ICELAND RESPONSIBLE FISHERIES MANAGEMENT (IRF) CERTIFICATION PROGRAMME

3rd Surveillance Report

For The

Icelandic Golden Redfish *(Sebastes norvegicus)* Commercial Fisheries

Facilitated By

Iceland Responsible Fisheries Foundation (IRFF)

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ICELAND RESPONSIBLE FISHERIES
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Glossary

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

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

i. Summary and Recommendations

The Fisheries Association of Iceland on behalf of the Federation of Icelandic Fishing Vessel Owners (LÍÚ), the Federation of Icelandic Fish Processing Plants (SF) and the National Association of Small Boat Owners, Iceland (NASBO) requested an assessment of the Icelandic golden redfish (*Sebastes norvegicus*) commercial fishery to the FAO Based Icelandic Responsible Fisheries Management (IRF) Certification Programme. Certification was granted the 1st of May 2014. The purpose of the Programme is to provide the fishing industry with a "Certification of Responsible Fisheries Management" at the highest level of market acceptance. Certification to the Programme demonstrates a commitment that will communicate to customers and consumers the responsibility of fishermen and fisheries management authorities and the provenance of Icelandic fish. The Iceland Responsible Fisheries Foundation, established in February 2011, owns and operates the brand of Iceland Responsible Fisheries.

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

The unit of certification includes the Icelandic Golden redfish (*Sebastes Norvegicus*) commercial fishery, under state management by the Icelandic Ministry of Industries and Innovation, fished with demersal trawl (main gear), long-line, Danish seine net, gill net, and hook and line by small vessel gear within Iceland's 200 nautical miles Exclusive Economic Zone (EEZ).

This Assessment report comprises the 3rd Surveillance Report for Icelandic golden redfish. Therefore, this report monitors for any changes in the management regime, regulations and their implementation, stock assessment and status, and wider ecosystem considerations since the 2nd surveillance assessment in 2016. Ultimately this assessment evaluates whether current practices in the management of the golden redfish fishery remain consistent with criteria contained in Revision 2.0 of the IRF Standard. The assessment was conducted according to the Global Trust procedures for FAO-Based IRFM certification using Version 2.0 of the IRFM Standard (July 2016).

The key outcomes of this Surveillance Assessment have been summarized in the Assessment Outcome Summary and Recommendations of the Assessment Team.

ii. Assessment Team Details

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1. Introduction

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

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

This Surveillance Report comprises the 3rd Surveillance Report for Icelandic golden redfish. Therefore, this report monitors for any changes in the management regime, regulations and their implementation, stock assessment and status, and wider ecosystem considerations since the last surveillance assessment in 2016.

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

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

1.1. Recommendations of the Assessment Team

The assessment team recommends that the management system of the applicant fisheries, the Icelandic golden redfish (*Sebastes norvegicus*) commercial fishery under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl (main gear), long-line, gill net, Danish seine net, and hook and line by small vessel gear and indirectly with Nephrops, shrimp and pelagic trawls and purse seines within Iceland's 200 nautical miles Exclusive Economic Zone (EEZ), is granted continued certification.

2. Fishery Applicant Details

Table 1. Fishery applicant details.

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

3. Unit of Certification

Table 2. Unit of Certification.

	Fish Species (Common and *Scientific Name*)	Geographical Location of Fishery	Gear Type	Principal Management Authority
1	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Demersal trawl	Ministry of Industries and Innovation
2	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Long-line	Ministry of Industries and Innovation
3	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Danish Seine net	Ministry of Industries and Innovation
4	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Gill net	Ministry of Industries and Innovation
5	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Hook and line by small vessels	Ministry of Industries and Innovation
6	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Nephrops Trawl	Ministry of Industries and Innovation
7	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Shrimp Trawl	Ministry of Industries and Innovation
8	Icelandic Golden Redfish *(Sebastes norvegicus)*	Iceland 200 mile EEZ	Pelagic Trawl	Ministry of Industries and Innovation

4. Surveillance Meetings

Table 3. Surveillance meetings (August 2016).

Date	Time	Organisation	Present	Overview/Key Items Discussed
06/09/2017	10:00	Coastguard	Björgólfur H. Ingason Chief Controller **Assessment Team**: Sam Dignan Gísli Svan Einarsson	▪ Enforcement Laws and Regulations. Amendments or changes to the Icelandic enforcement laws ▪ Changes to e-reporting system (bilateral agreement with Norway) ▪ Boardings and violations (as well as type) have been carried out by the ICG during 2016/2017 ▪ Type of vessels boarded ▪ Foreign vessels boarded ▪ Significant violations which undermined directly the management of the Icelandic redfish fisheries? ▪ Prosecutions and reprimands against skippers/vessels ▪ Changes in 2016/2017 in the systems or patrolling vessels used for enforcement ▪ Enforcement of gear marking regulations ▪ Enforcement of legislation regarding ETP species ▪ Enforcement of logbook reporting requirements
07/09/2017	10:00	Iceland Responsible Fisheries Foundation (IRFF)	Finnur Garðarsson **Assessment Team**: Sam Dignan Gísli Svan Einarsson	▪ Development of the IRF Programme ▪ Update on 2016/2017 fishing season ▪ Importance of fishing to Icelandic economy ▪ Importance of fish quality – steps to maximise the quality of the product.
	13:00	Fisheries Directorate	Þorsteinn Hilmarsson, Head of Services and information Hrannar Már Ásgeirsson **Assessment Team**: Sam Dignan Gísli Svan Einarsson	▪ Management, new organizational responsibilities, legislation ▪ Changes to re-weighing methods and how ice is accounted for. ▪ Changes in rules re transfer between years in response to under-catching in 2016/2017 as a result of labour issues. ▪ Development of smartphone app to replace/complement paper logs ▪ Catch versus TAC for 2016/2017 season. ▪ TAC allocation for 2017/2018 season. ▪ TAC versus catch ▪ Landing in other nations. Foreign vessels fishing in Icelandic EEZ. ▪ Changes to quota allocation mechanisms ▪ Gear marking regulations ▪ Fora/mechanisms for conflict resolution (e.g. gear conflict, conflict between sectors etc.) ▪ Mechanisms to disseminate information to the public. ▪ Updates on international cooperation ▪ New gear restrictions/technical measures ▪ Status of marine mammal populations, any updates

08/09/2017	10:00	Fisheries Iceland	Kristján Þórarinsson **Assessment Team**: Sam Dignan Gísli Svan Einarsson	▪ Better accounting for international catches ▪ Importance of fishing to Icelandic economy ▪ Importance of fish quality – steps to maximise the quality of the product.
	13:30	Marine and Freshwater Research Institute	Guðmundur Þórðarson Head of Demersal Research Department Guðjón Sigurðsson Steinunn Ólafsdóttir **Assessment Team**: Sam Dignan Gísli Svan Einarsson	▪ Changes to the analytical assessments for golden redfish? ▪ Plans for development of assessment and HCR. ▪ Formal state of the FMP/HCR at present? ▪ Fishery on the stock outside the Icelandic EEZ - shifts in distribution ▪ Concordance between TAC and catch. ▪ Bycatch/Habitats/ETP: ▪ Updates on mapping the distribution of benthic assemblages and habitats in Icelandic waters ▪ Interactions with ETP or depleted/low abundance species in Icelandic waters. Recent updates on the status of common skate, Atlantic halibut, Greenland shark, spiny dogfish and Atlantic wolfish ▪ Marine mammals. Porpoise and seal numbers latest updates. ▪ Logbook reporting of marine mammal and seabird bycatch. Comparisons of observer and self-reported data. ▪ New coral and hydrothermal vent closures implemented in the last 12 months.

5. Assessment Outcome Summary

5.1. Fishery Management

Iceland has a well-established marine policy, specified in legislation, on the structure of fisheries management and in practical implementation. The Ministry of Industries and Innovation is the principal management organization responsible for Icelandic fisheries. The Directorate of Fisheries is responsible for the implementation of Fishery Regulations on behalf of the Ministry. The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine Research Institute and Ministry of Industries and Innovation. The Marine Research Institute conducts a wide range of marine research and provides the Ministry with scientific advice. The stock is managed according to a management plan, approved by ICES, that has been in place since 2014. The main management measures include TACs in an ITQ system, area closures to protect undersized fish and mesh size regulations.

There is an established assessment method (Gadget) for golden redfish, which is approved by ICES. It uses data on catches and age and/or length distribution from Iceland, Greenland and the Faroes, and results from an extensive Icelandic bottom trawl survey in the spring and a groundfish survey in East Greenland. Supplementary data include age-length keys and other biological data from samples form surveys and landings. Redfish species are separated on board or at landing in the Icelandic fisheries, which is the major fishery, and by samples and information on location and depth in the Greenland and Faroese fisheries.

A limit reference point is defined for the spawning stock biomass. A target reference point is defined for fishing mortality, as part of a harvest rule. The harvest rule is considered precautionary and expected to give a near maximum long term yield. The harvest rule aims at maximizing long term yield with a target fishing mortality, but does not have a specific target biomass. The rule defines actions to be taken in terms of a fishing mortality for all levels of spawning biomass, including those below the limit point. Catches of juveniles are avoided by sorting grids in the shrimp fisheries and area closures if catches reach set levels of juvenile ratio. The harvest rule implies an exploitation below what would lead to growth overfishing.

The assessment of the stock is done by the ICES North Western Working Group (NWWG) where all relevant nations are represented. ICES reviews the NWWG report and provides advice based on the report. TACs are set according to scientific advice from ICES and MFRI. The stock is shared between Greenland, Iceland and the Faroes. Agreement was reached in 2015 between Iceland and Greenland on quota sharing, under which 10% it the TAC is allocated to Greenland. Other nations (Faroes and EU) only take minor catches of this stock.

5.2. Compliance and Monitoring

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

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

There is an integrated system for monitoring, control and surveillance (MCS) in Iceland. The Icelandic Coastguard administers the VMS for all Icelandic vessels and for all foreign vessels (including fishing vessels) that enter Icelandic waters as part of an integrated monitoring, control and surveillance (MCS) system. The

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

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

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

5.3. Ecosystem considerations

Adverse impacts of the fishery on the ecosystem (e.g. bycatch, ETP species interactions and habitat and food web interactions) are considered, appropriately assessed and effectively addressed. Gathering knowledge of the marine ecosystem is a key role that has been assigned to the Marine Research Institute. 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 MFRI monitors and researches the marine environment, including the ecosystem components.

Information is available on fishing gear used in the fishery, including its potential impact on the ecosystem. Stocks of non-target species commonly caught in the fisheries for the stock under consideration are monitored and their state assessed as appropriate. Discarding, including discarding of catches from non-target commercial stocks, is prohibited. Non-target catches, including discards, of stocks other than the “stock under consideration“ do not pose serious risks of depletion to these stocks.

The Icelandic authorities have implemented an extensive array of areal closures within the Icelandic EEZ. These include permanent, seasonal and periodic closures aimed at protecting both juvenile and spawning fish and are gear or fishery specific. These closures, in particular those of a permanent nature, provide wider ecological benefits over and above their intended fisheries management objective by offering *de facto* protection from fishing activity to other elements of the marine environment. While the majority of temporary closures to protect juveniles are aimed at protecting cod, haddock and saithe, these closures are likely to have a conservation benefit for other species too.

The MFRI has studied redfish, and its place in the ecosystem. All the redfish species primarily feed on zooplankton, but also on small fishes such as capelin. The single most important food group, however, is krill. Golden redfish are in turn prey to larger fish including cod, halibut and whales. There is no information to suggest that golden redfish are key species in the food web.

6. Conformity statement

The assessment team recommends that the management system of the applicant fisheries, the Icelandic golden redfish (*Sebastes norvegicus*) commercial fishery under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl (main gear), long-line, gill net, Danish seine net, and hook and line by small vessel gear and indirectly with Nephrops, shrimp and pelagic trawls and purse seines within Iceland's 200 nautical miles Exclusive Economic Zone (EEZ), is granted continued certification. Global Trust duly confirms that continued certification is granted.

7. FAO-Based Conformance Criteria Fundamental Clauses for Surveillance Reporting

7.1. Section 1: Fishery Management

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

Supporting Clauses:	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8 and sub-clauses, 1.1.9 and sub-clauses, 1.1.10 and sub-clauses			
Clause Guidance:	***There shall be a structured and effective fisheries management system, with objectives including the limiting of total annual catches for the stock under consideration. Accordingly, appropriate management measures for the conservation and management of the stock shall be adopted and effectively implemented by the competent authorities. Fishing for the "stock under consideration "shall be managed by the competent authorities in accordance with a documented and publicly available Fisheries Management Plan.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Iceland has a well-established marine policy, specified in legislation, on the structure of fisheries management and in practical implementation. The Ministry of Industries and Innovation is the principal management organization responsible for Icelandic fisheries. The Directorate of Fisheries is responsible for the implementation of Fishery Regulations on behalf of the Ministry. The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine and Freshwater Research Institute and Ministry of Industries and Innovation. The Marine and Freshwater Research Institute conducts a wide range of marine research and provides the Ministry with scientific advice. The stock is managed according to a management plan, approved by ICES, that has been in place since 2014. The main management measures include TACs in an ITQ system, area closures to protect undersized fish and mesh size regulations.

EVIDENCE

Iceland has an established Marine Policy. There is a principal Act ***(last amendment No** 116/2006)* and a number of supporting Acts and Regulations for the management of the fishery[1]. Article 1 in the principal act states the overall objective for Icelandic fisheries management: *The exploitable marine stocks of the Icelandic fishing banks are the common property of the Icelandic nation. The objective of this Act is to promote their conservation and efficient utilisation, thereby ensuring stable employment and settlement throughout Iceland.*

There is a structured fisheries management system adopted within Iceland for the management of fish species including golden redfish[2]. 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[3].

The Ministry of Industries and Innovation has the ultimate responsibility for fisheries management. They act according to law issued by the parliament (Althingi), and according to advice from the Marine and Freshwater Research Institute (MFRI). The executive body is the Fisheries Directorate (Fiskistofa). The coast guard is

[1] https://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/
[2] http://www.responsiblefisheries.is/seafood-industry/management-and-control-system/
[3] http://www.fisheries.is/management/government-policy/responsible-fisheries/

responsible for control at sea, both of the catches and the quality of the vessels. The Icelandic Coast Guard performs sea and air patrols of Iceland's 200-mile exclusive economic zone and 12-mile territorial waters, and monitoring of fishing within the zone in consultation with the Marine and Freshwater Research Institute and Ministry of Industries and Innovation. The Marine and Freshwater Research Institute (MFRI) conducts a wide range of marine research and now provides the Ministry with scientific advice as MRI did previously. MFRI was established on July 1, 2016 as a result of a merger of two inveterate Icelandic research institutes, the **Institute of Freshwater Fisheries** (founded in 1946), and the **Marine Research Institute** (founded in 1965).[4]

The Ministry of Industries and Innovation[5] in Iceland is the principal management organization responsible for Icelandic fisheries. Overall responsibilities include:

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

Limiting the total annual catch of redfish is achieved primarily by an annual TAC. This TAC is distributed on vessels as individual transferable quotas (ITQ), managed by the Directorate.

In addition, there are area closures (temporary and permanent), and gear restrictions in place. There is extensive control and monitoring of landings. Discards are prohibited, and studies by MFRI have indicated that discards of redfish are negligible. Management also includes fora for consultation with stakeholders. The Ministry sets the overall TAC for each species, including redfish. The TAC is set taking advice from MFRI, which is responsible for collecting and analysing scientific data on the stock. The MFRI advice is based on calculations done within the framework of ICES (The International Council for Exploration of the Sea) ICES provides advice, which normally, but not necessarily is followed by MFRI and subsequently by the Ministry. The ministry also seeks advice from ICES on management plans. The management plan for redfish was examined and approved by ICES in 2014[6].

The plan is publicly available and is effective from 2014 onwards[7].

[4] http://www.althingi.is/lagas/nuna/2015112.html
[5] http://eng.atvinnuvegaraduneyti.is/
[6] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/Special%20Requests/Iceland_Faroe_Islands_Greenland_Evaluation_of_ltmp_for_golden_redfish.pdf
[7] https://eng.atvinnuvegaraduneyti.is/publications/news/nr/8133

Clause 1.2 – Research and Assessment

Supporting Clauses:	1.2.1, 1.2.2, 1.2.3, 1.2.4 and sub-clauses, 1.2.5, 1.2.6, 1.2.7			
Clause Guidance:	***The relevant data collected/compiled by the relevant authorities shall be appropriate to the chosen method of stock assessment and sufficient for its execution, in line with assessing the size and/or productivity of the fish stock(s) under consideration. The determination of suitable conservation and management measures shall include or take account of total fishing mortality from all sources (including discards, incidental mortality and catches in other fisheries). Furthermore, there shall be active collaboration with international scientific organizations for stock assessment activities and review, and, in cases where the stock under consideration is a shared stock or a straddling stock or a highly migratory stock, there shall be scientific cooperation at the relevant bilateral, regional or international level for obtaining data and/or conducting stock assessments and/or providing advice, as appropriate.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

There is an established assessment method (Gadget) for golden redfish, which is approved by ICES. It uses data on catches and age and/or length distribution from Iceland, Greenland and the Faroes, and results from an extensive Icelandic bottom trawl survey in the spring and a groundfish survey in East Greenland. Supplementary data include age-length keys and other biological data from samples form surveys and landings. Redfish species are separated on board or at landing in the Icelandic fisheries, which is the major fishery, and by samples and information on location and depth in the Greenland and Faroese fisheries.

EVIDENCE

The current assessment method and the data that go into the assessment are described in the ICES Stock Annex for Golden redfish (*Sebastes norvegicus*) in ICES Subareas V and XIV[8].

Assessment method

The method for assessing the abundance and exploitation of the golden redfish in Iceland-East Greenland has evolved over several years and was approved by ICES in 2014. It uses the Gadget software, which has a combined age-length disaggregated forward projecting population model that is fitted to observations by the maximum likelihood approach. As such, it is versatile with respect to which data to use, but the data must be sufficient to reliably estimate the key model parameters that characterize the time course of stock abundance and mortality. The model operates on 3 commercial fleets, for which there are data on the length distribution and total landings. One survey index series is used, as a length disaggregated abundance indices.

The specific data that are used are:

- Length distributions from the commercial catches (Greenland, Iceland and the Faroese) in two cm length groups.
- Length disaggregated survey indices (from the Icelandic Spring groundfish survey (IS-SMB) and German Groundfish Survey in East Greenland combined) in two cm length group 19–54 cm
- Age–length keys from the Icelandic groundfish survey in October (IS-SMH): 1996–recent year. Based on two cm length groups.
- Age–length keys from the Icelandic commercial catch 1995–recent year. Based on two cm length groups.
- Mean length-at-age in IS-SMH.
- Mean length-at-age in Icelandic commercial catches.
- Landings by six month period.

[8] http://ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2015/smr-5614_SA.pdf

Further, a fixed natural mortality (0.05 for most lengths, but 0.10 for the largest (oldest)) fish is assumed. The model estimates the following parameters:

- The number of fish when simulation starts.
- Recruitment each year.
- Two parameters for the growth equation.
- Parameter β of the beta-binomial distribution controlling the spread of the length distributions.
- The selection pattern for the commercial catches. Two parameters for each fleet.

Commercial catch data

Iceland

The majority of the catches are taken by Icelandic vessels in Icelandic waters. Landings in Iceland are restricted to authorized ports where the amounts landed are recorded by authorized weighers. Splitting of catches on species is now (since 2010/11) done routinely at sea in the Icelandic fishery, and redfish is landed by species. If no direct information is available on the catches for a given vessel, the landings are allocated based on logbooks and samples from the fishery. According to the proportion of biological samples from each cell (one fourth of ICES statistical square), the unknown catches within that cell are split accordingly and raised to the landings of a given vessel. For other areas, samples from the landings are used as basis for dividing the demersal redfish catches between *S. norvegicus* and *S. mentella*[9] Previously, redfish was landed as such, and split by species by a quite complex procedure based on samples. The split as it is done now has been verified by the previous procedure, and found to be satisfactory[10]. There is documentation that while the official landings were 42,937 t, a split based on samples would have given 42,153 t. The Icelandic landings data are managed by the Directorate of Fisheries and used as catch data in the assessment.

Greenland

Management of redfish in Greenland waters is by the Greenland Ministry of Fisheries, Hunting and Agriculture. The catches of redfish in Greenland waters has varied over the years. There was a substantial fishery by foreign fleets around 1980, amounting to 15,000 t – 30,000 t. Since 1995 the catches in Greenland waters were very small and there was no directed fishery for redfish. A directed fishery was opened in 2008 in restricted areas and/or seasons, with restrictions aiming at protecting juvenile cod. So far, the estimated catches of Golden redfish has amounted to about 1,700 t, which is 3 – 4% of the total catch. Catch statistics are based on logbooks that are reported to the Greenland Institute of Natural Resources. The Greenlandic authorities operate the quota uptake with three types of redfish[11]:

- Fish caught by bottom trawl and longlines on the bottom are named *Sebastes norvegicus*;
- Fish caught pelagic in the Irminger Sea are named *Sebastes mentella*;
- Fish caught as bycatch in the shrimp fishery are named *Sebastes sp*. 20% of these are regarded as *S. norvegicus*.

From the Greenland and German surveys it is known that the demersal redfish found in the area is a mixture of *S. norvegicus* and *S. mentella*. All surveys report that *S. mentella* dominates the catch. According to survey background and one sample of fish from the commercial fishery, the amount of *S. mentella* caught in XIVb in 2009 and 2010 is estimated as 80% of the reported catch of demersal redfish derived from logbooks.

Faroes

For the Faroese catches, this split is based on data from Research Vessel surveys on horizontal and vertical distribution of the two species, from regular biological sampling of the redfish landings by fleet, and from logbooks (information on the location of each haul, effort, depth of trawling and how much redfish was caught)[12].

[9]Same as above

[10]Kristján Kristinsson, Fishery of Golden Redfish (*Sebastes marinus*) in ICES Division Va in 2012 WD#15 to NWWG 2013. Provided by IMR.

[11]http://ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2015/smr-5614_SA.pdf

[12]Same as above.

Discards
Discards are not included in the assessment, but are considered to be minor. In Iceland, discards are prohibited. Regular estimates of discards in Icelandic fisheries do not reveal measurable discards of golden redfish. The area where small redfish is found is permanently closed. Bycatch of small redfish is not regarded as significant after sorting grids were introduced in the shrimp fishery in 1992.

Survey data
The survey series is a combination of abundance by length from the Icelandic Spring groundfish survey (IS-SMB) and the German Groundfish Survey in East Greenland in the summer. Age-length keys are obtained from the Icelandic Groundfish survey in October and from samples from commercial catches in the Icelandic fishery

Data shall be appropriate
The data outlined above are relevant and sufficient for assessing the stock using the Gadget method. The Gadget method is sufficiently versatile to make proper use of the data that are available. The quality of the data is generally good, although fitting the model to some of the length distributions may be problematic. Sparse data on incoming year classes was noted in consultation with MFRI. The assessment is quite consistent, although the estimates of recent recruitments take some years to stabilize (Figure 1).

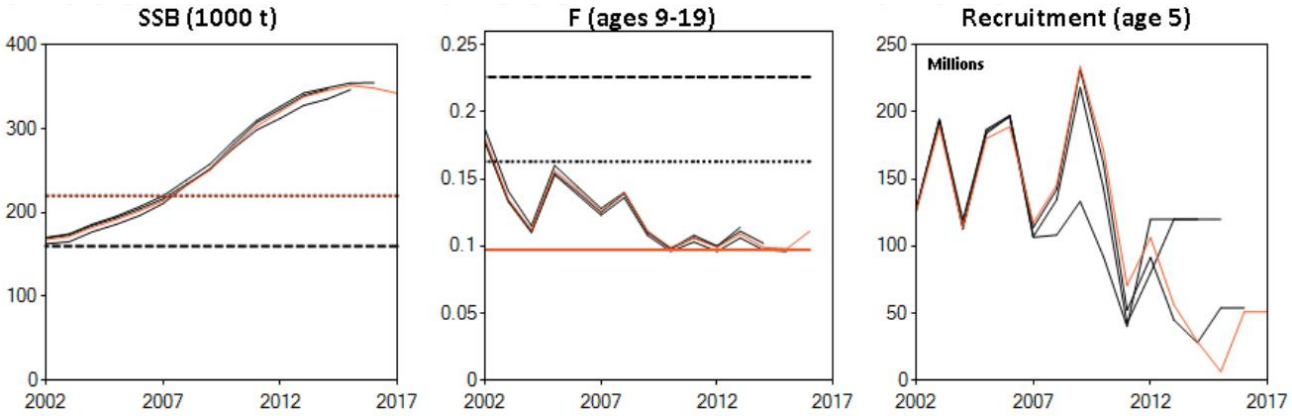

Figure 1. Retrospective performance of the Gadget assessment for Golden redfish. From NWWG 2017[13].

Research results are made public in a timely and readily understood fashion
The assessment is done by the ICES North-Western Working Group (NWWG)[14]. ICES provides advice based on the results from NWWG[15]. Once released, the advice and the NWWG report are available at the ICES website. The final advice to Icelandic authorities is provided by MFRI. The MFRI advice follows the advice for ICES unless there is good reasons to deviate from it. MFRI provides an overview of the state and the advice for each of all major Icelandic stocks on its website[16].

International cooperation and review:
The assessment is done by the ICES North-Western Working Group, where all interested nations participate, including Iceland, Greenland and the Faroes. ICES advices on catches based on the assessment of the NWWG. Since 2014, when the harvest rule was approved, the advice is given according to the rule.

[13] https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/NWWG/NWWG%202017%20Report.pdf
[14] As above
[15] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pdf
[16] For Golden redfish: https://www.hafogvatn.is/static/extras/images/Gullkarfi265.pdf

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

Clause 1.3.1 – The Precautionary Approach

Supporting Clauses:	1.3.1.1, 1.3.1.2, 1.3.1.3, 1.3.1.4, 1.3.1.5, 1.3.1.6			
Clause Guidance:	***The precautionary approach shall be implemented, as specified in the Fisheries Management Plan, to effectively protect the stock under consideration. Accordingly, relevant uncertainties shall be taken into account through a suitable method of risk assessment, appropriate reference points shall be determined, relevant uncertainties shall be taken into account through a suitable method of risk assessment, and specified remedial actions shall be taken if reference points are approached or exceeded.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

A limit reference point is defined for the spawning stock biomass. A target reference point is defined for fishing mortality, as part of a harvest rule. The harvest rule is considered precautionary and expected to give a near maximum long term yield. Other precautionary reference points have been defined by ICES. They are not used in the current harvest rule and are not in conflict with the rule.

EVIDENCE

ICES has defined precautionary reference points, as well as reference point related to MSY. The list was revised and extended by ICES in 2016 and 2017. The revisions have no impact on the management of redfish. Table 4 shows the current values of the reference points, taken from the ICES advice[17].

Table 4. Reference points for golden redfish, as currently (2017) defined by ICES.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	220 000 t	$B_{lim} \times \exp(0.2 \times 1.645)$	ICES (2014)
	F_{MSY}	0.097	Average of ages 9–19. F_{max} in the 2012 Gadget run, leading to < 1% probability of going below B_{lim}, based on recruitment patterns since 1975 and with large assessment uncertainty.	ICES (2014)
Precautionary approach	B_{lim}	160 000 t	Lowest SSB in the 2012 Gadget run.	ICES (2014)
	B_{pa}	220 000 t	$B_{pa} = B_{trigger} = B_{lim} \times \exp(0.2 \times 1.645)$.	ICES (2017)
	F_{lim}	0.226	F that leads to B_{lim} in the long term. From stochastic simulations.	ICES (2017)
	F_{pa}	0.163	$F_{lim}/\exp(1.645 \times 0.2)$	ICES (2017)
Management plan	SSB_{mgt}	220 000 t	MSY $B_{trigger}$	ICES (2014)
	F_{mgt}	0.097	F_{MSY}	ICES (2014)

[17] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pdf

Clause 1.3.2 – Management targets and limits

Clause 1.3.2.1 – Harvesting rate and fishing mortality

Supporting Clauses:	1.3.2.1.1, 1.3.2.1.2			
Clause Guidance:	***The management target for fishing mortality (or its proxy) and the associated limit reference point, as well as the management action to be taken when the limit reference point is exceeded, shall be stated in the Fisheries Management Plan. If fishing mortality (or its proxy) is above the limit reference point, management actions shall be taken to decrease the fishing mortality (or its proxy) below the limit reference point.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

A management plan, approved by ICES, has been in effect since 2014. Its main elements is a target fishing mortality and a reduction of the fishing mortality below a trigger biomass. The reduction clause also covers SSB below B_{lim}.

EVIDENCE

A management plan has been in place for Golden redfish since 2014, and the TAC is set according to this plan.

The harvest rule in the plan is[18]:

1. The annual TAC will be set consistent with the average fishing mortality rate of 0.097 in the advisory year for age-groups 9 – 19, when the spawning stock biomass (SSB) in the assessment year (SSB_y) is estimated to be above 220,000 t ($B_{trigger}$)
2. When the SSB in the assessment year is estimated to be below 220,000 t ($B_{trigger}$), the TAC will be set consistent with a fishing mortality rate in the advisory year equal to $0.097*(SSB_y/B_{trigger})$.

The target fishing mortality of 0.097 $year^{-1}$ in the proposed management plan is based on a point estimate of F_{max} from the 2012 assessment. The deterministic estimate of F_{max} of 0.114 $year^{-1}$ from the most recent assessment is slightly higher than the target reference point in the plan. The plan also has a trigger biomass below which the fishing mortality is reduced that is identical to the ICES B_{pa} and $MSYB_{trigger}$ simulations with realistic assumptions about assessment uncertainty (including a large autocorrelated assessment error) and recruitment variation indicate very low probability of the spawning stock going below $B_{trigger}$ and B_{lim} when applying the harvest rule. Accordingly, the plan has been approved by ICES[19].

The most recent assessment indicates a current fishing mortality close to the target and a spawning biomass well above the trigger; the probability of the current $SSB<B_{trigger}$ being estimated at 2.7%[20].

[18] https://eng.atvinnuvegaraduneyti.is/publications/news/nr/8133

[19] http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/Special%20Requests/Iceland_Faroe_Islands_Greenland_Evaluation_of_ltmp_for_golden_redfish.pdf

[20] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/NWWG/21-NWWG%20Report%202017%20Sec%2019%20Golden%20redfish%20in%20subareas%205%206%20and%2014.pdf; Section 19.6

Clause 1.3.2.2 – Stock biomass

Supporting Clauses:	1.3.2.2.1, 1.3.2.2.2, 1.3.2.2.3, 1.3.2.2.4			
Clause Guidance:	***The long term management target for stock size (biomass), either explicit or implicit depending on management approach, and limit reference points consistent with the objective of promoting optimum utilization, shall be specified. Furthermore, limits or directions for stock size (or its proxy), consistent with avoiding recruitment overfishing shall be specified and should the estimated stock size approach B_{lim} (or its proxy), then appropriate management action shall be taken with the objective of restoring stock size to levels above B_{lim} (or its proxy) with high probability within a reasonable time frame.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The harvest rule aims to maximize long term yield with a target fishing mortality, but does not have a specific target biomass. The rule defines actions to be taken in terms of a fishing mortality for all levels of spawning biomass, including those below the limit point.

EVIDENCE

A long term target for the stock biomass is not defined explicitly, However, the expected long term yield by following the rule was tested by the simulations and found to be near the maximum obtainable. A precautionary limit biomass is defined at 160,000 t SSB. This represents the lowest SSB observed in the historic data (SSB = B_{loss}). At that level of SSB, there are no indications of impaired recruitment, as shown in Figure 2 below.

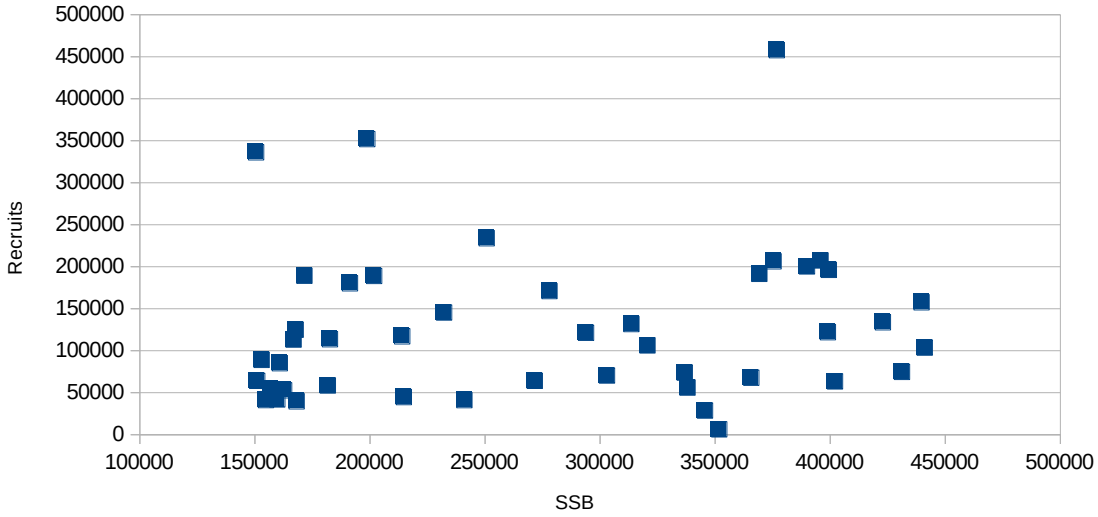

Figure 2. Stock recruit pairs according to the assessment done in 2016.

According to the rule, the fishing mortality below $B_{trigger}$ shall depend on the actual SSB as: F = 0.097*Actual SSB/$B_{trigger}$. Accordingly, the rule defines a fishing mortality at all levels of SSB, including levels below the limit. Whether that would be sufficient if the SSB drops below B_{lim} depends on the cause of the reduced SSB. This has not been explicitly tested, as the rule according to the simulations imply a very low risk of reducing the SSB to that level. The Minister of fisheries has a suite of measure to take additional action if needed[21].

[21] http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-79-1997-Fishing-in-Iceland-Exclusive-Fishign-Zone.pdf

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

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

SUMMARY EVIDENCE

Catches of juveniles are avoided by sorting grids in the shrimp fisheries and area closures if catches reach set levels of juvenile ratio. The harvest rule implies an exploitation rate below that which would lead to growth overfishing.

EVIDENCE

Regarding biology and life cycle, the *S. norwegicus* is a typical long-lived species with low natural mortality (0.05 is assumed). The management will take that into account indirectly, by recognizing that the assessment acts as a filter[22] where large changes in perceived stock abundance from one year to the next only will appear if there are strong and consistent indications in the data of large changes in the stock or in the interpretation of the data. Undue changes in TACs or excessive exploitation due to noisy input data should therefore be unlikely. Accordingly, the results in the 2017 assessment are similar to those in the 2016 assessment. Simulations took that into account by assuming a very high autocorrelation in assessment error in addition to a substantial random error. Still, the stock, when managed by the harvest rule, could be shown to be within precautionary bounds even with long periods with systematically biased assessments.

S. norwegicus in East Greenland, Iceland and the Faroes is considered a unit stock[23], with no known distinct subpopulations. The main nursery area is East Greenland, Icelandic waters are the main fishing area. Very old (large) fish also appear in Faroese waters. The migrations and area distribution is stable. However, within Icelandic waters, a more Northerly distribution has been observed in recent years. Figure 3 shows the distribution of catches in 2016[24].

Catches in East Greenland are small. Previously, the only fishery that might exploit juvenile redfish is the shrimp fishery. Here, sorting grids are mandatory since 2002, and believed to be effective. When sorting grids were introduced, the bycatch in the shrimp fishery was reduced drastically. Since 2009, there has been an increasing fishery for redfish in East Greenland. It has primarily targeted S. mentella, but catch statistics does not distinguish the species. Based on survey information, golden redfish in East Greenland catches is estimated to be between 1,000t and 2,700t in 2010 – 2015, but 5,400 t in 2016.

[22] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2016/NWWG/21%20NWWG%20Report%20-%20Sec%2019%20Golden%20Redfish%20(sebastes%20norvegicus)%20in%20Subareas%205,6%20and%2014.pdf; Section 19.4.2.2 in:

[23] Section 19.1: same report as above

[24] Figure 19.3.2: same report as above

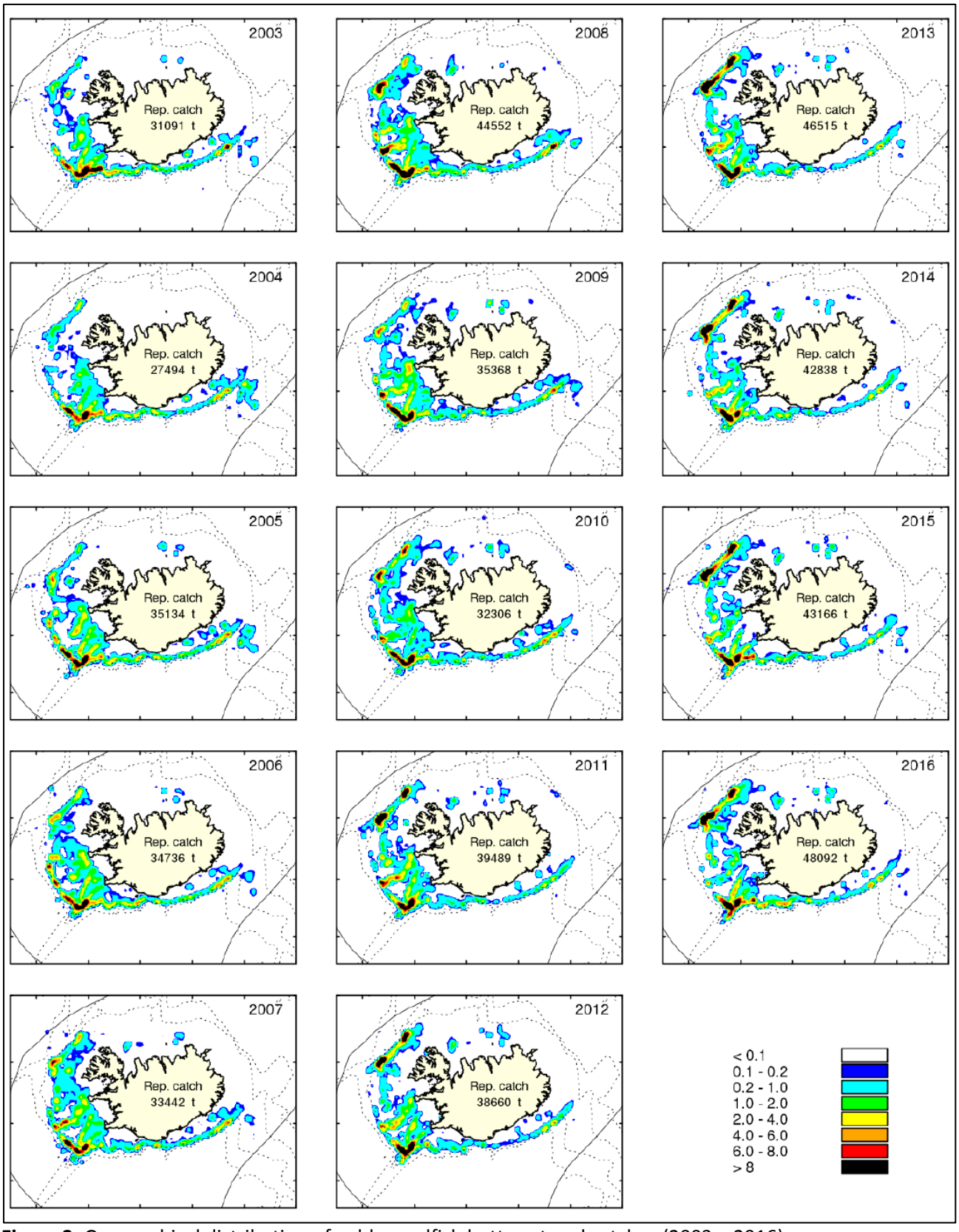

Figure 3. Geographical distribution of golden redfish bottom-trawl catches (2003 – 2016).

In Icelandic waters, *S. norwegicus* is caught mostly by trawlers in the Western and Southern part of the shelf break (see maps), and to a small extent by long-liners and by the coastal small boat fishery. The minimum mesh size in the trawl fishery is 135 mm. However, the major tool to protect juveniles is area closures. For golden redfish, there is a permanent area closure to the west of Iceland aimed at protecting small redfish (Figure 4 label outlined in red). This is considered a sufficient protective measure at present. If undersized golden redfish should be caught elsewhere, that would lead to area closures, but such closures have not been needed in recent years. The current target fishing mortality is somewhat below F_{max}, and the harvest rule is designed to give a long term yield near the maximum with low risk of recruitment overfishing. Hence, the risk of growth overfishing has been considered and is accounted for[25].

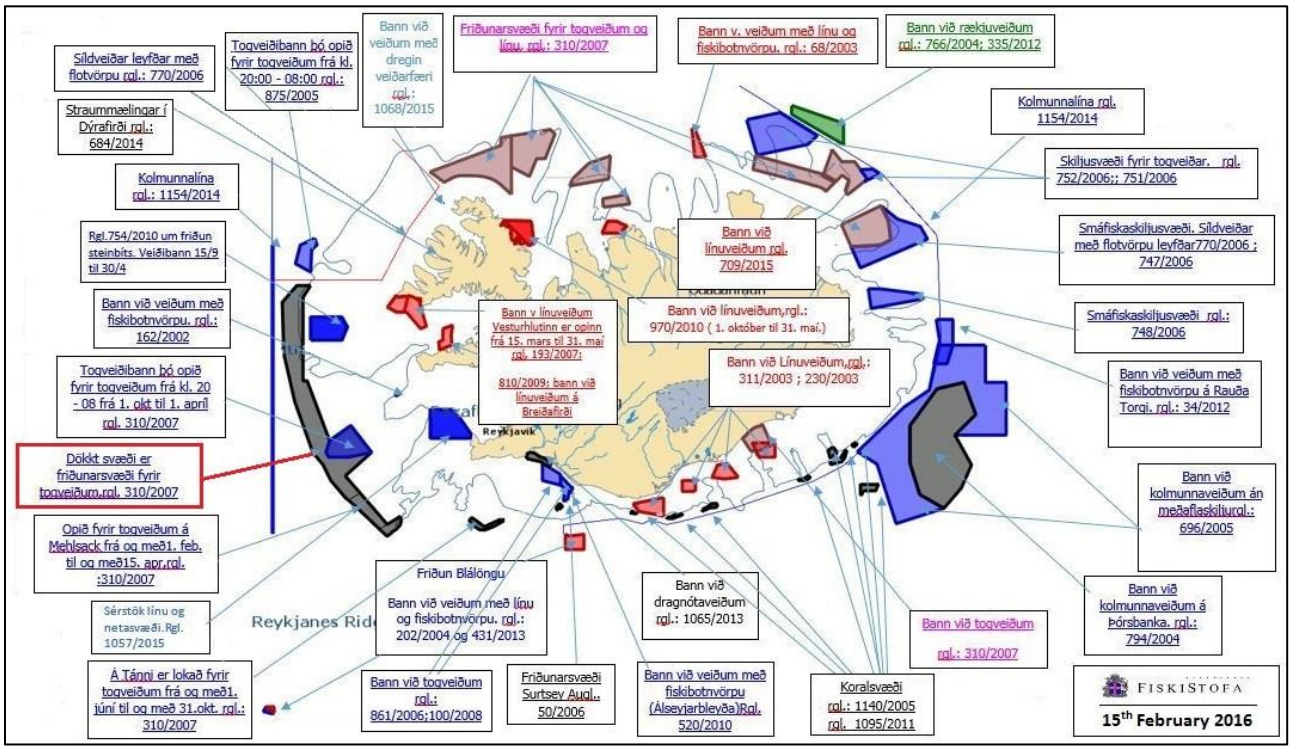

Figure 4. All closures according to the Fisheries directorate as of 15th February 2016[26]. Juvenile redfish closure outlined in red.

[25] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2014/WKREDMP/wkredmp_2014.pdf

[26] This map was previously available at http://www.fiskistofa.is/fiskveidistjorn/veidibann/reglugerdarlokanir/ It is not available any more - one gets directed to a solution in Google earth where the link http://uv.fiskistofa.is/uv.kml provides very detailed information on locations of interest.

Clause 1.4 – External Scientific Review

Supporting Clauses:	1.4.1, 1.4.2			
Clause Guidance:	***For the stock under consideration the harvesting policy (including its consistency with the precautionary approach), stock assessments and advice shall be reviewed, by request from the fisheries management authorities at appropriate, regular intervals as well as when substantive changes are made in harvesting policy by an appropriate international scientific body or committee. Following external scientific review, the competent fisheries management authority shall review and/or revise the harvesting policy, taking into consideration the external review, as appropriate.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The harvest rule was evaluated by ICES (2014) and found to be in accordance with the precautionary approach. The assessment of the stock is done by the ICES North Western Working Group (NWWG) where all relevant nations are represented. ICES reviews the NWWG report and provides advice based on the report.

EVIDENCE

The harvest rule was evaluated by ICES (2014) and found to be in accordance with the precautionary approach.[27]

The assessment of the stock is done by the ICES North Western Working Group (NWWG)[28] where all relevant nations are represented. ICES reviews the NWWG report and provides advice based on the report[29]. Based on the advice from ICES, MFRI provides advice to the Ministry of Industries and Innovation, which is the competent fisheries management in this respect.

[27] http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2014/WKREDMP/wkredmp_2014.pdf

[28] http://www.ices.dk/sies/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/NWWG/21-NWWG%20Report%202017%20Sec%2019%20Golden%20redfish%20in%20subareas%205%206%20and2014.pdf

[29] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pdf

Clause 1.5 – Advice and Decisions on TAC

Supporting Clauses:	1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.5.10			
Clause Guidance:	***Appropriate scientific advice shall be provided to the competent fisheries management authority including on the appropriate value(s) for precautionary reference points. For shared stocks the setting of TAC shall take into consideration international agreements and scientific advice. Decisions on TAC shall be made and implemented in such a way as to ensure that the actual catch is as close to the intended catch as practically possible.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

TACs are set according to scientific advice from ICES and MFRI. The stock is shared between Greenland, Iceland and the Faroes. Iceland and Greenland agreed in 2015 on sharing of the TAC. Catches by other parties are minor.

EVIDENCE

Stock assessment and advice, including advice on harvest rules, TACs and reference points is provided by ICES[30]. The process involves all relevant nations and the advice is for all areas. The advice is taken over by local authorities. In Iceland, the Ministry is advised by the MFRI, based on the ICES advice. In Greenland, a TAC is set common to *S. mentella* and *S. norwegicus* by the Ministry of Fisheries, Hunting and Agriculture. A common assumption is that 20% of the catch will be *S. norwegicus*.[31] Under that assumption, the Greenland catch of *S. norwegicus* was around 5% of the total in 2014 and 2015. Agreement was reached in 2015 between Iceland and Greenland on quota sharing, under which 10% of the international TAC is allocated to Greenland[32]. Other nations (Faroes and EU) only take minor catches of this stock.

According to data from ICES[33] and MFRI (Table 5), the TAC as derived from the harvest rule and set by managers was exceeded by approximately 10% in the two years (2015 – 2016) where the harvest rule has been in effect. Some of the overshoot may be due to the mixture of species in the increasing Greenland fishery, some due to overshoot of TAC in the Icelandic fishery.

Table 5. TACs and catches according to MFRI[34].

Fiskveiðiár *Fishing year*	Tillaga *Recommended TAC*	Aflamark fyrir Íslandsmið *National TAC*	Afli á Íslandsmiðum *Catch Icelandic waters*	Afli á öðrum miðum[1)] *Catch other areas[1)]*	Afli alls[1)] *Total catch[1)]*
2010/11	30 000	37 500	39 432	1498	45 271
2011/12	40 000	40 000	44 514	2466	45 555
2012/13	45 000	45 000	46 549	1871	53 201
2013/14	52 000	52 000	52 463	2908	50 677
2014/15	48 000[2)]	45 600	48 329	2832	51 601
2015/16	51 000[2)]	48 500	54 542	5607	59 698
2016/17	52 800[2)]	47 205			
2017/18	50 800[2)]				

[1)] Almanaksár. *Calendar year.*

[2)] Aflaregla fyrir Austur-Grænland/Ísland/Færeyjar. *Harvest control rule for East Greenland/Iceland/Faroes.*

[30] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pd

[31] http://ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2015/smr-5614_SA.pdf

[32] https://www.atvinnuvegaraduneyti.is/sjavarutvegs-og-landbunadarmal/frettir/nr/8732

[33] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pd

[34] https://www.hafogvatn.is/static/extras/images/Gullkarfi265.pdf

Fisheries advice is provided in a timely manner

Fishing seasons in Iceland runs from the 1st September in year y to the 31st August in year y+1. Surveys and ICES[35] and MFRI[36] assessments are conducted early in the year so as to allow advice books to be published in May/June. Following the publication of fisheries advice regulations on quotas are enacted in July[37], well in advance of the commencement of the fishing season on the 1st September.

Management authorities' cooperation and participation in RFMOs or arrangements

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

In response to a request by the governments of Greenland, Iceland and the Faroe Islands the MFI proposed a management plan for golden redfish in February 2014. ICES evaluated the management plan to be consistent with the precautionary and MSY approach and it was adopted by Iceland in March 2014. A bilateral agreement between Iceland and Greenland on the management of the shared golden redfish resource, based on the aforementioned management plan, was signed in September 2015. The agreement covers the period 2016 –2018 and states that each year 90% of the TAC is allocated to Iceland and 10% to Greenland. Furthermore, 350 t are allocated each year to other areas. The Faroe Islands are not a part of this agreement.

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

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

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

- The North East Atlantic Fisheries Commission (NEAFC[38])
- The Northwest Atlantic Fisheries Organisation (NAFO[39])
- The International Council for the Exploration of the Sea (ICES[40])
- The North Atlantic Marine Mammal Commission (NAMMCO[41])

[35] http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/reg.27.561214.pdf
[36] https://www.hafogvatn.is/static/extras/images/Gullkarfi265.pdf
[37] http://www.stjornartidindi.is/Advert.aspx?RecordID=9874e782-c577-4248-b835-845bd0fa1806
[38] http://www.neafc.org/
[39] http://www.nafo.int/
[40] http://www.ices.dk/Pages/default.aspx
[41] http://www.nammco.no/

7.2. Section 2: Compliance and Monitoring

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

Supporting Clauses:	2.1.1, 2.1.2			
Clause Guidance:	***An effective legal and administrative framework at the local, national or regional level, as appropriate, shall be established for the fishery, and compliance shall be ensured through effective mechanisms for monitoring, surveillance, control and enforcement. Laws and regulations concerning conservation and management measures are publicly available and effectively disseminated.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

The primary legislative instrument relating to fisheries management in Iceland, the Fisheries Management Act No.116/2006[42] superseded the Fisheries Management Act 1990 and establishes the requirement for all commercial fishing vessels to be permitted. These permits represent the initial legal requirement without which a vessel may not obtain the quota necessary to fish for Icelandic quota stocks, such as redfish. There are two categories of permit; a general permit with quota and a general permit with a hook-and-line quota. A register of all vessels permitted to fish in Icelandic waters is administered by the Maritime Division of the Icelandic Transport Authority.

The Act governing fishing activities within the Icelandic EEZ (Act No. 79/1997)[43] is the foundation for the Icelandic system of Individual Transferrable Quotas (ITQs) and grants powers relating to its administration to the Minister. The Act outlines the administration of fees where appropriate, the provision of powers to the Fisheries Directorate, penalties for breaches of the regulations and criteria for enacting temporary provisions. It further provides for the efficient utilisation of commercial stocks, specifies the Icelandic EEZ and prohibits foreign vessels from fishing within Iceland's EEZ (unless by prior Agreement). Under the Act the Ministers powers include, but are not limited to, the ability to limit gear types, fishing areas, fishing for certain stocks, prevent fishing in areas where the proportion of undersized fish in the catch exceeds agreed upon reference levels, and set rules surrounding the minimum legal saleable size of marine animals.

Penalties for violation of the provisions of the Act include up to 6 months imprisonment, confiscation of fishing gear and catch, temporary suspension of licenses and fines for violations of up to ISK 4,000,000 for a first offence and between ISK 400,000 and ISK 8,000,000 for repeat violations.

The Treatment of Commercial Marine Stocks Act No. 57 1996 prohibits discarding and fishing without sufficient quota. In addition the Act stipulates that all fish caught within the Icelandic EEZ, or during trips where a proportion of fishing activities take place in the EEZ, must be landed in an officially recognised port which need not necessarily be Icelandic.

Within 2 hours of landing catches are officially separated, weighed and recorded by accredited weighing stations and reported against the appropriate quota allocation following provisions outlined in the Act no 57, 1996 concerning the treatment of commercial stocks[44] and Regulation No. 224 2006 on Weighing and

[42] http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-116-2006-on-Fisheirs-Management.pdf
[43] http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-79-1997-Fishing-in-Iceland-Exclusive-Fishign-Zone.pdf
[44] https://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/

Recording of Catch[45]; the Act[46] also makes provisions for processing at sea, weighing by auction houses and the transfer of quotas to cover landings.

During the surveillance site visit assessors witnessed the landing, transfer to auction, weighing, tipping, re-icing and sale of fish using the electronic auction system as well as the labelling of catch for the purposes of traceability. The official weights are the sold and registered weights recorded on the calibrated scales and these are then submitted to the central database.

Each landing generates a weighing receipt recording:

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

The officially licensed scale operator then immediately enters the data into Directorates catch registration system.

The Directorate of Fisheries is responsible for the day-to-day implementation of Fishery Regulations; however, at sea surveillance is primarily the remit of the Icelandic Coast Guard. The Directorate is based in Akureyri and comprises approx. 70 staff split between its HQ and 6 other locations around the country. Surveillance is a big part of the work of the Directorate and it may be shore based, at sea or electronic using Vessel Monitoring Systems (VMS) and e-logbooks. In 2016, the Coast Guard conducted 216 vessel boardings, an increase of 47 over the corresponding number for 2015.

The Icelandic Coast Guard monitors commercial fishing vessels in Iceland's EEZ on a continuous basis. There are requirements surrounding the reporting of vessel position (manually or with using VMS systems) and the reporting of catch on entering or leaving Icelandic waters. Assessors visited the coastguard HQ during the surveillance audit site visit and were given a tour of the various monitoring and enforcement systems in place which represent effective mechanisms for the monitoring, surveillance, control and enforcement of fishing, and related activities, within Icelandic waters.

Vessel logbooks are inspected during random unannounced boardings both at sea (by the coastguard) or at the quayside (by Fisheries Directorate inspectors) which may include a comparison of catch and logbook entries. The main reasons for the generation of remarks during Coast Guard inspections have remained consistent in recent years (**Figure 5**). Measuring during Coast Guard inspections led to 6 short term closures in 2016.

[45] http://eng.atvinnuvegaraduneyti.is/laws-and-regulations/fisheries/
[46] http://www.fisheries.is/management/fisheries-management/the-fisheries-management-act/

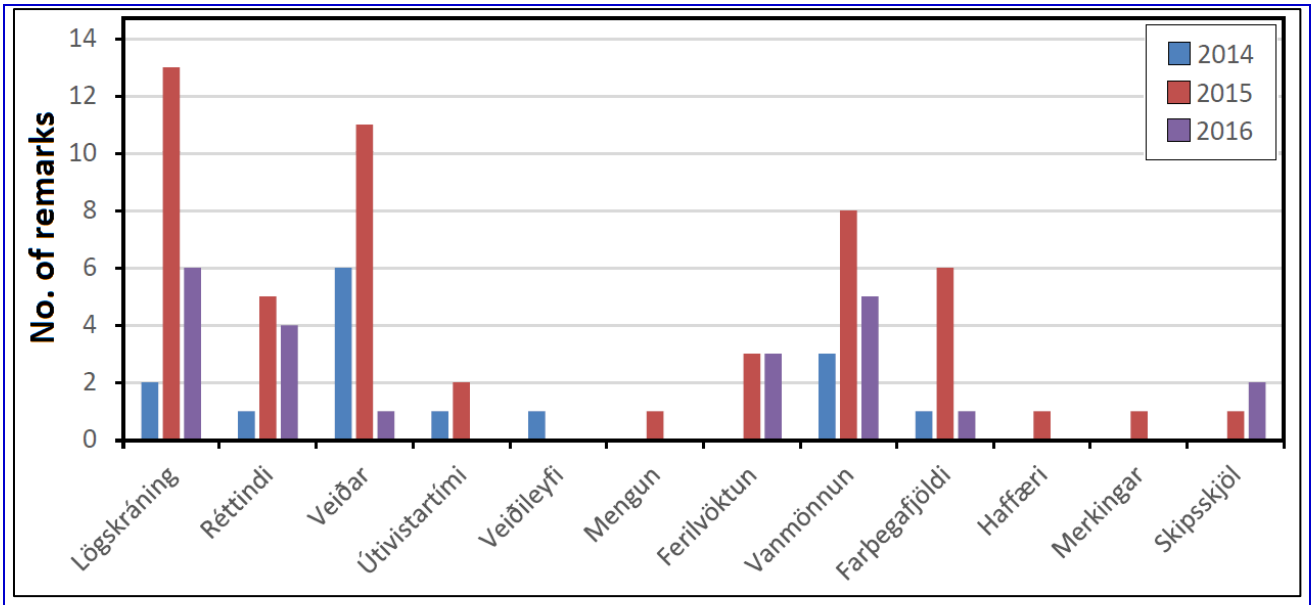

Figure 5. Reasons for the generation of remarks, by no. of remarks generated, during Coast Guard inspections in 2014, 2015 and 2016; Lögskráningar – Manning list, Réttindi – License, Veiðar – Fishing permit, Útivistartími – Time limits , Veiðileyfi – Fishing permit, Mengun – Pollution, Ferilvöktun – VMS, Vanmönnun – Manning, Farþegafjöldi – Passengers, Haffæri – Sea worthiness, Fiskveiðibrot – Fisheries, Merkingar – Marking, Skipsskjöl – Ship's papers.

Laws and regulations concerning conservation and management measures are publicly available on the Ministry of Industries and Innovation website[47] and are effectively disseminated through an online law gazette[48,49].

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

[47] https://www.atvinnuvegaraduneyti.is/sjavarutvegs-og-landbunadarmal/log-og-reglugerdir/
[48] http://vefbirting.oddi.is/Raduneyti/stjorn_fiskveida_2016-17/index.html#20
[49] https://www.stjornartidindi.is/

Clause 2.2 – Concordance between actual Catch and allowable Catch

Supporting Clauses:	2.2.1, 2.2.2, 2.2.3, 2.2.4 and sub-clauses			
Clause Guidance:	***Concordance between the Total Allowable Catch (TAC) and actual total catch from the stock under consideration shall be ensured through monitoring, control, enforcement, documentation, correction and verification activities. Accordingly, all participating companies engaged in fishing operations shall take responsibility and operate in compliance with the relevant rules and regulations.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

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

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

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

Landings must be weighed within 2 hours of landing by an official weigher using calibrated scales. Following allowances for ice the official weight is forwarded to the Directorate where it is compared with the relevant e-logbook entry before an appropriate deduction is made to that vessels remaining quota. The officially weighed catches are the official catch of record with e-log information being used as a secondary source to ensure accuracy. If a vessel does not have sufficient quota to cover it has a number of options available to it such as renting in additional quota or transferring quota between species; however, the landings must be

fully covered within 3 days. The time restrictions attached to landing, recording and rationalising catch and quota mean that while the system is not real time it is very close (circa. 24 hours)[50].

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

MFRI and ICES advised in 2016 that catches for the 2016/2017 season should be no more than 52,800 t. The TAC set by Icelandic authorities for redfish in the quota year 2016/2017 was 47,205 t with the remainder being allocated to Greenland as part of the management agreement. Catches of Golden redfish in Icelandic waters in the 2016/2017 season were approx. 48,350 t or approx. 2% in excess of the TAC (Figure 6).

Fiskveiðiár *Fishing year*	Tillaga *Recommended TAC*	Aflamark fyrir Íslandsmið *National TAC*	Afli á Íslandsmiðum *Catch Icelandic waters*	Afli á öðrum miðum[1)] *Catch other areas[1)]*	Afli alls[1)] *Total catch[1)]*
2010/11	30 000	37 500	39 432	1498	45 271
2011/12	40 000	40 000	44 514	2466	45 555
2012/13	45 000	45 000	46 549	1871	53 201
2013/14	52 000	52 000	52 463	2908	50 677
2014/15	48 000[2)]	45 600	48 329	2832	51 601
2015/16	51 000[2)]	48 500	54 542	5607	59 698
2016/17	52 800[2)]	47 205	48 350[3)]		
2017/18	50 800[2)]				

[1)] *Calendar year.*

[2)] *Harvest control rule for East Greenland/Iceland/Faroes.*

[3)] *Provisional – complied from all available sources on* http://www.fiskistofa.is.

Figure 6. Recommended TAC, national TAC, and catches (tonnes) of Golden redfish including provisional catches from Icelandic waters in the 2016/2017 fishing season (Source: www.hafogvatn.is and http://www.fiskistofa.is.

In June 2017 MFRI and ICES advised that catches of golden redfish in the 2017/2018 fishing season, based on the 2017 stock assessment and in accordance with the accepted HCR and management plan, should be no more than 50,800 t, implying an Icelandic TAC of not more than 45,720 t (90% of TAC to Iceland).

The TAC of golden redfish for the 2017/2018 fishing season has been set at 45,450 t by the Icelandic Authorities[51].

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

[50] http://eng.atvinnuvegaraduneyti.is/media/reglugerdir/Regulation-224-2006-on-weighing-and-recoding-of-catch.pdf

[51] http://www.stjornartidindi.is/Advert.aspx?RecordID=9874e782-c577-4248-b835-845bd0fa1806

Clause 2.3 – Monitoring and Control

Clause 2.3.1 – Vessel registration and catch quotas

Supporting Clauses:	2.3.1.1, 2.3.1.2, 2.3.1.3, 2.3.1.4				
Clause Guidance:	***Allocated catch quotas by species to registered vessels are assigned in such a way that the combined quotas conform to the currently effective decision on TAC. Accordingly, information on the size and composition of the fleet of fishing vessels shall be available and documented, and the catch quota of each vessel or vessel group for each fish species and fishing year shall be recorded in the official central database in a transparent manner.***				
Evidence Rating:	Low ☐	Medium ☐		High ☑	
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑	

SUMMARY EVIDENCE

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

EVIDENCE

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

Only vessels in possession of a valid permit from the Directorate of Fisheries are eligible to fish commercially. A register of 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. For illustrative purposes Table 6 shows the first 10 lines of the publically available[52] data on individual vessels' quota allocations of golden redfish in the 2016/2017 fishing season.

Table 6. First 10 lines of table showing the Icelandic golden redfish fleet TAC allocation, transfer, balances and catches for the 2016/2017 fishing season.

Reg. no.	Vessel	Class	Alloc. quota	Compensations	Trfr. prev. year	Trfr. b/t vessels	Allowed catch	Catch	Balance	Over fished
8	Ísborg ÍS 250	A	0	0	0	0	0	0	0	0
89	Grímsnes GK 555	A	0	0	0	0	0	11,020	-11,020	0
173	Sigurður Ólafsson SF 44	A	7,737	0	1,192	23,841	32,770	30,449	2,321	0
177	Fönix ST 177	A	0	2,341	0	-2,341	0	0	0	0
182	Vestri BA 63	A	238	10,000	0	0	10,238	15,743	-5,505	0
233	Erling KE 140	A	8,463	0	0	-7,582	881	1,418	-537	0
253	Hamar SH 224	A	3,582	4,354	0	2,200	10,136	10,068	68	0
264	Hörður Björnsson ÞH 260	A	3,582	50,788	0	-34,659	19,711	19,496	215	0
288	Jökull SK 16	A	0	2,102	0	-2,102	0	0	0	0
363	Maron GK 522	A	0	0	0	0	0	0	0	0

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

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

Registered catches are based on information from ports of landing and information on catcher exported unprocessed. The catch statistics are published, subject to change once they have been compared to submitted reports from buyers, and are available at:
http://www.fiskistofa.is/english/quotas-and-catches/quota-status-and-catches-of-species-by-vessel/aflastodulisti.jsp?lang=en

Clause 2.3.2 – Fishing vessel monitoring and control systems

Supporting Clauses:	2.3.2.1, 2.3.2.2, 2.3.2.3, 2.3.2.4, 2.3.2.5, 2.3.2.6, 2.3.2.7, 2.3.2.8, 2.3.2.9, 2.3.2.10, 2.3.2.11, 2.3.2.12, 2.3.2.13, 2.3.2.14, 2.3.2.15, 2.3.2.16, 2.3.2.17			
Clause Guidance:	***A program for the monitoring and control of fishing vessel activities shall be operated and enforcement shall be in place to prevent fishing by unauthorised vessels. Closed areas shall be monitored, the fishing gear and fishing logbooks shall be subject to inspection, as well as the composition of the catch and its handling onboard the fishing vessels. Catch amounts by species and fishing area shall be estimated and continually recorded in fishing logbooks on-board the fishing vessels. Discarding of catch from the stock under consideration shall be prohibited, those that may occur shall be monitored and all catches shall be landed in authorised fishing ports where harbour officials and fisheries inspectors shall monitor the correct weighing and registration of the catch. Accordingly, vessels must comply with all relevant National Fishery Management measures. In cases of passive fishing gear left unattended at sea, there are regulations that requires fishing gear to be marked so that the owner can be identified, where relevant.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

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

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

The VHF and AIS systems have a range of 30 – 60 nautical miles while the satellite-based VMSs can be used anywhere in the world. The use of complementary systems ensures that the limitations that arise when any one system is used in a standalone capacity are mitigated. These electronic MCS systems are further backed up by more traditional methods of surveillance such as patrol vessels and aircraft; indeed the use of electronic systems in the effective targeting of traditional surveillance methods increases the efficiency of these systems. Emphasis is placed on data analysis including the use of VMS data in conjunction with other sources (e.g. IUU vessel lists, vessel registries, fishing licences, permits, port State control reports); the below schematic outlines the inputs which make up the integrated MCS system in Iceland (**Figure 7**).

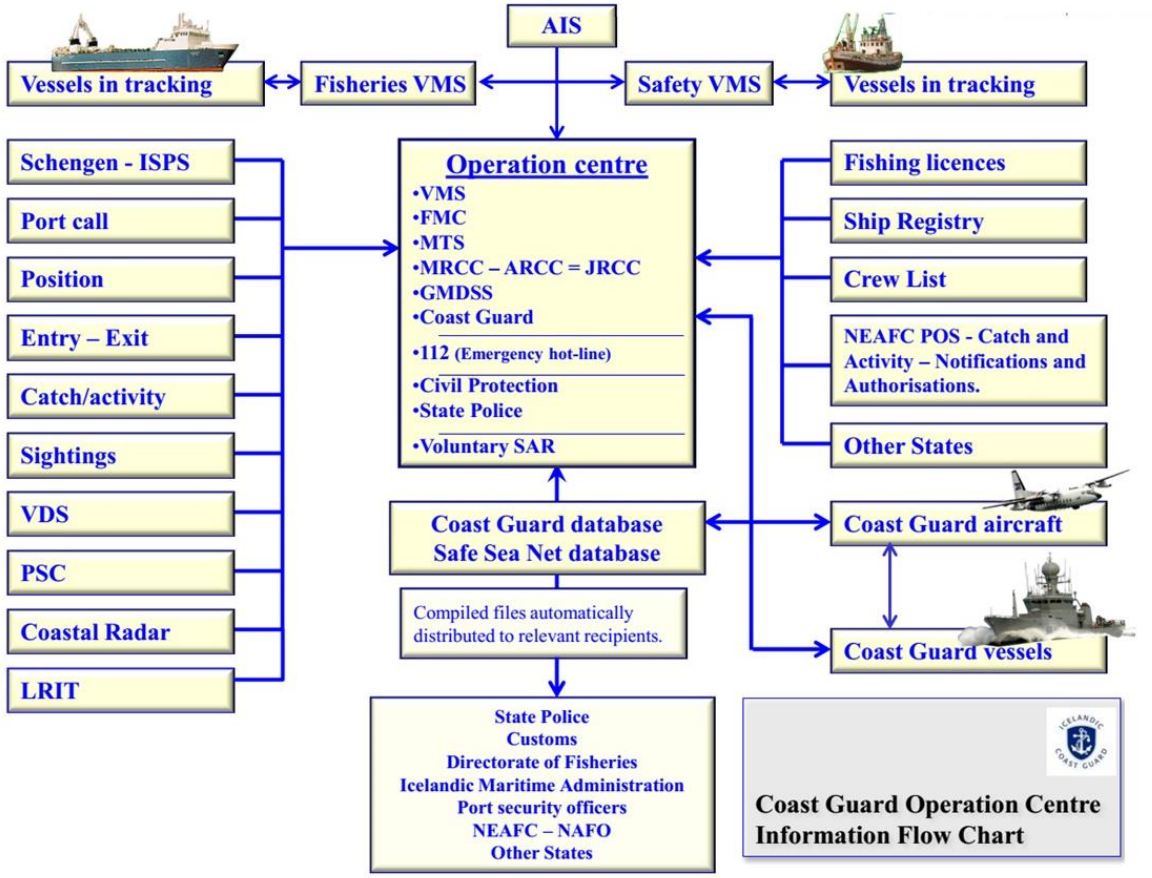

Figure 7. Schematic outlining the inputs which make up the integrated Monitoring, Control and Surveillance (MCS) system in Iceland.

The Coastguard conduct unannounced at-sea vessel boarding's in order to inspect gear, catch and catch records including logbooks as well as to perform inspections of mandatory safety equipment while log books may be subjected to in-port inspections by inspectors from the Fisheries Directorate. Data on coastguard enforcement activity in the past year has been provided in Clause 2.1.

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

In Iceland there are specific gear marking regulations for anchored bottom set nets targeting cod. These provisions are contained in Regulation No. 115 of 13 February 2006[53]. Paragraph 4 states that all anchors for set nets must be marked with the district registration and number of the boat. Buoys must be fixed at both ends of the nets and buoys must be marked clearly with district registrations and the number of the boat. Paragraph 5 states that the buoy attached at the west end of the nets must be marked with a net-ring (a floating ring ~ 20 cm in diameter). If nets are set in an area where bottom trawling also occurs the west end buoy must be marked with one white blinking light.

Other regulations with specific requirements for gear marking include:

- 202/2016, Lumpfish-fishing (Articles 7 and 11)[54]
- 1012/2013, on fishing whelk in traps (Paragraph 5)[55]
- 1070/2015 the fishing of crabs in the inner Faxaflói (Paragraph 4)[56]
- 923/2010, Monkfish-fishing (Paragraph 4)[57]
- 449/2013 Regulation of equipment and nets fishing for trout (Paragraph 6)[58]

[53] http://www.reglugerd.is/reglugerdir/allar/nr/115-2006
[54] http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/20032
[55] https://www.atvinnuvegaraduneyti.is/log-og-reglugerdir/sjavarutvegur---reglugerdir/ymsar-veidar-serveidileyfi/horpuskel/nr/7930
[56] http://www.reglugerd.is/reglugerdir/eftir-raduneytum/atvinnuvega--og-nyskopunarraduneyti/nr/19883
[57] https://www.atvinnuvegaraduneyti.is/log-og-reglugerdir/sjavarutvegur---reglugerdir/ymsar-veidar-serveidileyfi/ymsar-veidar/nr/7065
[58] http://www.reglugerd.is/reglugerdir/allar/nr/449-2013

Clause 2.3.3 – Catches are subtracted from relevant quotas

Supporting Clauses:	2.3.3.1, 2.3.3.2, 2.3.3.3, 2.3.3.4, 2.3.3.5			
Clause Guidance:	***Landed catches shall be subtracted from the relevant quotas (allowable catch) of the vessel or vessel group. Limited allowance may be made for the use of quota for one species to count against landings of another species, with the objective of providing the necessary minimum flexibility and discouraging discards. Transfer of quota between vessels shall take effect only after it has been authorised and recorded to the official central data base and information on each vessels catch quota and quota use shall be updated regularly and made public and accessible to all on the official website, thus ensuring transparency.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

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

A vessel is allowed to exceed its allocation for a particular species in a fishing season by up to but not exceeding 5%; the excess is then deducted from that vessels allocation for that species in the following fishing season. Additionally, a decision may be taken to postpone fishing up to 15% of ones quota for a particular species in a fishing season and transfer the balance to the following season; this measure may be particularly beneficial to the growth of long-lived species in maximising the return from strong year classes. The results of some of inter-vessel and inter-seasonal transfers aimed at balancing catches and quotas may be seen in the table provided under Clause 2.3.1. Note some of the restrictions around the amount of quota that can be transferred between years were temporarily restricted this year as some vessels were unable to fish their 2016/2017 quotas as a result of labour issues.

In addition to within-species quota transfers between vessels and/or fishing seasons the systems also makes provision for some limited quota transfer between different species; note that it is not possible to convert quota of other species for cod quota (e.g. cod quota may be exchanged for redfish quota but redfish quota may not be exchanged for cod). Interspecies transfers of quota are based on cod-equivalents a nominal value based around the market value of cod. The cod-equivalent value of a particular species may fluctuate in a particular season depending on the relative market value of that species in relation to the market value of cod.

The cod-equivalent values of a number of representative species during the 2011/2012 to 2017/2018 season are presented in **Table 7**. As can be seen the cod-equivalent value for more commercially valuable species is consistently higher across seasons. As previously discussed, cod equivalent values change seasonally; for the 2017/2018 season the cod-equivalent value of golden redfish is 0.6.

Table 7. Cod-equivalent values of representative species during the 2011/2012 – 2017/2018 fishing seasons.

Species	Cod Equivalents						
Season	**2011/2012**	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**
Cod	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Haddock	0.89	0.92	1.15	1.30	1.23	1.04	1.07
Saithe	0.63	0.73	0.82	0.81	0.77	0.79	0.72
Golden redfish	**0.71**	**0.82**	**0.89**	**0.85**	**0.79**	**0.69**	**0.60**
Norway lobster	4.35	4.70	6.46	5.98	5.98	6.10	8.12
Greenland halibut	2.12	2.47	2.67	2.59	2.48	2.65	2.61
Anglerfish	1.57	1.74	1.98	2.27	2.05	2.17	2.1
Ling	0.55	0.59	0.73	0.76	0.68	0.68	0.73
Tusk	0.37	0.39	0.52	0.51	0.47	0.42	0.38

Current quota share and TAC allocations by species as well as running catch totals and remaining quota for the season for each vessel are freely available on the Directorates website meaning the system is very transparent[59].

All transfers of quota must be authorised by the Fisheries Directorate. Application forms for the transfer of quota are available online and must be transmitted directly to the Directorate for authorisation of the transfer. If a fishing company wishes to transfer quota between two or more of its own vessels they may do so within all the relevant laws and regulations. All the necessary application forms for transfer of quota are available online[60].

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

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

Clause 2.3.4 – Rules are enforced

Supporting Clauses:	2.3.4.1			
Clause Guidance:	**Surveillance and enforcement of rules are carried out by the Icelandic Coastguard, the Marine Research Institute and the Fisheries Directorate. There are various penalties for serious infractions depending on the nature of the infraction and the number of times the offender has contravened the regulations.**			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

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

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

A breakdown of enforcement activities in 2016, including the number of vessel inspections carried out, was submitted by the Icelandic Coast Guard and is presented in the supporting evidence for Clause 2.1.

Clause 2.3.5 – Analysis is carried out

Supporting Clauses:	2.3.5.1, 2.3.5.2, 2.3.5.3			
Clause Guidance:	***Analysis shall be carried out with the aim of detecting any deviations that may occur of the actual total catch from the Total Allowable Catch (TAC). Measures are available and are adopted when indicated. Anyone purchasing and/or selling catches shall be obligated to present reports to the appropriate authorities, containing information on the purchase, sale and other disposition of fish catches.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

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

EVIDENCE

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

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

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

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

7.3. Section 3: Ecosystem Considerations

Clause 3.1 – Guiding Principle

Supporting Clauses:	3.1.1, 3.1.2			
Clause Guidance:	***Adverse impacts of the fishery on the ecosystem (e.g. bycatch, ETP species interactions, habitat and foodweb interactions etc.) shall be considered, appropriately assessed and effectively addressed consistent with the precautionary approach. Those impacts that are likely to have serious consequences shall be addressed. This may take the form of an immediate management response or further analysis of the identified risk.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Adverse impacts of the fishery on the ecosystem (e.g. bycatch, ETP species interactions, habitat and foodweb interactions etc.) are considered, appropriately assessed and effectively addressed consistent with the precautionary approach. Those impacts that are likely to have serious consequences are addressed.

EVIDENCE

The Marine and Freshwater Research Institute of Iceland (MFRI) is the key institution charged with the gathering of scientific knowledge of the marine ecosystem in Iceland. MFRI's activities are organised into three main sections and a number of supporting departments including the Environment, Resources and Advisory Sections and other important supporting departments including the Modelling and Electronic Departments and the Fisheries Library.

The Environment Section deals with environmental conditions, marine geology, and the ecology of algae, zooplankton, fish larvae, fish juveniles, and benthos, investigates surface currents, assesses primary productivity, overwintering and spring spawning of zooplankton and conducts studies on spawning of the most important commercial fish stocks. The Resources Section undertakes investigations on exploited stocks with the major part of their work devoted to estimating stock sizes and TACs for commercially exploited stocks. The Advisory Section scrutinizes stock assessments and prepares the formal advice on TACs and sustainable fishing strategies for managers.

Collectively the various Sections and Departments within MFRI work together to determine the status of commercial species in Icelandic waters and enable managers to make informed decisions as to their sustainable exploitation. However, the remit of the MFRI goes beyond species specific research to include monitoring of the wider marine ecosystem, collection and analysis of oceanographic and physical data, measurement of retained catches and interactions between Endangered, Threatened and Protected species (ETPs) and commercial fisheries, fishing gears and seabed habitats and between commercial fisheries and the ecosystem e.g. impacts of fisheries on predator-prey dynamics

Environmental conditions

The variable location of the fronts between the colder and fresher waters of Arctic origin and the warmer and more saline waters of Atlantic origin result in variable local conditions, especially on the northern part of the shelf. Analysis of environmental conditions around Iceland have shown that seasonal conditions vary markedly between years and that, in general, warm currents to the north of Iceland result in increased overall production. During the last two decades, the Atlantic water mass has been dominating, in contrast to the Arctic domination in the previous three decades[61]. However, there is a complex web of environmental factors which drive fluctuations in the abundance and distribution of commercial stocks around Iceland.

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

According to the latest ecosystem overview, increased bottom water temperatures on the western and northern part of the Icelandic shelf has resulted in changes in the spatial distribution of a number of demersal species such as haddock, anglerfish, ling, tusk, dab, and witch flounder. Icelandic waters have previously represented the northern boundary of the distribution of these species and in the past they have mainly been recorded in warmer waters to south and west of Iceland. However, these species are now showing a generally northward expansion along the Icelandic shelf in a clockwise direction. In contrast warming waters have led to declines in the abundance and distribution of many cold-water species.

Another factor driving fluctuations in the abundance and distribution of Icelandic stocks is the availability of zooplankton which represent an important prey species for various species during various stages of their life cycles. The availability of sufficient zooplankton is considered to be an important factor which contributes to rates of larval mortality and research by the MFRI has shown a correlation between spring zooplankton levels and the abundance of cod fry the following August indicating interconnectivity between species at different trophic levels. Studies aimed at following the long term trends in zooplankton abundance began around 1960 and show that generally zooplankton biomass on the northern shelf has fluctuated, on a five- to ten-year cycle, with a period of generally low biomass from the 1960s to the 1990s.

A recruitment failure of sandeel (*Ammodytidae*) was recorded in 2005 and 2006 and recruitment has remained at low levels since then, with the exception of the 2007 cohort. Analysis of fish stomach content data suggest that the decline in the sandeel population may even have started as early as the year 2000. Changes in density, composition, and spatial distribution of prey species such as sandeel may also be influencing trends in the breeding success of many seabird species. In recent decades the breeding success of many seabird species has been decreasing leading to declines in their population sizes.

Icelandic marine ecosystem

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.

Discards

Since 1996 discarding is prohibited and subject to penalty[62]. Practically, if vessels do not have sufficient quota to cover the species they have caught they are required to attain quota through the quota transfer system. Consequently if vessels do not have sufficient catch quotas for their probable catches they must suspend all fishing activities; this means that under the ITQ system, the discard policy primarily affects the composition of landings and not the aggregate volume.

[62]Act concerning the Treatment of Commercial Marine Stocks No. 57, 3 June 1996: http://eng.atvinnuvegaraduneyti.is/media/acts/Act-no-57-1996-Treatment-of-Commercial-Marine-Stocks.pdf

The discard ban has some inbuilt flexibility, as any 5% of demersal catches from a fishing trip (called VS catch), irrespective of fish species or size, may be excluded from quota restriction (which means that VS catches are additional to the TAC). On sale of VS catches in public fish markets 20% of the revenue generated is paid to the vessel with the remaining 80% going to a designated research and development fund (the VS fund, under the auspices of the Ministry). The maximum of 20% return on VS catches means that there are limited incentives to land it; however, having the VS catch provisions within the fisheries management system allows the flexibility for vessels to land small catches which are outside their specific quota, preventing discards, improving the treatment of the fishery resource and promoting responsible fishing practices. VS catches of golden redfish in 2016/2017 totalled 17 t[63].

Retained catch

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

Landings of golden redfish by the Icelandic fleet in the 2016/2017 season totalled 48,350 t; of which 92.5% or approx. 44,600 t was taken by bottom trawls. The remainder was taken primarily by Nephrops trawls (3.5%, approx. 1,680 t) and longlines (2.6%, approx. 1,230 t) with smaller amounts being contributed by Danish seines, pelagic trawls, handlines, gillnets and shrimp trawls (**Figure 8**).

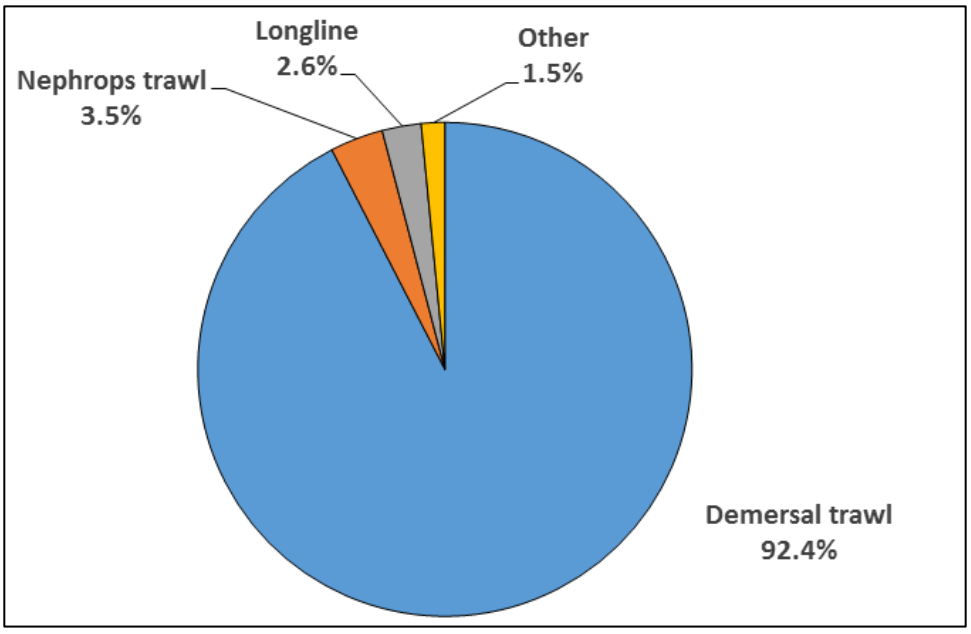

Figure 8. Proportion of total landings of golden redfish by gear type during the 2016 – 2017 fishing season other includes Danish seines, shrimp trawls, handline, gillnets and herring/blue whiting pelagic trawls (Source Fisheries Directorate website: www.fiskistofa.is).

In the 2016/2017 fishing season three fishing gears, bottom trawls, Nephrops trawls and longlines accounted for a cumulative 98.5% of golden redfish catches. Retained species accounting for >1% of the cumulative total for each of these three gear types are presented below (Table 8).

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

Table 8. Total catches and % contribution, by gear type, for species that represent >1% of the overall catch for the major gear types recording landings of golden redfish during the 2016/2017 fishing season.

Gear type	Species	Total catches (t)	% Contribution to total catches by gear type
Demersal trawl (Bottom trawl)	Cod	118,364	47.5%
	Redfish (Golden)	**44,612**	**17.9%**
	Saithe	40,716	16.3%
	Haddock	16,311	6.5%
	Deep sea redfish/ demersal beaked redfish	8,475	3.4%
	Greenland halibut	7,979	3.2%
	Greater Argentine/ Greater silver smelt	3,515	1.4%
Longline	Cod	77,849	72.7%
	Haddock	14,258	13.3%
	Atlantic wolffish	4,561	4.3%
	Ling	4,331	4.0%
	Tusk	1,626	1.5%
	Redfish (Golden)	**1,233**	**1.2%**
Nephrops trawl	Cod	2,396	33.1%
	Redfish (Golden)	**1,678**	**23.2%**
	Norway lobster	1,119	15.5%
	Ling	532	7.3%
	Saithe	416	5.7%
	Witch	300	4.1%
	Anglerfish/Monkfish	220	3.0%
	Megrim	219	3.0%
	Haddock	133	1.8%
	Atlantic wolffish	74	1.0%

These 15 species (ordered by total catches in the 3 gears listed; cod, saithe, haddock, deep sea redfish, Greenland halibut, ling, Atlantic wolffish, greater argentine, tusk, Norway lobster, witch, anglerfish and megrim constitute the major bycatch species in the golden redfish fishery; further information on the status of these stocks is presented below.

Cod

Estimated SSB has increased in recent years and has not been larger in 40 years. Harvest rate has declined and is at its lowest value in the assessment period. Recruitment since 1998 is lower than the average recruitment in the period 1955 – 1985. The 2013 year class was estimated small but the 2014 and 2015 year classes, which should enter the reference stock in 2018 and 2019, are near the long-term average and as a result it is expected that reference biomass will increase in size. MFRI advises that when the management plan is applied, catches in the fishing year 2017/2018 should be no more than 257,572 t. Estimated SSB_{2017} (616,906 t) is well above MSY $B_{trigger}$ (220,000 t), B_{lim} (125,000 t) and B_{pa} (160,000 t).

Saithe

SSB is currently near the time series maximum. Recruitment has been relatively constant in the last decade and well above the long-term average (1980 – present). The harvest rate has declined from 2009 and is presently estimated below HR_{MGT}. Stock size is not expected to change much in coming years. MFRI advises that when the management plan is applied, catches in the fishing year 2017/2018 should be no more than 60,237 t. Estimated SSB_{2017} (161,000 t) is well above MSY $B_{trigger}$ (65,000 t), B_{lim} (44,000 t) and B_{pa} (61,000 t).

Haddock
SSB has decreased in recent years but is above MGT $B_{trigger}$. Harvest rate in 2014 – 2016 is estimated close to its lowest level in the assessment period and is currently close to HR_{MGT}. Recruitment in 2010 – 2015 was low but is estimated high for 2016 and 2017 close to the geometric mean. Reference biomass will increase from a current low level in 2017, as the 2014 cohort enters the reference stock. MFRI advises that when the Icelandic management plan is applied, catches in the fishing year 2017/2018 should be no more than 41,390 t. Estimated SSB_{2017} (76,013 t) is well above MGT $B_{trigger}$ (45,000 t), B_{lim} (45,000 t) and B_{pa} (59,000 t).

Deep sea redfish (Demersal beaked redfish)
Note: this refers to demersal beaked redfish and not pelagic deep-sea redfish. 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 the advice. The stock size indicator has declined from 2001 – 2003, and remained at low levels since. Since 2007, survey have consistently shown very low estimates for juveniles.

Little information is available on sustainable yield of demersal beaked redfish. The fishable biomass, according to IS-SMH, is considered small compared to what it was in the beginning of the time series. The abundance index of fish <30 cm has been at low levels since 2007, indicating little recruitment to the fishable stock. The lack of long time-series of abundance indices prevents the determination of stock status of this long-lived species. The Iceland bottom trawls surveys cover the entire fishing area of the fishable stock in Icelandic waters. MFRI and ICES advise that when the precautionary approach is applied, catches in the fishing year 2017/2018 should be no more than 11,786 t.

Greenland halibut
Greenland halibut from the East Greenland/Iceland/Faroe Islands region are considered a single stock, so stock assessments and advice from ICES and the MFRI have referred to it as such. At the end of May 2014, Iceland and Greenland adopted a bilateral five-year management plan for Greenland halibut. The stock was well above MSY $B_{trigger}$ in the early part of the time-series and while it dropped below the trigger in 2004 and 2005, it has since increased and is currently back above MSY $B_{trigger}$. Fishing mortality has decreased in recent years, and is estimated to be relatively close to F_{MSY}. MFRI and ICES advise that when the MSY approach is applied, catches in the 2017/2018 fishing year should be no more than 24,000 t. According to an agreement between Iceland and Greenland, 56.4% of the TAC is allocated to Iceland. Biomass is currently likely above both B_{lim} and $B_{trigger}$.

Ling
Recruitment was high from 2004 to 2011 but has since declined to the levels more consistent with those seen in the 1980s and 1990s. While SSB and the reference biomass (ling >75 cm) in 2017 are among the highest in the time-series, short term projections indicate SSB is likely to decline as the result of low levels of recruitment in recent years with a corresponding decrease in catches. While harvest rate has decreased since 2008 and is now the lowest in the time series it remains above HR_{MGT}. MFRI advices that when the management plan is applied, catches in the fishing year 2017/2018 should be no more than 8,598 tonnes including catches of foreign fleets. Estimated SSB_{2017} (45,631 t) is well above MSY $B_{trigger}$ (9,930 t) and B_{lim} (7,090 t).

Atlantic wolffish
Fishing mortality has increased since 2014 and is now at F_{MSY}. Recruitment was low in the period 2008 – 2015. Harvestable biomass has declined since 2006, but is above average compared to the years from 1980 to present. The harvestable biomass has increased from 2013. Recruitment in 2017 is predicted to be above the average of 2008 – 2016. Therefore, catch levels are expected to be similar or increase slightly in coming years. MFRI advises that when the precautionary approach is applied, catches in the fishing year 2017/2018 should be no more than 8,540 tonnes. MFRI further recommends the continued closure of the spawning area off West Iceland during the spawning and incubation season in autumn and winter.

Greater Silver Smelt (Greater Argentine)
The survey index has fluctuated greatly but has been high in the last three years. The F_{proxy} has decreased since 2010 and has been below the target F_{proxy} since 2014. MFRI advises that when the precautionary approach is applied, catches in the fishing year 2017/2018 should be no more than 9,310 t.

Tusk
Recruitment in 2011 – 2014 was very low, but has increased since. Harvest rate has declined in recent years and is below HR_{MGT}. SSB has been increasing in recent years while the reference biomass (tusk >40 cm) has declined but remains at a high level. According to the prognosis, the SSB and harvestable biomass will not increase in the near future as a result of low recruitment and catch levels will likely remain close to current levels. MFRI advices that, catches in the fishing year 2017/2018 should be no more than 4,370 t. In addition, continued closure of the known nursery areas off the southeast and southern coast should be maintained. Estimated SSB_{2017} (15,165 t) is well above MSY $B_{trigger}$ (6,240 t) and B_{lim} (4,460 t).

Norway lobster
Fishing mortality has been low in recent year is still below F_{MSY}. Recruitment has decreased since 2005 and has never been lower. Harvestable biomass has decreased sharply and is at its lowest level. The biomass of large specimens is high but has decreased since 2009. Recruitment has been decreasing since 2005 which will lead to further decrease in recommended TAC in coming years. MFRI advises that when the MSY approach is applied, catches in the fishing year 2017/2018 should be no more than 1,150 t. Targeted Nephrops fishing results in bycatch of golden redfish and not the other way around; therefore the directed golden redfish fishery is unlikely to have significant impacts on Nephrops.

Witch flounder
Biomass index has been high since 2004. The recruitment index has, however, declined since 2009, and reached an all-time low in 2016. F_{proxy} has remained relatively low over the last five years. Biomass index indicates that the stock was relatively large from 2004 and onwards. Low recruitment in recent years and small cohorts in 2009 – 2014 might lead to a decline in the stock in the near future. MFRI advises that when the precautionary approach is applied, catches in the 2017/2018 fishing year should be no more than 1,116 t. Witch flounder are primarily caught in Danish seines and Nephrops trawls so the effects of directed fishing for golden redfish on this species should be minimal.

Anglerfish (Monkfish)
The biomass index was high in 2005 – 2011 compared to previous years, but has since then decreased substantially. Juvenile indices show strong recruitment for year classes 1998 – 2007, but poor recruitment before and after this period. F_{proxy} was stable when the stock peaked, but has reduced in recent years and is now close to target levels. Recruitment has been low in recent years and fishable biomass has decreased as a result. Recommended catch levels have declined and it appears that they will remain low in coming years. MFRI advises that when the precautionary approach is applied, catches in the fishing year 2017/2018 should be no more than 853 t. Anglerfish are predominantly caught as bycatch in special monkfish nets and Nephrops trawls and with there being little spatial overlap between areas of high anglerfish landings and those of golden redfish the effects of directed fishing for golden redfish on this species should be minimal.

Megrim
The IS-SMB recruitment index declined rapidly between 1989 and 1994. It stayed low until 1999, after which it increased and remained high until 2012 when it declined rapidly again and was very low in 2016. The biomass index has for the most part followed fluctuations in the recruitment index, but has remained high since 2006. Decline in the stock is to be expected due to low recruitment in recent years. MFRI does not recommend a TAC for the 2017/2018 fishing year. Megrim is predominantly caught as bycatch in Nephrops trawls and demersal seines and with there being little spatial overlap between areas of high megrim landings and those of golden redfish the effects of directed fishing for golden redfish on this species should be minimal.

Vulnerable species Interactions

Other species that do not encompass a major component of catches in the main gear types targeting redfish but are seen to be either vulnerable or ETP species include the common skate (*Dipturus batis*), Atlantic halibut (*Hippoglossus hippoglossus*), spiny dogfish/spurdog (*Squalus acanthias*) and Greenland shark (*Somniosus microcephalus*). Annual landing statistics for each of these four species are presented in (Table 9) below.

Table 9. Icelandic landings in tonnes of common skate (*Dipturus batis*), Atlantic halibut (*Hippoglossus hippoglossus*), spiny dogfish (*Squalus acanthias* also known as spurdog) and Greenland shark (*Somniosus microcephalus*) 2006 – 2016.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Common skate	136	123	127	128	117	125	145	153	141	157	132
Atlantic halibut	559	516	529	548	557	555	36	39	45	87	123
Spiny dogfish	82	43	68	102	62	53	51	6	19	8	8
Greenland shark	28	2	35	26	43	18	19	6	26	18	26

Common skate (Grey skate)

Recent studies have shown that the common skate in the Northeast Atlantic may actually be one of two nominal species; the smaller blue skate or grey skate (*Dipturus flossada*) and the large flapper skate (*Dipturus intermedia*); together they are more commonly referred to as the D. batis species-complex (Iglésias ,2009). Investigation of skates in Icelandic waters have shown that the skate currently found in Icelandic waters, and caught as bycatch in Icelandic fisheries, is the smaller grey skate (D. flossada) (Jonbjorn Pálsson, unpublished material) with the larger sister species, the flapper skate (D. intermedia), believed to be almost extinct in the Atlantic.

The grey skate used to be fairly common in Icelandic waters, but has been overfished and catches are now only about 10% of what they were 50 years ago. The status of the grey skate stock can be compared to the halibut stock as both species are at a low level. Both are widely distributed, fished in many types of fishing gear, very large and mature late**.** In 2016/2017 total catches of skate in Icelandic waters was 132 t. No TAC is available for this species because there is no directed fishery for it. No assessment is carried out for grey skate and indices of abundance are uncertain as only limited survey data exists. However, trends in total number indicate some increase in the scientific ground fish survey (Figure 9).

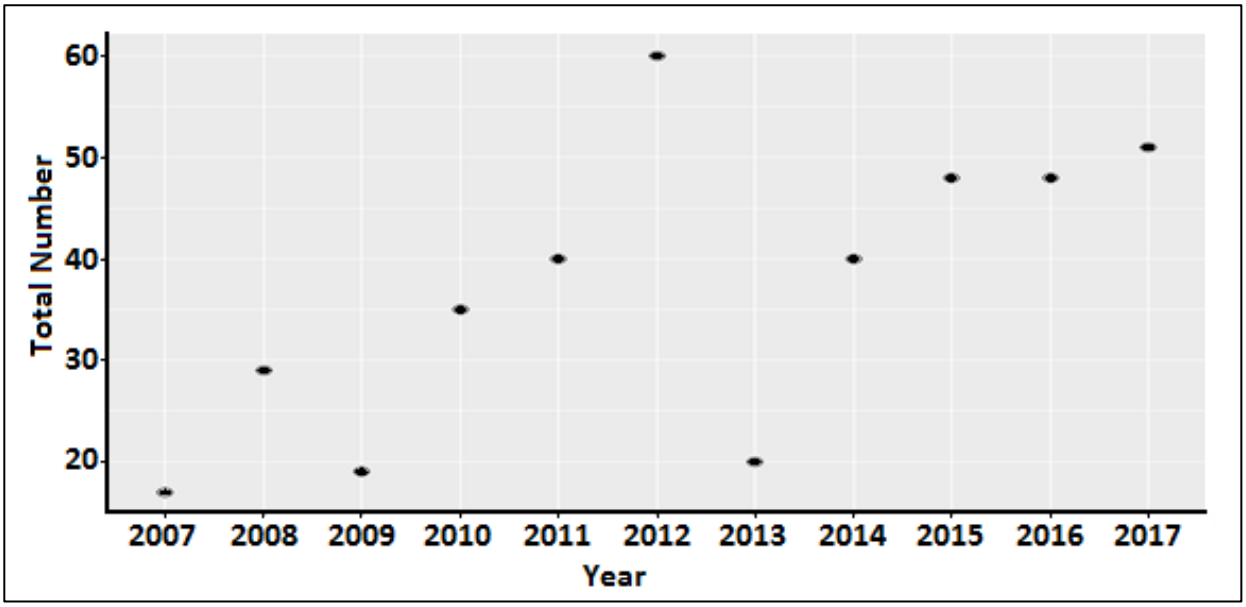

Figure 9. Total catch in numbers of Grey skate (*Dipturus flossada*) in MFRI spring survey (2007 – 2017) (Source: MFRI data provided to assessment team).

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

Atlantic halibut

Recruitment and biomass indices decreased rapidly between 1985 and 1992 and have remained low since. Survey catches of Atlantic halibut have predominantly been 3 – 5 year old immature fish. These age groups have been in decline for over 20 years, and it is evident that the stock has suffered a recruitment failure. It is therefore likely that the stock will remain low over the next years. In 2012, a regulation was issued to ban all targeted fishing for Atlantic halibut and stipulating that all viable halibut must be released in other fisheries the effects of which are evidenced by a sharp drop in halibut landings after 2011 (Table 9). MFRI recommends that these regulations should be maintained until clear indications of improvement in the stock are evident. Total landings of Atlantic halibut in the 2016/2017 fishing season amounted to 114 t, 81% of which was taken by demersal trawls with Danish seines and Nephrops trawls contributing 9% and 12% respectively. Trends in total number indicate some increase in the scientific ground fish survey (Figure 10).

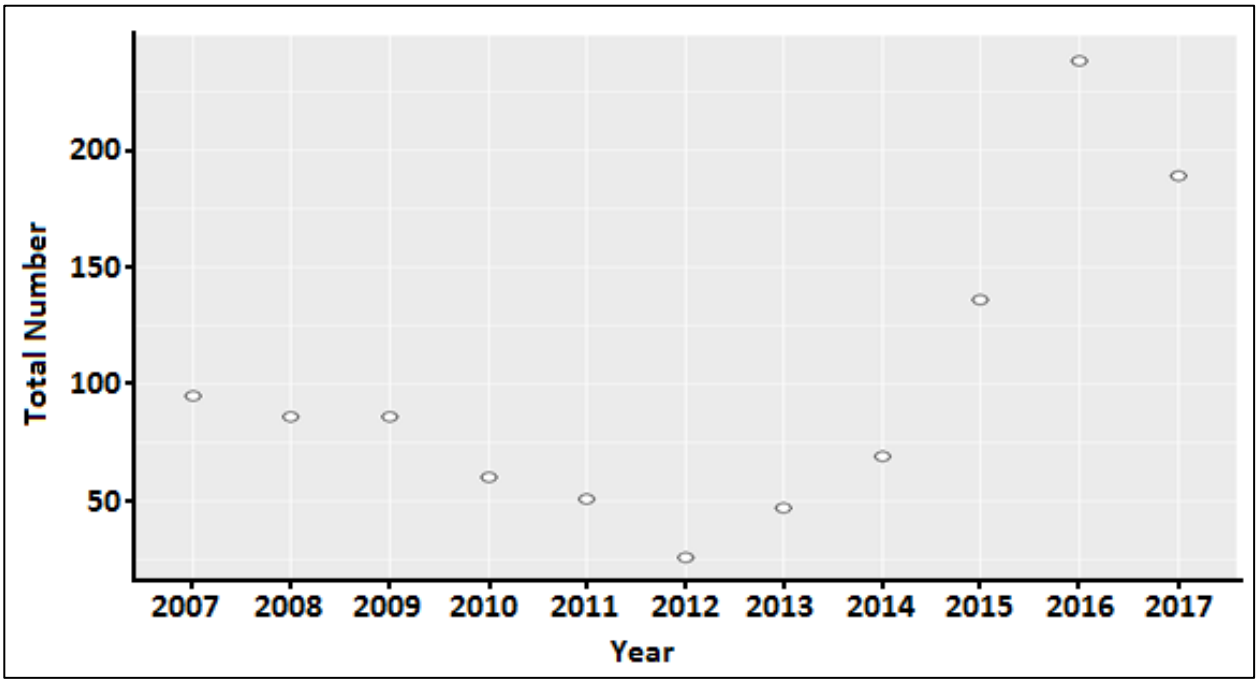

Figure 10. Total catch in numbers of Atlantic halibut (*Hippoglossus hippoglossus*) in MFRI spring survey. (2007 – 2017) (Source: MFRI data provided to assessment team).

Spiny dogfish (spurdog)

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, less than 100 tonnes, in recent years. As spiny dogfish are an aggregating species, landings can be dominated by relatively few large hauls leading to large fluctuations in annual landings and/or survey results. There is no directed fishery for spiny dogfish and current catches are solely bycatch in other fisheries, primarily gillnet fisheries off the southern coast during the summer months. Gillnets, the main gear responsible for catches of spiny dogfish, only accounted for approx. 0.2% of total golden redfish catches in 2016/2017; therefore, the effects of directed fishing for golden redfish on this species are likely to be minimal.

Greenland shark

Historically Greenland sharks (*Somniosus microcephalus*) were fished in Icelandic waters with the fishery reaching its peak in 1867 when 13,100 barrels of shark oil were exported. Later whale and then fuel oil became more available and commercial fisheries for Greenland shark ceased by about 1910. Greenland sharks are still targeted in small scale artisanal fisheries and is a periodic bycatch in bottom trawl fisheries. National landings in 2016/2017 totalled 18 t with no specific changes or trends apparent in the annual landings data (MFRI data provided to assessment team).

Interactions of bottom contact gear with benthic ecosystem

Interactions between fishing gears and the seabed are highly dependent on gear type with towed bottom gears such as demersal trawls and dredges having a greater impact than static gear such as longlines, set nets or pots. Of the total catch of golden redfish by the Icelandic fleet in the 2016/2017, 92.4 % was taken by bottom trawls, 3.5% by Nephrops trawls and 2.6 % (1,573 t) by longlines, with the remainder being contributed by Danish seines, pelagic trawls, handlines, gillnets and shrimp trawls.

The Icelandic groundfish fishery is multispecies in nature with vessels simultaneously targeting numerous species; as such the effects of bottom contact fishing gears are not separable by species and thus are generally attributed to the fishery as a whole rather than to any species in particular. The most widely used bottom fishing gear in Icelandic waters are demersal otter trawls the effects of which are dependent on seabed and community type. Effects on large emergent epifauna are more significant than on smaller encrusting organisms with areas subject to regular hydrodynamic disturbance, such as winter storms in shallower areas also being more naturally resilient to fishing disturbance.

As previously discussed, the major bottom contact fishing gear used to catch golden redfish around Iceland is bottom trawls (demersal otter trawls). Available data on fishing effort of the Icelandic fleet provided by satellite Vessel Monitoring Systems (VMS) are very accurate and have made it possible to map in detail the distribution of bottom trawl effort (Figure 11). The reduction in the intensity and footprint of the bottom trawl fishery in recent years is also evidenced by a reduction in total fishing effort (Figure 12).

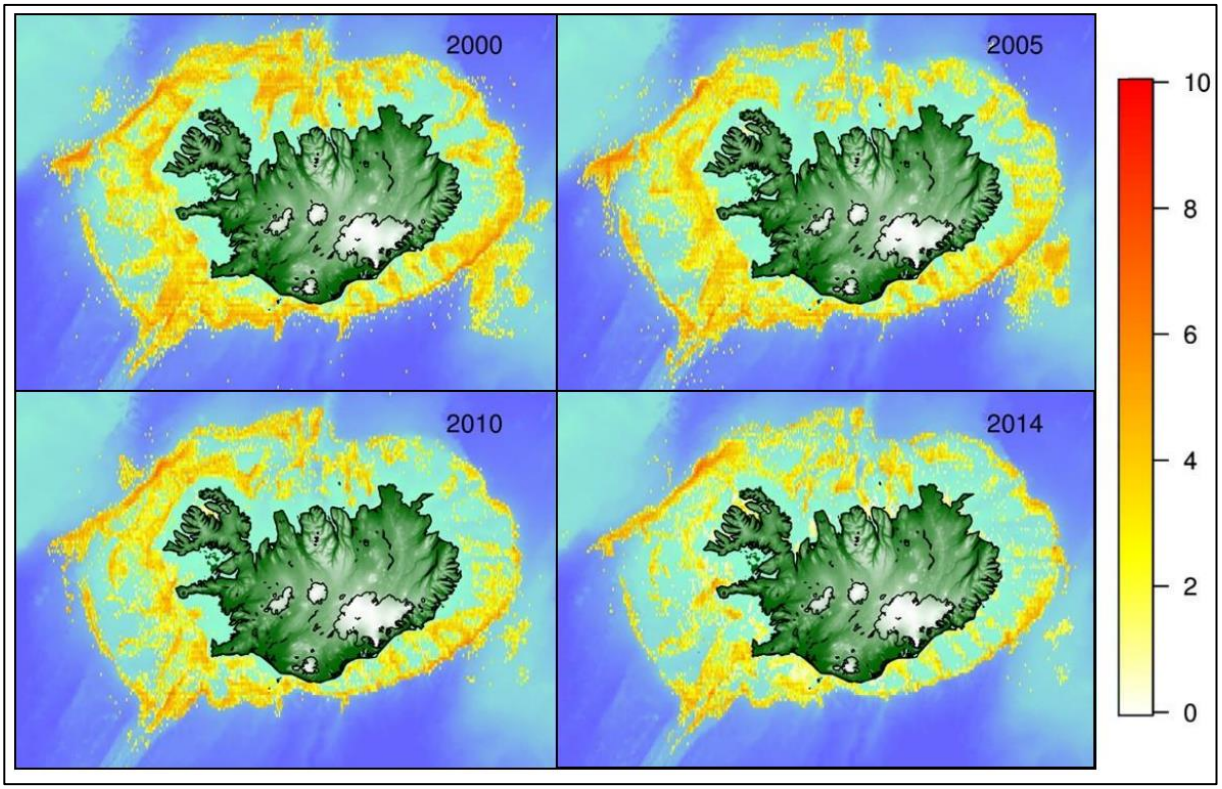

Figure 11. Spatial distribution of bottom-trawl effort (1000 kW hr) based on logbooks from trawl fishery targeting demersal fish, shrimp, and Norway lobster in 2000, 2005, 2010, and 2014.

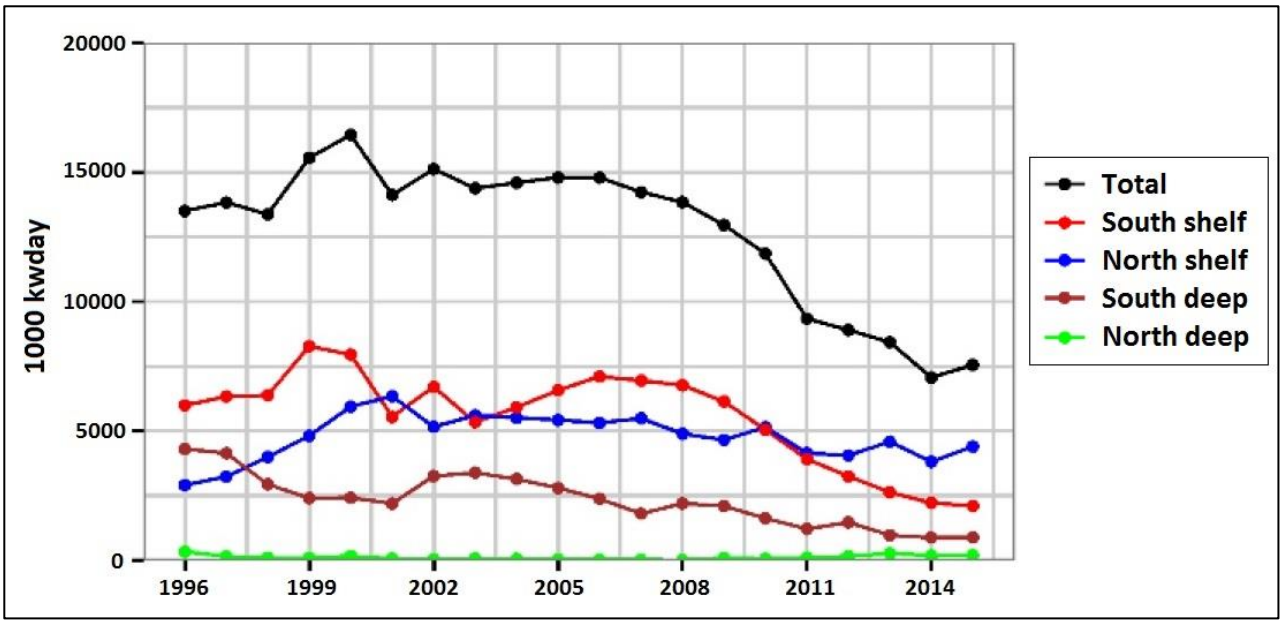

Figure 12. Annual total fishing effort (1000 kW days) for bottom-trawls targeting demersal fishes in the Icelandic ecoregion in 1994 – 2015 based on logbooks.

Protection of Vulnerable Marine Ecosystems (VMEs)

It is the policy of the Icelandic government to protect vulnerable marine ecosystems (VMEs; sponge communities, coldwater corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. Large areas within the Icelandic EEZ are closed, either temporarily or permanently, to fishing for a variety of reasons; these include the protection of juveniles, spawning fish and VMEs. Cumulatively approx. 58,000 km^2 of the 109,000 km^2 of Icelandic shelf area within which fishing activities occur is closed to bottom trawling. Furthermore, not all the fishable shelf areas outside closed areas are trawlable, as some parts of the seabed are unsuitable for trawl gear. While a closed area may be designed to protect one particular species/group of species within an ecosystem the benefits are not exclusive to that species and the closure may offer *de facto* protection to other ecosystem components. Therefore, while areas may not be specifically designed to benefit VMEs, with a total effective closed area in excess of 50% it is felt that suitable protection for VMEs is in place within the Icelandic EEZ.

Seabed mapping is a key aspect of this policy and is the remit of the MFRI During the summer of 2017 a 9 day habitat mapping cruise was conducted including a total 61 dives in four areas; more information can be found online[64]. The combination of data relating to the distribution of sensitive habitats and fishing effort is important in order to predict species and habitats at risk from fishing activity. VMEs of particular importance within Icelandic waters are sponge and cold water coral communities and hydrothermal vent areas.

Sponge communities

Bycatch of sponges are recorded during bi-annual groundfish surveys allowing managers to estimate the distribution of mass sponge occurrences. There are no strategic conservation plans in place for sponges; however, there are a number of different closures which while not designed specifically for the protection of sponge communities, provide *de facto* protection for benthic organisms including sponges. These include:

1. Closure of coastal areas within 4 – 12 nm to bottom trawls (total area of 45,290 km^2).
2. Several permanent regulatory fisheries closures outside of 12nm (total area 13,094 km^2) in which otter trawls, and in most cases long-lines, are banned
3. Cold water coral protection areas, some of which have considerable abundance of sponges

[64] https://hafsbotninn.wordpress.com

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

Hydrothermal vent areas
There are two known hydrothermal vent areas with series of chimneys and fissures on the Icelandic continental shelf. Both are inside Eyafjörður to the north of the island and are fully protected by environmental law. There are additional known hydrothermal vents in deeper waters to north, south and southwest of Iceland. These are in more remote areas and have less surface structure and are not been considered threatened by fishing activities.

Interactions with Seabirds and Marine Mammals
The electronic logbook system designed by TrackWell allows for marine mammal and seabirds to be recorded along with normal catch; the below screen grab shows the section of the e-log designed to record bycatch of marine mammals and seabirds. In total there are 171 marine mammal and seabird species pre-programmed into the e-log system that are selectable by fishers.

In a report on seabird and marine mammal bycatch in Icelandic fisheries, Pálsson *et al.* (2015)[65] found that reports of seabird and marine mammal bycatch were very few in all gear types with the exception of gillnets. However, the report also stated that it has been reported that sea birds are attracted to the baited hooks in longline fisheries, and that seals and small whales occasionally get caught in bottom trawls. In an update provided to the assessment team MFRI summarized records of seabird and marine mammal bycatch in the Icelandic longline and bottom trawl fisheries in 2014 and 2015 based on data from both onboard observers (representing approx. 1% coverage of the entire fleet) and records from the electronic monitoring system described above. This report suggested that bycatch of seabirds and marine mammals in the major gear used to target golden redfish (i.e. bottom trawls) is likely to be minimal.

Consistency of management of the fishery's ecosystem impacts with the precautionary approach.
As outlined above the most probable adverse impacts of the Icelandic golden redfish fishery are considered and those impacts likely to have serious consequences are addressed either by an immediate management response or further analysis of the identified risk. Consideration of the adverse impacts of the fishery on the ecosystem and resulting management actions are demonstrably consistent with the precautionary approach.

[65] http://www.hafro.is/Bokasafn/Timarit/fjolrit-178.pdf

Clause 3.2 – Specific Criteria

Clause 3.2.1 – Information gathering and advice

Supporting Clauses:	3.2.1.1, 3.2.1.2			
Clause Guidance:	***Information shall be available on fishing gear used in the fishery, including the fishing gears' selectivity and its potential impact on the ecosystem. Stocks of non-target species commonly caught in the fisheries for the stock under consideration may be monitored and their state assessed as appropriate. Information shall be available on the potential effect of fishing on endangered, threatened and protected species, as appropriate and relevant in the context of the unit of certification.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Information is 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 are monitored and their state assessed as appropriate. Information is available on the potential effect of the golden redfish fishery on species designated as ETPs. The current status of ETPs is assessed annually and present in the MRI advice book.

EVIDENCE

There is information available on the legal specification of fishing gear in the Icelandic groundfish fishery. The primary aim of fishing gear regulations is size selectivity of the gear with a secondary aim being species selectivity. Gears are regulated in several ways to regulate both size and species selectivity. In the mixed groundfish fishery, the minimum mesh size is 135 mm, the largest minimum mesh size in the north Atlantic. Even with a minimum mesh size of 135 mm small and immature fish may be retained by the gear. In order to further reduce the risk of unwanted bycatch a range of selectivity devices has been developed; these devices generally consist of sorting grids and/or square mesh panels that exclude bycatch larger than the target species. Additionally, longliners 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.

The MRI routinely conducts selectivity experiments to assess the performance of the main fishing gears and to assess ways in which selectivity might be improved. While MRI studies have shown codend selection to be appropriate, there has been a shift in the types of materials used to construct the trawls which may potentially impact the trawls performance when it comes to excluding unwanted catches. 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).

Stocks of non-target species commonly caught in the fisheries for the stock under consideration are monitored and their state assessed as appropriate; non-target species in this instance refer to other commercially fished stocks and not to other marine organisms that may be retained. The MRI provides annual catch advice for 35 different species, while catch statistics are routinely collected and publically available for many more. Note that for many of the species listed there is limited spatial overlap with golden redfish catches and therefore the technical interaction between these species and redfish will be limited or absent. See discussion and figures relating to retained species in clause 3.1 for further details.

In the context of the IRFF Standard Revision 2.0 endangered, threatened and protected species (ETPs) are those species recognised by Icelandic legislation and/or binding international agreements to which the Icelandic authorities are party and binding international agreements as applicable in Icelandic jurisdiction. ETPs in Icelandic waters are therefore limited to Atlantic halibut and some cold water coral species (*Lophelia pertusa*).

As discussed previously, discarding of fish species is prohibited and there is a statutory requirement for skippers to record both the capture of fish and non-fish species. The e-logbook system as well as paper logbooks for smaller vessels include provisions for such information to be recorded. Observations are also recorded by fishery inspectors aboard fishing vessels and during bottom trawl, gillnet and longline surveys undertaken by the MRI.

Atlantic halibut

Information is available to assess the status of Atlantic halibut on an annual basis. Results of the 2016 stock assessment of Atlantic halibut concluded that recruitment and biomass indices decreased rapidly between 1985 and 1992 and have remained low since. Additionally, survey catches of Atlantic halibut have predominantly been 3 – 5 year old immature fish. These age groups have been in decline for over 20 years, and it is evident that the stock has suffered a recruitment failure. It is therefore likely that the stock will remain low over the next years. In terms of catches of halibut in Icelandic fisheries around 2,000 t of Atlantic halibut were landed annually from Icelandic waters in 1984 – 1991.

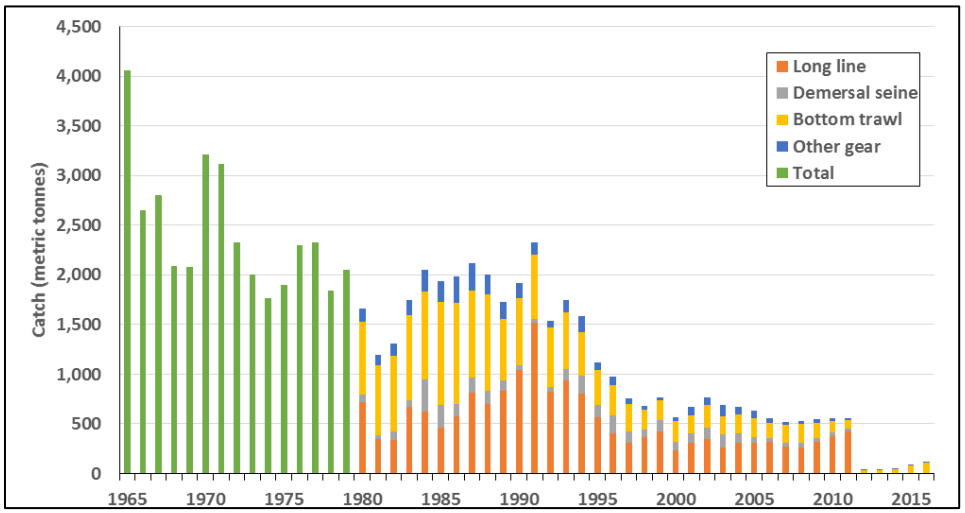

Figure 13. Landings of Atlantic halibut from 1960 to 2015 (split by gear type after 1982).

A steady decline in catch occurred from 1991 to 1997, after which the catch stabilized between 500 t and 800 t until the ban on targeted fishing in 2012 (Figure 13). In the years immediately preceding the 2012 regulation, a directed longline fishery for halibut was developing, coinciding with a sharp decline in the survey biomass index. Atlantic halibut is now only caught as bycatch in bottom gear all around the island. Currently, the halibut stock seems to be severely depleted (Figure 14), with very little recruitment into the spawning stock in recent years.

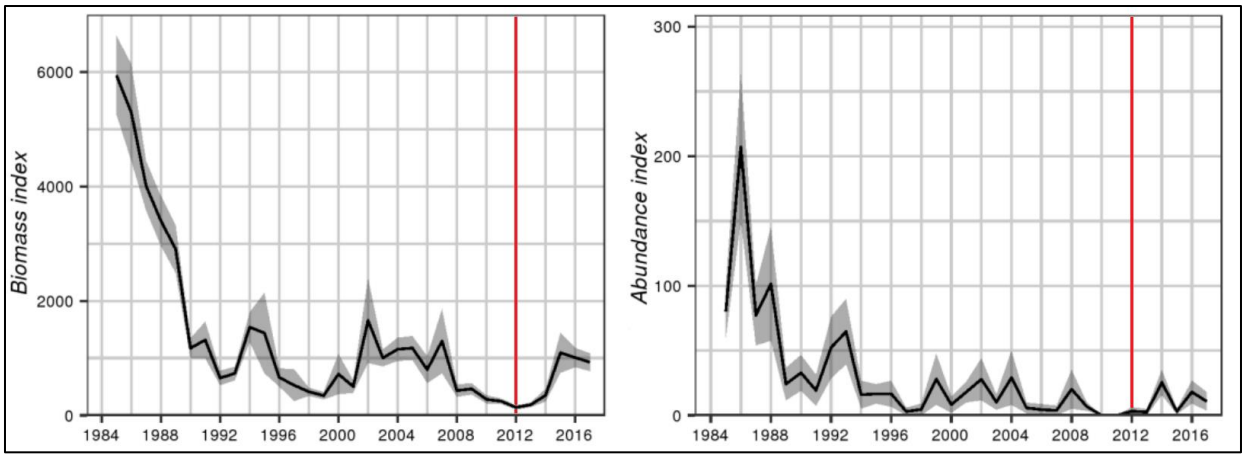

Figure 14. Biomass and juvenile indices form Icelandic bottom trawl surveys. Red line represents the year directed fishing for Atlantic halibut was prohibited.

Based on the spatial overlap of landings of golden redfish (2015) and Atlantic halibut (2000 – 2015) there is likely to be some impacts on the Atlantic halibut stock as a result of directed fishing for golden redfish (Figure 15).

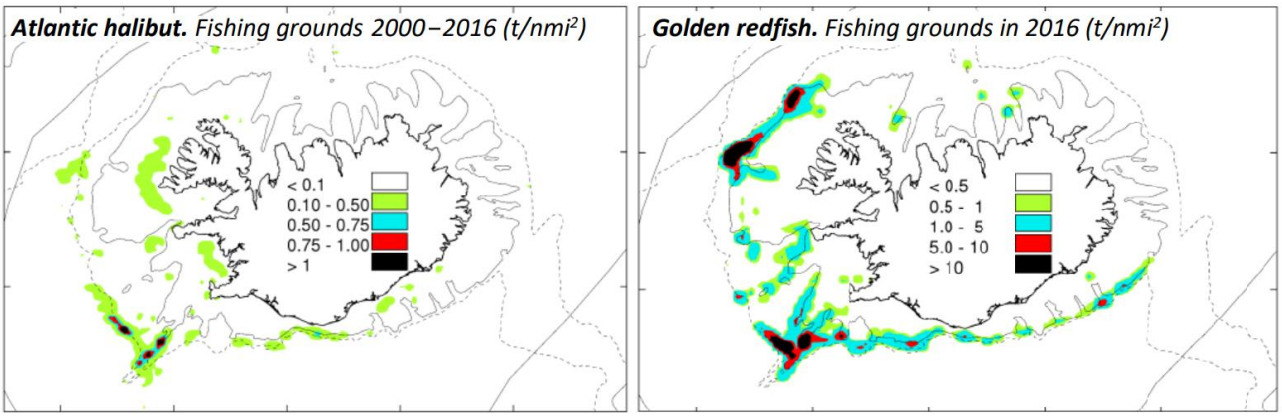

Figure 15. Fishing grounds for Atlantic halibut (2000 – 2016) and golden redfish (2015) in Icelandic waters (t/nm^2).

Cold water coral (*Lophelia pertusa*)

The coral water coral closures protect *Lophelia pertusa,* a species of cold-water coral which is extremely slow growing, associated with diverse communities and may be harmed by destructive fishing practices. In 2004 a research project mapped coral areas off Iceland and as a result 10 areas in to the southeast of Iceland were permanently closed to fishing (Figure 16). 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 trawl effort around Iceland. Research is ongoing aimed at mapping the distribution of benthic assemblages and habitats which are considered sensitive to disturbance by trawling.

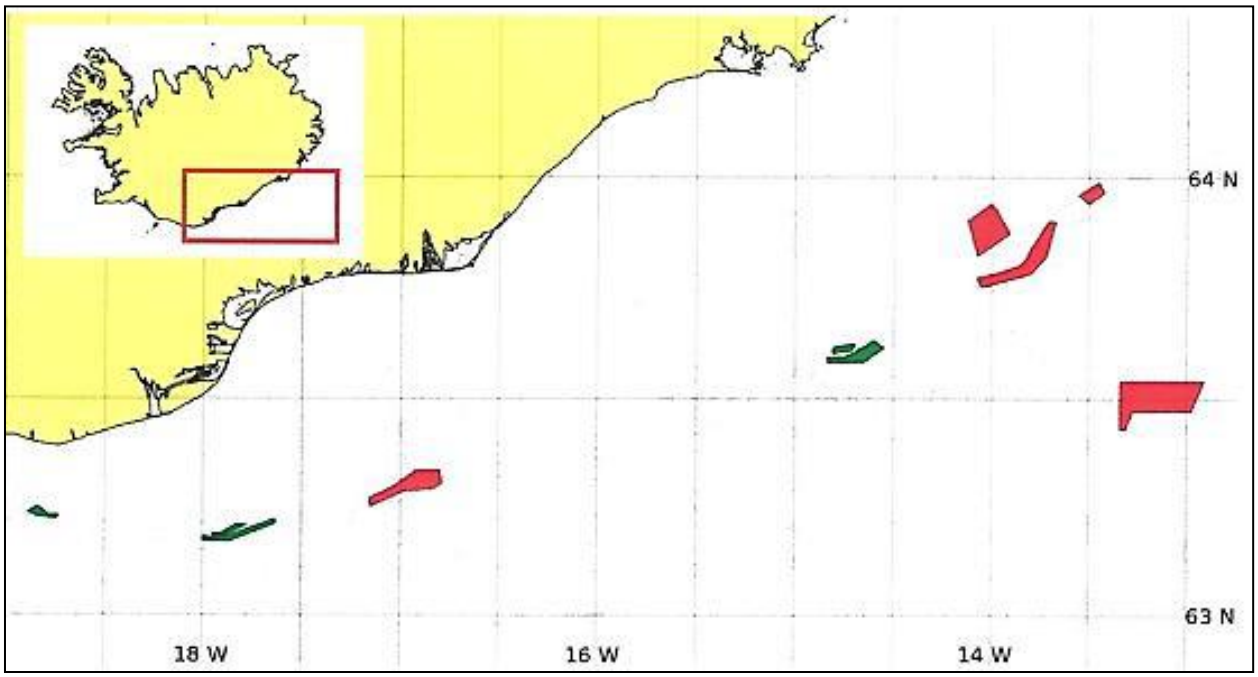

Figure 16. Location of closed areas for the protection of cold water corals in water to the southeast of Iceland.

Clause 3.2.2 – By-catch and discards

Supporting Clauses:	3.2.2.1, 3.2.2.2, 3.2.2.3, 3.2.2.4, 3.2.2.5			
Clause Guidance:	***Discarding, including discarding of catches from non-target commercial stocks, is prohibited. Where relevant, appropriate steps shall be taken to avoid, minimize or mitigate encounters with seabirds and marine mammals. Accordingly, non-target catches, including discards, of stocks other than the "stock under consideration" should not threaten these non-target stocks with serious risk of extinction; if serious risks of extinction arise, effective remedial action shall be taken. Suitable steps shall be considered to avoid, minimize or mitigate encounters with endangered, threatened and protected species, as appropriate and relevant in the context of the unit of certification and appropriate steps shall be taken to avoid the loss of fishing gear and ghost fishing of lost and abandoned gear.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Discarding, including discarding of catches from non-target commercial stocks, is prohibited. Non-target catches, including discards, of stocks other than the "stock under consideration" do not pose serious risks of depletion to these stocks.

Suitable steps are considered to avoid, minimize or mitigate encounters with ETP species, as appropriate and relevant in the context of the Icelandic golden redfish commercial fisheries and appropriate steps are taken to avoid the loss of fishing gear and ghost fishing of lost and abandoned gear

EVIDENCE

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) with inbuilt flexibility measures as previously discussed in Section 3.1. 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.

Non-target catches, including discards, of stocks other than the stock under consideration, in this case golden redfish, do not threaten these non-target stocks with serious risk of depletion. Details of this have been provided under clause 3.1.

As of February 2014, all interactions between fishing gears and marine mammals/seabirds including the number and species of the animal in question must be reported[66]. Bycatches of marine mammals and seabirds are not considered a significant problem in the golden redfish fisheries. Further information is provided under clause 3.1.

Suitable steps are considered to avoid, minimize or mitigate encounters with ETP species, as appropriate and relevant in the context of the Icelandic golden redfish commercial fisheries. In the context of this certification scheme ETPs in Icelandic waters are limited to Atlantic halibut and some cold water coral species (*Lophelia pertusa*). As discussed previously other species which might be considered vulnerable such as grey skate, spiny dogfish and marine mammal and seabird species are assessed under Clause 3.1. However, there are also mechanisms in place to mitigate adverse impacts on these species such as the use of acoustic cannons, tori lines and night setting in Icelandic longline fisheries to minimise interactions with vulnerable seabirds.

[66] http://www.reglugerd.is/interpro/dkm/WebGuard.nsf/key2/557-2007

Atlantic halibut

A committee established in 2010, in response to the state of the Atlantic halibut stock as outlined in the supporting evidence for Clause 3.2.1 above, concluded that the most effective way to rebuild the stock would be to ban all targeted fishing and to make it mandatory to release all viable bycaught Atlantic halibut. Regulations to this effect were enacted in January 2012. It is now illegal to fish for Atlantic halibut and any bycaught specimens deemed to be viable must be returned to the sea immediately. Any fish that are not deemed to be viable must still be landed but these are treated outside of normal catches and fishers do not profit from their sale. The effects of these regulations on halibut landings can be seen in **Error! Reference ource not found.** with landings dropping from an average of approx. 500 t per annum to less than 100 t. In the current fisheries advice booklet MRI recommends that these regulations should be maintained until clear indications of improvement in the stock are evident. Total landings of Atlantic halibut in the 2016/2017 fishing season amounted to 114 t, 81% of which was taken by demersal trawls with Danish seines and Nephrops trawls contributing 9% and 12% respectively. Figure 14 (left panel) also shows some tentative signs of recovery in response to the ban on commercial fishing however it is much too early to determine if this is in fact the case.

Cold water coral (*Lophelia pertusa*)

The coral water coral closures represent 10 areas in to the southeast of Iceland that are permanently closed to fishing specifically for the protection of *Lophelia pertusa* (Figure 16)**.** *L. pertusa* is a species of cold-water coral which is extremely slow growing, associated with diverse communities and may be harmed by destructive fishing practices. While these permanently closed areas protect known occurrences of *Lophelia pertusa* further mapping of the Icelandic seabed is continually undertaken to determine whether there are other similar areas/species in need of such protection. 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 trawl effort around Iceland.

There are a number of initiatives and regulations in place to avoid the loss of fishing gear and subsequent ghost fishing of lost and abandoned gear. Recycling schemes are in place to encourage fishers to bring old gear ashore and it is illegal to dump old gear at sea. Where the directorate finds and recovers lost or abandoned gear the Directorate recovers the cost of recovery from the gears' owner. In the 2015 lumpfish season the Directorate contracted two vessels to go out and specifically look for and recover lost gear. The Coastguard also reports any buoys it feels might represent lost or abandoned fishing gear to the Directorate (pers. comms. site visit, August 2016). All regulations relating to fishing gear may be found in the various Articles of Fisheries Management 2016/2017 Laws and regulations[67].

In the case of gillnets fishers are required to attend their nets at regular intervals and retrieve them before going ashore. According to Article 4 of Act 57/1996, concerning the Treatment of Commercial Marine Stocks (Translated from Icelandic); *"Nets and other gear, which are left in the sea, must be drawn on an appropriate and regular basis as circumstances allow. The Fisheries Directorate may remove, or have removed gears that are not been looked after properly. The same applies to fishing gear remaining in the sea after the end of fishing season, gears that are illegal or gears deployed in areas where their use is prohibited. The Directorate shall demand that the owners of fishing gear, removed from the sea by authority in paragraph 2 pay the costs associated with their removal. If the owner of the fishing gear is not known, the Directorate may sell the gear and the profit goes to the MRI."* This means that gear is not left out in inclement weather conditions that might lead to increased gear loses.

With respect to static gear fisheries for invertebrates, Article 4 of Regulation 1012/2013, on fishing whelk in traps and Regulation 1070/2015, the fishing of crabs in the inner Faxaflói both include specific provisions to prevent ghost fishing by lost whelk and crab traps respectively. Both of these Regulations require mechanisms be built into the trap to prevent it from continuing to fish indefinitely if lost (i.e. biodegradable panels).

[67] http://vefbirting.oddi.is/Raduneyti/stjorn_fiskveida_2016-17/index.html#20

Another important factor that contributes to low levels of lost fishing gear is the high price of that gear. This means that fishers are very careful to avoid losing their gear. In the case of trawls the majority of vessels carry special grapples onboard that allow them to retrieve lost gear even when both towing warps have parted, a situation which is extremely rare.

The Icelandic ITQ system allows for a slower paced fishery than would be expected if there was only an overall TAC with all boats fishing against it. The system allows fishers to target their efforts in optimum weather conditions leading to decreased rates of lost fishing gear; this has also been seen to be the case in the Alaskan Bering Sea crab fisheries post-rationalisation.

Clause 3.2.3 – Habitat Considerations

Supporting Clauses:	3.2.3.1, 3.2.3.2, 3.2.3.3, 3.2.3.4			
Clause Guidance:	***If studies show that the spawning or nursery areas or other essential habitats in the fishing area are at risk and highly vulnerable to negative impacts of particular fishing gear, such impacts shall be limited in range relative to the full spatial range of the habitat or else action is taken to avoid, minimise or mitigate such impacts. Management measures must take into account and protect through closures significant continuous stony coral areas, identified through scientific and formal methods. Known thermal vents shall be protected through area closures to fishing activities with gear that has significant bottom impact during normal operation.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The Icelandic authorities have implemented an extensive array of areal closures within the Icelandic EEZ. These include permanent, seasonal and periodic closures aimed at protecting both juvenile and spawning fish and are gear or fishery specific. These closures, in particular those of a permanent nature, provide wider ecological benefits over and above their intended fisheries management objective by offering *de facto* protection from fishing activity to other elements of the marine environment. While the majority of temporary closures to protect juveniles are aimed at protecting cod, haddock and saithe, these closures are likely to have a conservation benefit for other species, including golden redfish.

EVIDENCE

Descriptions of Icelandic redfish essential habitat can be found on the Icelandic Ministry of Fisheries website, and in the North Western Working Group report (NWWG, 2011). Golden redfish are found all around Iceland on various bottom types. Redfish mate in early winter; the female carries the sperm and eggs, and later larvae hatch in April/May in remote areas in the southwest. The fry stay near the bottom off East Greenland and at the edge of the Icelandic continental shelf. While juveniles are found mainly off the north coast, the main fishing grounds, as well as the main adult grounds, are at the edge of the continental shelf at 200 to 400 m depth to south and west of Iceland.

As previously discussed, Icelandic authorities have implemented an extensive array of permanent, seasonal and periodic real closures within the Icelandic EEZ. These closures, in particular those of a permanent nature, provide wider ecological benefits over and above their intended fisheries management objective by offering *de facto* protection from fishing activity to other elements of the marine environment. While the majority of temporary closures to protect juveniles are aimed at protecting cod, haddock and saithe, these closures are likely to have a conservation benefits for other species, including golden redfish.

The effects of bottom contact fishing gears are subject to ongoing research by the MRI and have been subject to review). Garcia (2007) identified the most vulnerable habitats as those with long-lived benthic structures such as corals, sponge communities and maerl, all of which may act as keystone species for diverse benthic communities. To counter some of the potential adverse effect of bottom contact gear a variety of technical measures (minimum mesh sizes, sorting grids) and closed areas are in force. 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. For more information relating to closed areas within the Icelandic EEZ see supporting evidence for clause 3.1.

Clause 3.2.4 – Foodweb Considerations

Supporting Clauses:	3.2.4.1			
Clause Guidance:	***If the stock under consideration is a key prey species in the ecosystem, the harvesting policy and management measures shall be directed to avoid severe adverse impacts on dependent predators.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

The MRI has studied redfish, and its place in the ecosystem. All the redfish species primarily feed on zooplankton, but also on small fishes such as capelin. The single most important food group, however, is krill. Golden redfish are in turn prey to larger fish including cod, halibut and whales. There is no information to suggest that golden redfish are key species in the food web.

EVIDENCE

The MRI has studied redfish, and its place in the ecosystem. Extensive studies on the feeding ecology of a large number of demersal fish species, marine mammals and seabirds have shown that capelin is a key prey species in the Icelandic waters ecosystems. All the redfish species primarily feed on zooplankton, but also on small fishes such as capelin. The single most important food group, however, is krill. Golden redfish are in turn prey to larger fish including cod, halibut and whales. There is no information to suggest that golden redfish are key species in the food web and their trophic level appears to be around 4.0 ± 0.68 se, based on food items.

Golden redfish do not represent a key prey species in the Icelandic marine ecosystem so it is not necessary that harvesting policy and management measures are specifically directed to avoid severe adverse impacts on dependent predators.

Jaworski and Ragnarsson (2006) analysed stomach data on the main fish species collected during the 1992 Icelandic groundfish surveys[68]. The study found that the main components of redfish diet were zooplankton, euphausiids, capelin, and other fish. The size of the individual redfish was the major factor determining diet. The diet of the smallest fish was dominated by zooplankton with the relative proportion of fish in the diet increasing with size. The study also found spatial and temporal variations in the diet of redfish.

[68] Jaworski and Ragnarsson (2006): http://icesjms.oxfordjournals.org/content/63/9/1682.full

Clause 3.2.5 – Precautionary Considerations

Supporting Clauses:	3.2.5.1			
Clause Guidance:	***Management plans shall be developed and implemented in a timely fashion for avoiding, minimizing or mitigating any ecosystem issues properly identified. These shall be based on risk analysis and scientific advice, consistent with the precautionary approach, as being of serious concern in the fishery in question.***			
Evidence Rating:	Low ☐	Medium ☐		High ☑
Non-conformance:	Critical ☐	Major ☐	Minor ☐	None ☑

SUMMARY EVIDENCE

Icelandic government policy exists to protect vulnerable marine ecosystems (VMEs; cold-water corals and hydrothermal vents), from significant adverse impact from bottom contacting gear. 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.

EVIDENCE

Icelandic government policy aims to protect vulnerable marine ecosystems from significant adverse impact from bottom contacting gear and legislation exists to provide for the prohibition of fishing activities with bottom-contacting gear in areas where vulnerable ecosystems occur. The annual MRI advice book includes a specific section on the ecosystem impacts of Icelandic fisheries[69]. Measures to minimize or mitigate any ecosystem issues identified include real time, temporary and permanent areal closures, technical measures such as the use of tori lines in longline fisheries and where appropriate the specific consideration of predation in some stock assessments as is the case in the assessment of capelin which considers the cod-capelin predator-prey relationship.

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 major spawning grounds 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. Additionally, 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. Most recently, Iceland has adopted a Fisheries Management Plan for Icelandic golden redfish which summarizes the measure in place relevant to ecosystem effects[70].

As mentioned above, large areas within the Icelandic EEZ are closed for fishing, either temporarily or permanently. Restrictions on the use of gear are also in effect. The use of bottom trawl and pelagic trawl is not permitted inside 12 nm along the northern coast of Iceland. Similar restrictions are implemented elsewhere based on engine size and size of vessels for example large demersal trawlers are not permitted to fish within 12 nm from the shore. In many areas special rules regarding fishing gear apply such as mandatory use of a sorting grid when fishing for shrimp to avoid juveniles and small fish or bycatch grids when fishing for pelagic species in certain areas.

Finally, as previously discussed, 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.

[69] http://www.hafro.is/Astand/2016/vistkerfi_2016.pdf
[70] https://eng.atvinnuvegaraduneyti.is/publications/news/nr/8133

8. Performance specific to agreed corrective action plans

Not applicable.

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

Not applicable.

10. Future Surveillance Actions

No specific future surveillance actions beyond those already required by the IRF Programme (i.e. annual surveillance).

11. Client signed acceptance of the action plan

Not applicable.

12. Recommendation and Determination

The assessment team recommends that the management system of the applicant fisheries, the Icelandic golden redfish (*Sebastes norvegicus*) commercial fishery under state management by the Icelandic Ministry of Industries and Innovation, fished directly by demersal trawl (main gear), long-line, gill net, Danish seine net, and hook and line by small vessel gear and indirectly with Nephrops, shrimp and pelagic trawls and purse seines within Iceland's 200 nautical miles Exclusive Economic Zone (EEZ), is granted continued certification.

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14. Appendix 1. Surveillance Assessment Team Bios

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

Sam Dignan, (Lead Assessor)
Sam Dignan is a fisheries scientist who has previously worked with the Department of Environment, Food and Agriculture (DEFA), Isle of Man and Bangor University Fisheries and Conservation Science Group (Wales). He has a BSc in Biological and Chemical Sciences with Zoology from University College Cork and an MSc in Marine Environmental Protection from Bangor University. He has experience conducting stock assessments, from the survey design and implementation phases through to final analysis and report presentation; from 2013 to 2015 he was a member of the ICES working group on scallop stock assessment. He has been involved in providing scientific data to ensure fishery compliance with the Marine Stewardship Council's (MSC) certification framework and has participated in MSC surveillance audits from a client's perspective. Sam has extensive experience of interacting directly with fishers and their representative organisations as well as members of scientific and government institutions. He was previously an advisor to the Isle of Man Queen Scallop Management Board that manages the MSC certified Isle of Man queen scallop fishery. He has also worked on the spatial analysis of fishing activity, using Vessel Monitoring System (VMS) and logbook data, to spatially quantify fishing activity and fisheries-ecosystem interactions. Sam is an ISO approved lead auditor.

Dankert Skagen, (Assessor)
Dankert retired from the Institute of Marine Research (IMR), Bergen in 2010, 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 more 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.

Dankert was not available during the site visit and so conducted his duties offsite using information supplied to him by the other members of the Assessment Team. Dankert did submit specific queries to the various stakeholders in the form of agenda items prior to the site visit.

Gísli 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. Gísli 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.