



FISHERY ASSESSMENT REPORT

IFFO GLOBAL STANDARD FOR RESPONSIBLE SUPPLY OF FISHMEAL AND FISH OIL



| | |
|------------------------|--|
| FISHERY: | Summer spawning herring (<i>Clupea harengus</i>) |
| LOCATION: | Iceland (ICES Division Va) |
| DATE OF REPORT: | 12 th June 2013 |
| ASSESSOR: | Sam Peacock |

Global Trust Certification Ltd, Quayside Business Centre, Dundalk, Co. Louth, Ireland Tel: 042 932 0912 Fax 042 938 6864

Issue No; 2; Issue Date; Nov 09

Report Ref: Summer Herring Re Approval 2013

CCM Code:

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| 1. Application Details and Summary of the Assessment Outcome | | | |
|---|-------------------------------------|---|---|
| Name: Icelandic Association of Fishmeal Manufacturers | | | |
| Address: | | | |
| Country: | | Zip: | |
| Tel. No. | | Fax. No. | |
| Email address: | | Applicant Code | |
| Key Contact: | | Title: | |
| Certification Body Details | | | |
| Name of Certification Body: Global Trust Certification | | | |
| Assessor Name: Sam Peacock | Peer Reviewer: Mike Platt | Assessment Days: 10 | Initial/Surveillance/Re-certification: Re-certification |
| Assessment Period | March- June 2013 | | |
| Scope Details | | | |
| 1. Scope of Assessment: | | IFFO Global Standard for Responsible Supply – Issue 1 | |
| 2. Fishery | | Summer spawning herring (<i>Clupea harengus</i>) | |
| 3. Fishery Location | | Iceland (ICES Division Va) | |
| 4. Fishery Method | | Purse seine, pelagic trawl | |
| Outcome of Assessment | | | |
| 5. Overall Fishery Compliance Rating | | High/Medium | |
| 6. Sub Components of Low Compliance | | None | |
| 7. Information deficiency | | None | |
| 8. Peer Review Evaluation | | Agree with the assessment decision to reapprove this fishery as raw material for the IFFO RS Standard | |
| 9. Recommendation | | Approve fishery | |

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|---|
| 2. Quality of Information |
| Good; primarily Icelandic government websites and ICES reports. |

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|-------------------------------------|
| 3. Compliance Level Achieved |
| High/Medium |
| Recommendation |
| Approve fishery |

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|--|
| 4. Guidance for On-site Assessment |
| Based on High Compliance Findings |
| |
| |
| Based on Medium Compliance Findings |
| |
| Key Stakeholders of the Fishery |
| |

| 5. Assessment Determination |
|---|
| <p>The Icelandic summer-spawning herring fishery is supported by a robust management and enforcement framework, and management decisions generally continue to be based on ICES and MRI stock assessment advice. In particular, the management response to increased mortality caused by the recent <i>Ichthyophonus</i> outbreak illustrates a commitment to ensuring the sustainability of the stock above short-term economic considerations.</p> <p>Both the 2011/12 and the 2012/13 TACs were set slightly higher than the maximum recommended by scientists. In both seasons, landings exceeded the TAC, by 23% and 9% respectively, due to by-catch of herring in other fisheries. However, landings do not appear to have had a negative impact on stock biomass, and fishing mortality in 2012 was estimated to be around F_{MSY}, leading the assessment team to award the fishery a medium compliance rating under section D1.</p> <p>The fishery has also been awarded a second medium compliance rating based on long-term management objectives. While management has been based around achieving a stable fishing mortality of $F_{0.1}$ for two decades, this does not strictly represent a long-term objective. For more detail on this decision, refer to section A3.</p> |
| HIGH COMPLIANCE |
| A1, A2, B1, B2, C1, D2, D3, E1, E2 |
| MEDIUM COMPLIANCE |
| A3, D1 |

Background

Herring is a coastal, pelagic, schooling species which can be found down to 200m. Individual herring stocks exhibit complex feeding and spawning migrations, the timing and extent of which are often used to define the stock. Herring feeds on small planktonic copepods in its first year, and thereafter mainly copepods, but also hyperid amphipods, euphausiids, mysid shrimps, small fishes, arrow-worms, ctenophores and pteropods.

Herring in the North Atlantic is split into many stocks, based on where and when they spawn. The Icelandic summer spawning herring is a coastal stock, does not leave Icelandic waters, and spawns in July. The stock was at high levels until 2008 but since then a substantial reduction took place due to increased natural mortality caused by *Ichthyophonus* infection. The infection is decreasing now and the stock size, which is well above BPA, is starting to increase due to incoming of year classes at near and above average size.

Ref: 1, 2

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| SUMMARY OF LEVEL OF COMPLIANCE | | | | | |
|---|---|---|------------------------|---------------------|-------------------|
| | The Management Framework and Procedures | Stock assessment procedures and management advice | Precautionary approach | Management measures | Implementation |
| legal and administrative basis | High Compliance | Medium Compliance | Medium Compliance | Medium Compliance | Medium Compliance |
| Fisheries management should be concerned with the whole stock unit | High Compliance | Medium Compliance | Medium Compliance | Medium Compliance | Medium Compliance |
| Management actions should be scientifically based | Low Compliance | Medium Compliance | Medium Compliance | Medium Compliance | Medium Compliance |
| Research in support of fisheries conservation and management should exist | Medium Compliance | High Compliance | Medium Compliance | Medium Compliance | Medium Compliance |
| Best scientific evidence available should be taken into account when designing conservation and management measures | Medium Compliance | High Compliance | Medium Compliance | Medium Compliance | Medium Compliance |
| The precautionary approach is applied in the formulation of management plans | Medium Compliance | Medium Compliance | High Compliance | Medium Compliance | Medium Compliance |
| The level of fishing permitted should be set according to management advice given by research organisations | Medium Compliance | Medium Compliance | Medium Compliance | Low Compliance | Medium Compliance |
| Where excess fishing capacity exist, mechanisms should be in established to reduced capacity | Medium Compliance | Medium Compliance | Medium Compliance | High Compliance | Medium Compliance |
| Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment | Medium Compliance | Medium Compliance | Medium Compliance | High Compliance | Medium Compliance |
| A management system for fisheries control and enforcement should be established | Medium Compliance | Medium Compliance | Medium Compliance | Medium Compliance | High Compliance |
| A framework for sanctions of violation of laws and regulations should be efficiently exists | Medium Compliance | Medium Compliance | Medium Compliance | Medium Compliance | High Compliance |

KEY: Low Compliance [Red Box] Medium Compliance [Yellow Box] High Compliance: [Green Box]

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6. Rationale of the Assessment Outcome

a. The Management Framework and Procedure

| LEVEL OF COMPLIANCE | a.i. The management of the fishery must include a legal and administrative basis for the implementation of measures and controls to support the conservation of the fishery. | References | Rating |
|---------------------|---|------------|--------|
| LOW | <i>Determination: Fisheries management in Iceland is based on firm legal and administrative foundations. The assessment team considers the management framework for the fishery to be both adequate and effective.</i> | 3, 4 | HIGH |
| MEDIUM | Modern Icelandic fisheries management is based on the Fisheries Management Act of 1990, and is the responsibility of the Ministry of Fisheries and Agriculture. The objectives of the Fisheries Management Act are to promote the conservation and efficient utilisation of the marine resources and thus to ensure stable employment and economic viability of fishing communities. In other words, the aim is to ensure the sustainability of the fisheries while emphasising the economic benefits of the fisheries sector. The fisheries management system in Iceland is primarily based on extensive research on the fish stocks and the marine ecosystem, decisions made on the conduct of fisheries and allowable catches on the basis of scientific advice, and effective monitoring and enforcement of the fisheries and the total catch. These are the main pillars of the Icelandic fisheries management intended to ensure responsible fisheries and the sustainability of the ocean’s natural resources. | | |
| HIGH | <p>The most recent version of the Fisheries Management Act was published in 2006 and includes:</p> <ul style="list-style-type: none"> • A commitment to the conservation and efficient utilisation of Icelandic fishery resources (Article 1). • A commitment to set an annual TAC for each species “for which it is deemed necessary to limit the catch” (Article 3). • A requirement for all commercial fishers to obtain a general fishing permit; vessels not fishing for an entire 12 month period will have their permit revoked (Article 4). | | |

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|--------|--|------------|--------|
| | <ul style="list-style-type: none"> • An outline of the ITQ quota system (described in more detail in section D2, below) (Article 8). • An outline of the methodology and responsibility for enforcement and monitoring of fishery regulations (Articles 17 & 18). • An outline of penalties for transgressions (Articles 24 – 27). <p>Iceland’s national fisheries science organisation is the Marine Research Institute (MRI). The MRI carries out wide ranging and extensive research on the status and productivity of the commercial stocks, and long-term research on the marine environment and the ecosystem around Iceland. The results of this research are the foundations on which fishery management decisions are made. Additional scientific advice is provided by ICES.</p> | | |
| | a.ii. Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account fishery removals and the biology of the species | References | Rating |
| LOW | <p><i>Determination: The geographical definition of the management unit is supported by the best available scientific understanding of the stock. All fishery removals are taken into account, including discarding where it occurs.</i></p> <p>Summer-spawning herring is constrained to Icelandic coastal waters throughout its lifespan. Results from various research including tagging experiments, studies on larval transport, and studies on migration pattern and distribution, all suggest that the stock is local to Icelandic waters. Until 2010, no specific genetic studies had taken place to distinct the stock from the two other herring stocks around Iceland (Icelandic spring-spawning herring and Norwegian spring-spawning herring). However, in 2009 the HERMIX project was initiated with this as one objective, and is ongoing in cooperation with several institutes in Iceland, the Faroes, Denmark, and Norway. The three stocks are distinguished on the basis of their spawning time and spawning area, as presented by their names, and to date there is no evidence to suggest sufficient mixing to require updating the stock definitions. The summer-spawning stock is managed, in line with this scientific understanding of the biological population, as a single unit throughout ICES Division Va.</p> <p>The large majority of discards are banned by Icelandic legislation, and so the extent of discarding in the</p> | 2, 5, 6 | HIGH |
| MEDIUM | | | |
| HIGH | | | |

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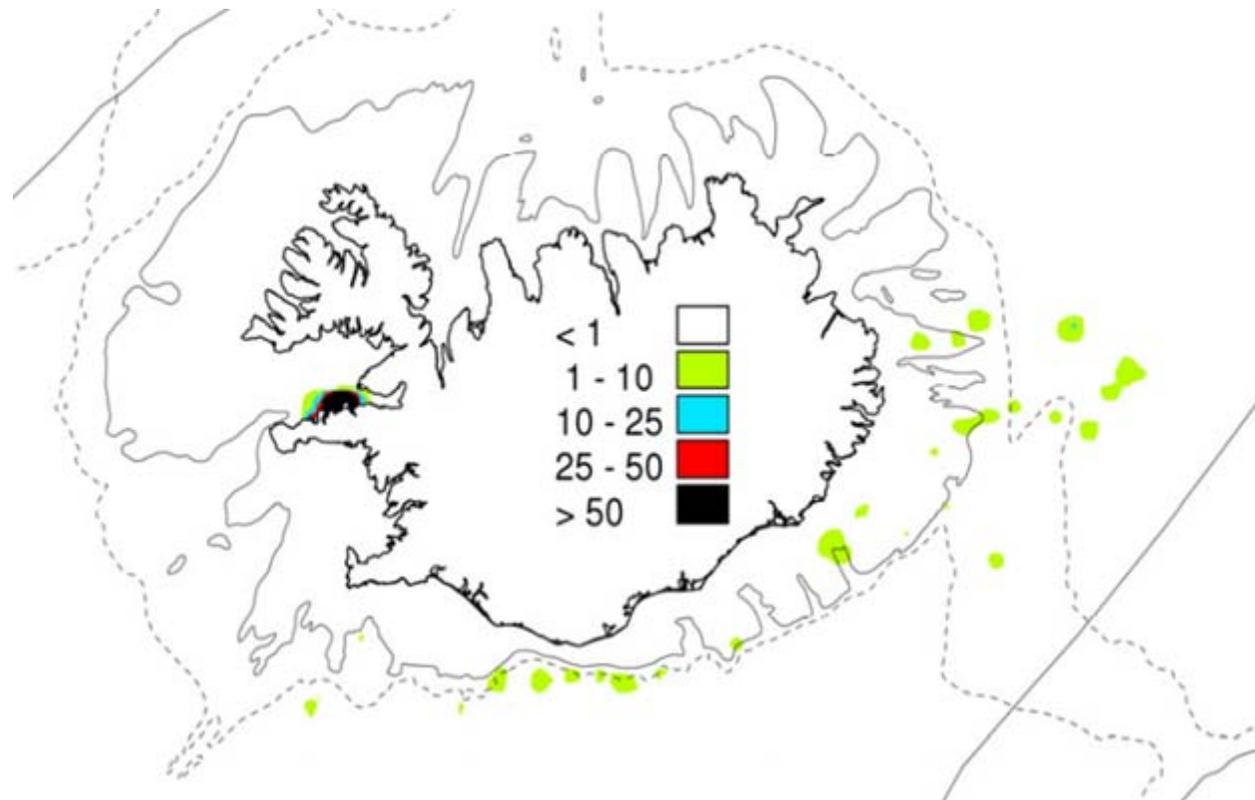
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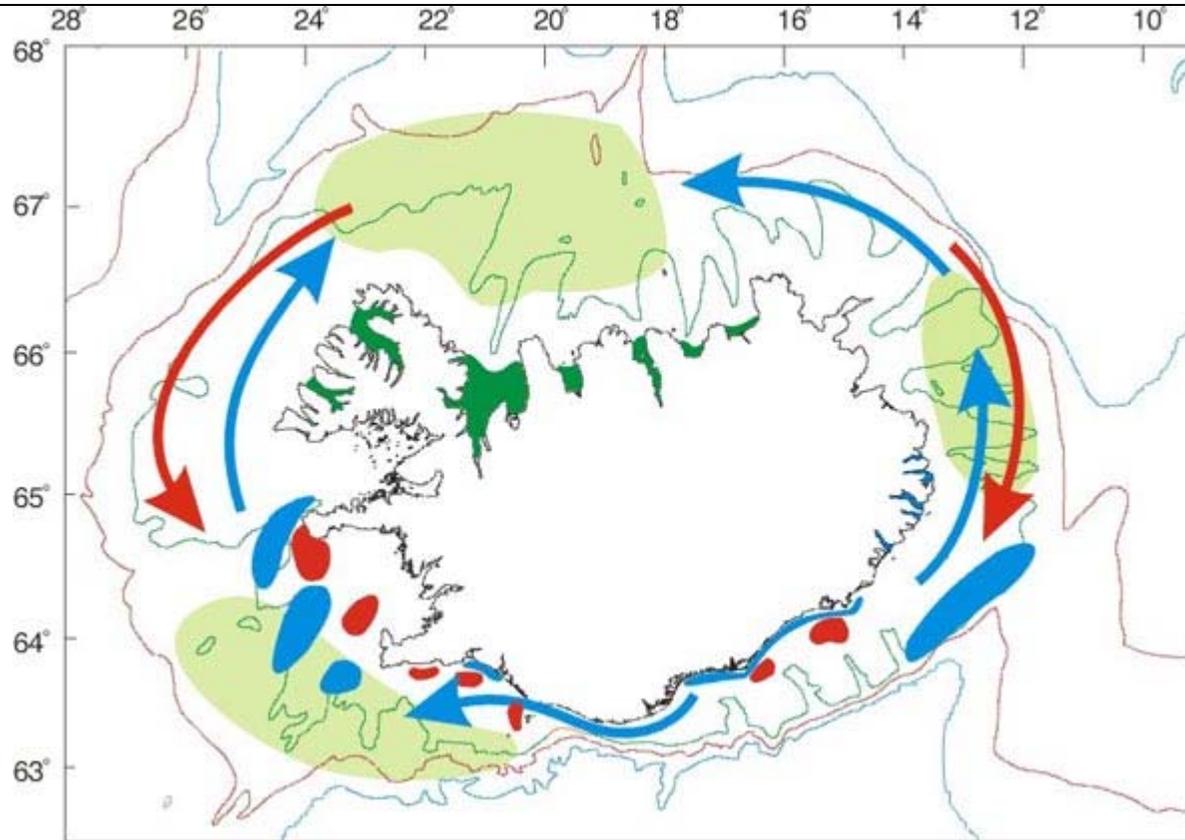
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summer spawning herring fishery is usually highly limited. In historical instances where there has been significant discarding, this has been factored into stock assessments and management decisions.



Icelandic summer-spawning herring fishing grounds, 2010/11 season (t/nm², all gears combined). From the Icelandic Ministry of Fisheries and Aquaculture website (R5).



Distribution and migration of Icelandic Summer Spawning herring. Main spawning areas indicated in red, wintering areas in blue, main juvenile areas in dark green, main feeding areas in light green. The arrows show migrations to and from spawning and feeding grounds. From Clupea.net (R6).

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| | a.iii .Management actions should be based on long-term conservation objectives | References | Rating |
|--------|---|------------|--------|
| LOW | <p>Determination: The fishery has been managed for the past 20 years with the aim of achieving a fishing mortality of $F = 0.1$. While this has a sound scientific basis and represents a precautionary approach to managing the fishery, in the opinion of the assessment team it does not represent a long-term objective as such and so a rating of medium compliance is appropriate.</p> <p>Although no formal management strategy has been adopted in the summer-spawning herring fishery, the practice has been to manage fisheries on this stock at $F = F_{0.1}$ ($= 0.22 = F_{pa}$) for more than 20 years. The ICES Working Group responsible for the stock (NWWG) has determined that managing the stock at an exploitation rate at or above $F_{0.1}$ has been successful in the past. In 2003, the ICES Study Group on Precautionary Reference Points for Advice on Fishery Management concluded that using $B_{lim} = 200,000t$ was also appropriate.</p> <p>The fishing mortality during 1990 to 2007 averaged 0.308, or approximately 40% higher than the intended target of $F_{0.1}=0.22$. This is despite the fact that the managers generally followed the scientific advice and restricted quotas in an attempt to achieve the target mortality. During the entire period the SSB remained above B_{lim}. Since 2008, fishing mortality has been at or below $F_{0.1}$, and substantially below in recent years due to the <i>Ichthyophonus</i> outbreak.</p> <p>The assessment team is not aware of any current intention to develop any more thorough long-term management objectives for the stock; however, the use of reference points and implicit efforts to maintain the stock above B_{pa} mean a score of low compliance would be inappropriate. On balance a medium compliance rating reflects both the presence of implicit long-term objectives, and the lack of explicit long-term objectives.</p> | 2, 7, 8 | MEDIUM |
| MEDIUM | | | |
| HIGH | | | |

b. Stock Assessment Procedures and Management Advice

| LEVEL OF COMPLIANCE | bi. Research in support of fisheries conservation and management should exist. | References | Rating |
|--|--|------------|--------|
| LOW | <p><i>Determination: There are data collection and stock assessment processes in place for the fishery which scientific organisations consider to be sufficient to ensure the sustainable management of the stock. Both ICES and the MRI conduct stock assessments and provide management advice.</i></p> | 2, 7, 8 | HIGH |
| MEDIUM | | | |
| HIGH | | | |
| <p>ICES and the MRI both produce an annual stock assessment and management advice report for Icelandic summer-spawning herring. The stock assessment is an age-based analytical assessment utilising catch-at-age data and the results of a hydroacoustic survey, plus other fishery-dependent data including total landings, CPUE, geographical location of the fishery and discard estimates (though discarding is largely banned in Iceland). Natural mortality is assumed to be constant, $M=0.1$, for the whole range of ages and years, although the <i>Ichthyophonus</i> infection of recent years is thought to have substantially increased this figure (see section B2).</p> <p><i>Hydroacoustic survey</i></p> <p>One annual acoustic survey is carried out by the MRI and made available to ICES, and is applied as a tuning series for the analytical assessment of the Icelandic summer-spawning herring stock. It has been conducted every year since 1974 (with a handful of exceptions). Surveys are conducted in October-December and/or January, and the survey area varies spatially to focus on the adult and incoming year classes. The target area is determined on the basis of all available stock distribution information from the previous and current years. Detailed information and the results of the surveys are given inter-annually in internal reports at MRI, and later summarized in the MRI and ICES assessment reports.</p> <p>The 2011/12 survey was conducted in October, November and January in and around Breiðafjörður. The measurement from November was considered to be the most accurate model for the Breiðafjörður stock and was used in addition to measurements from other areas. In all, about 579 thousand tonnes of adult herring were</p> | | | |

| | | | |
|--|---|--|--|
| | <p>measured, thereof 435 thousand tonnes in Breiðafjörður and 144 thousand tonnes offshore from Hornafjörður. About 71% of the herring measured in research cruise were full grown (>26 cm) but younger herring were most common at Mýrabug, offshore of Grindavík and in Stakksfjörður near Reykjanesbær. Most of the herring age 2+ were from the 2008 cohort and this year class was about 27% of the total number of fish. The cohort from 2009 was about 19% of the total, year class 2007 about 12% and cohorts from 2004-2006 about 7-9% each.</p> <p>There have occasionally been other acoustic surveys carried out on the stock, the results of which are available to ICES during the assessment process; however these are not regular occurrences.</p> <p><i>Fishery-dependent data</i></p> <p>Information about landings of the fishery fleet is collected by the Icelandic Directorate of Fisheries. They have access to both landings in the harbours (the official landing) and the registered catch in the digital logbook kept by all the vessels. The logbooks keep information about timing (day and time), location (latitude and longitude), fishing gear, catch size, and species composition in the catch of each fishing operation for each vessel. Biological samples from the catch are taken at sea by the fishermen or in the harbours by the MRI and/or inspectors from the Directorate of Fisheries and then analysed by MRI. Samples record length, weight, age (from scales), sex, maturation, and weight of sexual organs. The information from the samples is then used along with the total landings and logbook data to generate landings composition estimates.</p> <p>Commercial CPUE data are available but are not considered by ICES to be relevant due to the nature of the fishery and the continuous technological development of the fleet.</p> | | |
|--|---|--|--|

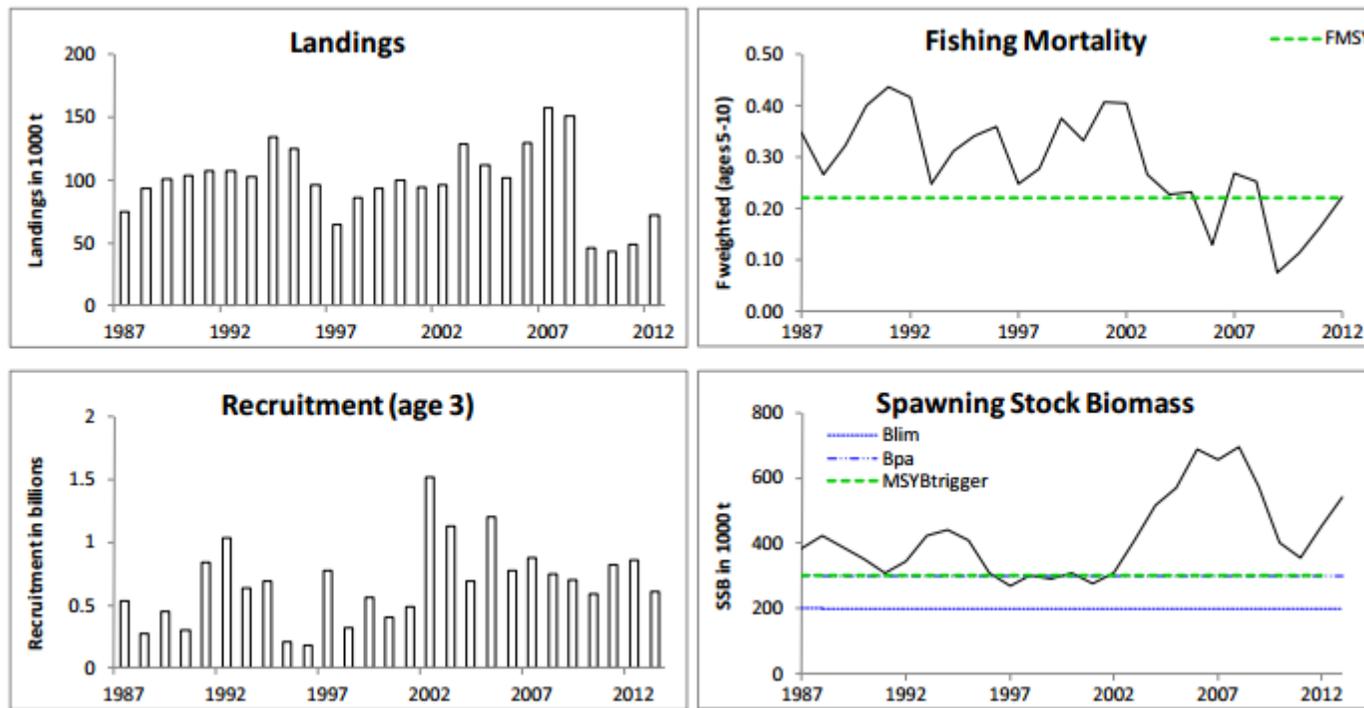
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Herring in Division Va (Icelandic summer-spawning herring). Summary of stock assessment (weights in '000t). From the ICES advice, June 2013 (R11).

| LEVEL OF COMPLIANCE | b.ii Best scientific evidence available should be taken into account when designing conservation and management measures | References | Rating |
|---------------------|--|------------|--------|
| LOW | <p>Determination: Management decisions and technical measures in place in the summer herring fishery are based primarily on the advice of the MRI and secondarily on the advice of ICES. The response to the recent outbreak of disease in the stock illustrates the willingness of managers to follow scientific recommendations on a year-to-year basis.</p> <p>General</p> <p>For the fishing season 2011/2012, a regulation was enforced that in practiced prohibited fishery for herring outside of the area of Breiðafjörður in SW Iceland. This was requested by the MRI because of small herring mixed with adults in other areas and less prevalence of infection there. Minimum mesh sizes are also in place in all Icelandic fisheries, partially to minimise the impact of the no-discards rule on smaller individuals.</p> <p>Ichthyophonus infection</p> <p>In November 2008, the MRI received early reports from the commercial summer-spawning herring fleet of an apparent infection in the stock. Within few days the infection was identified as a major outbreak of the protist parasite <i>Ichthyophonus hoferi</i>. During the period from 1991 to 2000, the prevalence of <i>Ichthyophonus</i> infection in the stock was determined inter-annually but only a minor infection of around 0.1% was observed. Thorough examinations of the fishable stock during 2008/09 and 2009/10 indicated that 32% and 43% of the stock was infected, respectively. In winter 2010/2011 the infection rate was still high. By winter 2011/12 fish of age 4 exhibited significantly lower rates of infection and those 3 and younger almost none, though the disease remained present in high proportions in the older fish. The cause of the outbreak remains unknown.</p> <p>The infection is transmitted through spores which must be eaten by the herring since they need an acid environment to be activated. Since the stock does not feed during the overwintering period, the parasite is most likely contracted in the feeding areas during other parts of the year. As the infection is believed to be fatal to all infected herring, this outbreak had huge effects on the size of the summer-spawning population as well as on</p> | 2, 7, 8 | HIGH |
| MEDIUM | | | |
| HIGH | | | |

recruitment into the fishing and spawning stock. The table below lists estimated rates of mortality due to the infection in each year class between 2008 – 2001. Note that the standard estimate of natural mortality (M) used by stock assessors is $M = 0.1$.

The scientific advice provided by the MRI and ICES since the outbreak has incorporated the additional mortality into its modelling process, and therefore the TAC recommendations made since 2008 include consideration of this variable. Section D1 includes a table of historical TACs and recommendations. TACs from 1999 – 2008 were consistently between 100,000t – 130,000t, falling to 40,000t from 2009 as a direct response by scientists and managers to the *Ichthyophonus* infection.

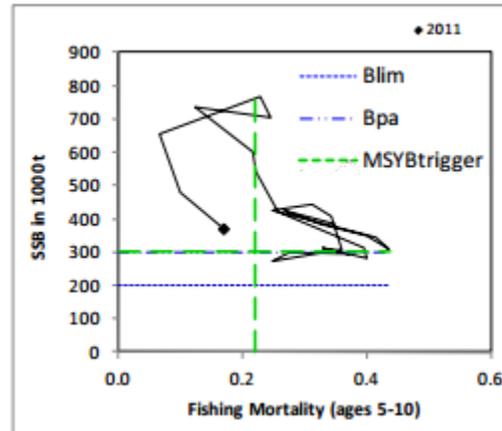
Estimated natural mortality caused by *Ichthyophonus* infection ($M_{infected}$) in Icelandic summer-spawning herring in the winter 2008/09 to 2011/12 (years referring to the autumns) for age groups 3 to 13+. From the NWWG report, 2012, p.664 (R2).

| Age (years) | $M_{infected}$ 2008 | $M_{infected}$ 2009 | $M_{infected}$ 2010 | $M_{infected}$ 2011 |
|-------------|---------------------|---------------------|---------------------|---------------------|
| 3 | 0.39 | 0.64 | 0.10 | 0.02 |
| 4 | 0.39 | 0.64 | 0.53 | 0.20 |
| 5 | 0.39 | 0.59 | 0.52 | 0.48 |
| 6 | 0.39 | 0.53 | 0.50 | 0.41 |
| 7 | 0.39 | 0.5 | 0.44 | 0.37 |
| 8 | 0.39 | 0.48 | 0.46 | 0.35 |
| 9 | 0.39 | 0.47 | 0.49 | 0.30 |
| 10 | 0.39 | 0.46 | 0.46 | 0.25 |
| 11 | 0.39 | 0.44 | 0.34 | 0.26 |
| 12 | 0.39 | 0.43 | 0.35 | 0.23 |
| 13+ | 0.39 | 0.44 | 0.35 | 0.10 |

c. The Precautionary Approach

| LEVEL OF COMPLIANCE | c.i The precautionary approach is applied in the formulation of management plans. | References | Rating | | | | | | | | | | | | | | | | | | | | | |
|------------------------|---|-------------------|---|-----------------|-----------------|--------------|-------------------|-----------|------------|-----------|------|--|------------------------|-----------|-----------|--|----------|-----------|--|----------|------|---|---------|------|
| LOW | <p>Determination: The precautionary approach is applied throughout the management of the stock. The target fishing mortality, which is the primary management objective, is based on F_{pa}. The additional uncertainty caused by the <i>Ichthyophonus</i> infection led to a substantial reduction in TAC.</p> <p>Reference points for the precautionary approach were agreed in 1998 and have remained unchanged since. In 2011, reference points for the MSY approach were added, and in the 2012 advice ICES utilised these as a basis for the 2012/13 quota recommendation. The table below lists these reference points; note that MSY $B_{trigger}$ is defined as B_{pa}, and the target fishing mortality or $F = 0.22$ is based on F_{pa}.</p> <p>Icelandic summer-spawning herring reference points. From the ICES advice, June 2012 (R7).</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Type</th> <th>Value</th> <th>Technical basis</th> </tr> </thead> <tbody> <tr> <td rowspan="2">MSY Approach</td> <td>MSY $B_{trigger}$</td> <td>300 000 t</td> <td>B_{pa}.</td> </tr> <tr> <td>F_{MSY}</td> <td>0.22</td> <td>HCS model for simulated harvest rules.</td> </tr> <tr> <td rowspan="3">Precautionary Approach</td> <td>B_{lim}</td> <td>200 000 t</td> <td>SSB with a high probability of impaired recruitment.</td> </tr> <tr> <td>B_{pa}</td> <td>300 000 t</td> <td>$B_{pa} = B_{lim} e^{1.645\sigma}$, where $\sigma = 0.25$.</td> </tr> <tr> <td>F_{pa}</td> <td>0.22</td> <td>$F_{pa} = F_{0.1} = 0.22$ (based on a weighted average) and used as a target.</td> </tr> </tbody> </table> <p>The 2012 ICES advice reported that SSB had been declining in recent years (likely because of <i>Ichthyophonus</i> infection), but that the decline now seems to have stopped and the SSB is above reference points. Strong year classes, which show no signs of infection, are entering the fishable stock. Fishing mortality is currently below FMSY.</p> | | Type | Value | Technical basis | MSY Approach | MSY $B_{trigger}$ | 300 000 t | B_{pa} . | F_{MSY} | 0.22 | HCS model for simulated harvest rules. | Precautionary Approach | B_{lim} | 200 000 t | SSB with a high probability of impaired recruitment. | B_{pa} | 300 000 t | $B_{pa} = B_{lim} e^{1.645\sigma}$, where $\sigma = 0.25$. | F_{pa} | 0.22 | $F_{pa} = F_{0.1} = 0.22$ (based on a weighted average) and used as a target. | 2, 7, 8 | HIGH |
| | | Type | Value | Technical basis | | | | | | | | | | | | | | | | | | | | |
| MSY Approach | | MSY $B_{trigger}$ | 300 000 t | B_{pa} . | | | | | | | | | | | | | | | | | | | | |
| | F_{MSY} | 0.22 | HCS model for simulated harvest rules. | | | | | | | | | | | | | | | | | | | | | |
| Precautionary Approach | B_{lim} | 200 000 t | SSB with a high probability of impaired recruitment. | | | | | | | | | | | | | | | | | | | | | |
| | B_{pa} | 300 000 t | $B_{pa} = B_{lim} e^{1.645\sigma}$, where $\sigma = 0.25$. | | | | | | | | | | | | | | | | | | | | | |
| | F_{pa} | 0.22 | $F_{pa} = F_{0.1} = 0.22$ (based on a weighted average) and used as a target. | | | | | | | | | | | | | | | | | | | | | |
| MEDIUM | HIGH | | | | | | | | | | | | | | | | | | | | | | | |
| HIGH | HIGH | | | | | | | | | | | | | | | | | | | | | | | |

The outbreak of *Ichthyophonus* infection in the herring stock started in 2008. The impact of the infection on the stock size is apparent, but cannot be fully quantified at present. The 2011 ICES advice, and subsequent reduced quotas, reflected the additional uncertainty in stock assessments caused by the infection and in the opinion of the assessment team reflect a precautionary approach to stock management.



SSB/F for the time series used in the ICES stock assessment (1987 – 2011). From the 2012 ICES advice (R7).

d. Management Measures

| LEVEL OF COMPLIANCE | d.i The level of fishing permitted should be set according to management advice given by research organisations. | References | Rating |
|---------------------|--|-------------|--------|
| LOW | <p>Determination: <i>The TAC for the fishery has, in recent years, been set at or below ICES advice, with the exception of 2011/12 when an additional 5,000t were added to allow for herring bycatch in the mackerel fishery, and 2012/13 when an additional 1,500t were added. Due to the Icelandic ban on discarding, total landings are often slightly in excess of annual quotas. On balance the assessment team considers a medium compliance rating to be appropriate.</i></p> <p>It is important to note that both the MRI and ICES provide annual management advice for the stock, and on occasion the MRI TAC recommendation is different to the ICES recommendation. In general the Ministry of Fisheries follows the MRI advice, even if this results in a lower TAC. The ICES advice since 1984 and the MRI advice since 1990 are shown in the tables below, along with final TACs and landings.</p> <p>Historically, there have been some discrepancies between the level of fishing recommended by ICES and the final TAC issued for the summer-spawning herring fishery, with the TAC being set both higher and lower on different occasions. Since 2008/09, the TAC has been set at or below the ICES advice in every year except 2011/12. The 2011 ICES advice for the stock made no initial quota recommendation, and advised that the fishery remain closed until additional information became available on the extent and impact of the <i>Ichthyophonus</i> infection; the subsequent scientific recommendation was that the quota be set at 40,000t. The final TAC was set at 45,000t to account for herring bycatch in the mackerel fishery, and official landings for 2011/12 totalled 49,000t. The fishery has frequently exceeded the quota by a small margin in the past, due primarily to the discarding ban which leads to summer-spawning herring landings in other fisheries. Landings in the 2011/12 season exceeded the scientific recommendation by around 23%.</p> <p>The 2012 ICES advice, with which the MRI agrees, recommended that 2012/13 catches be no greater than 67,000t on the basis of the MSY approach. The final quota for the 2012/13 season was set at 68,500t, and</p> | 2, 7, 8, 11 | MEDIUM |
| MEDIUM | | | |
| HIGH | | | |

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| | | <p>final reported landings were 72,000t. Thus landings in 2012/13 were around 7.5% greater than the original scientific recommendation. However, this represents a significant reduction compared to the 2012/13 season over-catch of 23%. Also, nearly 6,000t of the excess was caught as bycatch in the mackerel fishery – thus if Iceland permitted discarding the total landings would have been under quota.</p> | | |
|--|--|---|--|--|

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| Year | ICES Advice | Predicted catch corresp. to advice | Agreed TAC | ICES landings ⁴⁾ |
|------------------------|--|------------------------------------|------------|-----------------------------|
| 1984 | | 50 | - | 50.3 |
| 1985 | | 50 | - | 49.4 |
| 1986 | | 65 | - | 65.5 |
| 1987 | F _{0.1} | 70 | 72.9 | 75.4 |
| 1988 | F _{0.1} | ~100 | 90 | 92.8 |
| 1989 | F _{0.1} | 95 | 90 | 97.3 |
| 1990/1991 ² | Status quo F | 90 | 100 | 101.6 |
| 1991/1992 ² | F _{0.1} | 79 | 110 | 98.5 |
| 1992/1993 ² | F _{0.1} | 86 | 110 | 106.7 |
| 1993/1994 ² | No gain in yield by fishing higher than F _{0.1} | 110 ¹ | 110 | 101.5 |
| 1994/1995 ² | No gain in yield by fishing higher than F _{0.1} | 83 ¹ | 130 | 132 |
| 1995/1996 ² | No gain in yield by fishing higher than F _{0.1} | 120 ¹ | 110 | 125 |
| 1996/1997 ² | No gain in yield by fishing higher than F _{0.1} | 97 ¹ | 110 | 95.9 |
| 1997/1998 | No gain in yield by fishing higher than F _{0.1} | 90 ¹ | 100 | 64.7 |
| 1998/1999 | No gain in yield by fishing higher than F _{0.1} | 90 ¹ | 90 | 87.0 |
| 1999/2000 | Current F is sustainable | 100 ¹ | 100 | 92.9 |
| 2000/2001 | Current F is sustainable | 110 ¹ | 110 | 100.3 |
| 2001/2002 | Current F is sustainable | 125 ¹ | 125 | 95.3 |
| 2002/2003 | Current F is sustainable | 113 ¹ | 105 | 97 |
| 2003/2004 | Current F is sustainable | 113 ¹ | 110 | 131 |
| 2004/2005 | F = 0.22 | 106 | 110 | 114.2 |
| 2005/2006 | Status quo catch | 110 | 110 | 103 |
| 2006/2007 | Status quo catch | 110 | 130 | 135 |
| 2007/2008 | Average of the last 3 years catch | 117 | 150 | 159 |
| 2008/2009 | F _{pa} = 0.22 | 131 | 130 | 152 |
| 2009/2010 | F _{pa} = 0.22 | 75 | 40 | 46 |
| 2010/2011 ³ | Domestic advice autumn 2010 | 40 | 40 | 44 |
| 2011/2012 ³ | Domestic advice autumn 2011, no fishery until then | 40 | 45 | 49 |
| 2012/2013 | F _{MSY} = 0.22 | 67 | 68.5 | 72 |
| 2013/2014 | F _{MSY} = 0.22 | 87 | | |

Weights in thousand tonnes.
¹⁾ Catch at F_{0.1}.
²⁾ Season starting in October of first year.
³⁾ No advice was given by ICES until new information on *Ichthyophonus* infection was available from survey monitoring in the following autumn.
⁴⁾ Official landings and ICES landings are the same in all fishing season and are used for the assessment.

Herring in Division Va (Icelandic summer-spawning). ICES advice, management, and landings. From the 2013 ICES advice (R11).

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| Ár Year | Tillaga <i>Recommended TAC</i> | Aflamark <i>National TAC</i> | Afli <i>Landings (Iceland)</i> |
|------------|-----------------------------------|---------------------------------|-----------------------------------|
| 1990/91 | 80 | 110 | 105 |
| 1991/92 | 80 | 110 | 109 |
| 1992/93 | 90 | 110 | 107 |
| 1993/94 | 90 | 100 | 103 |
| 1994/95 | 120 | 120 | 132 |
| 1995/96 | 110 | 110 | 126 |
| 1996/97 | 100 | 100 | 96 |
| 1997/98 | 100 | 100 | 64 |
| 1998/99 | 90 | 70 ¹⁾ | 87 |
| 1999/00 | 100 | 100 | 93 |
| 2000/01 | 110 | 110 | 100 |
| 2001/02 | 125 | 125 | 95 |
| 2002/03 | 105 | 105 | 94 |
| 2003/04 | 110 | 110 | 126 |
| 2004/05 | 110 | 110 | 115 |
| 2005/06 | 110 | 110 | 103 |
| 2006/07 | 130 | 130 | 135 |
| 2007/08 | 130 | 150 | 159 |
| 2008/09 | 131 | 150 | 152 |
| 2009/10 | 40 | 47 | 46 |
| 2010/11 | 40 | 40 | 44 |
| 2011/12 | 40 | 45 | |

MRI advice, final TAC and estimated landings, 1990-2012. From the MRI advice, 2011/12 (R8).

| LEVEL OF COMPLIANCE | d.ii Where excess fishing capacity exist, mechanisms should be in established to reduced capacity to allow for the recovery of the stock to sustainable levels. | References | Rating |
|---------------------|---|------------|---|
| LOW | <p><i>Determination: The management of excess fishing capacity is handled satisfactorily in Iceland. Annual quotas remain the primary mechanism for limiting fishing effort, although capacity-reducing processes are also in place.</i></p> | 2, 3, 9 | HIGH |
| MEDIUM | | | |
| HIGH | | | <p>The main instrument in Icelandic fisheries and fleet management is a system based on Individual Tradable Quota (ITQs), which has been in place in its current form since 1990. During the past 15 years there has been no specific fleet management system in Iceland; fishing licenses are readily available for anyone with a seaworthy vessel, and no decommissioning schemes are in place. Under the ITQ system, each vessel is allocated a certain share of the TAC of the relevant species. Within this system individual boat owners have substantial flexibility in exchanging quota, both among vessels within individual company as well as among different companies. The latter can be done via temporary or permanent transfer of quota. In addition, some flexibility is allowed by individual boats with regard to transfer allowable catch of one species to another. These measures, which can be acted on more or less instantaneously, are likely to result in lesser initiative to discards and misreporting than can be expected if individual boats are restricted by strict TAC measures alone. They may however result in fishing pressures of individual species to be different than intended under the single species TAC allocation. Decommissioning occurs indirectly, as companies increase their share of the TAC by buying out vessels and thus receiving the quota attached to those vessels.</p> |

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| LEVEL OF COMPLIANCE | d.iii Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment. | References | Rating |
|---------------------|---|------------|--------|
| LOW | <p>Determination: <i>Bycatch of both PET and commercial species is considered limited, and when it does occur bycatch is landed and recorded by scientific and government officials. The assessment team was unable to determine the extent to which the ecological impacts of fishery removals are considered during the management process, but does not consider this to be a significant enough issue to warrant anything other than a score of high compliance in this section.</i></p> <p>Non-target species / bycatch</p> <p>With a handful of minor exceptions, discarding is banned in Icelandic fisheries and so all bycatch is landed, and therefore recorded by MRI or government officials and included in annual reports. Likewise, bycatch of summer-spawning herring in other commercial fisheries is included in the estimates of total landings in the tables in section D1. Neither ICES nor the MRI have raised concerns over bycatch in the summer-spawning herring fishery. The ICES working group report mentions a regulation limiting the amount of bycatch permitted in the fishery, but the assessment team was not able to find any details on what the limit is, nor the response of fishery managers if the limit is reached. In any case, bycatch in the fishery is usually insignificant as it is prosecuted during the over-wintering period when the species is in large, dense schools.</p> <p>Surveillance by inspectors from the Directorate of Fisheries during each fishing season is considered by ICES to be adequate for ensuring that discarding remains within the regulations.</p> <p>PET species</p> <p>Icelandic legislation (557/2007) states that all fishing vessels must keep a Fishery Log-book. Birds and Mammals that are caught in fishing gear are to be reported and recorded in the Fishery Log-book. This Fishery Log-book is returned to the Directory of Fisheries once a month. These reports are then sent onto the MRI where the information is used in their scientific work.</p> | 2, 7, 8 | HIGH |
| MEDIUM | | | |
| HIGH | | | |

| | | | |
|--|--|--|--|
| | <p>Ecosystem considerations</p> <p>Adult herring is food resource for various animals in Icelandic waters, including mink whale (<i>Balaenoptera acutorostrata</i>), humpback whale (<i>Megaptera novaeangliae</i>), several sea bird species, cod (<i>Gadus morhua</i>) and pollack (<i>Pollachius virens</i>). The annual consumption of herring by the different predators is relatively unknown. An increased predation of herring by cod has been observed in stomach analyses in the Icelandic groundfish survey since the <i>Ichthyophonus</i> outbreak started in the herring stock in November 2008, even if it has not been quantified. It is not clear to what extent the ecosystem impacts of herring removals are factored into scientific advice nor management decisions.</p> <p>Physical environment</p> <p>Direct effects on habitat and seafloor are typically minimal for pelagic gears, although occasional contact is known to occur and, in these cases, can potentially cause damage to fragile ecosystems (e.g. corals).</p> | | |
|--|--|--|--|

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e. Implementation

| LEVEL OF COMPLIANCE | e.i There should be a framework for sanctions of violation of Laws and regulations. | References | Rating |
|---------------------|--|------------|--------|
| LOW | <p><i>Determination: There is a robust framework for sanctioning violations of laws and regulations in place in Iceland.</i></p> <p>Breaches of the law and regulations on fisheries management are subject to fines or revoking of the fishing permit, irrespective of whether such conduct is by intent or negligence. Major or repeated intentional offenses are subject to up to six years imprisonment. If the catch of a vessel exceeds the allowable catch of the said vessel of individual species, the relevant fishing company must obtain an additional catch quota for the relevant species. If this is not done within a certain timeframe, the fishing permit may be revoked as well as a charge having to be paid for the illegal catch.</p> <p>Collecting and bringing ashore any catches in the fishing gear of fishing vessels is obligatory; discarding is prohibited and such conduct is subject to penalty according to law. If a vessel catches any species in excess of its fishing permit, the relevant fishing company has the option of obtaining additional quota within a certain period of time after landing the catch. Vessels are authorized to land a small percentage of the catch, usually by-catch, without the use of quota. The catch in question is sold at auction and the proceeds go to a research fund that supports marine research.</p> <p>Penalties are outlined in Articles 24-27 of the Fisheries Management Act, including:</p> <ul style="list-style-type: none"> • Violations of the Act shall be prosecuted according to the Criminal Proceedings Act. • Violations against the Act shall be liable to fines, and cases of serious or repeated deliberate violation shall be liable to imprisonment for up to six years. • Fines may vary between ISK 400,000 (US\$3,200) and ISK 8,000,000 (US\$65,000), depending on the | 4, 10 | HIGH |
| MEDIUM | | | |
| HIGH | | | |

| | | | |
|---------------------|---|------------|--------|
| | nature and scope, and whether it represents a repeat offence. | | |
| LEVEL OF COMPLIANCE | e.ii A management system for fisheries control and enforcement should be established. | References | Rating |
| LOW | <p>Determination: Effective fisheries control and enforcement regimes are in place in Iceland.</p> <p>Day to day administration and enforcement of the Fisheries Act and related legislation is in the hands of the Directorate of Fisheries, a government body responsible to the Minister of Fisheries. The Directorate is also responsible for the continuous monitoring of compliance with the Act.</p> <p>The Icelandic Coast Guard, responsible to the Minister of Justice, monitors fishing activities in Icelandic waters, including surveillance of areas closed for fishing and inspection of mesh sizes and other gear related practices.</p> <p>The Department of quota allocations of the Directorate issues commercial fishing permits, allocates catch quotas to Icelandic fishing vessels and maintains records of those rights. It also records quota transfers between vessels and checks that vessels do not fish in excess of their quotas. The department collects data on fishing and the catches landed by the Icelandic fleet and monitors compliance with rules on the weighing and recording of catches.</p> <p>Under a bilateral agreement between Iceland and the European Union (EU), Icelandic inspectors are required on board all EU fishing vessels in Icelandic waters</p> | 3, 10 | HIGH |
| MEDIUM | | | |
| HIGH | | | |

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