

4. English summary of the State of Marine Stocks in Icelandic waters 2011/2012 – Prospects for the Quota Year 2012/2013

2.1. Cod

Total nominal landings of Atlantic cod (*Gadus morhua*) in 2011 were 172 000 t, compared to 169 000 t in 2010. Based on domestic advice, the national TAC for cod in the quota year 2011/2012 was set at 177 000 t.

Mean weights at age in the landings and the survey have been increasing in recent years and are presently around the long-term average.

Biomass indices in the spring survey have increased during the last 5 years, mostly due to increased abundance of older cod. The indices of year classes 2001–2007 as juveniles were at or below the mean but are in later years (6–11 year old) above the mean.

The reference biomass in 2012 is estimated as 1 070 000 t and the spawning stock as 419 000 t, compared to $B_{lim}=125$ and $B_{trigger}=220$ 000 t. The stock has been increasing in recent years and is now larger than observed in the last three decades. During the last 10 years, the harvest rate has declined from 34–40% to around 20% and the fishing mortality from above 0.7 in 2000 to 0.28 in 2011. Recruitment during this period has been around 2/3 of the long-term average. The decrease in harvest rate, imposed by management action, has hence been the main reason for the increase in stock size.

Based on the present assessment, the TAC in 2012/2013 should be set at 196 000 t according to the management plan. Following the HCR will most likely lead to an additional increase in TAC in the medium term.

The Marine Research Institute (MRI) emphasizes the importance of managers subtracting all other expected catches prior to allocating the ITQ catches to the fishing fleet.

2.2. Haddock

In 2011, 49 000 t of haddock (*Melanogrammus aeglefinus*) were landed, compared with 64 000 t in 2010. The advice for the quota year 2011/12 was 37 000 t and the TAC was set at 45 000 t.

The biomass of age 3 and older haddock is estimated as 121 000 t at the beginning of 2012. The mean fishing mortality is estimated as 0.45 in 2011 and 0.40 in 2012, given that the landings will be 44 000 t. Short and medium term predictions show that the stock size of haddock will decrease in coming years, when the small year classes from 2008–2011 will replace the medium year classes from

2004–2007. There is some risk of the spawning stock going below the historical minimum in 2014–2015, how much depends on fishing effort. Growth was very slow in 2004–2009 but increased considerably in 2009–2011, when it was estimated to be around average. Mean weight at age of 5 years and older haddock is still below average, but above average for the small 2008–2011 year classes.

Two years ago, the Ministry of Fisheries requested MRI to suggest a management plan for haddock. Work has been ongoing since then and recently proposals for a harvest control rule (HCR) were introduced to the Ministry of Fisheries and stakeholders. Based on the suggested management plan, the MRI recommends a TAC for the quota year 2012/2013 not exceeding 32 000 t. This will lead to low probability of the spawning stock in 2014–2015 going below B_{lim} .

2.3. Saithe

In 2011, landings of saithe (*Pollachius virens*) were 51 000 t, a decrease of approximately 6% compared to 2010. The advice for the quota year 2011/2012 was 45 000 t and the TAC was set at 52 000 t.

The reference biomass of age 4 and older is estimated as 265 000 t at the beginning of 2012, the fishing mortality in 2011 as 0.26, and the harvest rate as 22%. The biomass estimate this year is considerably higher than last year, due to a large estimated 2008 cohort. As signals in the data are contradictory about the size of this cohort, there is an increased risk of overestimation this year.

Over the last two years, possible harvest control rules (HCR) for the Icelandic saithe have been evaluated within ICES. To maximize the long-term yield of the saithe stock, a 20% HCR similar to that used in Icelandic cod management is recommended. Furthermore, the analysis indicates that a shift in the fishery towards younger saithe can decrease the potential yield in the long term.

The advice of the MRI is based on the average between last year's advice and 20% of the current reference biomass (4+). The MRI recommends that the TAC for the quota year 2012/2013 should not exceed 49 000 t.

2.4. Golden redfish and *Sebastes viviparus*

In 2011, approximately 45 000 t of **golden redfish** (*Sebastes marinus*) were landed, around 6 000 t more than in 2010. The spring survey index of the fishable stock is above 90% of the observed maxi-

sum and there are indications from the autumn survey that year classes 1996–2001 are above average in size. According to an age-length based model (Gadget) the fishable stock has increased since 2005 after a considerable reduction 1985–1995. MRI recommends that the fishing mortality (F_{msy}) should not exceed 0.15, corresponding to a TAC for the quota year 2012/2013 of no more than 45 000 t.

Exploratory fishery for *Sebastes viviparus* started in 1997 with a catch of 1 200 t. The catches declined rapidly until 2000, and between 2001 and 2009 only a few tonnes were landed. In 2010 a direct fishery started again and total landings were 2 600 t, followed by 1 400 t in 2011. Very little is known about the stock size and sustainable yield. Therefore, MRI recommends that the precautionary approach is adopted in the management of *Sebastes viviparus* fishery in order to ensure sustainability of the resource and recommends a TAC of no more than 1 500 t for the quota year 2012/2013.

2.5. Deep sea redfish

In 2011, 13 000 t of **Icelandic demersal deep sea redfish** were landed, or about 5 000 t less than in 2010. The lack of long-term indices of abundance prevent analytical assessment, but survey indices from the autumn survey since 2000 are used as basis for advice. ICES and MRI recommend that effort should be kept low and that the TAC in Icelandic waters should not exceed 10 000 t for the quota year 2012/2013.

In 2011, an estimated 600 t of **shallow pelagic redfish** were caught, which is the lowest catch since the fishery started in 1982. No fishing was conducted on the main fishing grounds south and southeast of Greenland. Some of the catches were taken in the same area as the deep pelagic redfish. Annual landings peaked at about 100 000 t in 1993–1995. Given the very low state of the stock, ICES advises no directed fishery.

In 2011, the estimated landings of **deep pelagic redfish** were about 47 000 t, compared to 59 000 t in 2010. Annual landings were between 80 000 and 140 000 t in 1995–2004. The Icelandic fleet caught about 12 300 t in 2011, compared to 14 600 t in 2010.

Given the reduced abundance of this stock in the biennial international redfish surveys since 1999, ICES advises that the total catch in 2013 should not exceed 20 000 t.

2.6. Greenland halibut

In 2011, approximately 26 000 t of Greenland halibut (*Reinhardtius hippoglossoides*) were landed from the East Greenland, Iceland, and Faeroese waters of which the Icelandic fleet caught 13 000 t in 2011. CPUE of the Icelandic trawler fleet has been slowly increasing from a historical low in 2005. Biomass indices from the Icelandic autumn groundfish survey in 1996–2010 show a similar pattern. There is

no agreement on sharing of the stock between nations. ICES and MRI recommend that effort should be reduced to a level corresponding to long-term maximum sustainable yield. Such effort corresponds to a total catch of no more than 20 000 t for the East Greenland, Icelandic and Faeroese waters in the 2012/2013 quota year.

2.7. Halibut

In 2011, 550 t of halibut (*Hippoglossus hippoglossus*) were landed. From 1996 onwards, annual landings have been less than 1 000 t, the lowest observed since 1905. Historically, halibut has mainly been taken as bycatch in the bottom trawl and longline fisheries. In recent years a longline fishery has been developing, coinciding with a sharp decline in the survey biomass index. In recent years, the biomass indices from the groundfish survey have declined sharply. Currently, the halibut stock seems to be severely depleted, with very little recruitment into the spawning stock in recent years.

Due to the poor state of the stock, the Ministry of Fisheries has issued regulations where a ban is set on a directed fishery for halibut and that all viable halibut must be released in other fisheries. The MRI recommends that these regulations should be valid until clear indications of significant improvement in the stock are visible.

2.8. Plaice

In 2011, 4 900 t of plaice (*Pleuronectes platessa*) were landed. Survey indices have increased somewhat in recent years, and recruitment measurements from the groundfish survey suggest some improvement in the last few years. Stock assessment results show increasing biomass since 2000 and fishing mortality has also been decreasing since then. The MRI recommends that the catch should not exceed 6 500 t in the quota year 2012/2013, and that regulations regarding area closures on spawning grounds remain in effect.

2.9. Dab

In 2011, 900 t of dab (*Limanda limanda*) were landed. Between 1987 and 1997, landings of dab increased from 1 200 to 8 000 t, but have since decreased considerably. CPUE is now near a historical low. The MRI recommends that the TAC for the quota year 2012/2013 should not exceed what is considered to be bycatch in other fisheries. Considering the state of the stock, this could amount to about 500 t from the defined management area for the 2012/2013 quota year.

2.10. Long rough dab

In 2011, 180 t of long rough dab (*Hippoglossoides platessoides*) were landed, compared to the record high of 6 400 t in 1996. Survey indices and CPUE have been near a historical low in recent years. The MRI recommends that the TAC for the

quota year 2012/2013 should not exceed what is expected to be landed as bycatch in other fisheries. Considering the state of the stock, this could amount to around 200 t for the 2012/2013 quota year from the defined management area.

2.11. Witch

Since 1988, landings of witch (*Glyptocephalus cynoglossus*) have been between 900 and 3 000 t, with landings in 2011 amounting to 1 300 t.

The abundance index for the fishable stock reached a maximum in 2005, but has since been declining and CPUE has shown a similar trend. The size of the witch stock remains uncertain, but survey data indicate that both the fishable stock and recruitment have declined in recent years. The MRI recommends a TAC of 1 100 t for the quota year 2012/2013.

2.12. Lemon sole

In 2011, 1 900 t of lemon sole (*Microstomus kitt*) were landed. Survey indices of the fishable stock were high in 2003–2010 but somewhat lower in the last two years. Recruitment indices have also been high since the early 2000s. CPUE in the Danish seine fishery off southwest Iceland has doubled from the period 1993–1998 to the present. Preliminary stock assessment indicates a high current fishing mortality rate. Therefore, the MRI recommends the effort to be reduced and a TAC of no more than 1 400 t for the quota year 2012/2013.

2.13. Megrim

Megrim (*Lepidorhombus whiffiagonis*) is caught as bycatch in the Danish seine and *Nephrops* fisheries off South Iceland. In 2011, 321 t of megrim were landed. The MRI does not recommend a TAC for the quota year 2012/2013.

2.14. Atlantic wolffish

Landings of Atlantic wolffish (*Anarhichas lupus*) in 2011 were around 11 000 t, the lowest landings since 1985. The index of fishable biomass is close to average but recruitment indices are at a historical low level. According to the stock assessment, the fishable part of the stock has been decreasing since 2006 and further decline is foreseen, as recruitment to the fishable stock will be low in the coming years. MRI recommends a TAC according to the management strategy of F_{\max} or 7 500 t for the quota year 2012/2013. In addition, the MRI recommends a continued closure of the major spawning area off West Iceland during the spawning and incubation season in autumn and winter.

2.15. Spotted wolffish

Landings of spotted wolffish (*Anarhichas minor*) in 2011 were about 1 600 t. The average annual landings were 1 000 t in 1982–1997, but have increased to 2 300 t since 1998. Survey indices of recruitment,

total biomass, and fishable biomass are all at the historical minimum, while the harvest rate is about three times higher than in 1985–1997. The basis of the MRI advice is to reduce the harvest rate to half of what it has been on the average since 2000. The MRI recommends that the TAC for the quota year 2012/2013 should not exceed 900 t.

2.16. Blue ling

In 2011, 6 500 t of blue ling (*Molva dypterygia*) were landed. In past decades, blue ling has mainly been taken as bycatch in the bottom trawl fishery. In 2008–2011, the proportion caught by longliners increased considerably as a result of targeting of blue ling by that fleet. Longlines account for 70% of landings in 2011. Indices from the autumn survey indicate an increase in biomass and recruitment since 2005, but the most recent survey results from spring 2012 indicate a sharp decrease in stock size.

MRI considers the current high exploitation level unsustainable and recommends that landings be constrained to no more than 3 100 t in the quota year 2012/2013. The advice is to bring catches to sustainable levels as indicated by an exploratory Gadget model. Furthermore, a continued closure of known spawning grounds from 15 February–30 April should be maintained.

2.17. Ling

Landings of ling (*Molva molva*) in 2011 were 9 600 t, having increased steadily since 2001. Survey indices of harvestable biomass have remained high since 2007. In 2011, the exploitation level had decreased and was at a similar level as in 2004 to 2008, when survey indices were increasing rapidly.

MRI recommends a TAC of no more than 12 000 t in the quota year 2012/2013, including catches of foreign vessels which have been about 1 400 t in recent years. The basis of the advice is to keep exploitation levels at a similar level as observed in 2004 to 2008 and in 2011. Exploratory analytical assessment indicates that these catches would result in fishing mortality close to $F_{0.1}$.

2.18. Tusk

Landings of tusk (*Brosme brosme*) from Icelandic waters were 7 400 t in 2011. Indices of fishable biomass in the spring survey have increased considerably since 2001. However, recruitment indices peaked in 2006 but have decreased since then, and were in 2012 at the lowest observed value. The tusk stock assessment is based on the Gadget model as recommended by ICES.

The MRI recommends that the catches be no more than 6 700 t in the quota year 2012/2013, including catches of foreign vessels. This advice is based on the assumption that $F_{\max}=F_{MSY}=0.29$. It is furthermore recommended that the closure of nursery areas off the southeast and south coast is continued.

2.19. Anglerfish

In 2011, about 3 200 t of anglerfish (*Lophius piscatorius*) were landed from Icelandic waters, which is the third highest recorded catch. Previous results from surveys and CPUE indicated a large fishable stock due to very good recruitment during the period 1998–2007. Latest survey results indicate a declining trend in fishable biomass in 2012. Furthermore, survey indices show poor recruitment for year classes 2008–2011. With current fishing effort and the reduced recruitment in the last four years, the fishable stock will decline considerably in the coming years. The MRI recommends 1 500 t as the TAC for the quota year 2012/2013, and an effort should be made to reduce the bycatch of juvenile anglerfish in trawl fisheries.

2.20. Lumpfish

In 2011, about 5 200 t of female lumpfish (*Cyclopterus lumpus*) were landed in Iceland. This is slightly less than the annual average landings in 1971–2010 of 6 200 t. Effort and number of licenses have increased in recent years. A recent decline in the female biomass index, increasing F_{proxy} , and a record low male abundance index indicate the need of a more precautionary management approach.

The objective of the MRI advice is to keep F_{proxy} at or below the long-term average. The advice is given in two stages: in this report an initial advice is based on the 2012 survey biomass index, but the final advice will be given by end of March 2013 based on the 2012 and 2013 survey biomass indices. If the survey biomass index does not change much, the final advice is around 3 times the initial advice.

MRI recommends an initial TAC of 1 700 t for the 2012/2013 quota year, or approximately 3 500 barrels. MRI will recommend a final TAC after the 2013 spring survey. Furthermore, it is recommended that data collection and monitoring be improved in the male fishery and lumpfish bycatch in other fisheries.

2.21. Herring

Landings of **summer-spawning herring** (*Clupea harengus*) in Icelandic waters during the fishing season 2011/12 amounted to 49 000 t. For the fourth winter in a row, the stock was heavily infected by *Ichthyophonus* and it is estimated that 14% of the fishable stock will die because of it during the spring of 2012. There are strong indications that the infection is decreasing and the estimate of the stock size is more optimistic now compared to previous years with relatively strong year classes entering the fishable stock. The spawning stock is estimated as 377 000 t in the beginning of the 2012/13 fishing season. Thus, MRI recommends a TAC for 2012/13 corresponding to $F_{0.1}=0.22$ of 67 000 t.

In 2011, around 151 000 t of **Norwegian spring-spawning herring** were landed by Icelandic vessels, with estimated total international landings of

988 000 t. ICES has recommended a TAC of 833 000 t for the 2012 season, corresponding to a weighted $F = 0.125$. According to the international agreement reached in January 2007, Iceland will have a quota of 121 000 t in 2012. ICES will not recommend a TAC for 2013 until autumn 2012.

2.22. Capelin

In the beginning of July 2011, 82 000 t of capelin quota were allocated to Norway, Faroe Islands and Greenland on the basis of an existing agreement. No capelin fishery was allowed inside Icelandic EEZ from 6 July to 30 September 2011. A starting quota of 181 000 t was allocated to Iceland and the starting of the Icelandic fishery season set to 1 October. The final TAC based on survey results in January 2012 was 765 000 t.

A summer fishery took place in 2011 for the first time since 2004, with landings of 63 000 t. The autumn fishery started in October but only 9 000 t were landed in Oct–Dec. The winter fishery started in the beginning of January 2012 and the landings in Jan–Mar were 675 000 t. The total international landings 2011/2012 were 747 000 t.

The fishing season 2012/2013 will be based on the year classes from 2010 and 2009. The annual autumn survey could not be conducted because of a strike and two surveys conducted later in the winter covered only a limited part of the potential distribution area of young capelin. The indices from these two surveys are very low and do not provide a basis for an initial quota for 2012/2013. Therefore MRI advises that the fishery is not opened until further acoustic surveys have confirmed sufficient abundance of these cohorts to sustain a fishery with the usual prerequisite of a target remaining spawning stock of 400 000 t in spring 2013.

2.22. Blue whiting

International landings of blue whiting (*Micromesistius poutassou*) in the Northeast Atlantic in 2011 are estimated to be around 94 000 t. Icelandic landings were 6 000 t.

The analytical assessment in 2011 indicates a steady decrease in the spawning stock of about 66% between 2004 and 2012 and ICES recommends that a catch quota of 391 000 t in 2012 should not be exceeded. ICES will assess the stock in September and release its advice for 2013 in October 2012.

2.24. Mackerel

International landings of mackerel (*Scomber scombrus*) in the Northeast Atlantic in 2011 are estimated at 927 000 t. Since the mid 2000s mackerel has been observed in the Icelandic EEZ, which has led to a direct fishery in the last years. In 2011 the Icelandic landings were 159 000 t. The spawning stock increased from 2003 to 2009 but has decreased since then and the estimated spawning stock in 2012 is about 2.7 million t. ICES will assess the stock in

the autumn and release its advice for 2013 in October 2012. A multilateral agreement on sharing the mackerel quotas has not been reached among the nations participating in the fishery.

2.25. Pearlside

Experimental pelagic trawl fishery for pearlside (*Maurolicus muelleri*) started in late 2008 with a catch of only a few tonnes. In 2009, the catch was about 46 000 t, followed by 18 000 t in 2010 and 9 000 t in 2011. Very little is known about the biology and stock size of the pearlside and its position in the ecosystem. The MRI recommends that the catch should not exceed 30 000 t in the quota year 2012/2013.

2.26. Greater silver smelt

In 2011 about 10 000 t of greater silver smelt (*Argentina silus*) were landed compared to the historical maximum of 16 400 t in 2010. The 2011 autumn survey that has formed the basis of advice was not conducted, but preliminary results from a Gadget model indicate that the state of the stock is healthy, although the fishing mortality in recent years has been higher than can be sustained in the long run ($F_{0.1}=0.17$).

The stock is assessed with limited data and must therefore be harvested with caution. The MRI recommends a precautionary TAC of 8 000 t for the quota year 2012/2013. The basis of the advice is the preliminary results of the Gadget model. MRI further reiterates last year's advice that the precautionary approach be adopted in management of the greater silver smelt fishery in order to ensure sustainability of the resource.

2.27. Nephrops

In 2011, 2 240 t of *Nephrops norvegicus* were landed, compared to 2 540 t in 2010. The survey biomass index has decreased since 2008 and is now under the long-term average. CPUE (kg/hour, single rigged) was 71 kg in 2011, compared to 76 kg and 80 kg in 2010 and 2009, respectively. According to the current assessment, the fishable stock biomass (age 6 and older) in 2012 is estimated 16 000 t. The stock declined around 1995 due to poor overall recruitment and high fishing intensity off Southeast Iceland. The increase in stock biomass in recent years is considered the combined result of larger year classes from 1994–1995 onwards and a sustainable F_{opt} management strategy. MRI recommends a TAC of no more than 1 900 t in the quota year 2012/2013.

2.28. Northern shrimp

In recent years, the inshore fishery for northern shrimp (*Pandalus borealis*) has been closed, with the exception of the Snæfellsnes area and Arnarfjörður. MRI recommends a preliminary TAC of 1 000 t for the Snæfellsnes area in the quota year

2012/2013. Furthermore MRI recommends a continued closure of other areas until surveys have shown a significant increase of abundance.

In 2011, the offshore catch of northern shrimp was 6 300 t, compared to its highest level of 65 000 t between 1995 and 1997. MRI recommends a TAC of 5 000 t for northern shrimp in the offshore areas (excluding the Dohrn Bank area) for the quota year 2012/2013.

2.29. Iceland scallop

The Iceland scallop (*Chlamys islandica*) fishery remained closed during the 2011/2012 fishing season. Survey indices declined drastically between 2001–2008, resulting in 2011 indices amounting to only 10% of the average for 1993–2000. The downward trend in stock abundance is mainly due to increased natural mortality, probably caused by protozoan infestation in adult scallops. Recruitment has been poor in the period 2004–2010. MRI therefore recommends a continued closure of the scallop fishery in the quota year 2012/2013.

2.30. Ocean quahog

In 2011 only 5 t of ocean quahog was landed, compared to the maximum 14 400 t in 2003. Since 1987 a fishery for human consumption has been developing, but annual landings have been variable because of variable effort connected to the market. In 2009 the fishery for ocean quahog (*Arctica islandica*) with a hydraulic dredge stopped and since then a dry dredge has been used. MRI recommends a harvest policy of 2.5% of the estimated stock size corresponding to no more than 31 500 t in the quota year 2012/2013.

2.31. Common whelk

Pot fishing for common whelk (*Buccinum undatum*) started in Breiðafjörður in 1996. In 2011, the total catch amounted to 512 t compared to 142 t in 2010. Due to increased effort and uncertainty in stock size, MRI recommends a TAC not exceeding 750 t in Breiðafjörður.

2.32. Sea cucumber

In 2011 about 2 700 t of sea cucumber (*Cucumaria frondosa*) were landed. Since 2003 a fishery for human consumption has been developing, but annual landings were minimal until 2008. A maximum of nine fishing licenses are issued in this fishery, three within each of the three defined areas off Iceland. MRI recommends a harvest policy of 10% of the estimated stock size in each sub area.

2.33. Sea urchin

In 2011, 144 t of sea urchin (*Strongylocentrotus droebachiensis*) were landed. Harvesting of sea urchin commenced in 1993. Total landings reached a maximum of 1 500 t in 1994 but declined rapidly and were negligible in the years between 1997–2006.

During the last 5 years, the catches have been between 126 and 146 t. Areas with good quality sea urchins are limited in size, which requires a precautionary management strategy.

2.34. Whales

In 1986, the International Whaling Commission's (IWC) resolution on a temporary closure of commercial whaling came into effect. In 2006, Iceland resumed commercial whaling on fin whales (*Balaenoptera physalus*) and common minke whales (*Balaenoptera acutorostrata*). In 2011, 58 minke whales were caught, compared with 60 in 2010. No fin whaling was conducted in 2011, but 148 fin whales were caught in 2010.

The minke whale stock around Iceland is considered to be in a healthy condition, and historic catches are not thought to have affected the stock appreciably.

Based on stock assessments conducted by the Scientific Committees of NAMMCO and the IWC, the MRI recommends that annual catches of common minke whales from the Central North Atlantic stock do not exceed 229 animals in the Icelandic continental shelf area (CIC) and 121 animals in the CM area. This advice applies for the calendar years 2013 and 2014.

Results from a fin whale sightings survey in 2007 indicate a total population size of 20 600 animals in the East Greenland, Iceland, and Jan Mayen stock area (EGI stock area), which is similar to the 1995 and 2001 surveys.

On the basis of a recent assessment conducted within the Scientific Committees of the IWC and NAMMCO, the MRI recommends annual catches of up to 154 fin whales as sustainable and precautionary for the calendar years 2013 and 2014.

2.35. Seals

In 2011, the reported seal catch and bycatch in Iceland was 114 grey seals (*Halichoerus grypus*), 85 harbour seals (*Phoca vitulina*), 6 harp seals (*Phoca groenlandica*), two bearded seals (*Erignathus barbatus*), one ringed seal (*Phoca hispida*) and 188 seals of unidentified species. **Grey seal** surveys were conducted in 2008 and 2009, where 6 100 (95% CI: 4 600–7 600) animals were estimated along the Icelandic coast. The stock was estimated as 12 000 animals in 1990. After a continuous decline from 1980 to 2002 the stock seems to be increasing again. According to a survey conducted in 2011, the stock of **harbour seals** was around 11 000 animals. The stock was estimated as 34 000 seals in 1980 but has remained stable since 2003.