing stomach content weight (stomach fullness) as a percentage of predator body weight in (a) March and (b) autumn.

Pálsson, O. K., and Björnsson, H. 2011. Long-term changes in trophic patterns of Iceland cod and linkages to main prey stock sizes. – ICES Journal of Marine Science, 68: 1488–1499. <http://icesjms.oxfordjournals.org/content/early/2011/05/11/icesjms.fsr057.full>

Engilbertsson, V., 2012. The Food Intake of Iceland Cod (Gadus morhua) over the Summer Season, BS dissertation, Life and Environmental Sciences, University of Iceland, 23 pp. http://skemman.is/stream/get/1946/11875/29972/1/b.s._ritgerd_-_vidar_final.pdf

ICES (2013) notes that capelin is an important forage fish and declines in stock may be expected to have implications on the productivity of their predators (i.e. cod) as can be seen in the figure below from Astthorsson et al. 2007 (http://www.hafro.is/Bokasafn/Greinar/deep_sea_res_54-2456.pdf). The mean weight of individual fish aged 6 year can vary from 3kg to 4kg, a 25% difference in the biomass of 6 year old cod.

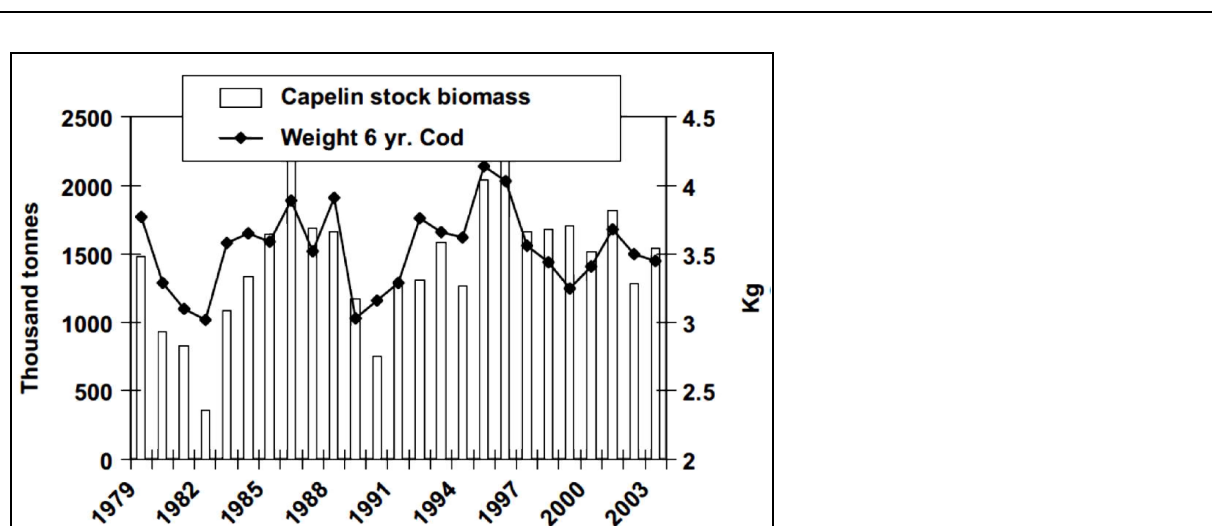


Figure 27.1. Relationship between capelin stock biomass and weight of 6 years old cod.

A capelin management plan has been agreed between Iceland, Greenland, and Norway. The fishery is managed according to a two-step management plan which requires a spawning-stock biomass of no less than 400 000 t by the end of the fishing season (mid - to late March). A preliminary TAC, is based on the results of the October-November acoustic survey carried out to evaluate the immature age 1-group and immature part of the age 2-group, almost a year before the fishing season starts. Under the management plan the initial quota is set at **two thirds** of the predicted TAC, calculated on the condition that 400 000 t of the SSB should be left for spawning. The results from the second survey conducted during the fishing season is for the same year classes. This result is used to revise the TAC, based on the condition that 400 000 t of the SSB should be left for spawning. The intention is that the TAC comprises only mature fish. ICES has not evaluated the plan for accordance with PA/MSY considerations.

<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/cap-icel.pdf>

ICES notes that there is considerable uncertainty in both the SSB forecast and the assumptions around natural mortality. Furthermore, there is potential for significant unaccounted mortality associated with the pelagic trawl fishery for capelin. Einarsson, H. A., *et al* (2007) note that as little as 20% to 40% of the capelin entering the trawl are retained and given that escape mortality of small pelagics in general are high, it is fair to assume that there may be substantial unaccounted mortality associated with this fishery, although it is noted that the majority of capelin are caught using purse seine (73%) with the pelagic trawl fishery accounting for 26% and the pelagic trawl fishery is limited spatially and temporally.

Unlike the management plan for Barents sea capelin, the current Icelandic management plan does not directly consider predation of capelin by cod in its escapement strategy. Failure to recognise this in the management plan could potentially lead to higher than desired levels of total mortality and could impact negatively on the future stock status of this important forage fish leading to possible implications for the productivity of other species that rely on capelin as a primary prey. It is noted that a benchmark is planned for 2015. It would seem prudent to consider predator-prey interactions in any future revisions to the management plan.

Einarsson, H. A., Hreinsson, E., and Jónsson, S. P. 2007. Direct observations of large mesh capelin trawls; evaluation of mesh escapements and gear efficiency. ICES CM 2007/Q:12.

<http://www.fiskeridir.no/content/download/29442/259444/version/1/file/Sak-3-Lodde-Grl-Isl-JM-vedlegg.pdf>

A minor non conformance was identified here by the assessment team regarding cod-capelin predator-prey interactions.

Icelandic cod is a key predator of capelin. The 2014 ICES Advice for Icelandic capelin notes that there is considerable uncertainty in both the spawning stock biomass (SSB) forecast and the assumptions around natural mortality of the species. Furthermore, there is potential for significant post escape unaccounted mortality associated with the pelagic trawl fishery for capelin (accounting for 26% of total catches). Accounting for these uncertainties in mortality and SSB estimation, the fact that Icelandic cod is a key predator of capelin, and that the objective of the cod Fishery Management Plan (FMP) is to build a large healthy cod stock, the FMP should ideally take into consideration the adequacy and health of the capelin stock. Failing to account for this in the management of capelin could mean depleting the capelin resource and later affecting the cod stock directly, through a lack of prey resource. It is noted that a benchmark for the capelin stock assessment and the review of the Icelandic cod FMP is planned for 2015. It would be very prudent to consider predator-prey interactions in future revisions to the management plans for cod and capelin.

After issuing the minor non conformance (text above in italics) to the client representative, the MRI responded formally, as part of a requested corrective action, that an in-depth ICES benchmark assessment of the capelin stock occurring in the area around East Greenland, Iceland and Jan Mayen and harvested by Iceland, Greenland and Norway will be carried out in the first half of 2015. The communications is provided below as evidence.

Vito Romito

From: Kristján Þórarinnsson <k@liu.is>
Sent: 14 July 2014 16:52
To: Vito Romito
Subject: FW: Forthcoming benchmark meeting capelin harvested by Iceland

Dear Vito,

I forward to you the confirmation message below that I have just received from Mr. Jóhann Sigurjónsson, Director General of the MRI, concerning the forthcoming capelin benchmark.

All the best,
Kristjan

From: Jóhann Sigurjónsson [<mailto:johann@hafro.is>]
Sent: 14. júlí 2014 14:40
To: Kristján Þórarinnsson
Subject: Forthcoming benchmark meeting capelin harvested by Iceland

Dr Kristján Þórarinnsson, special adviser
LÍÚ, Icelandic Federation of Vessel Owners

Re: Forthcoming benchmark meeting capelin harvested by Iceland

Dear Kristján

As a follow up of our conversation today, it is my pleasure to confirm that our institute has been informed that ICES secretariat has planned to conduct an in-depth benchmark assessment of the capelin stock occurring in the area around E Greenland, Iceland and Jan Mayen and harvested by Iceland, Greenland and Norway. The benchmark is going to take place during the first half of 2015.

Yours sincerely,

Jóhann Sigurjónsson, forstjóri/Director General
Hafrannsóknastofnun/Marine Research Institute
Skúlagata 4, P.O. Box 121 Reykjavík, Iceland
Sími/Telephone : +354-5752000
Bréfsími/Telefax: +354-5752001
Netfang/Email: johann@hafro.is
Vefsíða/Website: www.hafro.is/hafro/sjalf.html

In the first surveillance assessment for this fishery (12 months after certification date) the assessment team will reassess this issue taking into account 1) the results of the ICES capelin assessment benchmark and 2) the relative management actions and harvest decisions taken by the Icelandic authorities. After reassessing this issue in the first surveillance, the assessment team may agree to request further corrective action, if the conditions require.

Given the uncertainties in the assessment and following on based on precautionary considerations, ICES (2014) advised that the initial (first stage) quota should be set at **one half** of the predicted quota (not the two-thirds rule in the management plan). For 2015, this implies an initial quota of 225 000 t for 2015. The final quota is expected to be revised based on in-season survey information in winter 2015. The Icelandic quota for 2014/2015 season has been recommended provisionally at 225000 tonnes, and is in line with ICES Advice for the 2014/15 season. Revision based on the winter survey is common practice. <http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/cap-icel.pdf> ; <http://www.hafro.is/Astand/2014/1-tac.PDF>

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.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
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NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
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SUMMARY EVIDENCE: Those impacts that are likely to have serious impacts are addressed though the cod management plan and wider Icelandic fisheries and marine legislation (see section 3.1.1 for further details).

EVIDENCE

Four types of impact have been considered under this clause (an above in clause 3.1.1)

- Impact on retained species
- Impacts on habitats and benthos;
- Impacts on marine mammals, ETP species and seabirds;

Fisheries Management Plan- Icelandic Cod: Management measures relevant to ecosystem effects of the fishery.

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

An amendment to Act No 79/1997 on Fishing in Iceland’s Exclusive Economic Zone provides for the prohibition of fishing activities with bottom-contacting gear to especially protect vulnerable benthic habitats.

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 of Fisheries and Agriculture. See clause 3.1.1 for further details.

Impact on retained species

Directed fishing of cod as well as the by-catch of these species in all other multi species fisheries is assessed yearly, and corrected appropriately through quotas on the main commercial species. These are based on advice from the MRI and are rigorously enforced. There 35 commercial TAC species and these cannot be discarded, which aims to maintain catch levels within the desired limits. Information is collated from logbooks at each trip and only non-commercial invertebrates and other small benthic species are discarded. Small fish usually less than 30 cm long such as gobies, rockling and dragonets can be discarded. Given that the size of demersal trawl gear is relatively large (set nets are 200 mm and demersal trawls cod-end are 155 mm) the likelihood of catching such species is considered very small. The longline fishery is also unlikely to catch these species given the size of the bait (i.e. generally considered too large). Catch of these non commercial species are is not considered significant but the burden of proof rest with the fishermen. See also the information about retained species provided in clause 3.1.1 above.

To minimise the levels of unwanted catch, managers increased the allowable mesh size for trawl gear to reduce the catch of smaller-sized fish. The Icelandic regulations require the retention of most fish specimens for which there are TACs or species for which a market value exists. There are however provisions within the legal framework for exceptions to be made. For instance it is a requirement that live cod less than 50 cm long be released, and allowance for diseased or damaged fish to be discarded. There are upper limits on the percentage weight of fish that can be landed below minimum landing size and any cod, saithe, haddock or redfish which is landed is counted against the individual quota at 50% of its weight. Fish kept on board under these no-discard rules may be marketed.

The State Marine 2012 /2013 provides Outlook for fishing 2013/2014. *State of Marine Stocks in Icelandic Waters 2012 /2013. Prospects for the quota year 2013/2014.* Reykjavik 2013.

http://www.hafro.is/undir_eng.php?ID=26&REF=4

<http://www.fao.org/docrep/W6602E/w6602E11.htm>

Collecting and bringing ashore any catches of TAC species is obligatory meaning that catches of TAC species are fully documented. Discarding is prohibited and such conduct is subject to penalty according to law. If a vessel catches any species in excess of its fishing permit, the relevant fishing company has the option of obtaining additional quota 3 days after landing the catch. Vessels are authorized to land a small percentage of the catch, without the use of quota. The catch in question is sold at auction and the proceeds go to a research fund that supports marine research, but the process is closely enforced. The Directorate of Fisheries and the Marine Research Institute conduct research, assess and provide TAC recommendations and estimate discarded catches. The results indicate insignificant discards by the Icelandic fishing fleet.

Icelandic trawl fisheries are also subject to a range of technical measures. While primarily aimed at minimising the catches of undersize TAC species, these measures also help minimise the catches of non-TAC by-catch species.

Impacts on habitats and benthos

Eight Marine Protected Areas have been designated around Iceland, of which dragged fishing gear is forbidden in Surtsey Nature Reserve, traditional fishing practices are permitted in Hornstrandir and Búdahraun Nature Reserves and no fishing restrictions operate in Breiðafjörður Conservation Area. A list and representation of the MPAs is available at the following address <http://www.mpatlas.org/region/nation/ISL/>

Since 2000, the Marine Research Institute maintains a programme mapping the seabed habitats and fishing grounds using multibeam echosounding in co-operation with other domestic organisations, such as Reykjavik Energy and the Science Institute of the University of Iceland; together, they contribute towards the BIOICE and IceAGE habitat mapping projects. The aim is to compile a comprehensive picture of the entire continental shelf. The Marine Research Institute is also investigating the effects of fishing gear on the seabed and there is a growing focus on habitat studies in keeping with the increased emphasis of the ecosystem approach to marine research (www.hafro.is).

Gear by Gear Impacts

Bycatch/Protected, Endangered and Threatened species effects

Demersal otter trawl	Benthos/Habitats	High	Towed
Long-line	Marine Mammals	High	Passive
Danish Seine net	Marine Mammals	High	Towed
Gill net	Marine Mammals	High	Passive
Hook and line also termed jigger and hand line	Marine Mammals	Low	Passive
Nephrops trawl	Benthos/Habitats	High	Towed
Shrimp trawl	Benthos/Habitats	High	Towed
Pelagic Trawl	Benthos/Habitats	High	Towed

Ragnarsson, S. A. Steingrímsson, S.A, 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 ICES (60), No. 6., pp. 1200-1215

<http://icesjms.oxfordjournals.org/content/60/6/1200.full.pdf+html>

The most commonly used bottom fishing gear in the N. Atlantic is the otter trawl. Between 1991 and 1997, around 72% of total landings of demersal fish in Icelandic waters were caught with otter trawl. Other types of bottom towed gears used during this period (ranked by total landings) were shrimp trawl, Danish seine, scallop dredge, Nephrops trawl and hydraulic dredge.

During the first half of the 20th century, the otter trawling fishery around Iceland was confined to relatively shallow waters (<400 m) and targeted cod (*Gadus morhua*), haddock (*Melanogrammus*

aeglefinus) and ocean perch (*Sebastes marinus*). Deep water fishing (>500 m) developed rapidly in the 1970s, with deep-sea redfish (*Sebastes mentella*) and Greenland halibut (*Reinhardtius hippoglossoides*) as the main target species (Magnusson, 1998).

The effects of trawling on the marine ecosystem have been a cause of concern in recent years (e.g. Auster and Langton, 1999; Hall, 1999; Kaiser et al., 2002). Such effects include changes in benthic communities as a result of direct mortality of individuals (e.g. Bergman and Hup, 1992; Collie et al., 1997) and damage of habitats (e.g. Auster et al., 1996; Fossa et al., 2002). Stock depletion in shallow waters coinciding with the development of larger and better equipped vessels has resulted in effort extending into deeper waters (e.g. Koslow et al., 2000), deep-sea fauna is often characterised by fragile forms typical of low disturbance regimes, which can be more vulnerable to trawling (e.g. Fossa et al., 2002).

Ragnarsson & Steingrímsson examined the spatial distribution of trawling effort from logbook data from all Icelandic vessels fishing for demersal fish between 1991 and 1997. The trawling effort was widely distributed but was intensive only in small and localised areas. Three measures of effort were compared; tow frequency, tow duration and separate estimates of swept area for otter boards and trawls. In each year, the area swept with otter trawl was 1.7 times greater than the total area in which fishing occurred over the 7 year period. In contrast, the area swept with otter boards was 4% of the total fishing area. Most of the fishing effort was confined to depths shallower than 400 m. Effort was highest off the south and NW coasts and lowest off the north and east coasts. Effort was most intensive at the 100–500 m depth in all zones but in some areas (such as off NW Iceland), effort extended to deeper waters. Knowledge of the distribution of fishing effort is important for predicting larger scale effects of fishing gears on benthic communities.

Several studies have been carried out in areas where habitat complexity is high, such as boulder grounds, corals and seapen communities. These habitats are known to be vulnerable to physical disturbances caused by trawling (Auster et al., 1996; Turner et al., 1999; Fossa et al., 2002) and for biogenic structures in general the natural recovery following impact can be very long, especially in deep waters (Mortensen and Rapp, 1998; Turner et al., 1999; Fossa et al., 2002). In such habitats, the bridles and groundrope of the trawl can easily break down fragile structures rising above the seabed and only a few tows may be required to cause significant impacts. In contrast, on homogeneous soft bottoms the otter boards are likely to be the only component of the trawl causing an impact on the infauna. Data on the distribution of taxa known to be sensitive to physical disturbances and the information on otter trawl fishing effort are useful to identify those areas where benthic communities are impacted by fishing activities.

Ongoing work by the MRI is continuing on mapping the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances, through programmes such as BIOCE which has already mapped many areas of coral distribution (ICES, 2010). Such information will be important in order to predict which species and habitats are being at risk of being damaged by fishing activities and for protection of important marine habitats in the future.

Also, research on the effects of bottom trawling on seabed communities specific to Iceland is provided in Ragnarsson and Lindergarth, 2009 (<http://www.int-res.com/articles/meps2009/385/m385p051.pdf>).

In addition to monitoring fisheries to assess their effect on the exploited stock, the MRI has a

research programme examining the effects of fishing on the seabed. Of particular relevance to demersal fisheries is the study of the effects of otter trawling. These effects were investigated with a manipulative field experiment over four areas that were intensively trawled and four areas left undisturbed. The results showed that only a few species were affected by trawling. In general, the effects of otter trawling in shallow areas with a soft seabed are relatively minor for most of the smaller species. Effects of trawling on large structural biota such as corals and sponges are considered to be more severe. Although little evidence exists on the effects of trawling on this group of animals, it is likely that their distribution is now more fragmented than prior to fishing.

http://www.hafro.is/undir_eng.php?ID=16&REF=2

Please see clause 3.1.1 for further details on the discussion on trawl closures for protection of vulnerable habitats in Icelandic waters.

Impacts on marine mammals, seabirds and ETP species.

Marine mammals bycatch

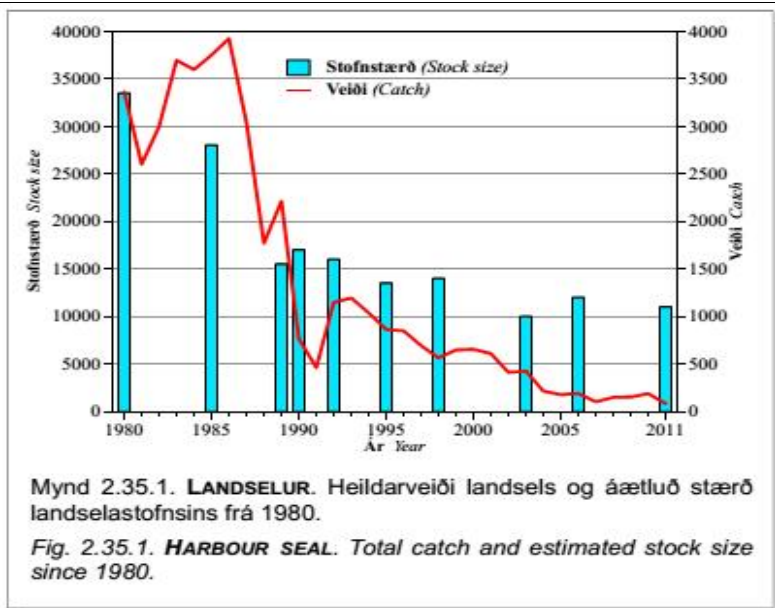
Two species of seal are permanent inhabitants of Icelandic waters: harbour seals and grey seals. In addition, there are a few migratory species that come regularly into Icelandic waters. Seal hunting occurs around the country, in addition to a good number that get caught accidentally in fishing nets. In 2012, the reported seal catch and bycatch in Iceland was 204 grey seals (*Halichoerus grypus*), 251 harbour seals (*Phoca vitulina*), 6 harp seals (*Phoca groenlandica*), and 171 seals of unidentified species. A grey seal survey was conducted in 2012, where 4 200 animals were estimated along the Icelandic coast. The stock was estimated as 12 000 animals in 1990. The adopted management plan is to maintain the harbour seal population around 12 000 animals. According to a survey conducted in 2011, the stock of harbour seals was around 11 000 animals. The stock was estimated as 34 000 seals in 1980 but has remained stable since 2003. The adopted management plan is to maintain the grey seal population around 4 100 animals.

<http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

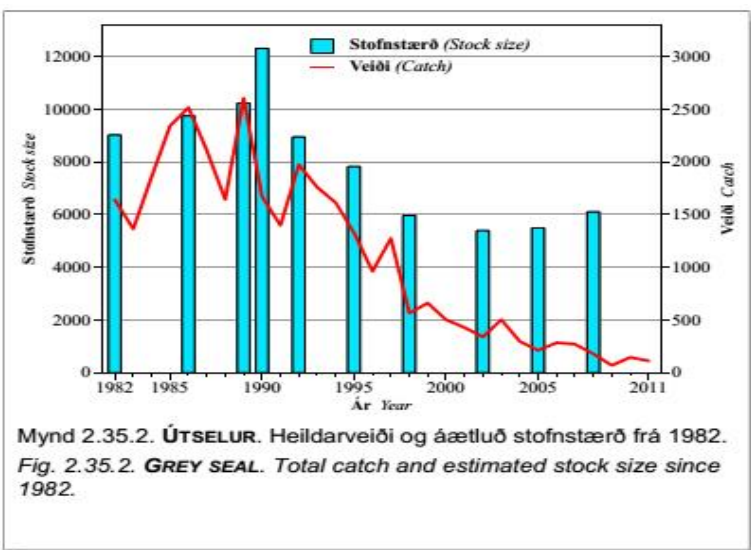
There is little describing the trends of number of seals as bycatch. In seal hunt data from previous years no distinction was made between purposefully hunted seals and numbers killed as bycatch. In addition, usually only seals that were sold or traded for bounty were recorded. Therefore, numbers of animals killed for personal use and bycatch that was not turned in for bounty were not recorded.

Since February 2014, reporting of marine mammal bycatch in the Icelandic fisheries is mandatory. Since 2002 there has been a special emphasis placed on instructing the crews of gillnet boats about the recording of mammals killed but annually only 2–7% of them report seals in nets.

Harbour seals were last counted in July–September of 2011 with an improved method in which the researcher flies over large haul-outs three times and small haul-outs twice. This method is thought to give a more accurate count of harbor seals. The population was estimated at 11000 animals (95% confidence interval 8 000–16 000), which is unchanged from the summers of 2003 and 2006.



Grey seal pups have not been counted since 2008 and 2009. The estimate calculated then was 1539 animals (95% confidence interval 4 600–7 600). The population reached an historical low in 2002 when the number of animals was estimated to be 5500 and it had decreased considerably since 1990 when the estimated population was about 12 000 animals. The method was improved and thus it is unsafe to read the 2002 results as an increase but there was an increase of about 6% (4.5–7.9) per year from 2005–2009. Most of the increase was observed in Breiðafjörður where the pup population went from 645 to 859 pups. It is clear that the harvest mortality in the 1990’s was above the yield capacity of the population, but less hunting was conducted in recent years. In 2005 the government decided on a management policy for grey seals that aims at keeping the population to at least 4 100 animals, where it was in 2004. If the population drops below this level measures will be taken immediately to reverse the decline.



<http://www.hafro.is/Astand/2013/36-engl-sum.PDF>

Presently, data on marine mammal and seabird bycatch is collated from several sources including dedicated surveys, coastguard inspections and logbooks.

Table 4. Reported by-catch of pinnipeds by the Icelandic fishing fleet in 2010 to 2012 (source: NAMMCO annual report 2013; www.nammco.no)

Species	Area	Count	Pups	Gear	Source
Harbour seal	Coastal Iceland	4		Gillnet	MRI survey
Harp seal	Coastal Iceland	3		Gillnet	MRI survey
Harbour seal	Coastal Iceland	6		Lumpsucker net	Inspector
Grey seal	Coastal Iceland	4		Lumpsucker net	Inspector
Harbour seal	Coastal Iceland	1		Lumpsucker net	Biopol
Gray seal	Coastal Iceland	1		Lumpsucker net	Biopol
Harp seal	Coastal Iceland	2		Lumpsucker net	Biopol
Harbour seal	Coastal Iceland	36	11	Lumpsucker net	Log books
Grey seal	Coastal Iceland	26		Lumpsucker net	Log books
Harp seal	Coastal Iceland	1		Lumpsucker net	Log books
Unspecified seal	Coastal Iceland	112		Lumpsucker net	Log books

Table 5. Reported by-catch of cetaceans by the Icelandic fishing fleet in 2010 to 2012. (source: NAMMCO; www.nammco.no)

2010					
Harbour porpoise	Coastal Iceland	50		Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	4		Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	1		Lumpsucker net	MRI scientist
Harbour porpoise	Coastal Iceland	4		Lumpsucker net	Inspectors
Harbour porpoise	Coastal Iceland	65		Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	3		Gillnet	MRI survey
2011					
Harbour porpoise	Coastal Iceland	28		Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	6		Gillnet	Inspectors
Harbour porpoise	Coastal Iceland	1		Anglerfish net	Inspectors
Harbour porpoise	Coastal Iceland	149		Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	3		Lumpsucker net	Inspectors
2012					
Harbour porpoise	Coastal Iceland	28		Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	1		Lumpsucker net	Inspectors
Harbour porpoise	Coastal Iceland	1		Lumpsucker net	MRI scientist
Harbour porpoise	Coastal Iceland	113		Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	1		Lumpsucker net	Log books

At least 12 species of cetaceans occur regularly in Icelandic waters, and additional species have been recorded more sporadically. Reliable abundance estimates exist for most species of large whales while such estimates are not available for small cetaceans.

At least 12 species of cetaceans occur regularly in Icelandic waters, and additional 10 species have been recorded more sporadically (ICES, 2011b). Of the commonly recorded cetacean species, Blue

whale (*Balaenoptera musculus*), Sei whale (*Balaenoptera borealis*) and Fin whale (*Balaenoptera physalus*) are Endangered (2008 IUCN Red List), and the Sperm whale (*Physeter macrocephalus*) is Vulnerable (2008 IUCN Red List); the Grey skate *Dipturus batis* is also listed (Critically Endangered; 2006 IUCN Red List) (IUCN, 2012). Of these, the only interaction with the cod fisheries is the one with grey skate bycatch. Specific details about this issue has been provided under (the previous) clause 3.1.1.

Seabirds bycatch

Long-liners in Iceland are obliged to use protective devices to shield baited hooks as gears are shot in order to prevent encounters with seabirds. Fishermen tend to use scarelines, automatic gas guns and night settings (i.e. haul gear at night minimizing seabird interaction), generally in the winter period. The requirement follows Regulation 456 issued in 1994.

See Regulation 456, 1994. REGLUGERÐ um fuglaveiðar og nýtingu hlunninda af villtum fuglum, nr. 456/1994. Regulation on bird hunting and utilization of wild birds, nr. 456/1994.

The MRI continues to monitor the distribution, population and feeding ecology, of important whale species and other marine mammals. Major survey work commenced in 1989 and a formal research plan involving international collaboration continues today. This information is being used to continue the development of multi-species modelling in the support of development of ecosystems based management of fisheries such as cod.

Regulation 557/2007 on logbook recording requirements applies to all Icelandic fishing vessels, whether they take place inside or outside Icelandic waters, unless otherwise specified in the rules of the relevant fishery. In short, skippers are required to record the following information in logbooks:

- Vessel name, call sign and registration letters.
- Fishing gear type and size.
- Positioning (width and length) and the time when the gear is placed in the sea.
- Catch by species and quantity.
- Harvesting.
- Landing.

Recently, public sector (business, Ministry of Innovation and the MRI), in collaboration with the Small Boat Owners Association worked to improve catch documentation. To this end, amendments have been made in the forms of logbooks to make registration easier. The aim is to provide more and more reliable data on catch, especially regarding marine mammals and seabirds.

<http://www.fiskistofa.is/ymsaruppl/tilkynningar/nr/1033>

A new amendment to the existing logbook regulation requires that data submitted in logbooks includes seabirds and marine mammals number and species was issued in February 4 2014. The amendment took effect immediately.

<http://www.reglugerd.is/interpro/dkm/WebGuard.nsf/key2/557-2007>

Vulnerable species

Iceland has ratified a number of conventions on species protection including the Convention on Biological Diversity, the OSPAR Convention and the CITES Convention. Vulnerable species known to occur in Icelandic waters include basking shark and the ocean quahog.

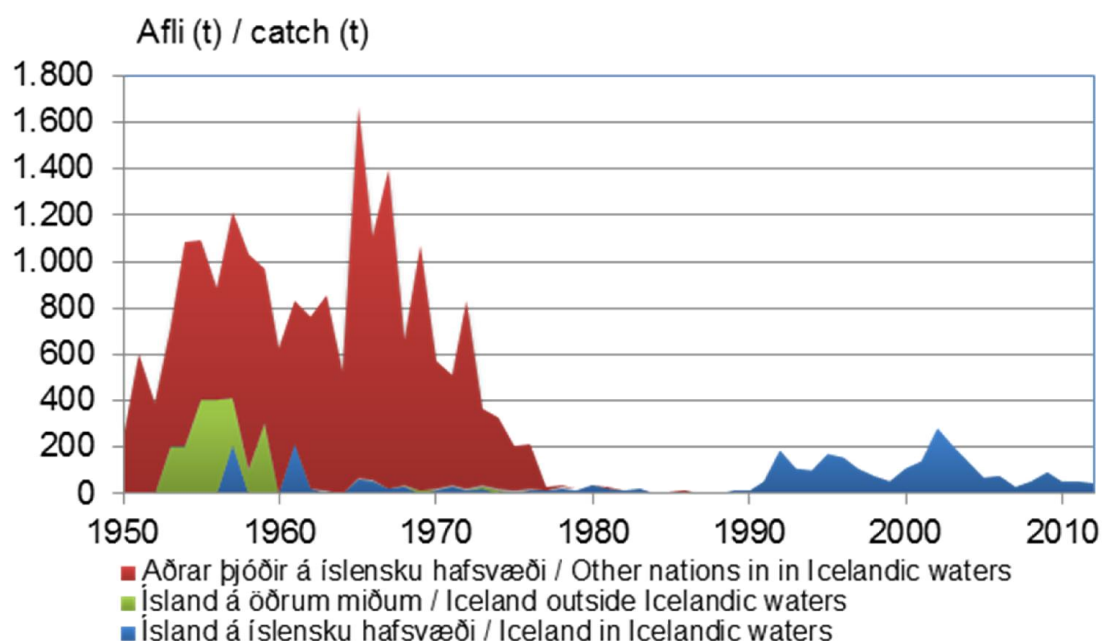
For specific details on grey skate, Atlantic wolffish and halibut please refer to clause 3.1.1. The information has not been repeated again here below.

Porbeagle shark

The porbeagle shark (*Lamna nasus*) is classified as vulnerable to extinction under the IUCN Red list framework. Bottom trawl catches in Iceland in 2013 were estimated at about 0.163 tonnes, therefore the catch rate appear to be insignificant.

Dogfish

The spiny dogfish or spurdog *Squalus acanthias* is a small demersal shark of temperate continental shelf seas worldwide. It is considered endangered to extinction on the IUCN Red list. A few hundred tonnes of spiny dogfishes were fished annually by foreign fleets when they operated in Icelandic waters. However, Icelandic catches have always been low, or around 100 tonnes in recent years.



The spiny dogfish was in fact considered a pest by Icelandic fishermen, as other more valuable fish species disappear from the fishing grounds when the dogfish appears. The current catches are only bycatch in other fisheries, primarily gillnet fisheries off the southern coast during the summer months (<http://www.fisheries.is/main-species/cartilaginous-fishes/spiny-dogfish/>). Although the abundance of spiny dogfish is low in Icelandic waters compared to many bony fishes, this is still the most common shark species there. However, no information is available on the stock status of this

species. Dogfish (*Squalus acanthias*) catches in the Icelandic bottom trawl fleet in 2013 were less than 2 tonnes and are considered insignificant.

Ocean quahog

In 2013 only 20 t of ocean quahog was landed, compared to the maximum of 14 400 t in 2003. Since 1987 a fishery for human consumption has been developing, but annual landings have been variable due to variable effort related to the market. MRI recommends a harvest rate of 2.5% of the estimated stock size corresponding to no more than 32 500 t in the quota year 2014/2015.

<http://www.hafro.is/Astand/2014/39-engl-sum.PDF>

3.2 Specific criteria

3.2.1 Information gathering and advice

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>																		
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>																		
SUMMARY EVIDENCE: There is information available on the legal specification of fishing gear for cod for each fishing method. MRI undertakes experiments to quantify the selective characteristics of the main cod catching gears. Species selective gear may result in lower impact on certain aspects of the ecosystem such as lower incidence of by-catch. Commonly caught species such as by-catch in cod fisheries are also subject to ITQ management and hence are recorded as part of the vessel catch.																						
EVIDENCE Stocks of non-target species are meant as other stocks (i.e. commercial) caught together with Icelandic cod (e.g. saithe, haddock, redfish and others) and do not include other benthic assemblages (e.g. starfish, large bivalves, hard-shelled gastropods, crabs etc.). In terms of monitoring and assessment, these other main "non target" commercial stocks are monitored/assessed accordingly by Icelandic Authorities. The "may be" is therefore intended as shall for all the main stocks commonly caught together with cod. The Marine Research Institute provides catch advice for 35 different species, while catch statistics for 2013 were collected for 72 species (source: Directorate, 2014)																						
<table border="1"> <thead> <tr> <th>Species</th> <th>Landed Weight (Kg)</th> </tr> </thead> <tbody> <tr> <td>Cod</td> <td>115976507</td> </tr> <tr> <td>Haddock</td> <td>24739293</td> </tr> <tr> <td>Saithe</td> <td>8381669</td> </tr> <tr> <td>Whiting</td> <td>562182</td> </tr> <tr> <td>Golden redfish</td> <td>3967186</td> </tr> <tr> <td>Ling</td> <td>8580736</td> </tr> <tr> <td>Blue ling</td> <td>1655195</td> </tr> <tr> <td>Tusk</td> <td>4900359</td> </tr> </tbody> </table>					Species	Landed Weight (Kg)	Cod	115976507	Haddock	24739293	Saithe	8381669	Whiting	562182	Golden redfish	3967186	Ling	8580736	Blue ling	1655195	Tusk	4900359
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Catfish	6356792
Rock grenadier	1003
Deep sea redfish	8137890
Starry skate	1546994
Spotted catfish	1615076
Monkfish	1354482
Common skate	120672
Dogfish	3973
Greenland shark	2904
Mackerel shark	542
Greater silver smelt	194863
not specified	0
Halibut	9576
Greenland halibut	2522709
Plaice	4410930
Lemon sole	1387470
Gray sole	1123790
Megrim	325845
Dab	712150
Rough dab	177455
Herring	157493000
Capelin	453836000
Norway pout	20328
Blue whiting	106998000
Mackerel	153641498
Rabbit-fish	703
European lobster	1723525

Deep water prawn	10928838
Common spider crab	130
Squid	14432
Common whelk	0
Iceland cyprine	0
Arctic wolffish	5491
Orange roughy	0
Redfish	2530
Deepwater redfish	96533
Onion eye	44
Esmark's eelpout	229
Forkbeard	395
Blue mussel	0
Vahl's eelpout	1
Fuller's ray	36994
White hake	16298
Turbot	121
Black dogfish	750
Grey gurnard	2634
Eel	92
Deal fish	1442
Baird's smooth-head	0
Black scabbard-fish	1140
Portuguese dogfish	0
Sailray	6806
Sea-urchins	0
Sea cucumber	4052

Atlantic salmon	11
Bluefin tuna	3800
Flounder	40
Green pollack	283
Atlantic rock crab	8734
Lumpfish roe	168083
Lumpfish / male	51218
Lumpfish female	3992689
Minke whale	0
Harbour seal	48

Reported catches for 2013 (Source: Directorate)

There is information available on the legal specification of fishing gear for cod for each fishing method. Fishing gear selectivity is intended primarily as size selectivity, and secondarily as species selectivity. Gears are regulated in several ways to regulate both size and species selectivity.

Key areas of specification include; 155 mm codend in trawl and seine nets; specifications for gill net construction and mesh size and; hook specifications in the longline fishery. MRI routinely undertakes selectivity experiments to assess the characteristics of the main gears used and to investigate measures to further enhance selectivity. By-catches of cod associated with the *Pandalus* shrimp and *Nephrops* fisheries are minimized through the mandatory use of sorting grids in the *Pandalus* fishery and large square mesh panels in the *Nephrops* fishery. Both of these devices are also expected to minimize the retention of other bycatch species associated with these fisheries.

Long-liners in Iceland are obliged to 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 interaction), generally in the winter period. The requirement follows Regulation 456 issued in 1994.

Regulation 456, 1994. REGLUGERÐ um fuglaveiðar og nýtingu hlunninda af villtum fuglum, nr. 456/1994. Regulation on bird hunting and utilization of wild birds, nr. 456/1994.

Since the introduction of electronic log-books in the Icelandic fleet, more technical details of fishing gear construction have been routinely gathered. The gear technology group have also investigated the utility of this type of data in terms of refinements in CPUE estimates and trawl footprint (swept area). (Source <http://www.ices.dk/reports/SSGESST/2011/WGFTFB11.pdf>).

Generally, highly selective gear may result in lower impact on certain aspects of the ecosystem such as lower incidence of by-catch. Commonly caught species such as by-catch in cod fisheries are also

subject to ITQ management and hence are recorded as part of the vessel catch in the logbook and through the reporting structure to the database.

Un-standardised CPUE and effort indices, based on log book records where cod constitutes more than 70% of the catch, showed an increase in CPUE in all gears in the early 1990's coinciding with the time of the adoption of the HCR. CPUE decreased from 1998-2001 but has increased since then and is now high for all gear types. The perception from logbook data is that effort towards cod has decreased in recent years but a proper method to calculate effort has not yet been implemented. ICES (2014) notes that based on previous analysis, the changes in CPUE are to some extent a reflection of the dynamics in the stock but they are confounded by other factors like abundance of other species caught with cod in mixed fisheries. This abundance affects the arbitrary selection criteria applied (cod >70% of catch). The assessment method does not use a commercial tuning fleet in the assessment (ICES, 2014).

<http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2014/NW/WG/11%20NWWG%20Report%20-%20Sec%2009%20Icelandic%20Cod.pdf>

<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/cod-iceg.pdf>

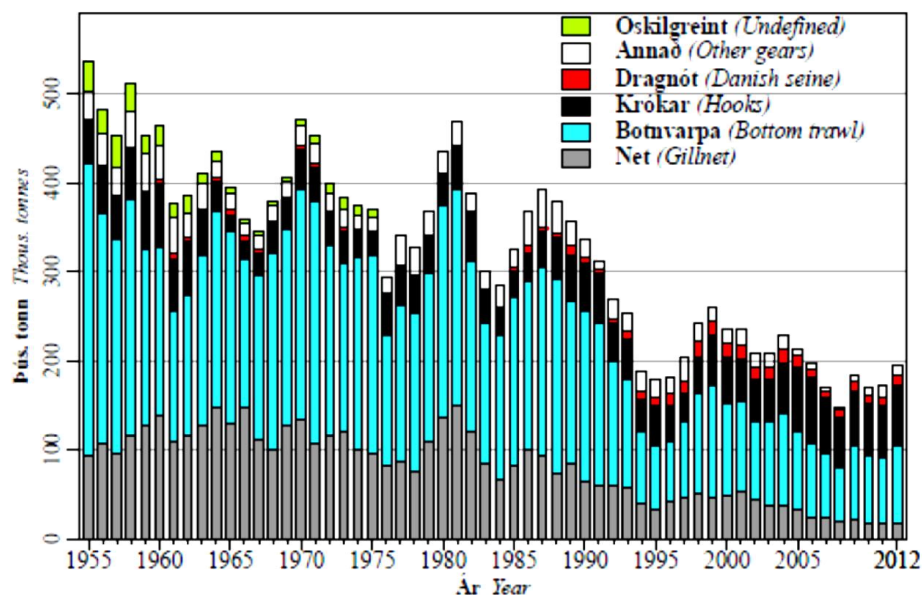
3.2.2 By-catch and discards

CLAUSE: 3.2.2.1 Discarding, including discarding of catches from non-target commercial stocks, is prohibited.			
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>
SUMMARY EVIDENCE: Discarding of all commercial stocks is prohibited under national Icelandic law.			
<p>EVIDENCE</p> <p>Icelandic fishery law prohibits the discarding of all commercial stocks. Commercial species are listed yearly in documents such as the annual MRI advice. Catches of these species are subjected to a discard ban (regulation no. 57/1996). The same is also true for other species with commercial value but outside the TAC system.</p> <p>Latest MRI advice: http://www.hafro.is/Astand/2013/36-engl-sum.PDF</p> <p>There is a minimum catch size for cod (and other demersal species) with tolerances allowing for the landing of below minimum size fish which does not count as full quota – and hence, encourages vessel operators to report where undersized cod may be encountered. Vessel catch inspections can be coordinated with areas where juvenile fish are reported (recent shut downs) to compare landings with vessel catches. This activity also forms part of the annual discard monitoring program to evaluate and confirm the estimates derived by gear type of discard percentage for cod and haddock.</p> <p>ICES (2009) reported that the ITQ system used in Icelandic fisheries has a build-in incentive for the fleet to direct effort to more valuable fish (high-grading). When juveniles are a high proportion of the fishable biomass or when the TAC is relatively low compared to the biomass, this may lead to increased discarding of the target species. However, the Iceland Coast Guard notes that “In recent years misreporting has not been regarded as a major problem in the fishery of this stock”. Production figures from processing plants are in “good” agreement with landings figures according to the Fisheries Directorate (pers. comm. Directorate, April 2014).’</p> <p>There has been one prosecution case of discarding witnessed by the Coast Guard in the last 10 years. Monitoring for compliance is a feature of the at sea inspectors and the Coast Guard.</p>			

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Long-liners in Iceland utilize bird scaring devices [acoustic cannons; scaring (tori) lines] to shield baited hooks as gears are shot in order to prevent encounters with seabirds and use night setting of longlines to minimise bird interactions. It is now a mandatory requirement to report bird and marine mammals interaction/bycatch with fishing gears.				
EVIDENCE				
Seabird Interaction:				
<p>There has been research into the impact of cod (and other groundfish) long-line fisheries in Norway, Iceland, and the Faeroes on northern fulmars (<i>Fulmarus glacialis</i>). Mortality rates were as high as 1.75 birds/1000 hooks (95% of which were fulmars) recorded, but observers on trips where lines were set by night have reported levels as low as 0.02 birds/1000 hooks. When these figures were multiplied by the large numbers of hooks set (476 million in 1996 by the 63-vessel Norwegian autoline fleet alone), the annual mortality of fulmars was deemed high. However, as noted, because it's breeding distribution and population size (which is in the millions) is expanding (perhaps helped by the availability of discards; Camphuysen <i>et al.</i>, 1995), long-line mortality was not then regarded as a serious threat to the species (Tasker <i>et. al</i> 2000). FAO (1999) reported the longline fisheries of Norway, Iceland and the Faeroes in the North and Norwegian Seas take mainly fulmars as well as gannets, Great Skuas <i>Catharacta skua</i> and Glaucous, Great Black-backed, Lesser Black-backed and Herring Gulls <i>Larus hyperboreus</i>, <i>L. marinus</i>, <i>L. fuscus</i> and <i>L. argentatus</i>.</p> <p style="text-align: center;"><i>FAO (1999) International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries. Food and Agriculture Organization of the United Nations. Rome.</i></p> <p>Currently, long-liners in Iceland utilize bird scaring devices [acoustic cannons; scaring (tori) lines] to shield baited hooks as gears are shot in order to prevent encounters with seabirds and use night setting of longlines to minimise bird interactions.</p> <p>Marine mammal interaction are minimised by the fleet by avoiding sites and adopting fishing and hauling techniques that minimise the interaction between fishing gear and these animals. No other specific measure or practice is currently known to the assessment team. Having said that, the impact of the cod gillnet fisheries does not appear to be significant on pinnipeds and cetaceans.</p> <p>Iceland has started with improving data collection systems for marine mammals and seabirds bycatch in the groundfish fisheries. Data collection is the first step in determining if a threat exist. Management measure should follow once information is available. While the by-catch of marine mammals raises important ethical issues, by-catches of seals are predominantly associated with the fishery for lumpsucker and while by-catches of cetaceans are relatively elevated in the cod gill net</p>				

fishery, the incidence is mainly observed in the lumpsucker fishery.

The overall levels of dolphin by-catch are also expected to decline further due to the trend in use of gill nets as a fishing method for targeting cod. The figure below shows the continued decline in the use of gill nets in the past decade and this fishing method accounts for less than 9% of the annual cod catch. It is also noted that based on the most recent population estimates, the by-catch of cetaceans is less than 1% of the total population, therefore presenting a very low risk to the population.



Mynd 2.1.1. ÞORSKUR. Heildarafli (þús. tonna) eftir veiðarfærum árin 1955–2012.

Fig. 2.1.1. Cod. Total landings (thous. tonnes) 1955–2012 by gear type.

As of February 2014, it is now mandatory requirement to report bird and marine mammals interaction/bycatch with fishing gears. A new amendment to the existing logbook regulation requires that data submitted in logbooks includes seabirds and marine mammals number and species was issued in February 4 2014. The amendment takes effect immediately.

<http://www.reglugerd.is/interpro/dkm/WebGuard.nsf/key2/557-2007>

Further details on known marine mammal interactions

NAMMCO - the North Atlantic Marine Mammal Commission - is an international body for cooperation on the conservation, management and study of marine mammals in the North Atlantic. The NAMMCO Agreement, was signed in Nuuk, Greenland on 9 April 1992 by Norway, Iceland, Greenland and the Faroe Islands, and entered into force 90 days later on 8 July 1992. The agreement focuses on modern approaches to the study of the marine ecosystem as a whole, and to understanding better the role of marine mammals in this system.

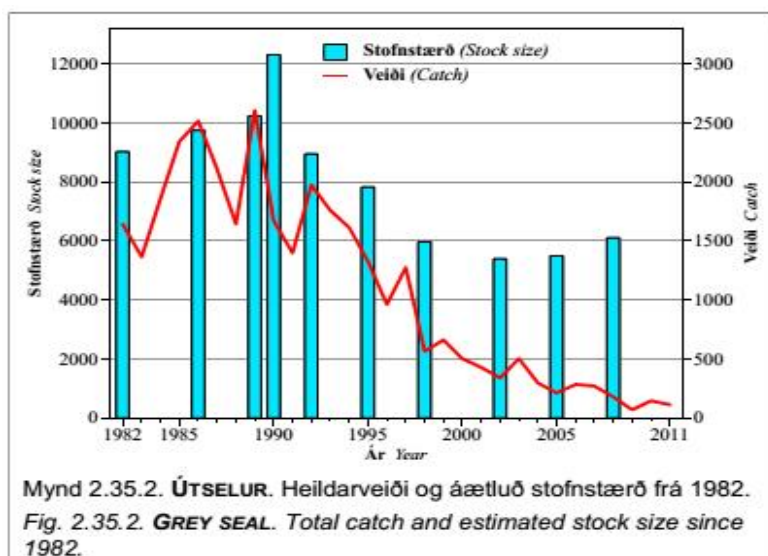
NAMMCO provides a mechanism for cooperation on conservation and management for all species of cetaceans (whales and dolphins) and pinnipeds (seals and walruses) in the region, many of which have not before been covered by such an international agreement.

The majority of seal by-catch events are associated with the gill net fishery for lump sucker.

Table 6. Seals reported by inspectors (2 harbour and 2 grey) are also given under log books. Where pups are known they are given separately.

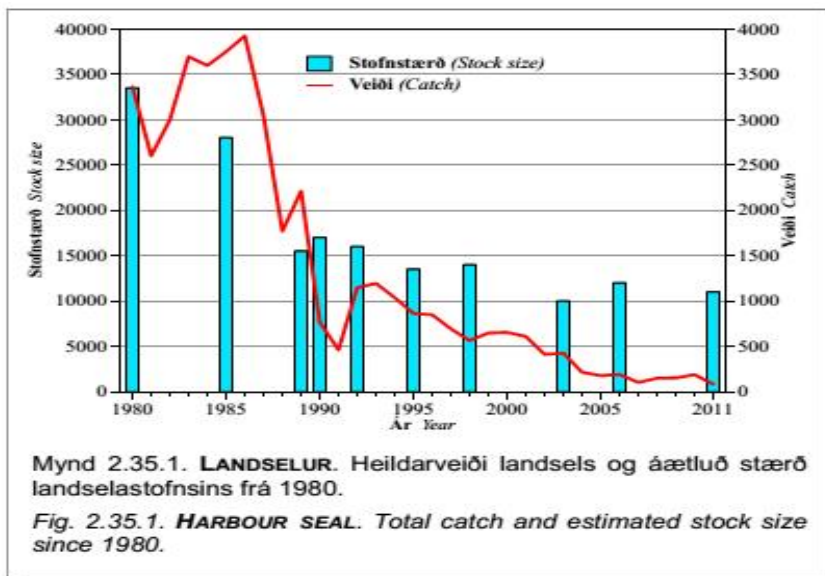
Species	Area	Count	Pups	Gear	Source
Harbour seal	Coastal Iceland	4		Gillnet	MRI survey
Harp seal	Coastal Iceland	3		Gillnet	MRI survey
Harbour seal	Coastal Iceland	6		Lumpsucker net	Inspector
Grey seal	Coastal Iceland	4		Lumpsucker net	Inspector
Harbour seal	Coastal Iceland	1		Lumpsucker net	Biopol
Gray seal	Coastal Iceland	1		Lumpsucker net	Biopol
Harp seal	Coastal Iceland	2		Lumpsucker net	Biopol
Harbour seal	Coastal Iceland	36	11	Lumpsucker net	Log books
Grey seal	Coastal Iceland	26		Lumpsucker net	Log books
Harp seal	Coastal Iceland	1		Lumpsucker net	Log books
Unspecified seal	Coastal Iceland	112		Lumpsucker net	Log books

A grey seal survey was conducted in 2012, where 4 200 animals were estimated along the Icelandic coast. The stock was estimated as 12000 animals in 1990. In 2010 management goals were drafted for the harbour seal population in Iceland at the behest of the Ministry of Fisheries. Thereby the choice was made to aim toward keeping the population at or above where it was in 2006 when it was estimated to be 12 thousand animals. If the population drops below this level measures will be immediately taken to reverse the decline if possible. In the coming years the population must be monitored, in part by counting every 2–3 years, in order to follow the management goals. A seal count was planned for the summer of 2013 similar to that conducted in 2011, based on funding availability.



According to a survey conducted in 2011, the stock of harbour seals was around 11 000 animals. The stock was estimated as 34 000 seals in 1980 but has remained stable since 2003. In 2005 the government set a harvest rule for grey seal in Icelandic waters that aims to hold the population at the size it was in 2004 which was about 4 100 animals.

If the population decreases significantly measures will be taken to reverse the trend. The population is approaching the threshold where extra measures of control will have to be taken and close monitoring of the population is necessary. A grey seal count is planned for the fall of 2014, if funding is available.



The catches of harp seal (a non resident species) are considered very small to be cause of serious concern.⁵⁹

The by-catch of cetaceans by the Icelandic fishing fleet in 2010 to 2012 shows that by-catch events are associated with both the gill net fishery targeting cod and also the lumpsucker gill net fishery. (source: NAMMCO 2013 Annual Report⁶⁰). However, it appears that, only a small percentage is caused is bycatch by cod gillnets.

⁵⁹ <http://www.hafro.is/Astand/2013/english/35-seals-13.pdf>

⁶⁰ <http://www.nammco.no/webcronize/images/Nammco/1002.pdf>

2010				
Harbour porpoise	Coastal Iceland	50	Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	4	Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	1	Lumpsucker net	MRI scientist
Harbour porpoise	Coastal Iceland	4	Lumpsucker net	Inspectors
Harbour porpoise	Coastal Iceland	65	Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	3	Gillnet	MRI survey
2011				
Harbour porpoise	Coastal Iceland	28	Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	6	Gillnet	Inspectors
Harbour porpoise	Coastal Iceland	1	Anglerfish net	Inspectors
Harbour porpoise	Coastal Iceland	149	Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	3	Lumpsucker net	Inspectors
2012				
Harbour porpoise	Coastal Iceland	28	Gillnet	MRI survey
Harbour porpoise	Coastal Iceland	1	Lumpsucker net	Inspectors
Harbour porpoise	Coastal Iceland	1	Lumpsucker net	MRI scientist
Harbour porpoise	Coastal Iceland	113	Lumpsucker net	Log books
Unspecified dolphin	Coastal Iceland	1	Lumpsucker net	Log books

Given the comparatively low numbers caught; relative to the overall population size and the by-catches in the lumpsucker fishery; it is unlikely that by-catches of seals associated with the cod gill net fishery have any measureable impact on the stock status of the two seal species.

Regarding by-catches of harbour porpoise, by-catches in the gillnet fishery are more prevalent in comparison to seal by-catch. Available population estimates are relatively old, but Stenson 2003 notes that the population of harbour porpoise around Iceland in the late 1980's to be in the order of 27,000 individuals. Stenson (2003) and Vikingsson *et al* (2003) report that in Iceland, catches are reported to be at least 200 porpoises per year, which is less than 1% of the estimated population size.

Vikingsson, G.A., Ólafsdóttir, D. and Sigurjónsson, J. 2003. Diet of harbour porpoises (*Phocoena phocoena*) in Icelandic coastal waters. NAMMCO Sci. Publ. 5:243-270.

<http://septentrio.uit.no/index.php/NAMMCOSP/article/viewFile/2830/2683>

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>
SUMMARY EVIDENCE: Most non-target species landed in cod fisheries are themselves subject to TACs based on scientific advice. There are some species of noted low abundance. Closure rules are available to the Ministry to limit impacts on by-catch species and habitat if deemed appropriate through scientific evaluation by MRI. There is no evidence of serious risk of extinction of by-catch species resulting from the activities of cod fisheries.			
EVIDENCE			
<p>According to Icelandic law, discards are prohibited, and all catches must be landed (see also clause 3.1.1. on retained species). The Marine Research Institute carries out wide ranging and extensive research on the status and productivity of the commercial stocks, and long-term research on the marine environment and the ecosystem around Iceland. The results of this research are the foundation of the advice on sustainable catch level of the fish stocks. The Directorate of Fisheries (<i>Fiskistofa</i>) 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.</p> <p>Landed catches are subtracted from the relevant quotas (allowable catch) of the vessel or the vessel group. Limited allowance is 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. When a vessel’s quota is used up, additional quota must be transferred to the vessel from other vessels or the vessel stops fishing. Transfer of quota between vessels takes effect only after it has been authorised and recorded to the official central data base. Information on each vessels catch quota and quota is regularly updated and made public and accessible to all on the official web-site. Information from the database is immediately made available on the internet. It is open to everyone, all hours every day. It includes information on individual vessels and summarized data for all Icelandic vessels. The table for individual vessels includes information on all landings, detailed catch report, list of transferred quotas and quota status.</p> <p>MRI is working on long term management strategy for main the marine stocks. This is in agreement with the United Nations conventions on conservation, sustainability and precautionary approach in the fisheries management. Long term management schemes (catch rules) for cod, capelin and summer spawning herring are already in force. http://www.hafro.is/undir_eng.php?REF=4</p> <p>The English summary of the report of the Marine Research Institute headed: State of Marine Stocks in Icelandic Waters 2011/2012 and prospects for the Quota Year 2013/2014 details assessment results and recommendations for most commercial stocks. Out of the 35 species included in this report several this year have been found to have decreased in abundance and so TAC have been</p>			

reduced accordingly e.g. halibut is severely depleted and now there is a ban on direct landings of this species. Many of these retained species however have not yet a defined management plan and directed stock assessment have not been performed on term, although the catches appear to be small.

There are also a number of other species which have been classified as vulnerable by MRI and/or IUCN (see clause 3.1.1 and 3.1.2 above for further details). These include the porbeagle shark, grey skate and spiny dogfish.

3.2.3 Habitat Considerations

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Area closures are a commonly employed management tool to protect spawning grounds, essential fish habitat, stony coral areas and thermal vents. Iceland operates an extensive array of area closures aimed at minimising catches of juvenile fish (permanent and temporary closures) and to protect vulnerable marine habitats (permanent closures).

EVIDENCE
 Descriptions of Icelandic cod essential habitat can be found on the Icelandic Ministry of Fisheries website and in the report of the Working Group on North Western Waters (NWWG, 2013). Cod is found all around the coast of Iceland, but is rarer in colder waters to the North and North East of Iceland. Cod spawns all around Iceland, but the largest and most important fishing grounds are off the south-western coast. Spawning takes place in late winter when mature cod aggregate on the spawning grounds. After spawning, the cod migrates; spreading out over the continental shelf, but the highest abundance is on the main feeding grounds off the northwest and southeast coast where the warmer Atlantic waters meet the colder Polar currents. After spawning, eggs and larvae drift clockwise around the country with the ocean currents. Settlement occurs in autumn. The most important grounds for juveniles are in colder waters in the northwest, north and east of Iceland (source: <http://www.fisheries.is/main-species/cod/biology-and-distribution/>)

The Icelandic authorities have implemented an extensive array of areas closures in national waters. These take the form of permanent, seasonal and periodic closures aimed at protecting both juvenile and spawning fish and are gear or fishery specific. In particular, the permanent closures will also provide wider ecological benefits over and above their intended fisheries management objective. The red areas in the figure below are aimed as spawning and nursery areas for cod while the blue

ones on the bottom left to protect spawning plaice <http://www.fisheries.is/management/fisheries-management/area-closures/>

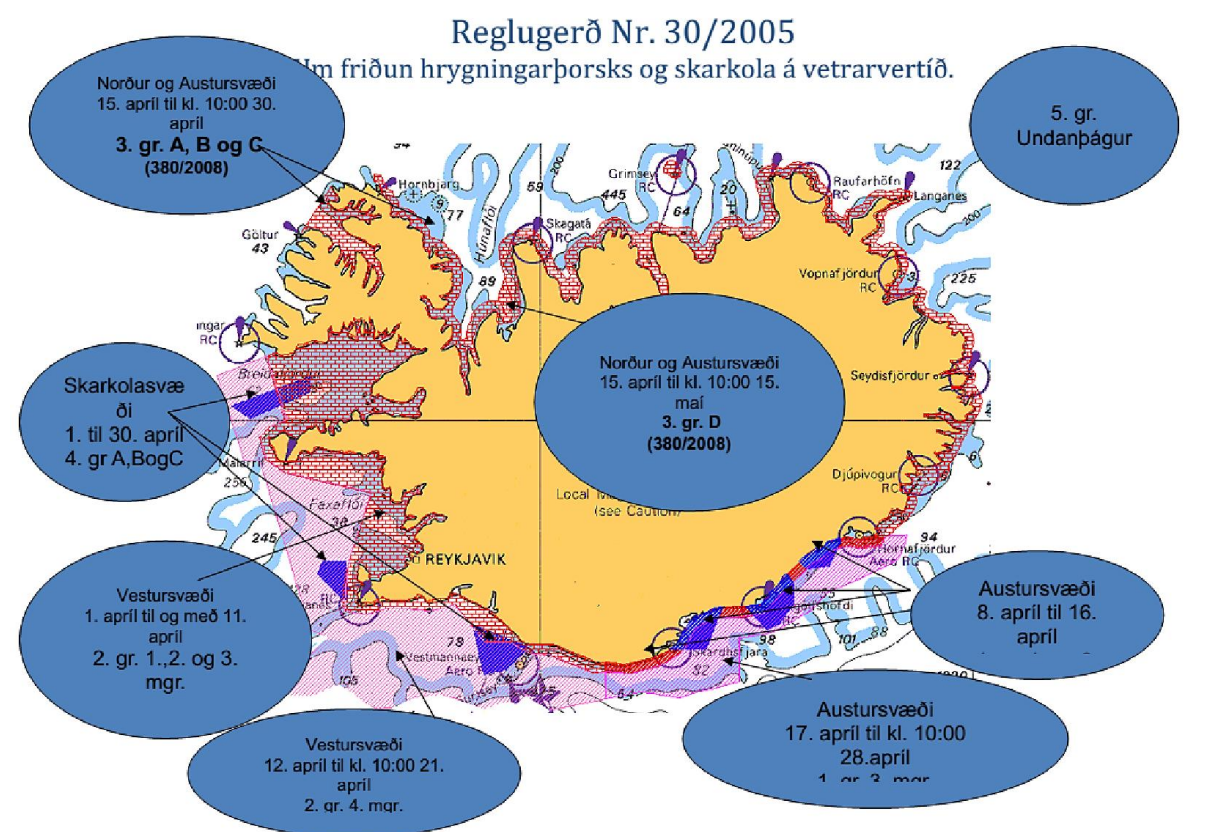


Figure 28. Spawning closures in Iceland.

The figure below shows the extent of permanent; seasonal and temporary closures (source <http://www.fisheries.is/management/fisheries-management/area-closures/>). 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.

⁶¹ <http://www.fiskistofa.is/fiskveidistjorn/veidibann/hrygningarstopp/>

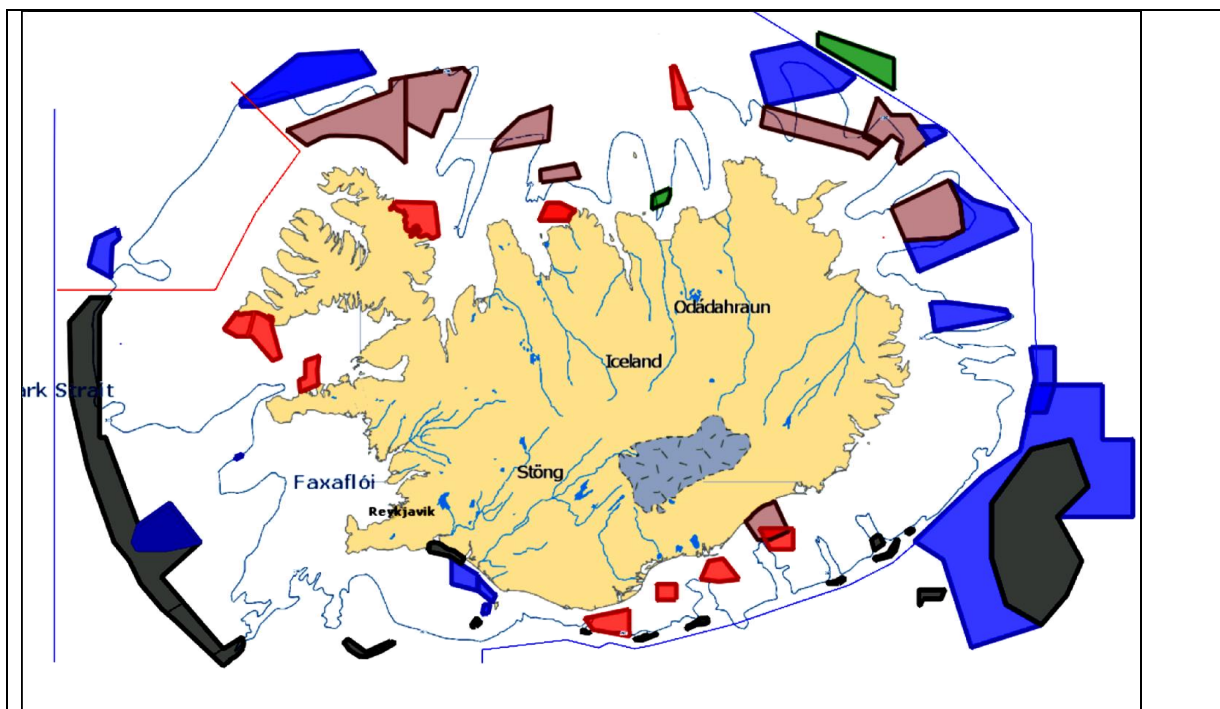


Figure 29. Areas with restricted fishing as of May 1st 2014. Shadings indicate different levels of restriction and type of gear involved, ranging from temporary (e.g. time of day, season) to permanent closure.

The table below provides the specific conservation objective for each of the permanent and seasonal closures with the relevant Icelandic regulation.

Green areas
Shrimp fishing ban Rgl.: 766/2004;335/2012
Blue areas, north of Iceland
Trawls must be equipped with separators Rgl.:749/2006 amended by Regulation 534/2013
Brown areas,
Protected areas against trawling and line fishery Rgl.: 310/2007
Red areas, north of Iceland
Line and trawling ban Rgl.: 68/2003
Red areas (coastal)
Line and handline Rgl. 742/2009
Blue area east of Iceland
Blue whiting fishing ban unless bycatch separators are used Rgl. 696/2005
Dark area east of Iceland
Blue whiting fishing ban Rgl.794/2004
Red areas off the south coast
Coral Protection rgl.: 1140/2005. rgl. 1095/2011
Dark area west of Iceland
Conservation area where trawling is prohibited rgl. 310/2007
Blue area west of Iceland
Trawling ban but open for trawling from 20.00-8.00 o'clock from 1.10 – 1.4 incl. both days

The figure below shows the extent of permanent; seasonal and temporary closures (source <http://www.fisheries.is/management/fisheries-management/area-closures>). 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. There are also extensive nursery areas outside these boundaries permanently closed for fishing.

Also, according to law nr. 79/1997 all fisheries with danish seine, bottom trawl and pelagic trawl are forbidden within the 12 nm (the black line). However there are temporary openings for vessels to fish with those gears within the 12 nm. These openings are both area- and time based. The ships are divided into 3 groups depending on their length and power. Group 1 (largest ships) are the largest ships. The green area represents the temporal allowance for fishing.

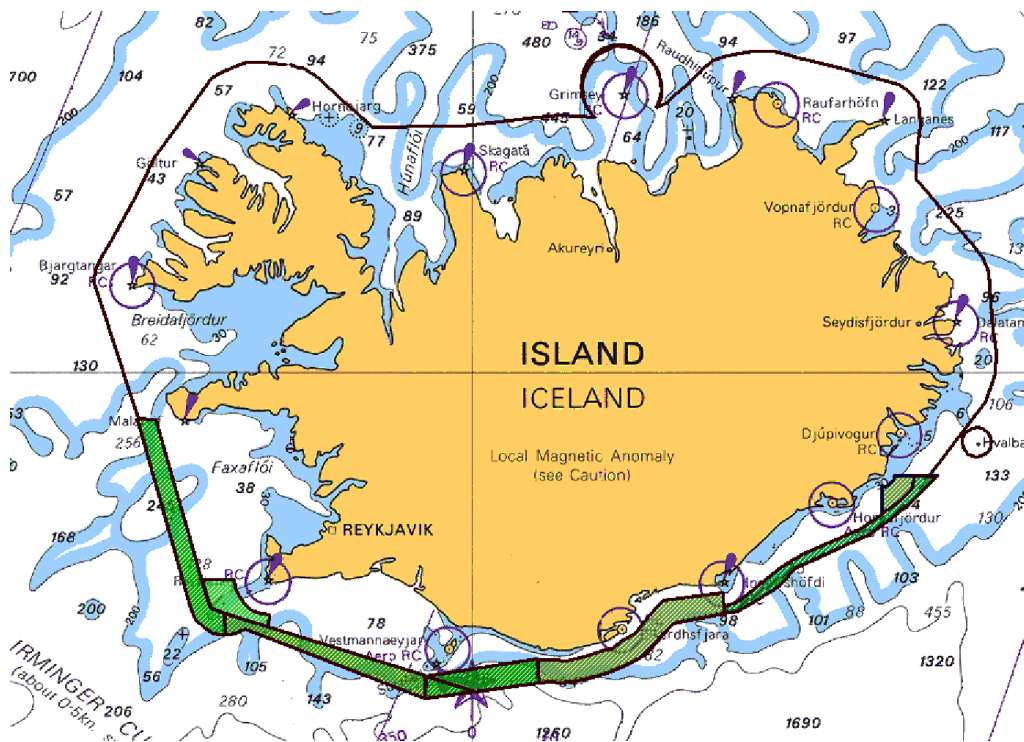


Figure 30. Temporary fishing areas for group 1, large-size vessels.

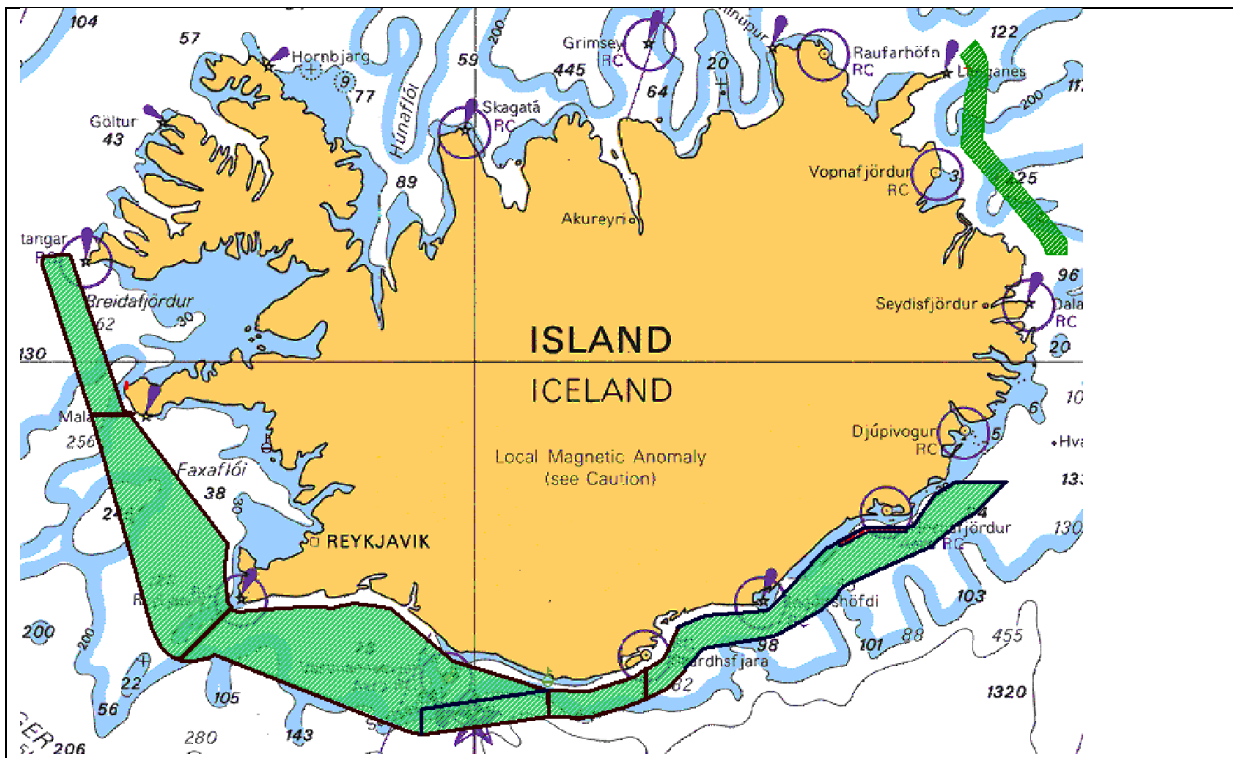


Figure 31. Temporary fishing areas for group 2, mid-size vessels.

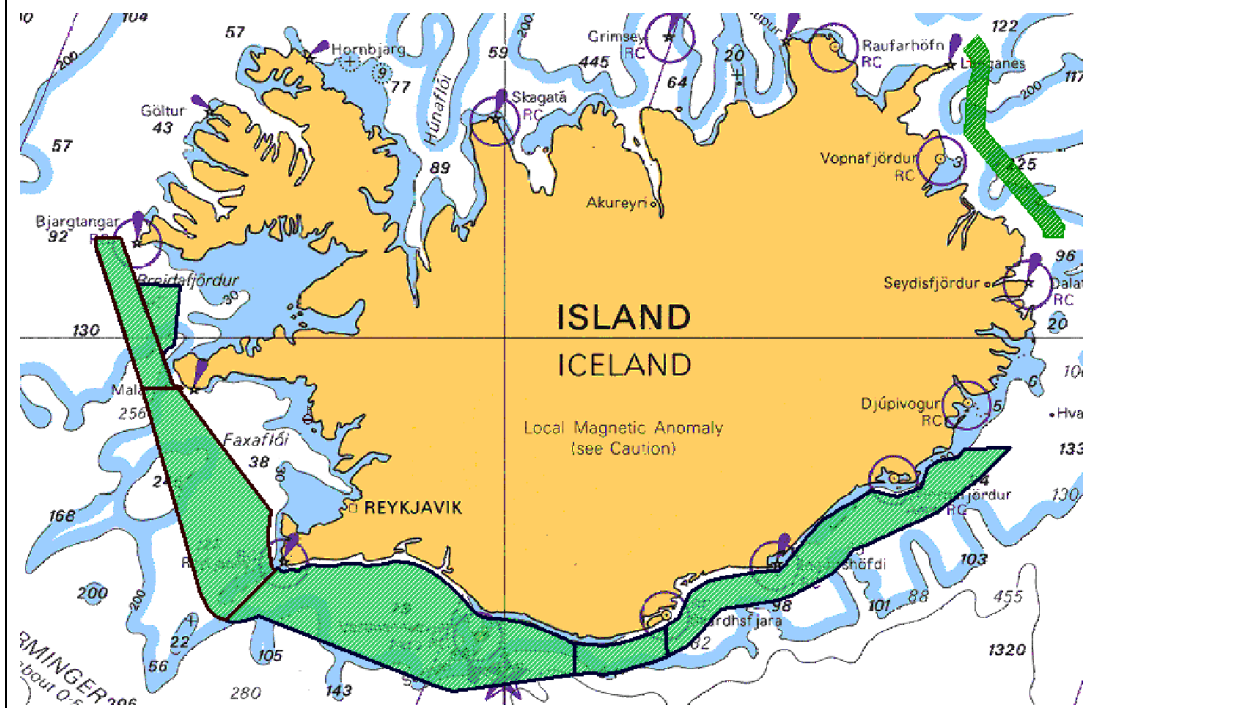


Figure 32. Temporary fishing areas for group 3, small-size vessels

A temporary closure system has been in force since 1976 with the objective to protect juvenile fish and reduce the incentives to discard. Fishing is prohibited for at least two weeks in areas where the number of undersized fish in the catches has been observed by inspectors to exceed a certain percentage. If, in a given area, there are several consecutive quick closures, the Minister of Fisheries

can with regulations close the area for longer time, forcing the fleet to operate in other areas. Inspectors from the Directorate of Fisheries supervise these closures in collaboration with the Marine Research Institute, sometimes the Coast Guard raises the alert. In addition, the Marine Research Institute (MRI) has the authority to close fishing areas temporarily without prior notice if the proportion of small fish in the catch exceeds certain limits (25% or more of <55 cm cod and saithe, 25% or more of <45 cm haddock and 20% or more of <33 cm redfish).

In the past 27 years, about 2000 temporary closures have come into effect (figure below), mostly off the Westfjords. Most of the closures concern cod fishing (63%) and often they have been limited to bans on bottom trawling or longlining.

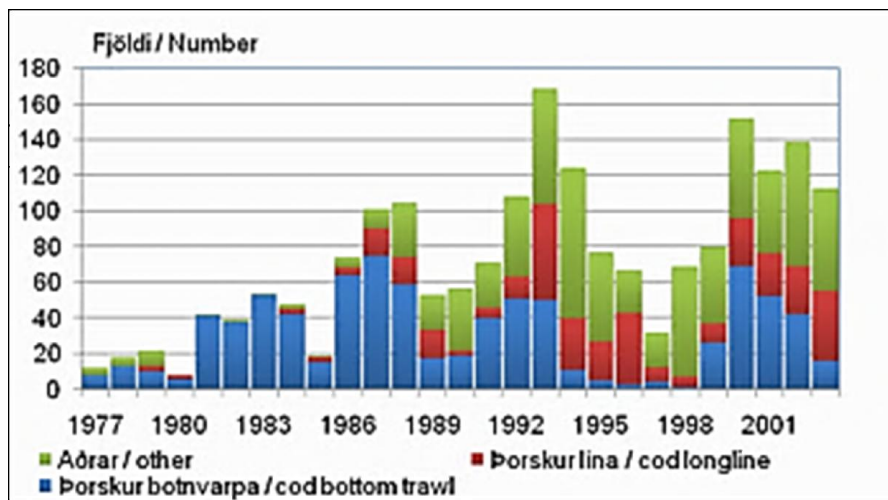


Figure 33. Temporary closures in effect from 1977 to 2001.

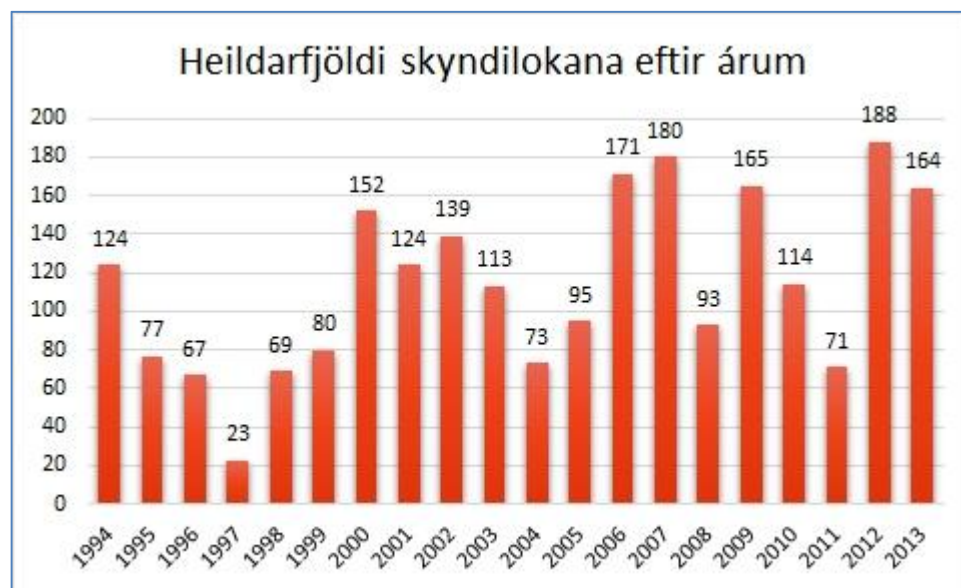


Figure 34. Total number of short term closures from 1994 to 2013.

CLAUSE: 3.2.3.2 Management measures must take into account significant continuous stony coral areas, identified through scientific and formal methods.

EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/> Critical <input type="checkbox"/>

SUMMARY EVIDENCE: Permanent area closures are in place to protect cold water corals.

EVIDENCE

The database of the BIOICE programme provides information on the distribution of soft corals, based on sampling at 579 locations within the territorial waters of Iceland. The results show that gorgonian corals occur all around Iceland. They were relatively uncommon on the shelf (< 500 m depth) but are generally found in relatively high numbers in deep waters (> 500 m) off the South, West and North Iceland. Similar patterns were observed in the distribution of pennatulaceans off Iceland. *L. pertusa* was known to occur in 39 places in Icelandic waters (Carlgren 1939, Copley et al. 1996). The distribution was mainly confined to the Reykjanes Ridge and near the shelf break off the South coast of Iceland. The depth range was from 114 to 875 m with most occurrences between 500 and 600 m depth. A study by Steingrímsson and Einarsson (2004) examined coral reefs known to fishermen since at least 1970, and noted that a majority of these were absent in 2003. Since coral reefs are extremely slow growing, damage due to for example trawling are almost irreversible. The full extent of coral reefs around Iceland is not known. Systematic mapping of the seabed is in progress. Based on information from fishermen (questionnaires), eleven coral areas were known to exist close to the shelf break off NW- and SE-Iceland at around 1970. Since then more coral areas have been found, reflecting the development of the bottom trawling fisheries extending into deeper waters in the 70s and 80s.

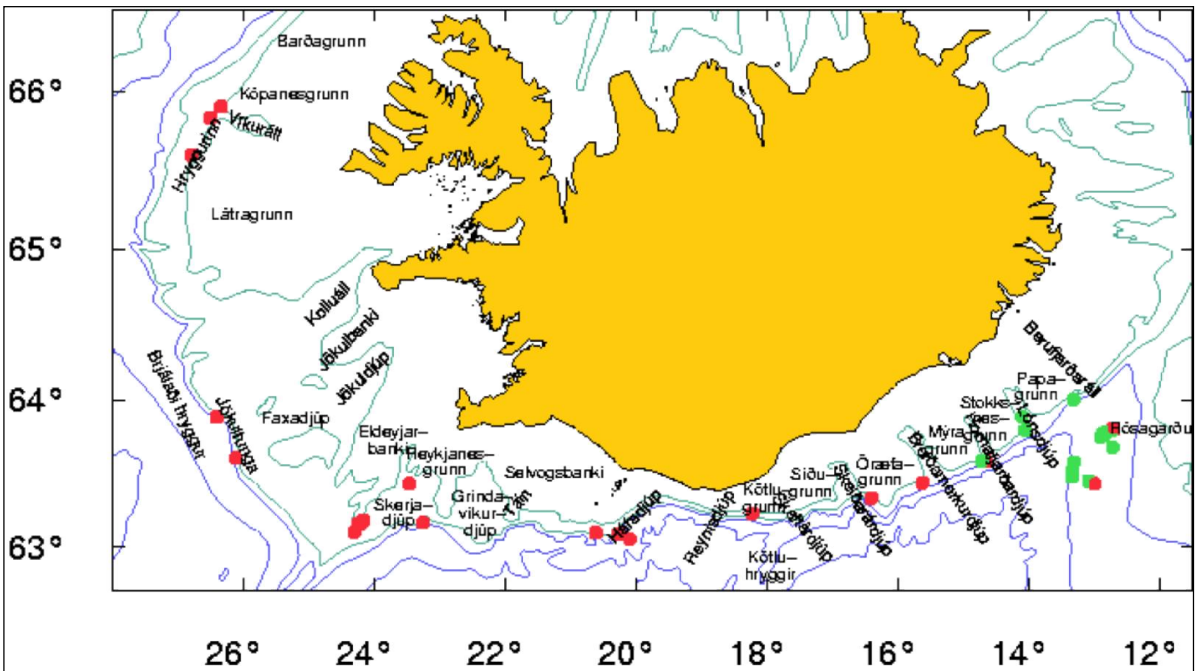
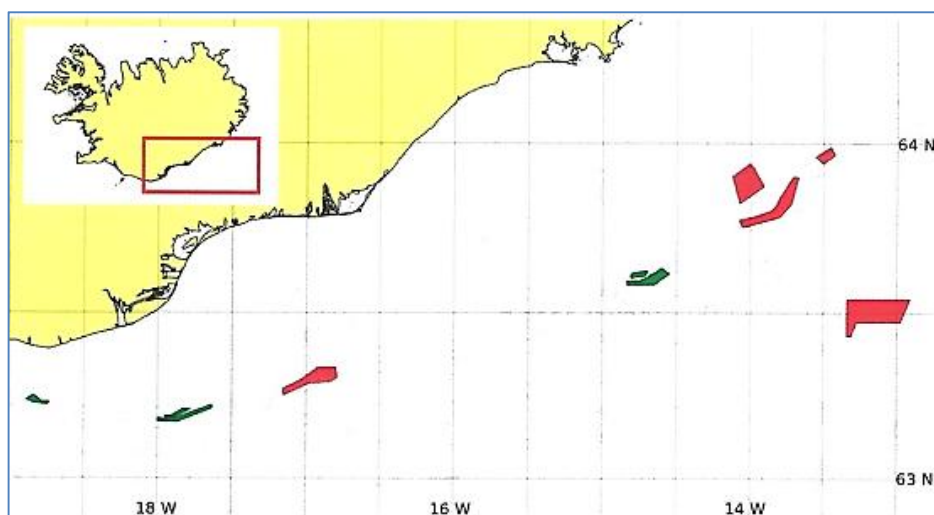


Figure 35. Occurrence of coral grounds off Iceland at around 1970, based on information from retired fishermen, and their occurrence in 2003, based on questionnaire from fishermen. Green dots - present in 2003, red-dots not present in 2003. From Steingrímsson and Einarsson (2004).

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

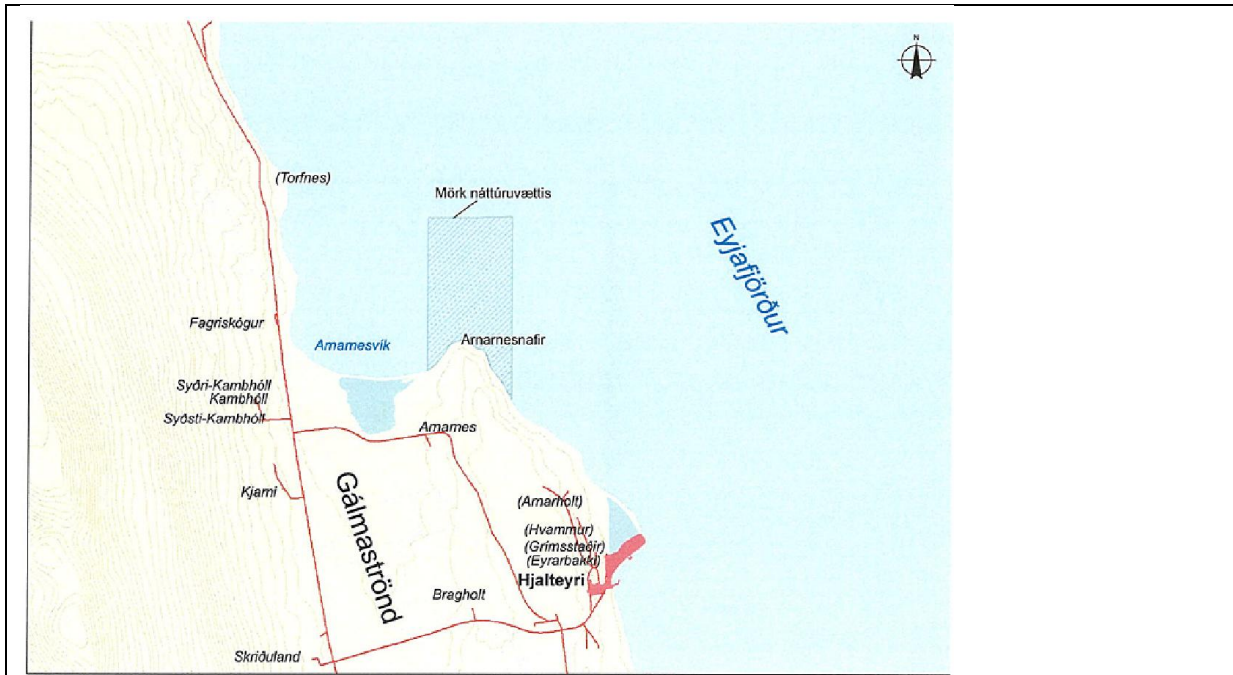
The coral (*Lophelia pertusa*) closures protect a species of cold-water coral which grows in the deep waters throughout the North Atlantic ocean. *L. pertusa* reefs are home to a diverse community, however the species is extremely slow growing and may be harmed by destructive fishing practices. In 2004 a research project was started on mapping coral areas off Iceland (using a Remote Operated Vehicle, ROV), based on the results from questionnaires to fishermen on occurrence of such areas. As a result several areas were permanently closed to fishing for protection of coldwater corals. As of 2014, ten closed areas have been established in Icelandic waters to protect cold water corals, (see map below) and some of these have also considerable abundance of sponges.



Source (MRI 2014, pers. comm.).

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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Permanent area closures, prohibiting the use of all fishing methods are in place to protect cold water corals.				
EVIDENCE				
Please see clause 3.2.3.2.				

CLAUSE: 3.2.3.4 Known thermal vents shall be protected through area closure to fishing activities with gear that has significant bottom impact during normal operation.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Known cold-water coral reefs and hydrothermal vents are protected through permanent closures.				
EVIDENCE				
<p>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 of Industries and Innovation.</p> <p>There are two known hydrothermal vent areas on the Icelandic continental shelf with series of chimneys and fissures both inside Eyafjord, North Iceland (see map). 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.</p>				



The chimney areas in Eyjafjord area are fully protected by environmental law/regulation. The other vents are in more remote areas and with less surface structures and have thus not been considered under serious threat by fishing activities (evidence received by the MRI, September 2014).

3.2.4 Considerations

CLAUSE: 3.2.4.1 Foodweb considerations - 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:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Cod is not a key prey species but a major predator, and the magnitude of the cod stock is likely to have an inverse impact on capelin, herring and shrimp.				
EVIDENCE				
<p>There is a growing international focus on food web considerations in fisheries management. This is evidenced by the Marine Research Institute's involvement in the development of ecosystem based understanding of the relationship between multi-species stocks and other ecosystem components – a so called ‘multi-species stock system and management approach’.</p> <p>While cod is not a key prey species, there is some predation by both pinnepeds and cetaceans. Capelin is a significant prey species for cod and the current management plan fails to formally consider the interactions between the two species. The biomass of cod is inversely linked to that of capelin. This could potentially lead to higher than desired overall mortality on capelin during periods of high cod abundance, which in turn could negatively impact on the future productivity of cod if this results in lower than anticipated capelin SSB. Refer to clause 3.1.1. for a discussion of the cod-capelin issue.</p>				

CLAUSE: 3.2.4.2 Management plans shall be developed and implemented in a timely fashion for avoiding, minimizing or mitigating any ecosystem issues properly identified, based on risk analysis and scientific advice, as being of serious concern in the fishery in question.				
EVIDENCE RATING:	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>		Low <input type="checkbox"/>
NON CONFORMANCE:	High <input checked="" type="checkbox"/>	Minor NC <input type="checkbox"/>	Major NC <input type="checkbox"/>	Critical <input type="checkbox"/>
SUMMARY EVIDENCE: Icelandic cod is subject to a dedicated management plan which includes wider ecosystem considerations including area closures and the use of size and species selective gears. Additionally, where vulnerable habitats e.g. cold water corals have been identified, area closures have been introduced.				
EVIDENCE:				
The MRI is responsible for scientific advice to the Ministry. There is a high level of interaction on				

scientific information such as the output from fishery surveys with the Ministry and associated departments and industry.

Real time area closures: A short-term sudden closure system has been in force since 1976 with the objective to protect juvenile fish. If, in a given area, there are several consecutive sudden closures, the minister of Fisheries can issue a regulation to close the area for a longer time period, thus directing the fleet to other areas. The Directorate of Fisheries and the Coast Guard supervises these closures in collaboration with the MRI.

Temporary area closures: The major spawning grounds of cod are closed during the main spawning season. In addition there are gear and mesh size restrictions in place. The restrictions are mainly to protect juvenile fish but also to decrease the effort towards bigger spawners.

Permanent area closures: Many areas have been closed permanently. These closures are based on knowledge of the biology of various stocks with the aim of protecting juveniles (e.g. cod, haddock, saithe, redfish, flatfish) and vulnerable marine ecosystems, e.g. coldwater corals, deepwater sponges communities (indirectly), and hydrothermal vents.

Fisheries Management Plan- Icelandic Cod: Management measures relevant to ecosystem effects of the fishery.

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

There is a process to benchmark the capelin stock which is important for the future state of cod. It has been identified and will be reviewed accordingly in 2015 as part of the ICES benchmark and the surveillance assessment.

8. External Peer Review

Peer Reviewer A.

Summary and Recommendation

Having reviewed the assessment carried out on the Icelandic Cod Fishery I am in support of the assessors view that certification should be awarded. Where I have made critical comments I believe most of these can addressed by clarifying the evidence already presented.

The ecosystem effects of the cod fishery have been thoroughly explored and, where a deficiency has been noted, processes have been put in place to fill this gap within the next year. The compliance and enforcement measures in effect for this stock have been comprehensively set out and clearly provide a robust and flexible suite of tools for the management of the stock, with a good balance of carrot (e.g. carry-over of quota from year to year, ITQs, constraint on the magnitude of TAC change, etc.) and stick (e.g. at-sea inspections, catch traceability, VMS / e-logbooks, real-time closures to protect juveniles, etc.) measures.

The section describing the management objectives is a little more mixed. The information going into the assessment and the assessment itself are clearly described and fit for purpose. An agreed management plan has been in place for several years, and the goals and objectives of this plan meet all the criteria set out in the clauses of the document, however the response is a little confused on some areas and needs a bit of cleaning up to make this more apparent. The plan has been assessed by ICES as being precautionary, with a low risk of the stock being reproductively impaired in the medium term (i.e. within the duration of the management plan). Biological limit reference points have been established by empirical means: B_{lim} is set at the lowest observed spawning stock biomass, a proxy B_{pa} is a trigger value established by the management plan at roughly twice the limit level, levels of fishing mortality and biomass consistent with maximum sustainable yield are not well known, however the F_{target} implied by the $0.2B_{4+}$ harvest control rule is a conservative value therefore F_{lim} and F_{pa} are not required. Sections 1.1.6 and 1.1.7 in particular need some revision to highlight these facts more clearly. It is unfortunate that this assessment is being conducted in the final year of a five-year harvest control rule, when the rule for the years ahead has not yet been agreed, but should it be along the lines of what is currently in place, I would have no hesitation in endorsing the certification of this stock.

The background information presented on the fishery provides a clear context in which the assessment can be framed. Citations are provided for sources of evidence. Where I have indicated no comment I believe the assessment team have done a comprehensive job and I have nothing to add.

IRFM Specification Clauses	Insert Comments as Required
<p>Section 1: Fisheries Management</p>	<p>A comprehensive summary of the management system is presented. The sections outlining the rationale and measures behind the management (1.1.1 – 1.1.5) are well set out and clear. The sections on the objectives and implementation of the harvest control rule (1.1.6 and 1.1.7) require some curation, and I would concur strongly with the comments from ICES that a full MSE exercise should be conducted when the plan is reviewed in 2015.</p> <p>Assessment Team: No comment</p>
<p>1.1.1</p>	<p>No comment.</p>
<p>1.1.2</p>	<p>No comment.</p>
<p>1.1.3</p>	<p>No comment.</p>
<p>1.1.4</p>	<p>No comment.</p>
<p>1.1.5</p>	<p>No comment.</p>
<p>1.1.6 and sub-clauses</p>	<p>Sections 1.1.6.1 – 1.1.6.3 provide a comprehensive view of the management unit, stock and legal jurisdiction in which it falls. I am not sure section 1.1.6.4 properly addresses the question which is being asked. The phrase <i>“long-term harvesting policy, consistent with achieving optimum utilization, including the means for assurance of its consistency with the precautionary approach to fisheries management”</i> would suggest a discussion of the objectives of the legal instruments in place, and their relationship to internationally agreed fisheries management measures, particularly the UN Fish Stocks Agreement, which specifies the application of the precautionary approach. Discussion of the specific reference points adopted would sit better under the following clause.</p> <p>Assessment Team Response: The Assessment Team acknowledges the Peer Reviewer Comments. The following has been added to the report.</p> <p>Regarding clause 1.1.6.4. “Discussion of the specific reference points adopted would sit better under the following clause.”</p> <p>Biological reference points have not been defined for this stock. The 2009 ICES’ assessment and advice, indicates that the SSB in 1993 was the lowest in the time series. This gives an estimated Bloss at ~123 kt. The estimated SSB for 2009 is ~220 kt (~1.8 xBloss) which is the reference biomass for the management plan. ICES’ evaluation of the management plan indicates a projected SSB in 2015 that has a high probability (> 95%) of being above the estimated SSB for 2009. This statement implies a low probability (< 5%) that the projected SSB for 2015 will be below Bloss (a candidate value of Blim) and hence, ICES’ evaluates the management plan to be</p>

	<p>precautionary. The high probability of the stock being above $B_{trigger}$ and the very low probability of being below B_{loss} provides quantitative evidence of the validity of the two chosen reference points.</p> <p>Taking a narrower view of the requirements of the heading of this section, one would hope to see a discussion of the specification (or lack thereof) of reference points with reference to maximum sustainable yield, and, in terms of ensuring consistency with the precautionary approach, MSY-based precautionary reference points such as $F_{0.1}$. Instead, the response focuses on the comments of ICES on the management plan likely avoiding the lowest observed spawning stock biomass, briefly mentions the plan is consistent with efforts to achieve MSY in the medium term ($F_{msy} \sim 0.3$) but offers no comment on the derivation of this figure.</p> <p>Assessment Team Response: The Assessment Team acknowledges the Peer Reviewer Comments. The following has been added to the report. See comment above. The exact conditions leading to MSY are not well known, and may depend on external conditions. The expected decrease in fishing mortality should increase stock biomass closer to that producing maximum sustainable yield. The projected management plan catch fraction of ~ 0.2 on average is similar to common proxies for F_{MSY}.</p> <p>In relation to the content of the information presented in subclause 1.1.6.4 (and throughout), I have concerns about the treatment of the precautionary approach and MSY reference points as targets in the management plan, and some loose use of terminology. The interpretation of the precautionary approach described here implies avoidance of reproductive impairment of the stock at an unspecified point in the future as the measure of success. The ICES recommendation presented here states that the plan is precautionary as it a high probability of SSB remaining above the lowest observed spawning stock.</p> <p>I have concerns about treating F_{crash} and B_{loss} as “precautionary” reference points. Later in the section, it is stated that ICES have adopted the lowest observed SSB (rounded to 125kt) as a limit reference point. Typically a precautionary reference point would be set at a more conservative level than B_{lim} (and certainly more so than B_{loss}) to allow for uncertainty in measurement of the state of the stock (and the suitability of the reference points). Taking a view of a precautionary biomass reference point as a place where you start having concerns about the stock and begin to take steps to reduce harvest levels, I would be more inclined to view the 220 kt figure used in the harvest control rule as the point where the scaling factor for the TACs is reduced as a precautionary reference point.</p> <p>Assessment Team Response: The Assessment Team acknowledges the Peer Reviewer Comments. The following has been added to the report. The Icelandic Government has adopted a management plan for the Icelandic cod stock for the next five fishing years, starting with the 2009/2010 fishing season. The main objective of the management plan is to ensure that the spawning stock biomass (SSB) will, with high probability (>95%), be above the 2009 size of 220</p>
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	<p>thousand tonnes by the year 2015. This will be achieved by applying the following harvest control rule (HCR) to calculate the total allowable catch (TAC): $TAC_{y+1} = (\alpha B_4 + y + TAC_y)/2$, where y refers to the assessment year, $B_4 +$ to the biomass of 4-year and older cod, and α to the harvest rate. α is set to 0.2 when SSB_y is higher than 220 thousand tonnes (SSBMP*), but set to $\alpha = 0.2 SSB_y / SSBMP$ when SSB_y is lower. *ICES interprets SSBMP as Btrigger. The TAC would start decreasing if the SSB would go lower than 220 thousand tonnes.</p> <p>The final paragraph of this section again seems a little out of place. While the stock biomass may have increased since the implementation of the plan in 2010, that does not tell us <i>per se</i> anything about the long-term suitability of the measures contained within the plan, particularly in a fast growing species such as cod.</p> <p>Assessment Team Response: The Assessment Team acknowledges the Peer Reviewer Comments. The text has been modified to further clarify that the increase in biomass may not be fully due to the measures taken within the management plan.</p>
<p>1.1.7 and sub-clauses</p>	<p>Again, there is some repetition of material from the previous section, and I am not sure if it is all relevant to the two questions posed in section 1.1.7.</p> <p>In section 1.1.7.1, the long-term goal for the management plan is stated as having a stock size capable of generating MSY, although it is acknowledged that B_{msy} is currently undefined. The metric of success used for the management plan in the medium term is $B_{2015} > B_{2009}$, which looks likely to be achieved.</p> <p>Assessment Team Response. None needed.</p> <p>In section 1.1.7.2, addressing precautionary limits in the management plan, paragraphs 4 and 5 seem better suited to the previous section as they deal with MSY-based objectives. Although there is mention of the biomass limit reference point ($B_{lim} - 125\ 000$ t), it is not specified what management action the plan would require should SSB fall below this level (presumably closure of the fishery, but I see that is up to the Minister?).</p> <p>Assessment Team Response: The Assessment Team acknowledges the Peer Reviewer Comments. Yes, presumably closure of the fishery. This is one of the Minister's powers. However, it is not mentioned specifically in the Icelandic cod FMP.</p> <p>The method for derivation of the TAC is repeated in sections 1.1.7.1 and 1.1.7.3. I am a little concerned that no mention is made of the harvest rate being based on ages 4+, while the reference points are set for spawning stock biomass, on a stock where the M_{50} is between 6 and 7, and where there is a consistent negative trend in maturity at age for ages 5 and 6 over the 2000 – 2013 period.</p>

	<p>Assessment Team Response. The reviewer points out the paradox that the TAC is set according to a harvest rate, which is a percentage of the 4+ biomass, while reference points are defined by SSB. The harvest rate rule does not pick up the sensitivity of the SSB to the age of first maturity, which has been increasing recently.</p> <p>The harvest rate rule, which has evolved in Icelandic management for a long time, was developed to have a rule that is simple, easily understandable for the layman and simple to implement. The reference points, on the other hand, are related to biology and are in principle set to protect the stock from recruitment overfishing, and to some extent to ensure a large enough stock to provide a yield near the MSY.</p> <p>It complicates matters that when the management plan was evaluated by ICES in 2010, it was presented as a temporary plan with the objective to ensure that the SSB in 2015 would exceed that estimated for 2009, which was 220000 tonnes. Subsequently, this level became regarded as a $BMSY_{trigger}$ reference point by ICES.</p> <p>Accordingly, the harvest rule is largely independent of the reference points. One may perhaps think of it as a 'black box', where the only relation to the reference SSB is that it should keep the SSB safely above reference points. The reference points provide a safety net if the stock does not develop as intended. The key issue is that the harvest rate set is sufficiently low to imply a low probability of reaching even the trigger SSB, when tested with simulations for a presumably plausible range of biological scenarios. That includes the conservative scenario that the age at first maturity will remain at the recent high level (clause 1.3.1.3).</p> <p>So it is a deliberate choice to maintain a relatively low harvest rate to obtain stable conditions for the industry and a relatively large cod stock. A higher harvest rate (or fishing mortality) would require a higher trigger biomass and a regime where the harvest rate would be adjusted year by year, being on the slope of the HR (SSB) function. Managers in Iceland do not want that. This issue was taken up once again with MRI at the site visit, and again, it was clearly expressed that this was a deliberate choice by managers.</p> <p>Relating the harvest rate to the 4+ biomass rather than to SSB is part of the same thinking. It is simple and easily understandable, and may have played a role in facilitating an understanding in the industry for a cautious management. The relation between B4+ and SSB varies with year class composition and maturity age. When deciding the harvest rate by simulations, that was taken into account. - see the ICES response to the plan in 2010: http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2010/Special%20Requests/Icelandic%20cod%20management%20plan.pdf.</p> <p>The measures set out in section 1.1.7.4 detail a comprehensive set of tools for management of the fishery. In particular, the system underpinning the real-time</p>
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	<p>closures (referenced again in section 1.1.8.2) to protect undersized cod, is considered as state of the art.</p> <p>Assessment Team Response. None needed.</p>
1.1.8 and sub-clauses	<p>The remainder of section 1.1.8 is excellent and clearly sets out the position with respect to the other considerations of the management plan. One might have expected to see some mention of the change to regulations regarding seabirds in the text on effect on the ecosystem, but I appreciate that is mentioned later.</p> <p>Assessment Team Response. None needed.</p>
1.2.1	No comment
1.2.2	<p>The data available to the stock assessment process is clearly set out and appears to be comprehensive. One area which might benefit from some clarification is the policy behind length and age sampling by fleet, where the distribution of lengths and otoliths sampled by fleet sector seems out of line with the distribution of landings (e.g. gill nets – 9% of landings, 38% of otoliths, Danish seine – 4% of landings, 20% of length samples).</p> <p>Assessment Team Response. The reviewer points out the mismatch between the number of samples and the catch volume between fleet segment. The assessment team agrees on that. However, the problem seems to be over-sampling of some segments rather than under-sampling of the more important ones.</p>
1.2.3	<p>The summary of the assessment data and survey are comprehensive. I would suggest that the second paragraph on page 58 highlight that the although the retrospective error is below 10% (well below, from a look at the graphs in the latest ICES advice), the retrospective pattern looks to be one of slightly underestimated SSB and slightly overestimated fishing mortality, therefore errs on the side of caution rather than posing a risk to the fishery.</p> <p>Assessment Team Response. Text modified accordingly.</p>
1.2.4 and sub-clauses	<p>Evidence is presented which suggests total mortality of fishing is taken into account in the assessment: discards appear to be negligible; unobserved landings and landings overseas are limited by regulation and technical measures are in place to minimize bycatch in smaller-meshed fisheries (prawn and <i>Nephrops</i>).</p> <p>Assessment Team Response. None needed.</p>
1.2.5	<p>There appears to be good level of dialogue between scientists and fishers, and the availability of log-book data to MRI is an important component of this.</p> <p>Assessment Team Response. None needed.</p>

1.2.6	No comment.
1.2.7	<p>It is stated that for all practical purposes, Icelandic cod is not a shared stock and this is certainly true for the fished component of the population. There is some evidence that the cod stock in NAFO SA1 is non-sustaining population which is occasionally replenished by larval drift from the Icelandic stock (with occasional return of adults in the opposite direction). This issue is being investigated at ICES, at the request of the Greenlandic administration, with input from NAFO Scientific Council. As noted in the response to clause 1.2.6, Iceland is a member of both these organizations, and international cooperation is taking place in this area.</p> <p>Assessment Team Response. None needed.</p>
1.3.1.1	<p>As commented previously, I am not convinced of the precautionary nature of the reference points being discussed here, in the absence of a risk based framework. That said, the positive trends seen in the fishing mortality on the stock since the implementation of the management plan suggest that it is being managed in a way which allows growth of the stock.</p> <p>Assessment Team Response. None needed.</p>
1.3.1.2	<p>The reproductive potential of the stock does not appear to have been impaired at the lowest observed SSB, now corresponding to B_{lim} in the management plan (SSB = 125 000 t), therefore this clause is satisfied. It might be worth pointing out that this value occurred in 1997, within the “low recruitment” phase of the stock-recruitment trajectory and could therefore be considered conservative.</p> <p>Assessment Team Response. Text modified accordingly.</p>
1.3.1.3	<p>The SCAA method used is reasonably robust to error. I commented earlier that there is a declining signal in maturity at age in the 5 and 6 year groups since 2000, however I note that in the assessment the figures used are the average of the 2006 – 8 figures, therefore at the lower end of this period.</p> <p>Assessment Team Response. See return comment above for clause 1.1.7.1 - 1.1.7.3.</p>
1.3.1.4	No comment.
1.3.1.5	No comment.
1.3.1.6	<p>I would interpret the implementation of the precautionary approach to mean having a rule for setting catches under “normal circumstances”, reducing fishing pressure once the stock falls below a threshold (in this case 220kt) and stopping it once a limit reference level has been exceeded (125kt). This third step isn’t made explicit here – it may not specify exactly what action the minister should take in the management plan,</p>

	<p>but I feel there should be some mention of the option here, for the sake of completeness.</p> <p>Assessment Team Response. Clarification added.</p>
1.3.2.1.1	<p>The response to this clause seems at a tangent to the request. As per my comments above, the management plan states a target fishing mortality proxy ($F_{target} \sim 20\% B_{4+}$), precautionary ($B_{pa}$ SSB = 220 kt) and limit (B_{lim} SSB= 125 kt) reference points for biomass, and defined courses of action should these reference points are breached. The management plan has been assessed by ICES as precautionary, and fishing at a level consistent with F_{target} gives a low risk (<5%) of failing to meet the objectives of the management plan ($B_{2015} > B_{2009}$) therefore there is no requirement to establish and react to an F_{lim} value. (in simple terms, the TAC is determined by the target (low value of F, rather than the F being determined by the TAC). I believe the response would be more in line with the question if it stuck to these points and avoided heading into discussion of ICES advice leading to SSB at B_{lim} and so on.</p> <p>Assessment Team Response. Clarification added.</p>
1.3.2.1.2	No comment.
1.3.2.2.1	No comment.
1.3.2.2.2	No comment.
1.3.2.2.3	No comment.
1.3.2.2.4	No comment.
1.3.2.3.1	<p>In terms of demonstrating resilience of the stock and the effect of the current fishing mortality level on survivorship of older year classes, this is excellent. It might be worth noting the ontogenetic changes in maturity at age (fish maturing older) being a feature of gadoid stocks recovering from periods of overfishing, and the increased viability of eggs/larvae produced by these older females (“BOFF” hypothesis).</p> <p>Assessment Team Response. Clarification added.</p>
1.3.2.3.2	<p>I would interpret this clause to be focusing on the spawning behavior and the avoidance of spawning aggregations, should they occur (for example, the blue ling fishery in ICES Div. XIV has regulations prohibiting fishing in known spawning grounds between February and April), rather than the maintenance of the SSB. Consequently, much of the information on p.79 is extraneous, down to the paragraph above the map. I would suggest including more information on the seasonal closures and the information upon which these are based. [following the link quoted here, I found the text “All fisheries are closed within 12 miles along the south and west shore and within 6 miles along the north and east shore for two weeks during Easter to protect</p>

	<p>the spawning of cod". Easter falls at some point between the 22 March and 25 April. Maybe this is a shortcoming of this measure.]</p> <p>Assessment Team Response. Clarification added.</p>
1.3.2.3.3	No comment.
1.3.2.3.4	Information provided here is excellent.
1.4.1	No comment.
1.4.2	No comment.
1.5.1	No comment.
1.5.2	<p>Again, I'd argue that the 220 kt value is more in the spirit of a B_{pa} than a MSY $B_{trigger}$, given that we lack a candidate value for B_{msy}, but maybe that is just semantics.</p> <p>Assessment Team Response. None needed.</p>
1.5.3	No comment.
1.5.4	No comment. Iceland technically also has access to the "other countries" quota for cod in NAFO Div. 3M (Flemish Cap) – 58 t – but has never fished it.
1.5.5	No comment.
1.5.6	No comment.
1.5.7	No comment.
1.5.8	<p>No real comment, although would it be possible to include the figures from table 2.4.4.1 of the ICES Advice? I find bar charts such as this difficult to interpret – is the TAC overshoot decreasing or increasing with time, etc.</p> <p>Assessment Team Response. The existing figure is clear and easily understandable.</p>
1.5.9	There are no trans-boundary issues to consider in the management of the stock.
1.5.10	Nothing further to add.
Section 2: Compliance and Monitoring	<p>The information presented on compliance and enforcement measures fully addresses the issues raised. It may be possible to expand on a small number of areas to enable the reader to more easily grasp the scope of some topics, but otherwise the evidence is clearly set out and referenced and provides an good synoptic view of the fishery</p>

	<p>management measures.</p> <p>Assessment Team Response. None needed.</p>
2.1.1	No comment.
2.2.1	See below.
2.2.2	<p>Haul by haul e-logbook data, coupled with VMS, port and at-sea inspections, and a traceability system combine to make for a very robust system to monitor information on catches.</p> <p>Assessment Team Response. None needed.</p>
2.2.3	<p>The management measures appear flexible enough to correct for any errors in their implementation. I am intrigued by the fact that quota is lost if uptake is <50% in two consecutive years – more of an economic than a fishery management measure, but serves to maintain stability in the processing industry.</p> <p>Assessment Team Response. None needed.</p>
2.2.4 and sub-clauses	No comment.
2.3.1.1	No comment.
2.3.1.2	No comment.
2.3.1.3	No comment.
2.3.1.4	No comment.
2.3.2.1	No comment.
2.3.2.2	No comment.
2.3.2.3	No comment.
2.3.2.4	No comment.
2.3.2.5	<p>Would it be possible to expand upon what types of infringement fall within the categories of prosecutions detailed here? Does having catch onboard in excess of a vessels quota fall under the “fishery” category (for failing to stick to the allocated quota) or the “logbook” (for failing to record those catches properly), for example? It would help to understand the seriousness or otherwise of the figures being presented.</p> <p>Assessment Team Response. Clarification provided.</p>

2.3.2.6	No comment.
2.3.2.7	No comment.
2.3.2.8	No comment.
2.3.2.9	No comment.
2.3.2.10	No comment.
2.3.2.11	No comment.
2.3.2.12	No comment.
2.3.2.13	No comment.
2.3.2.14	No comment.
2.3.2.15	No comment.
2.3.2.16	No comment.
2.3.3.1	No comment.
2.3.3.2	<p>Is the monitoring of quota uptake by vessels automated? How is this information transmitted to the fishers?</p> <p>Assessment Team Response. Clarification provided.</p>
2.3.3.3	No comment.
2.3.3.4	No comment.
2.3.3.5	No comment.
2.3.4.1	<p>What are the ranges of penalties imposed for these infringements?</p> <p>Assessment Team Response. This information is not clearly available.</p>
2.3.5.1	No comment.

2.3.5.2	No comment.
2.3.5.3	No comment.
Section 3: Ecosystem Considerations	<p>Ecosystem considerations seem to have been comprehensively considered by the reviewers. The role of cod as a predator and prey species has been covered, along with the effects of fishing for cod on the benthic environment, non-target and bycatch fish species, mammals, seabirds and IUCN-listed species.</p> <p>Assessment Team Response. None needed.</p>
3.1.1	<p>The evidence presented here is very comprehensive, examining the impact of cod fisheries on other fished and non-target species, benthic fauna, marine mammals and sea birds, as well as considering the role of cod as both a predator and prey component of a food web. I concur with the assessment teams view on the importance placed upon capelin as a food source and the uncertainty associated with that assessment. From personal experience, the capelin fishery in NAFO Div. 3LNO is under moratorium in order to promote the recovery of the cod stock in this area. Consideration of capelin stock status in the management of cod would help develop an ecosystem approach to fisheries management, in line with the 1995 FAO Code of Conduct for Responsible Fisheries.</p> <p>Assessment Team Response. None needed.</p>
3.1.2	<p>This section mostly complements clause 3.1.1. Would it be possible to include a map of the eight MPAs which have been designated? The final sentence of the first paragraph on marine mammal bycatch is out of place (should be closer to the sentences on Grey Seals).</p> <p>Assessment Team Response. Added.</p>
3.2.1.1	No comment.
3.2.2.1	No comment.
3.2.2.2	No comment.
3.2.2.3	No comment.
3.2.3.1	No comment.
3.2.3.2	No comment.
3.2.3.3	No comment.

3.2.3.4	No comment.
3.2.4.1	<p>The question of whether a balanced harvesting regime can give consistent catches of predators and prey, or whether it is simply not possible to have everything at MSY at the same time, is the key here. I can't shed any light beyond what the assessment team has contributed, but it is good to see this issue being considered and builds confidence in the comprehensiveness of the review.</p> <p>Assessment Team Response. None needed.</p>
3.2.4.2	No comment.

Peer Reviewer B.**Summary and Recommendation**

The report contains adequate description of the biology of cod and the status of the stock (past and present), also the fishery and its management.

It would be helpful to have a summary table to give an overview of confidence ratings assigned to sections and clauses. Section 1 (management) was assigned high scoring in evidence rating and conformance for all clauses and the same was for section 2 (compliance and monitoring). One clause in section 3 (ecosystem considerations) received medium evidence rating and minor non-conformance, clause 3.1.1, but the rest received high score.

The information presented for management (section 1) and compliance and monitoring (section 2) provide sufficient information to support a broad understanding of the general history, development and main management entities and management systems in use by the fishery. I support the confidence ratings assigned to clauses in sections 1 and 2.

The proposed unit of certification includes six types of fishing gear (subunits) which differ in level of impacts on non-target species and benthic habitats. Therefore, the information in section 3 (ecosystem considerations) should be presented accordingly and the impact of individual gear assessed independently. This might result in different ratings by gear for evidence and conformance. It is argued that medium confidence rating should be given for clause 3.1.1 (all gears), 3.1.2 (demersal trawl), 3.2.2.2 (gillnets) and 3.2.3.1 (demersal trawl).

IRFM Specification Clauses	Insert Comments as Required
Section 1: Fisheries Management	The information presented provides sufficient information to support the assigned ratings.
1.1.1	
1.1.2	<p>The fisheries management system objective shall be to limit the total annual catch form the fish stocks so that catches are in conformity with amounts allowed by the competent authorities</p> <p>In the past the total annual catch has exceeded TAC, even since the HCR was implemented (3-5%, clause 1.5.8). The relevance of such overshooting should be addressed.</p> <p>Assessment Team Response. This was already considered in the clause. The small TAC overage that can be seen between TAC and actual catch is likely due to the flexibility rules related to the catch of juveniles (to avoid their discards) and to the response time of the catch accounting system. However, all catches are accounted in the yearly stock assessment process of the MRI.</p>
1.1.3	
1.1.4	
1.1.5	<p>Fishing for the “stock under consideration“ shall be managed by the competent authorities in accordance with a documented and publicly available Fisheries Management Plan</p> <p>The current HCR is under revision and changes to the rule are being discussed. This may raise concern that the authorities will not stick to the principles which the HCR is based on. The rationale must shed some light on what issues have been discussed and what possible changes will be made on the current HCR.</p> <p>Assessment Team Response. This item was discussed at the site visits in April 2014. The MRI confirmed that the HCR is under revision, with a number of potential changes that could take place. This however is still largely at the discussion phase and for that reason, speculations are not justified. When the FMP will be updated next year, an appropriate review and comparison with the precious one will take place accordingly.</p>
1.1.6 and sub-clauses	<p>1.1.6.4 The Fisheries Management Plan developed and adopted by the competent authorities shall be formulated with due consideration to 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</p>

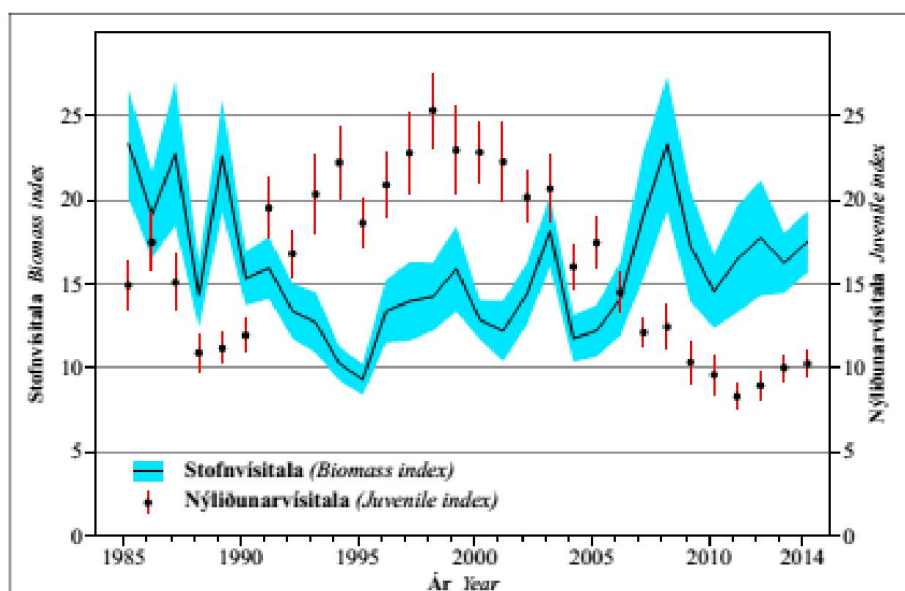
	<p>The current HCR is under revision. See comments to clause 1.1.5.</p> <p>Assessment Team Response. Same as above.</p>
1.1.7 and sub-clauses	
1.1.8 and sub-clauses	
1.2	
1.2.1	
1.2.2	
1.2.3	
1.2.4 and sub-clauses	
1.2.5	
1.2.6	
1.2.7	
1.3.1.1	
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1.3.2.3.2	
1.3.2.3.3	
1.3.2.3.4	
1.4.1	
1.4.2	
1.5.1	
1.5.2	
1.5.3	<p>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.</p> <p>The rationale does not state that the annual TAC is set by the Minister of Industries and Innovation (competent authority).</p> <p>Assessment Team Response. Text modified accordingly.</p>
1.5.4	
1.5.5	<p>The competent fisheries management authority shall decide on TAC within the boundaries set by the adopted harvesting policy.</p>
1.5.6	
1.5.7	
1.5.8	<p>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</p> <p>The TAC has been over-fished with 3-5% in recent years. The relevance of such overshooting should be addressed.</p> <p>Assessment Team Response. The relevance of TAC overshooting has been addressed in the clause.</p>
1.5.9	
1.5.10	

Section 2: Compliance and Monitoring	The information presented provide sufficient information to support the assigned ratings. No comments are needed.
2.1.1	
2.2.1	
2.2.2	
2.2.3	
2.2.4 and sub-clauses	
2.3.1.1	
2.3.1.2	
2.3.1.3	
2.3.1.4	
2.3.2.1	
2.3.2.2	
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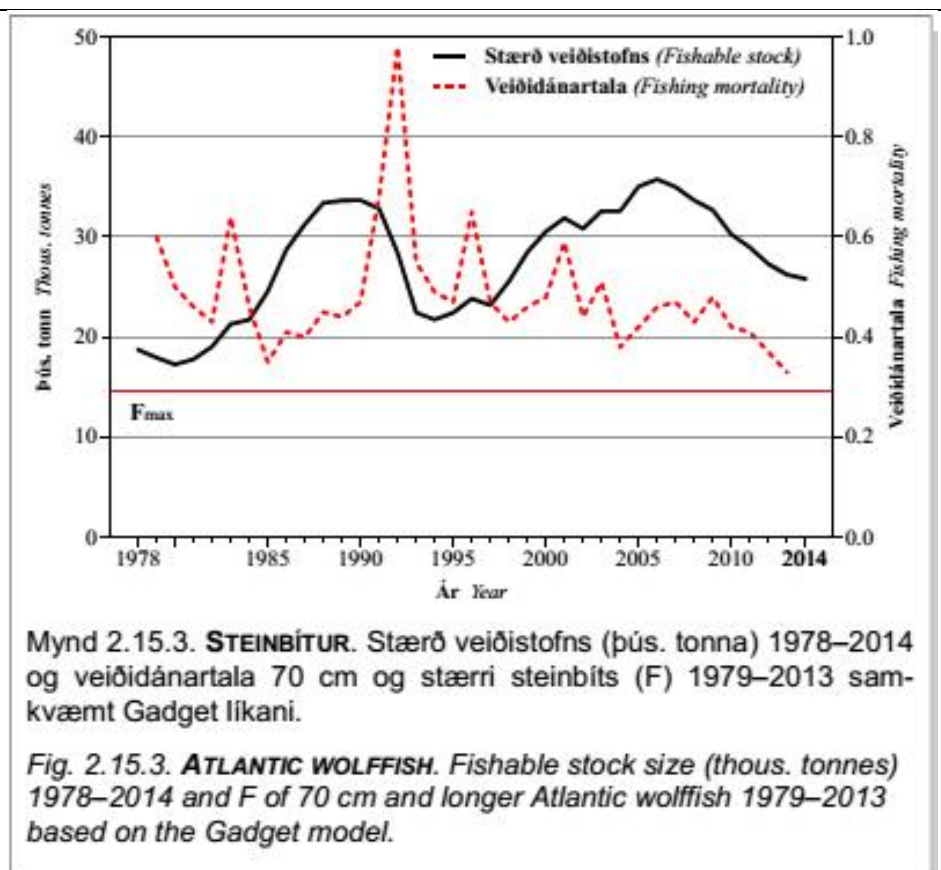
2.3.2.13	
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2.3.2.16	
2.3.3.1	
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2.3.3.3	
2.3.3.4	
2.3.3.5	
2.3.4.1	
2.3.5.1	
2.3.5.2	
2.3.5.3	
Section 3: Ecosystem Considerations	The assessment includes six types of fishing gear which differ in level of impacts on non-target species and benthic habitats. The impact of individual gear should be assessed separately and assigned with confidence rating independently.
3.1.1	<p>Adverse effects of the fishery on the ecosystem shall be considered....</p> <p>Agree with the Assessment Team regarding non-conformance regarding cod-capelin predator-prey interactions and the proposed recommendation.</p> <p>However, there are other issues regarding retained species and habitat impacted by the cod fishery which the assessment is not addressing :</p> <p>1) For wolffish (catfish), the TAC has repeatedly been exceeded and fishing mortality remains higher than the target level, which, when combined with poor recruitment, suggests that the management measures may not be effective (FAO Code of Conduct 7.2.2 e&f).</p>

Assessment Team Response. Comments acknowledged. Landings of Atlantic wolffish (*Anarhichas lupus*) in 2013 were around 9 000 t, the lowest landings since 1982, despite the MRI recommended setting the TAC as 7 500 t for the quota year 2013/2014, based on $F_{max}=0.29$. Despite a general decline in recruitment since the late 1990's, the stock has shown an increasing trend in biomass (survey index) which appears to be partially driven by the continued decline in fishing mortality. While F is still above F_{max} is likely to be well below any potential PA level. Evidence from stock assessment shows the fishing mortality has been decreasing continuously since the past 5 years and appears to be close to reaching the target mortality. Based on this information the management of this stock appears to be improving although not ideal, but not posing significant threats to the stock. This stock and its management will be reassessed with attention in the coming years, given the low recruitment levels. Further work is also ongoing to assess specifically the level of wolffish by-catch associated with the targeted cod fishery.



Mynd 2.15.2. **STEINBITUR.** Visitalur veiðistofns (þyngd, fiskar 60 cm og stærri) og nýliðunar (fjöldi, 20–40 cm) úr stofnmælingu botnfiska í mars, ásamt staðalfrávik.

Fig. 2.15.2. **ATLANTIC WOLFFISH.** Fishable biomass indices (>60 cm) and juvenile abundance indices (20–40 cm) from the annual groundfish survey in March, along with the standard deviation.



<http://www.hafro.is/Astand/2014/15-steinbitur.PDF>

2) Atlantic halibut is an ETP species recognized by Icelandic authorities. The ban on targeting halibut has been recently introduced, and the effectiveness of the strategy remains to be seen (FAO Code of Conduct 7.2.2 e&f).

Assessment Team Response. Comments acknowledged. Currently, the halibut stock seems to be severely depleted, with very little recruitment into the spawning stock in recent years. Recently, the Minister set up a dedicated working group to identify the best management measures to protect the stock. This resulted in closure of the directed fishery. In 2012 a regulation was issued to ban all directed fishery for halibut (*Hippoglossus hippoglossus*) and that all viable halibut must be released in other fisheries (mandatory release). As a consequence, the landings of halibut dropped to 36 and 44 t in 2012 and 2013, respectively, compared to 555 t in 2011. Studies elsewhere indicate that survival is somewhat variable, but with median ranges of ~40 - 60% survival indicating that the measure is likely to reduce fishing mortality. The MRI recommends that these regulations should be maintained until clear indications of improvement in the stock are evident. The stock is depleted but management appears to be acting responsibly (ban on directed fishing and release of viable caught halibut).

3) OSPAR has listed several species and habitats as threatened and/or declining in Icelandic waters and which are impacted by the fishery: Common skate, coral

gardens, deep-sea sponge aggregations, *Lophelia pertusa* reefs, and hydrothermal vents/fields. There are measures in place, such as area closures, that are likely to reduce impacts on common skate but do not address the species conservation specifically (FAO Code of Conduct 7.2.2 e&f). Coral gardens, deep-sea sponge aggregations and hydrothermal vents/fields are habitats that are not addressed in the cod fishery assessment (FAO Code of Conduct 7.2.2 d). Information is given for the stock status of a range of retained species. For some reason some are left out, e.g. common skate.

Assessment Team Response. Comments acknowledged. Firstly, it is important to clarify the purpose of the OSPAR List of Threatened and/or Declining Species and Habitats (Reference Number: 2008-6). The list was designed to guide the OSPAR Commission in setting priorities for its further work on the conservation and protection of marine biodiversity. The inclusion of a species or of a type of habitat on this list has no other significance. The OSPAR Commission has no competence to adopt programmes or measures on questions relating to the management of fisheries. These are the responsibilities of the various fisheries management organizations.

Seabed mapping is a one of the Marine Research Institute's projects which started with the launching of the research vessel, Awni Fridriksson, in the year 2000. The vessel is equipped with a multibeam echo sounder which enables a detailed mapping of the seabed. Bathymetrical and backscatter data is used to make different kinds of maps, i.e. contour-, sun-illuminated and three dimensional maps, and maps with information of the substrate. The equipment is the first one, owned by Iceland, in an Icelandic vessel. The main emphasis of the project is to do detailed mapping of the seabed inside the exclusive economic zone. The information is useful for research of the marine environment, the physical properties of the ocean and the marine geology. Emphasis has been on mapping fishing grounds and benthic communities and habitats.

The available data on fishing effort of the Icelandic fleet is very accurate and have made it possible to map in detail the distribution of otter trawl effort around Iceland. Over the next few years priority will be given to map the distribution of benthic assemblages and habitats which are considered to be sensitive to trawling disturbances. Such information will be important in order to predict which species and habitats are being at risk of being damaged by fishing activities and for protection of important marine habitats in the future.

The waters around Iceland, at least down to 500 m depth, are very rich in habitat forming sponge communities, "ostur", dominated by *Geodia* spp. Klitgaard and Tendal (2004) describe the composition of "ostur" from sampling sites all around Iceland, the community south of Iceland being comprising *Geodia atlantica*, *G. Mesotriaena* and *G. barretti* as well as *Geodia* (former *Isops*) *phlegraei*. Very large catches of sponges (up to >20000 kg) were reported to Klitgaard and Tendal (2004) from the eastern and western flanks of the northern part of Reykjanes Ridge at

more than 1000 m depth in Atlantic water. Bycatch analysis carried out during the 2002 groundfish survey enabled the estimation of the distribution of mass sponge occurrences on the Iceland shelf (Ragnarsson and Steingrímsson 2003). The authors suspected that sponge bycatch is lower in areas of high fishing effort as indicated in the Figure below.

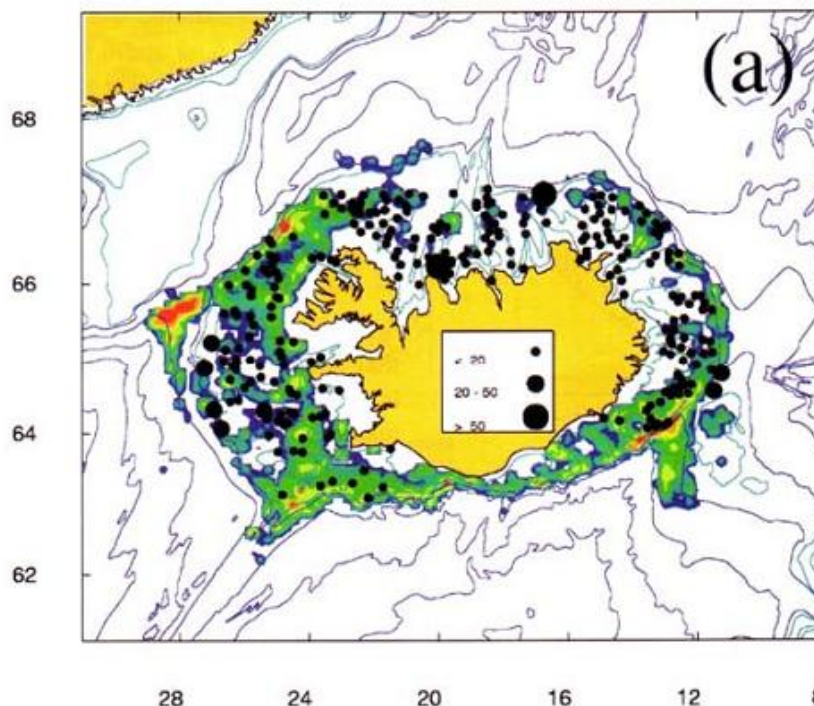
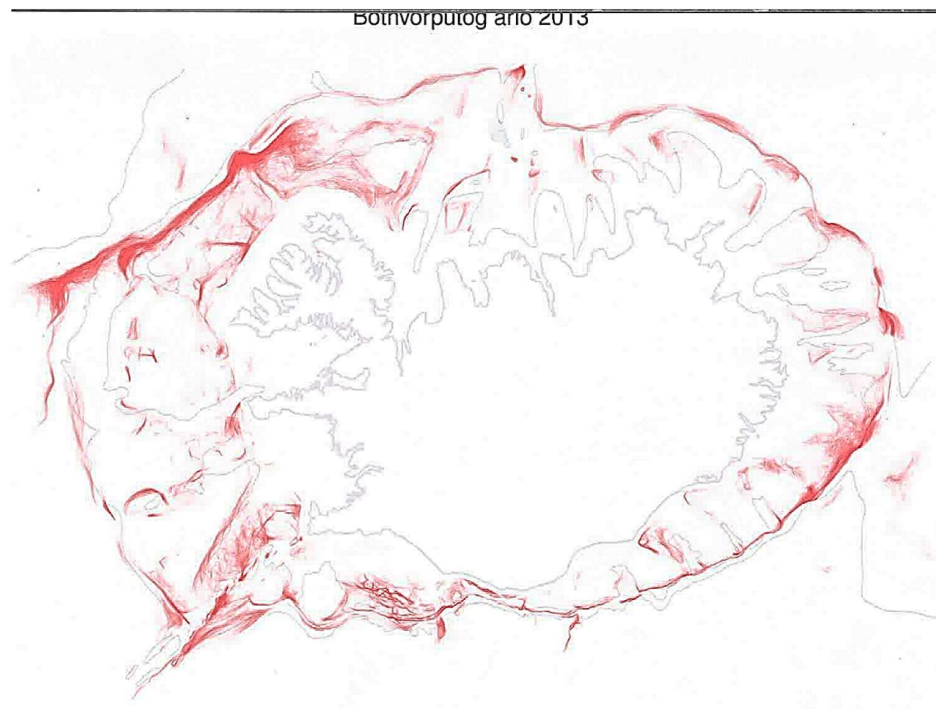


Figure. Iceland. Biomass of sponge bycatch in 2002, superimposed on fishing effort as mean annual swept area (nm^2 per 1° latitude x 1° longitude cell). Black dots indicate total biomass (kg/h otter trawl haul) of sponges in the 2002 groundfish survey by the Marine Research Institute.

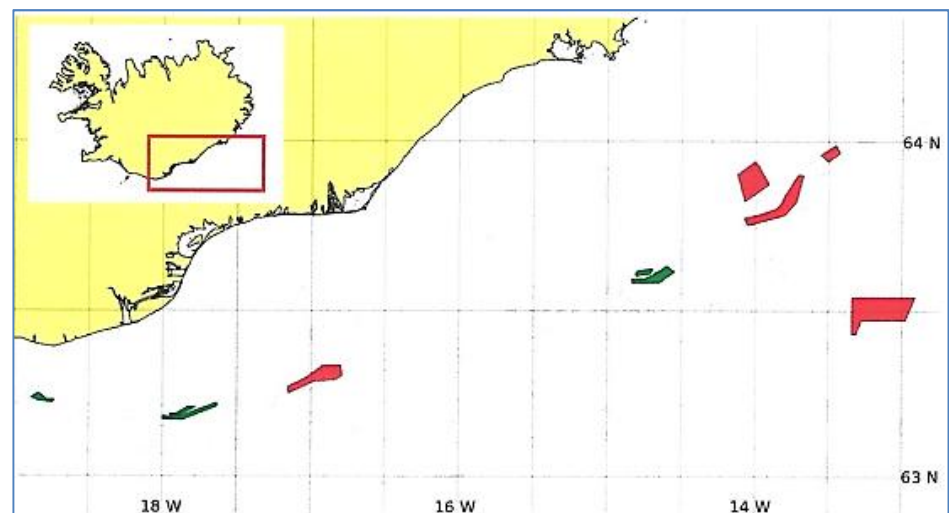
http://qsr2010.ospar.org/media/assessments/Species/P00485_deep_sea_sponge_aggregations.pdf

Currently, there are no strategic conservation plans for sponges. However, within Icelandic water outside 12 nautical miles, several permanent regulatory fisheries closures (total area $13,094 \text{ km}^2$) have been established, where fishing with otter trawls and also in most cases long-lines, is banned. The main aim of these closures is to protect nursery grounds of Atlantic cod (*Gadus morhua*) and redfish (*Sebastes spp.*). However, these closures do also *de facto* protect benthic organisms, including sponges. In addition, all coastal areas within 4-12 nautical miles are protected against bottom trawls (total area of $45,290 \text{ km}^2$), while Danish seine are permitted and the area thus practically protected with respect to sponges. Finally, ten closed areas have been established in Icelandic waters to protect cold water corals, (see map below showing the coral closures in South East Iceland) and some of these have considerable abundance of sponges. Within those areas, all activities (including fishing) that can affect the seabed are prohibited. All in all, aside from the

coral closures, 58,384 km² are protected through trawl closures, while the shelf area⁶² (within which fishing activities occur) is 109,010 km². Trawl closures make up more than half of the total fishable area. Furthermore, not all the fishable shelf areas outside closed areas are trawlable, as some parts are too rough or uneven for trawl gear to operate on. This can be seen in the figure below showing trawl effort in Iceland in 2013 (darker areas signify higher effort).



Because of this, it appears that there is suitable protection for sponge communities within the Icelandic shelf area.



The coral (*Lophelia pertusa*) closures protect a species of cold-water coral which grows in the deep waters throughout the North Atlantic ocean. *L. pertusa*

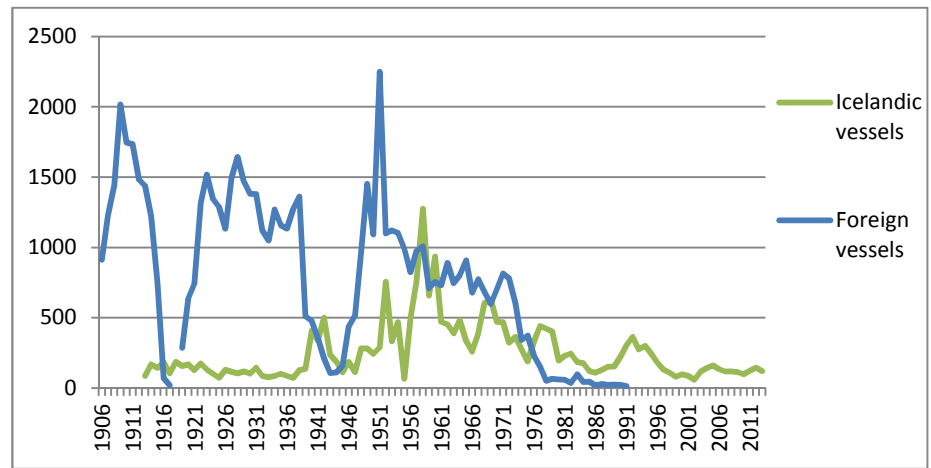
⁶² <http://www.searoundus.org/eez/352.aspx>

	<p>reefs are home to a diverse community, however the species is extremely slow growing and may be harmed by destructive fishing practices. In 2004 a research project was started on mapping coral areas off Iceland (using a Remote Operated Vehicle, ROV), based on the results from questionnaires to fishermen on occurrence of such areas. As a result several areas were permanently closed to fishing for protection of coldwater corals (see above, currently there are 10 coral closures).</p> <p>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.</p> <p>In 2013 the total catch of common skate (<i>Dipturus batis</i>) in Icelandic waters was 121 t. No TAC is available for this species because there appears to be no directed fishery for it. New studies suggest that the common skate <i>D. batis</i> is actually a species-complex, split into two nominal species, the blue skate (provisionally called <i>D. cf. flossada</i>) and the flapper skate (<i>D. cf. intermedia</i>) with maximum lengths of 143.2 cm and 228.8 cm respectively (Iglesias <i>et al.</i> 2009⁶³). This classification confusion has resulted in the depletion of the flapper skate throughout European waters, the more endangered species of the two, being masked in the catch record.</p> <p>From 2011 onwards, all <i>Dipturus</i> specimens caught in the annual lobster survey of the south coast have been carefully examined and compared to the criteria given by Iglesias <i>et al.</i> (2009)⁶⁴ to differentiate between <i>Dipturus cf. flossada</i> and <i>Dipturus cf. intermedia</i>. All specimens morphologically examined hitherto belong to <i>Dipturus cf. flossada</i>, not <i>intermedia</i>. This is also true for other specimens caught in the groundfish surveys. The largest individuals caught in these cruises was 152 cm long. Identification of sexual maturity stages revealed the onset of maturity at 100 cm length (males) and that all individuals larger than 120 cm were mature. This agrees with what Iglesias <i>et al.</i> (2009) found for <i>Dipturus cf. flossada</i>. <i>Dipturus cf. intermedia</i> is considerably larger when sexually mature.</p> <p>In 2013, tissues samples for DNA analysis from these skates were sent to Dr. Andrew Griffiths at the University of Salford, UK. By the end of the year the largest individuals of the batch were analysed and it was found that the sequences analysed were identical to others previously collected from <i>D. flossada</i>. Thus confirming the identification based on morphological characters (MRI and Griffiths, 2013, pers. comm.). Search for archived specimens in Iceland did not reveal a single <i>Dipturus cf. intermedia</i>. Thus, there is no indication of occurrence of <i>D. intermedia</i> in Icelandic waters. MRI note that the bottom trawl spring survey will continue to</p>
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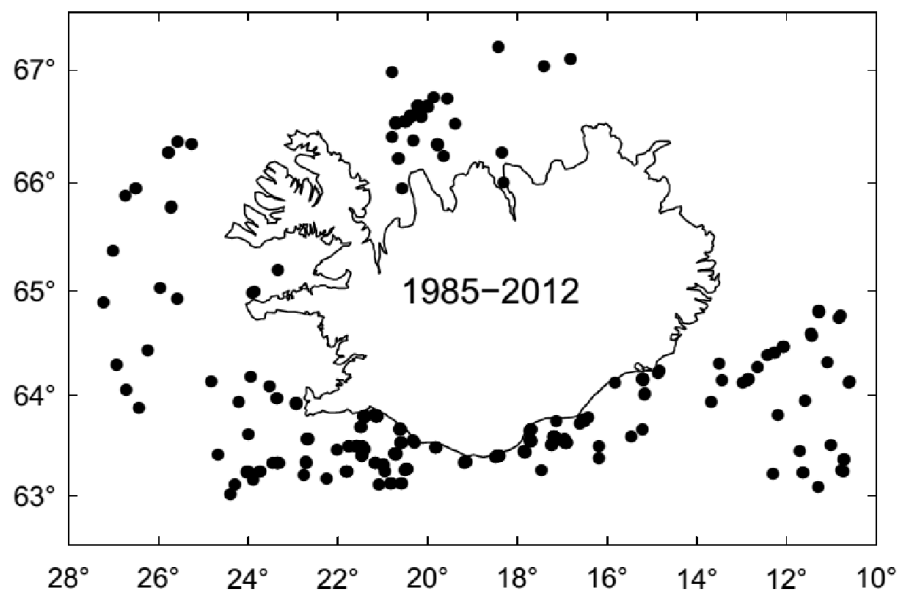
⁶³ Iglésias, S. P., Toulhoat, L. and Sellos, D. Y. (2010), Taxonomic confusion and market mislabelling of threatened skates: important consequences for their conservation status. *Aquatic Conserv: Mar. Freshw. Ecosyst.*, 20: 319–333. doi: 10.1002/aqc.1083

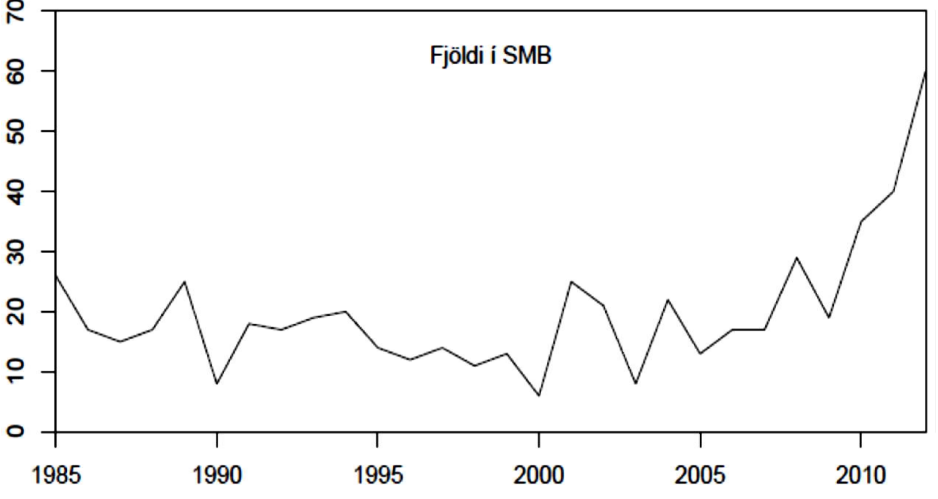
⁶⁴ Iglésias, S. P., Toulhoat, L. and Sellos, D. Y. (2010), Taxonomic confusion and market mislabelling of threatened skates: important consequences for their conservation status. *Aquatic Conserv: Mar. Freshw. Ecosyst.*, 20: 319–333. doi: 10.1002/aqc.1083

report on incidences and distribution of skate (*Dipturus spp.*) in the survey as they have been doing since the start of the survey in 1985. Also, catches in commercial fisheries will continue to be collected and that the MRI will monitor whether significant changes in quantities landed or in the survey results occur. Currently the catches are stable.



The stock is listed as Critically Endangered to Extinction on the IUCN Red list but not officially listed as a stock of concern in Iceland, while the catches and indices of abundance will, as for other stocks, be reviewed to consider if there are potential concerns to the stock status. In fact, the incidence of this species in the MRI surveys has been increasing in recent years (see below). Icelandic catch reports, at present, still go with *Dipturus batis* in terms of nomenclature, as the accepted scientific name. The 'World Register of Marine Species' lists the names *Dipturus cf. flossada* and *Dipturus cf. intermedia* as "Status under discussion". It is still not clear if these will be the officially accepted names.

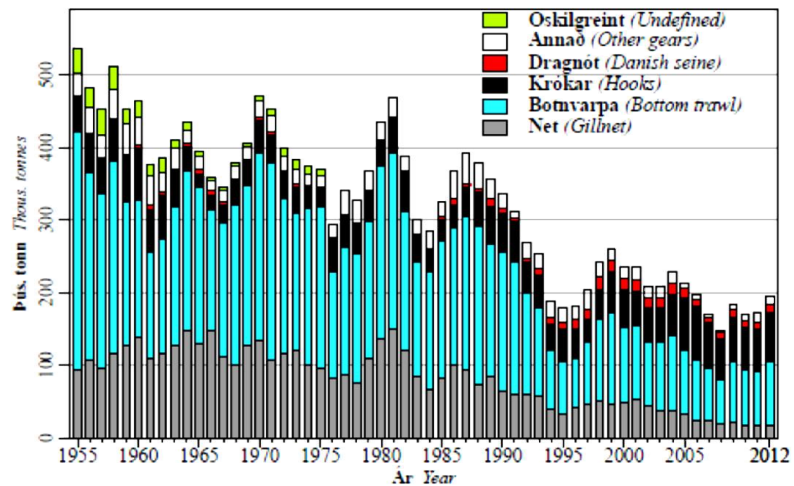


	 <p>Spring groundfish survey incidence of skate (<i>D. flossada</i>) captures per year (1985-2012). The Y axis of the bottom graph represents the number of skate caught. The upper figure represents the survey catch locations for the species in question.</p> <p>http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2871835/ http://www.sciencedaily.com/releases/2009/11/091117191048.htm http://onlinelibrary.wiley.com/doi/10.1002/aqc.1083/abstract</p> <p>It is argued that the lack of effective management measures to rebuilding the wolfish stock should contribute to the assignment of medium confidence rating. The non-conformance should be major based on the fact that existing measures are not strong enough although there is evidence that the status of the stock is critical.</p> <p>Assessment Team Response. The non conformance as proposed by the Peer Reviewer is not supported by the evidence available.</p>
<p>3.1.2</p>	<p>Those impacts that are likely to have serious consequences shall be addressed (immediate management response or further analysis)</p> <p><i>Impact on retained species:</i> Extensive area closure, mesh size regulations and ban on discarding are examples of management response as listed in the report. However, they do not specifically address the serious state of the stocks of wolfish and common skate (FAO Code of Conduct 7.2.2 d).</p> <p>Assessment Team Response. Points addressed. Please, see comments above.</p> <p><i>Impacts on habitats and benthos:</i> Iceland is a member of the Northwest Atlantic Fisheries Organization (NAFO) which manages the international fisheries in the Northwest Atlantic by establishing conservation and management measures to prevent significant adverse impacts of bottom fishing activities on vulnerable marine ecosystems (VME). Every Contracting Party shall ensure that fishing vessel comply with conservation and management measures. These measures have been</p>

	<p>implemented by the Icelandic authorities stipulating that vessels shall quantify each catch of VME indicator species and if it is beyond a set threshold the incident must be reported, fishing must cease and the vessel move away. Similar measures have been established by the North East Atlantic Fisheries Commission (NEAFC) which manages fisheries in the North East Atlantic and implemented by the Icelandic authorities (Regulation 1221/2008). However, none of these management measures apply to fisheries in Icelandic waters. (FAO Code of Conduct 7.2.2 d&g).</p> <p>Assessment Team Response. These measures apply to VME areas encountered in the deep seas by the contracting parties EEZ. The regulations and measures in the high seas were set up so to avoid potential damage to new sites, caused by otter trawl gear. VMEs within the Icelandic EEZ are protected through area closures. This was clarified above specific to closures relevant to coral and sponge communities. Hydrothermal vents with complex surface structures are also protected through specific closures.</p> <p><i>Impacts on ETP species:</i> Ban on targeting Atlantic halibut and release of viable halibut is an example of immediate management response (FAO Code of Conduct 7.2.2 d).</p> <p>Assessment Team Response. See comments above.</p> <p>Assigning this clause with high level of confidence in evidence and non conformance seems to be too generous. Impacts on vulnerable habitats, such as deep-water sponge aggregations, are likely to have serious consequences but are only partially addressed (protection of coral). There are no evidence of immediate management response (such as applied by NAFO and NEAFC). It is argued that demersal trawl should be assigned with medium (evidence) and major non-conformance as it will be a major improvement to apply measures similar to the move away rule by NAFO and NEAFC.</p> <p>Assessment Team Response. As above, see previous comments that deal with this point. In Iceland, aside from coral closures, 58,384 km² are protected trough trawl closures, while the shelf area (within which fishing activities occur) is 109,010 km². Trawl closures make up more than half of the total fishable area. Furthermore, not all the fishable shelf areas outside closed areas are trawlable, as some parts are too rough or uneven for trawl gear to operate on. It would appear than enough protection is afforded to sponge communities within the Icelandic shelf.</p>
3.2.1.1	
3.2.2.1	
3.2.2.2	<p>Where relevant, appropriate steps shall be taken to avoid, minimize or mitigate encounters with seabirds and marine mammals</p> <p>Scaring devices used by long-liners is an example of measures to avoid or minimize</p>

encounters with seabirds. The gillnet fishery encounters marine mammals but the rationale does not provide evidence of measures in order to reduce its impact. The amendment to the logbook regulation is not such a measure. If evidence is not given the confidence rating should be medium for **gillnets**.

Assessment Team Response. Comments acknowledged. Marine mammal interaction are minimised by the fleet by avoiding sites and adopting fishing and hauling techniques that minimise the interaction between fishing gear and these animals. No other specific measure or practice is currently known to the assessment team. Having said that, the impact of the cod gillnet fisheries does not appear to be significant on pinnipeds and cetaceans. Iceland has started with improving data collection systems for marine mammals and seabirds bycatch in the groundfish fisheries. Data collection is the first step in determining if a threat exist. Management measure should follow once information is available. The Assessment Team agrees with the peer reviewer that the situation is not ideal but does not agree with raising a non conformance since the management is currently working to improve this area. While the by-catch of marine mammals raises important ethical issues, by-catches of seals are predominantly associated with the fishery for lumpsucker and while by-catches of cetaceans are relatively elevated in the cod gill net fishery, the incidence is mainly observed in the lumpsucker fishery. The overall levels of dolphin by-catch are also expect to decline further due to the trend in use of gill nets as a fishing method for targeting cod. The figure below shows the continued decline in the use of gill nets in the past decade and this fishing method accounts for less than 9% of the annual cod catch. It is also noted that based on the most recent population estimates, the by-catch of cetaceans is less than 1% of the total population, therefore presenting a very low risk to the population.



Mynd 2.1.1. ÞORSKUR. Heildarafli (þús. tonna) eftir veiðarfærum árin 1955–2012.

Fig. 2.1.1. Cod. Total landings (thous. tonnes) 1955–2012 by gear type.

3.2.2.3

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

	<p>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, minimize or mitigate such impacts.</p> <p>Several types of vulnerable habitats have been identified in Icelandic waters (e.g. http://www.atvinnuvegaraduneyti.is/media/Skyrslur/fridunskyrsla_2005.pdf). Cold water coral (<i>Lophelia pertusa</i>) and hydrothermal vents are examples of such habitats which IRFM specifically focuses on. However, the law 79/1997 (Lög um veiðar í fiskveiðilandhelgi Íslands) does not apply to particular types of vulnerable habitats (article 9). Deep-sea sponge aggregations habitats (“ostur”) are also highly vulnerable and listed by OSPAR as threatened where they occur. Such habitats do occur near Hali fishing ground off NW Iceland and could be impacted by the cod fishery. However, MRI has not conducted research in that respect. It is argued that demersal trawling should be assigned with medium confidence.</p> <p>Assessment Team Response. Comments acknowledged. This point has been dealt with and provided evidence for above.</p>
<p>3.2.3.2</p>	<p>Management measures must take into account stony coral areas, identified through scientific and formal methods</p> <p>IRFM specifically focuses on stony coral. However, the Act 79/1997 on Fishing in Iceland’s Exclusive Economic Zone does not apply to particular types of vulnerable habitats (article 9). The evidence given is not based on the latest developments in area closure for coral protection.</p> <p>Assessment Team Response. Comments acknowledged. The clause focuses on stony corals. The evidence provided is relevant to stony coral closures.</p>
<p>3.2.3.3</p>	<p>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)</p> <p>The evidence given is not based on the latest developments in area closure for coral protection.</p> <p>Assessment Team Response. Same as above.</p>
<p>3.2.3.4</p>	<p>Known thermal vents shall be protected through area closure to fishing activities with gear that has significant bottom impact during normal operation.</p> <p>No evidence is given where hydrothermal vents do occur in Icelandic waters, nor where they might be at risk of impact by the fishery. Also, no information on how the implied protection was established.</p> <p>Assessment Team Response. Maps have been provided and evidence updated.</p> <p>There are two known hydrothermal vent areas on the Icelandic continental shelf with series of chimneys and fissures both inside Eyafjord, North Iceland (see map). In addition, there are known hydrothermal vents deep north of Iceland on the</p>

Grimsey-Kolbeinsey ridge and at Steinakoll, south of Melsa at the Reykjanes ridge, Southwest Iceland.



The chimney areas in Eyjafjord area are fully protected by environmental law/regulation. The other vents are in more remote areas and with less surface structures and have thus not been considered under serious threat by fishing activities.

3.2.4.1

3.2.4.2

9. Non-Conformances and Corrective Actions

A minor non conformance was identified by the assessment team regarding cod-capelin predator-prey interactions under:

Clause 3.1.1. Adverse impacts of the fishery on the ecosystem shall be considered and appropriately assessed and effectively addressed of the Icelandic RFM Specification (version 1, revision 1, March 2014).

Text of the non conformance:

Icelandic cod is a key predator of capelin. The 2014 ICES Advice for Icelandic capelin notes that there is considerable uncertainty in both the spawning stock biomass (SSB) forecast and the assumptions around natural mortality of the species. Furthermore, there is potential for significant post escape unaccounted mortality associated with the pelagic trawl fishery for capelin (accounting for 26% of total catches). Accounting for these uncertainties in mortality and SSB estimation, the fact that Icelandic cod is a key predator of capelin, and that the objective of the cod Fishery Management Plan (FMP) is to build a large healthy cod stock, the FMP should ideally take into consideration the adequacy and health of the capelin stock. Failing to account for this in the management of capelin could mean depleting the capelin resource and later affecting the cod stock directly, through a lack of prey resource. It is noted that a benchmark for the capelin stock assessment and the review of the Icelandic cod FMP is planned for 2015. It would be very prudent to consider predator-prey interactions in future revisions to the management plans for cod and capelin.

After issuing the minor non conformance (text above in italics) to the client representative, the MRI responded formally, as part of a requested corrective action, that an in-depth ICES benchmark assessment of the capelin stock occurring in the area around East Greenland, Iceland and Jan Mayen and harvested by Iceland, Greenland and Norway will be carried out in the first half of 2015. The communications is provided below as evidence.

Vito Romito

From: Kristján Þórarinnsson <k@liu.is>
Sent: 14 July 2014 16:52
To: Vito Romito
Subject: FW: Forthcoming benchmark meeting capelin harvested by Iceland

Dear Vito,

I forward to you the confirmation message below that I have just received from Mr. Jóhann Sigurjónsson, Director General of the MRI, concerning the forthcoming capelin benchmark.

All the best,
Kristjan

From: Jóhann Sigurjónsson [<mailto:johann@hafro.is>]
Sent: 14. júlí 2014 14:40
To: Kristján Þórarinnsson
Subject: Forthcoming benchmark meeting capelin harvested by Iceland

Dr Kristján Þórarinnsson, special adviser
LÍÚ, Icelandic Federation of Vessel Owners

Re: Forthcoming benchmark meeting capelin harvested by Iceland

Dear Kristján

As a follow up of our conversation today, it is my pleasure to confirm that our institute has been informed that ICES secretariat has planned to conduct an in-depth benchmark assessment of the capelin stock occurring in the area around E Greenland, Iceland and Jan Mayen and harvested by Iceland, Greenland and Norway. The benchmark is going to take place during the first half of 2015.

Yours sincerely,

Jóhann Sigurjónsson, forstjóri/Director General
Hafrannsóknastofnun/Marine Research Institute
Skúlagata 4, P.O. Box 121 Reykjavík, Iceland
Sími/Telephone : +354-5752000
Bréfsími/Telefax: +354-5752001
Netfang/Email: johann@hafro.is
Vefsíða/Website: www.hafro.is/hafro/sjalf.html

In the first surveillance assessment for this fishery (12 months after certification date) the assessment team will reassess this issue taking into account 1) the results of the ICES capelin assessment benchmark and 2) the relative management actions and harvest decisions taken by the Icelandic authorities. After reassessing this issue in the first surveillance, the assessment team may agree to request further corrective action, if the conditions require.

Also to be taken into account is the capelin quota decided by Iceland for 2015. Given the uncertainties in the assessment and following based on precautionary considerations, ICES (2014) advised that the initial (first stage) quota should be set at **one half** of the predicted quota (not the two-thirds rule in the management plan). For 2015, this implies an initial quota of 225 000 t for 2015. The final quota is expected to be revised based on in-season survey information in winter 2015. The Icelandic quota for 2014/2015 season has been recommended at 225 000 tonnes, provisionally, and is in line with ICES Advice for the 2014/15 season. Revision based on the winter survey is common practice.

<http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/2014/cap-icel.pdf> ;

<http://www.hafro.is/Astand/2014/1-tac.PDF>

10. Recommendation and Determination

Assessment Team Recommendation

The assessment team recommends that the management system of the applicant fishery, the Icelandic Cod (*Gadus morhua*) commercial fishery, fished within the 200 mile Icelandic Exclusive Economic Zone (EEZ) by all Icelandic registered vessels using all gear types directly (demersal trawl, long-line, Danish seine net, gill net, hook and line) and indirectly (Nephrops trawl, shrimp trawl and pelagic trawl) under the management of the Icelandic Ministry of Industries and Innovation, is awarded certification to the FAO-Based Icelandic Responsible Fisheries Management Certification Programme.

Certification Committee Determination

Following the recommendations of the assessment team and peer review team, the certification committee determined on October 7th, 2014, that the management system of the applicant fishery: the Icelandic Cod (*Gadus morhua*) commercial fishery fished within the 200 mile Icelandic Exclusive Economic Zone (EEZ) by all Icelandic registered vessels using all gear types directly (demersal trawl, long-line, Danish seine net, gill net, hook and line) and indirectly (Nephrops trawl, shrimp trawl and pelagic trawl) under the management of the Icelandic Ministry of Industries and Innovation; is awarded certification to the FAO-Based Icelandic Responsible Fisheries Management Certification Programme.

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Appendix 1

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

Gisli Svan Einarsson, (Assessor)

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

Dankert Skagen (M.D), (Assessor)

Dankert Skagen 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.

Dr Norman Graham, (Assessor)

Norman started his working career as a commercial fisherman followed by a BSc in fishery studies and PhD in by-catch reduction in shrimp fisheries. Principal research has been on the development and testing of discard mitigation tools, ghost fishing, benthic impact of fishing gear, scientific diving including underwater observation of fishing gears and fish escape mortality. Current area of work relates to stock assessment, scientific advice for managers, interface between industry-science-policy, use of fishery dependent data and participation in a number of national and international scientific working groups and committees. Advice provided included that for the EU presidency on reform of the EU CFP; national and regional scientific adviser on implementation of the EU landings obligation (discard ban); participation in ICES assessment Working Groups and advice drafting groups; scientific adviser to Regional Advisory Committee (NWWRAC) and member of STECF plenary committee and chair of STECF expert groups on EU discard ban and role of technical measures.

Vito Ciccio Romito, Lead Assessor

Vito Ciccio Romito holds a BSc in Ecology and an MSc in Tropical Coastal Management (Newcastle University, UK). His BSc studies focused on bycatch, discards, benthic impact of commercial fishing gear and relative technical solutions, after which he spent a year in Tanzania as a Marine Research officer at Mafia Island Marine Park carrying out biodiversity assessments and monitoring studies of coral reef, mangrove and seagrass ecosystems. Subsequently, for his MSc, he worked on fisheries assessment techniques, ecological dynamics of overexploited tropical marine ecosystems, and evaluation of low trophic aquaculture as a support to artisanal reef fisheries. Since 2010, he has been fully involved through Global Trust with the FAO-based RFM Assessment and Certification program covering the Alaska commercial salmon, halibut, sablefish, Pollock, crab, cod and flatfish fisheries as well Icelandic Cod, Saithe, Haddock and Redfish fisheries. Vito is also a lead, third party IRCA approved auditor.

Appendix 2

Based on the technical expertise required to carry out the above fishery assessment, Global Trust Certification Ltd., is pleased to confirm the Peer Review team members for the fishery as follows.

Dr. Neil Campbell

Neil Campbell is the Scientific Council Coordinator for the Northwest Atlantic Fisheries Organization (NAFO). After graduating in Marine Biology from Newcastle University, Neil moved to Aberdeen to study for a master's degree, before being employed as a researcher on a number of EU-funded fisheries research projects, the results of which formed the basis of his doctoral thesis. In 2005 he moved across Aberdeen to work for the Fisheries Research Service of the Scottish Government. During this time he performed a number of roles, including fish and shellfish stock assessment, deepwater fisheries, bioeconomic modelling, bycatch and discards reduction and analysis of VMS data. In 2011 Neil moved to Canada and took up a job with NAFO. This involves the coordination of the advisory process for fisheries targeting straddling and high-seas stocks of the northwestern Atlantic; working in close cooperation with scientists and managers from national governments, international organizations such as the FAO, academia, industry bodies and environmental NGOs.

Dr. Sigmar Steingrímsson

Dr. Sigmar Steingrímsson graduated in 1989 with a Ph.D. in Marine Biology from the University of Liverpool. He currently holds the position of department expert on environmental impact assessment (EIA) with the Icelandic National Planning Agency. Dr. Steingrímsson has extensive research experience in marine biology with the ecology of the seabed as his principal expertise. He has been involved in the designing and managing of fundamental research e.g. on the mapping of benthic invertebrates and cold water coral reefs in Icelandic waters and has studied the distribution of vulnerable deep water habitats around Iceland in relation to bottom fishing. He has also directed research on the ecology of several coastal areas in connection with EIA. He was a member of a government committee on the conservation of vulnerable deep water habitats and has represented Iceland in numerous working groups on marine ecology within ICES, including ecosystem effects of fishing activities. For several years Dr. Steingrímsson was heavily involved in Iceland's participation in the OSPAR convention.