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Executive summary

Demersal stocks in the Faroe Area (Division Vb and Subdivision IIa4)

Faroe Bank Cod

Landings of Faroe Bank cod amounted to 219 tonnes in 2008, which is the lowest recorded since 1992. Results from the summer and spring surveys indicate that the stock is currently well below its average level and there is no indication of strong year classes from the surveys. Exploitation The exploitation ratio has sharply decreased since 2006. In 2008 it is estimated to levels comparable to those in the 1990's for both survey indices.

Faroe Plateau cod

The assessment settings and input data were the same as in the 2008 assessment. Based on an XSA fishing mortality in 2008 (average of ages 3-7 years) was estimated at 0.76, which was considerably higher than the precautionary fishing mortality of 0.35 and also higher than the limit fishing mortality of 0.68. The total stock size (age 2+) in the beginning of 2008 was estimated at 25 000 tonnes and the spawning stock biomass at 19 000 tonnes, which was slightly below the limit biomass of 21 000 tonnes. The estimates of stock size were amongst the lowest during the 1906-2008 period.

The short term prediction until year 2011 showed a situation with a stock size of around 31 000 tonnes and a spawning stock biomass of around 19 000 tonnes.

Managers should realize the poor state of the stock. Of importance, especially the recruitment seems to be positively correlated with the total stock size of cod. It is, therefore, urgent to reduce the fishing mortality so that the stock increases. This could be achieved by extending area-closures, preferably for all fishing.

Faroe haddock

Being an update assessment, the only changes compared to last year are additions of new data from 2008 and some minor revisions of the landings data for 2006 and 2007 with corresponding revisions of the [catch@age](#) data. Based on an XSA the results are in line with those from 2008, showing a declining SSB mainly due to poor recruitment. SSB is now estimated just below B_{pa} and is predicted to be close to B_{lim} in 2010 and 2011 with status quo fishing mortality. Fishing mortality in 2008 is estimated at 0.22 ($F_{pa} = 0.25$) and landings in 2008 were only 7 500t. In recent years there has been a tendency to overestimate SSB and underestimate F.

Faroe Saithe

The most recent benchmark assessment was completed in 2005. Since 2006 assessments have been rejected because of a retrospective pattern believed to be due to decreased size at age. As size at age has not increased markedly, the retrospective pattern, which underestimates stock size and overestimates fishing mortality, is expected to continue to exist.

The working group concludes that the XSA assessment is useful to indicate stock trends, although the values themselves may be questionable.

Recent year classes are probably underestimated because of changes in catchability (q) due to slower growth, and fishing mortality is probably overestimated. The Faroe saithe total biomass is estimated to be above average in 2008, whereas the spawning stock biomass is estimated below average for the whole time series back to 1961.

Biological reference points for this stock need revision. This will hopefully be accomplished at a scheduled benchmark assessment in 2010.

Demersal stocks in Icelandic waters (Division Va)

Icelandic saithe

The assessment is a SALY (Same As Last Year) using the same input data with addition of one year and the same model with the same parameter settings as last year. The assessment results are very much in line with that of last year.

The stock size (B4+ and SSB) is around the long term average but fishing mortality is high in most recent year. Relatively strong recruitment is now being replaced by much lower average recruitment. A SALY advice, based on the short term prediction provided would imply very harsh measures if the stock is to be maintained above Bpa, following the advisory year.

The major issue in the development of the saithe stock, are low mean weight at age for most ages in recent years and recent changes in fishing pattern, with increasing mortality on younger fish. In addition weight at age of the older age groups, in the early part of the time series seem to be abnormally high. If they are artificially high, the dynamic range of historical SSB is much narrower than what has been used in past assessments. All the above points have implications with regards to the appropriateness of using the current reference points as the basis of the advice.

The scheduled benchmark assessment in 2010 will explore both assessment inputs and reference points. However, for next years advice the WG suggests interim reference F values to be used as the basis of the advice. The approach used is similar as has been done for Icelandic haddock, in part due to similar issues.

Icelandic cod

The total reported landings in 2008 were 147 kt. Total landings in the last 4 fishing year have been relatively close to the set TAC for the Icelandic fleet. The TAC for the current fishing year is set to 160 kt.

Mean weight at age in landings have been declining in the last 6-7 years and are in 2008 about 9 to 12 % (20 % for the small 2001 year class) below the long term average in age groups 4 to 9. Weights at age in the spring survey have also been declining over the same period and are generally very low in the 2009 survey.

Abundance indices by age from the spring and the fall surveys show that the year classes from 2001 onward are on average smaller than the ones from 1997 to 2000. The first measurement of the 2008 year class indicates that it may be above average. That year class will however not contribute significantly to the fisheries until 2013.

Based on the statistical Catch at Age Model (ADCAM), fishing mortality in 2007 is now 0.52 compared with 0.55 estimated last year. The SSB in 2008 is now estimated to have been 253 kt compared with 230 kt estimate last year. Half of this difference is caused by inclusion of the Iceland-Faeroe ridge in the survey area. The retrospective pattern of recruitment estimates in recent years, both historical and analytical, indicates a minor but constantly downward revision of year classes 2002 and younger. Since these revisions are on pre-recruits that have not entered the fishery they have minor effect on the estimates of the post-recruit metrics.

The spawning stock has been relatively small in the last 40 year compared with the time before that. It reached a historical low in 1993 (120 kt) but has since then increased and is estimated to be about 220 kt at present. Fishing mortality has declined

significantly in recent years, the present estimate of about 0.4 not seen since the early 1960's. Year classes from 2001 to 2007 are estimated to be below the long-term average. First measurement of the 2008 year class indicates that it may be above medium size or even larger. The low recruitment in recent years in addition to very low mean weight at age means that the productivity of the stock at present is very low.

Icelandic haddock

The assessment is a SALY (Same As Last Year) using the same input data with addition of one year and the same model with the same parameter settings as last year. Year-classes that are entering the fishable stock are much smaller than those disappearing so the stock is rapidly decreasing. Growth of haddock has been very slow in recent years leading to late recruitment of incoming year classes to the fishery. In this situation same age based fishing mortality means higher fishing effort than earlier. This has led to too high effort towards haddock compared to cod causing problems in mixed fisheries. The group proposes lowering the target F from 0.47 to 0.35 to keep target effort comparable to what 0.47 led to earlier.

Based on an Adapt type model tuned with both spring and autumn surveys SSB is estimated to decrease from a high since 2004 and fishing mortality has been maintained at approx 0.5 which is above F_{pa} (0.47).

The main problem in current assessment is prediction of mean weight at age in the stock that is used to predict selection at age. There is still no indication of improved growth in spite of smaller year-classes.

Short term predictions show that both stock size and landings will decrease rapidly in coming years when the large year classes disappear.

Icelandic summer spawning herring

The total reported landings in 2008/09 were 152 kt, the recommended TAC was 130 kt, while the TAC was 150 kt. Around 137 kt of the catch was taken in a relatively small area in Breidafjörður, in W Iceland, similar to the preceding fishing season.

In November 2008, the herring stock was found to be seriously infected by *Ichthyophonus*. Around 32.2% of the fishing stock, as estimated in the January survey 2009, will die in the winter/spring 2009 because of the infections, which corresponds to $M_{infection}=0.39$.

Based on the SALY approach, the NFT-Adapt, the biomass of age 3+ is 628 kt and SSB is 542 kt in the beginning of year 2009. Accounting for the observed *Ichthyophonus* infection (32.2%) in that period gives estimates of surviving fish, or 426 kt of age 3+ and SSB of 367 kt. Fishing at $F_{0.1}=0.22$ in the fishing season 2009/10 will give a catch of 75 kt, where 17% derives from the 1999 year class. This prediction is under the premises that no further *Ichthyophonus* infection occurs, which is considered unlikely because similar outbreaks in other herring stocks often last for two years. This will be verified in a survey in July 2009.

Capelin in the Iceland-East Greenland-Jan Mayen area

In 2008 no starting quota was issued due to the 2007 year class being very low. There was no official fishery because the acoustic measurements prior to the spawning gave only SSB of 320 000 t. The only catch was 15 000 t that was allocated to scouting vessels in February 2009. The stock has been at low levels the last 4 years. Only very low abundance of 1 year old capelin was measured in November- December 2008.

The advice is therefore not to open the fishery in the season 2009/10 until acoustic assessment surveys have verified that a catch can be allowed with the usual prerequisite of a remaining spawning stock of 400 000 t in March 2010 after accounting for the natural mortality.

Demersal stocks in Greenland waters*Cod stocks in Greenland*

The two survey abundance indices both indicate that the Greenland cod stock is presently significantly above the very depressed state that was experienced in the 1990's. The stock is however well below historical levels. Some of the increase may be due to inflow of recruits (2003 year-class) from Iceland. Off East Greenland a small offshore spawning stock has been building up in the most recent years and spawning has been inferred since 2004. Both surveys indicate that all year classes since 2002 are larger than any of the year class since the 1985 year class. The increase is mainly attributed to occurrence of the 2003 year class that show the characteristic usually associated with Year classes of Icelandic origin. This year-class is estimated at approx. 25% of the size of the very large 1984 year class.

A multi-annual management plan should be developed to ensure that the quotas are set at low levels until a substantial increase in biomass and recruitment is evident in the Greenland cod stocks. The management plan may incorporate the knowledge on the stock structure, inter alia, by differentiating management objectives and regulatory measures for the inshore and offshore stock components.

Greenland halibut

Input data to the Greenland halibut assessment this year is unchanged from recent years. As in 2008 a logistic production model in a Bayesian framework was used to assess stock status and for making predictions.

Estimated stock biomass showed an overall decline throughout most of the time series. Since 2004 the stock has been stable at relative low levels well below B_{MSY} and fishing mortality exceeds the value that maximizes yield (F_{MSY}). Stock biomass is estimated at $0.4B_{MSY}$, and the projected risk of exceeding this reference point will be relatively high at any catch level. Maintaining catches of 20 kt will result in a further decline of the stock and a high probability of being above F_{MSY} . Setting TAC at 5kt will likely result in an increase in stock biomass ($0.7B_{MSY}$ over a decade) and F is projected to decrease to below $0.5F_{MSY}$.

At present no formal agreement on the management of the Greenland halibut exists among the three coastal states, Greenland, Iceland, and the Faroe Islands. The regulation schemes of those states have in the recent past resulted in catches of about 25 kt compared to the recent advice by ICES of 5 kt. A basis for the advice is therefore an adaptive management plan that is coordinated among the three coastal states.

Redfish in Subareas V, VI, XII and XIV

Redfish are found in the entire North Atlantic and contribute important fishery resources around Iceland, the Faroe Islands, off Greenland and in the Irminger Sea. The management does not separate the two most important species, *Sebastes marinus* and *S. mentella*. In early 2009 the stock structure of *S. mentella*, which is found on demersal grounds and in the pelagic zone, was reviewed by WKREDS and based on their review advice is now given separately for *S. marinus*, demersal *S. mentella* on the Icelandic slope, shallow pelagic *S. mentella* and deep pelagic *S. mentella*. Adult *S. mentella* on the Greenland continental slopes likely belongs to more of the newly identified stocks and are only tabulated with respect to catches in the introductory chapter on redfish. The issue of stock structure within the *S. mentella* stocks was requested by NEAFC, and in ICES response to NEAFC request (as of March 2009) a complete description of the re-interpreted stock structure can be found.

Golden redfish (S. marinus)

Total landings in 2008 were about 45,000 t, about 5,000 t more than in 2007. About 99% of the catches were taken in Division Va.

The basis for advice and the relative state of the stock is based on projection derived from the analytical GADGET model and survey index series. The approach is unchanged from last year. Catch-at-age data from Va shows that the catch is dominated by two strong year classes from 1985 and 1990. It is expected that the 1990 year class will be important in the catches in the next few years, but the 1985 year class is disappearing.

Survey indices of the fishable stock in Va have decreased in recent years but increased in 2008 and is now in the vicinity of safe biological limits (Bpa). The fishable stock situation in Subarea Vb remains at a low level, but has improved in Subarea XIV. Recruitment in Va has been low since 1993 compared to the big 1985- and 1990 year-classes, but there is an indication of strong new year classes observed as 9-11 years old fish in the October survey in 2008. There are signs of improved recruitment in XIV as well.

The assessment predicts that catches in Va below 30 000 t would provide a fishable stock size above current biomass level for the next 5 year.

Demersal S. mentella on Icelandic slopes

Total landings of demersal *S. mentella* in Icelandic waters in 2008 were about 25 500 t, about 8 500 t more than in 2007.

No formal assessment was conducted and there are no biological reference points for the species. Survey indices are used as basis for advice. Available survey biomass indices show that in Division Va the biomass has been low but stable in the last 6 years. In recent years, good recruitment has been observed on the East-Greenland shelf which is assumed to contribute to the three stocks at unknown shares.

Deep Pelagic S. mentella

The WG was not able to evaluate the state of the stock. Based on a scheduled acoustic-trawl survey in June 2009, an assessment and advice will be provided in the autumn 2009.

Shallow *Pelagic S.mentella*

The WG was not able to evaluate the state of the stock. Based on a scheduled acoustic-trawl survey in June 2009, an assessment and advice will be provided in the autumn 2009.

1 Introduction

1.1 Terms of Reference (ToR)

1.1.1 Specific ToR

2008/2/ACOM04 The North-Western Working Group [NWWG] (Chair: Jesper Boje, Denmark) will meet at ICES Headquarters, 29 April – 5 May 2009 to:

- a) address generic ToRs for Fish Stock Assessment Working Groups (see table below).

The assessments will be carried out on the basis of the stock annex in National Laboratories, prior to the meeting. This will be coordinated as indicated in the table below.

NWWG will report by 11 May 2009 for the attention of ACOM.

FishStock	Stock Name	Stock Coord.	Assess. Coord. 1	Assess. Coord. 2	Advice
cod-farp	Cod in Subdivision Vb2 (Faroe Bank)	Faroe Is-	Faroe Is-	Faroe	Advice
cod-farb	Cod in Subdivision Vb2 (Faroe Bank)	Faroe Is-	Faroe Is-	Faroe	Same
had-faro	Haddock in Division Vb	Faroe Is-	Faroe Is-	Faroe	Advice
sai-faro	Saithe in Division Vb	Faroe Is-	Faroe Is-	Faroe	Advice
cod-iceg	Cod in Division Va (Icelandic cod)	Iceland	Iceland	Iceland	Advice
had-iceg	Haddock in Division Va (Icelandic haddock)	Iceland	Iceland	Iceland	Advice
sai-icel	Saithe in Division Va (Icelandic saithe)	Iceland	Iceland	Iceland	Advice
her-vasu	Herring in Division Va (Icelandic summer-	Iceland	Iceland	Iceland	Advice
cap-icel	Capelin in Subareas V, XIV and Division IIa	Iceland	Iceland	Iceland	Advice
ghl-grn	Greenland halibut in Subareas V, VI, XII and	Greenland	Greenland	Iceland	Advice
smr-5614	Redfish (<i>Sebastes marinus</i>) in Subareas V, VI, XII	Iceland	Iceland	Faroe	Advice
smn-con	Redfish (<i>Sebastes mentella</i>) on the continental	Iceland	Iceland	Germany	Advice
smn-ocn	Redfish (<i>Sebastes mentella</i>) in Subareas V, VI,	Germany	Iceland	Spain	Advice
cod-ewgr	Cod in ICES Subarea XIV and NAFO Subarea 1	Greenland	Germany	Germany	Advice

1.1.2 Generic ToRs for Regional and Species Working Groups

The working group should focus on:

ToRs a) to g) for stocks that will have advice,

ToRs b) to d) and f) for stocks with same advice as last year.

ToRs b) to c) and f) for stocks with no advice.

- a) Produce a first draft of the advice on the fish stocks and fisheries under considerations and the regional overview according to ACOM guidelines.
- b) Update, quality check and report relevant data for the working group:
 - i) Load fisheries data on effort and catches (landings, discards, bycatch, including estimates of misreporting when appropriate) in the INTERCATCH database by fisheries/fleets;
 - ii) Abundance survey results;
 - iii) Environmental drivers.

- iv) Propose specific actions to be taken to improve the quality of the data (including improvements in data collection).
- c) Produce an overview of the sampling activities on a national basis based on the INTERCATCH database);
- d) In cooperation with the Secretariat, update the description of major regulatory changes (technical measures, TACs, effort control and management plans) and comment on the potential effects of such changes including the effects of newly agreed management and recovery plans.
- e) For each stock update the assessment by applying the agreed assessment method (analytical, forecast or trends indicators) as described in the stock annex. If no stock annex is available this should be prepared prior to the meeting.
- f) Produce a brief report of the work carried out by the Working Group. This report should summarise for the stocks and fisheries where the item is relevant:
 - i) Input data (including information from the fishing industry and NGO that is pertinent to the assessments and projections);
 - ii) Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information;
 - iii) Stock status and 2010 catch options;
 - iv) Historical performance of the assessment and brief description of quality issues with the assessment;
 - v) Mixed fisheries overview and considerations;
 - vi) Species interaction effects and ecosystem drivers;
 - vii) Ecosystem effects of fisheries;
 - viii) Effects of regulatory changes on the assessment or projections;
- g) Where appropriate, check for the need to reopen the advice in autumn based on the new survey information and the guidelines in AGCREFA

1.2 NWWG 2009 work in relation to the ToR

The ToR were not addressed systematically for all the stocks. The following points highlight the WG response to these ToR.

As follows of section 1.4, no data was uploaded to the ICES INTERCATCH database.

The updates of the stock annexes were only completed for some stocks. Due to limited time available some annexes were left at a status almost of last year. As has been pointed by the ICES secretariat, the updating of the annexes is most efficiently an inter-sessional task, but this task was not fulfilled by stock/assessment coordinators. It is, however, the perception of the WG that fulfilling this task is a continuous process along with change of objectives by ICES.

Due to the number of tasks that is put on WGs (Generic ToRs and bookkeeping) together with the reduced number of days allocated for the meeting, the NWWG had no time to ensure the quality of the report. Although an internal review system is set-up in NWWG, the priority was put on the adoption of assessments that were basis for stock status and the premises for the forecasts. This procedure was to ensure that the basis for a proper advice was agreed upon. Further, the time allocated for advice

draft (approx 2 days) reduced the number days for assessments and other business to 4-5 days.

Although a system on update and benchmark assessments has been established by ICES, arrival of new data always give rise to discussions on whether to change options for an assessment or await a benchmark assessment. For example, parasite infestations in Icelandic herring gave rise to a high mortality and question was how these infestations is expected to develop within the short time frame. It was decided to await a parasite survey in July 2009 and to implement the measured infestation rates (mortality) into a forecast that will be released after July.

S. mentella redfish stock structure was reviewed by ICES WKREDS in the early 2009 and resulted in a revised view of the stock structure. This new structure has been implemented in this report, but due to the fact that most of the data input to especially the pelagic stocks needed to be split and re-interpreted, combined with data compilation from a number of nations, these sections appears in a preliminary state with regard to conclusive statements of state of the stock. For the same reason, both pelagic stocks are provisionally put under same section (section 19), but sub-sectioned by stock. The advice for the pelagic stocks are awaiting an acoustic-trawl survey to be conducted in June/July 2009, and it is anticipated that final advice will be available in the autumn prior to the annual NEAFC meeting.

1.3 Assessment methods applied to NWWG stocks

The methods applied to assess the stock status of the NWWG stocks covers a wide range from descriptive to age based analytical assessments as follows:

<i>Stock</i>	<i>ASSESSMENT model</i>	<i>input*</i>
<i>Faroe Bank cod</i>	<i>Descriptive</i>	<i>survey</i>
<i>Faroe Haddock</i>	<i>XSA</i>	<i>survey</i>
<i>Faroe Saithe</i>	<i>XSA</i>	<i>CPUE</i>
<i>Faroe Plateau cod</i>	<i>XSA</i>	<i>survey</i>
<i>Iceland Saithe</i>	<i>ADCAM (statistical catch at age)</i>	<i>survey</i>
<i>Iceland cod</i>	<i>ADCAM (statistical catch at age)</i>	<i>survey</i>
<i>Iceland haddock</i>	<i>Adapt type model</i>	<i>survey</i>
<i>Iceland herring</i>	<i>NFT-Adapt</i>	<i>survey</i>
<i>Capelin</i>	<i>Acoustics (absolute biomass)</i>	<i>survey</i>
<i>Greenland cod</i>	<i>Descriptive</i>	<i>survey</i>
<i>Greenland halibut</i>	<i>Stock production model (Bayesian)</i>	<i>survey+ CPUE</i>
<i>S. marinus</i>	<i>GADGET (age-length based cohort model)</i>	<i>survey</i>
<i>S. mentella Iceland slope</i>	<i>Descriptive</i>	<i>survey</i>
<i>Deep pelagic S. mentella</i>	<i>Descriptive</i>	<i>survey+CPUE</i>
<i>Shallow pelagic S. mentella</i>	<i>Descriptive</i>	<i>survey+CPUE</i>

* landings or landings by age are input to all assessments

1.4 InterCatch

Henrik Kjems-Nielsen from the ICES secretariat gave a presentation of the status of InterCatch (IC). Presently, the age-based assessments in the WG do not use IC. This

is mainly due to the fact that most stocks in the WG, where advice is based on age-based analytical assessments, are national stocks where data are compiled at the national lab, i.e. only national fleets and surveys contribute to the assessment input. However, it is the aim that data from the gadoid stocks at Iceland and Faroe Islands will be uploaded at IC within 2009/2010.

1.5 NWWG Draft of Advice Summary Sheets

The WG used more effort this year than previously to improve and finalise the summary advice sheets. The group spent three days drafting and going through the draft advice sheets in plenary. The WG therefore appreciates any feed-back from the ADG in form of minutes that reflect justification for major changes in the advice sheet compared to the suggestion by the WG.

1.6 Recommendations

The WG experienced a number of problematic issues related to survey stratification and likely stock distribution. The character of the problems differed slightly by stock but it was recognised that a common multinational effort on this is needed to improve the quality and use of surveys as stock indicators. A survey workshop is therefore suggested to take place in 2010 within the framework of ICES as provided in the recommendation in Annex 04.