

ANNEX 1

TECHNICAL MINUTES

ACFM Review

Technical Notes from the review of the North Western Review Group report (reviewed jointly with report of Arctic Fisheries Working Group) May 25-27, 2004

Participants

Holger Hovgaard (Chair)
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General observations

The ACFM North Western Review Group (NWRG) met in Copenhagen, May 25-27, 2004, to review the report of the North Western Working Group (NWWG).

The NWRG noted that the NWWG report has not addressed the ToR item b, relating to providing effort options for the stocks that are regulated through the Faroese effort regulation system. The discussions during the review meeting revealed that catch and effort data on the appropriate scale for stock assessment has not been made available for the NWWG. Although the data shortcomings are caused by purely berocratic factors it in practice nullifies one of the main benefits recognized when introducing the Faroese effort system – namely the expected improvements in the assessment data quality when using a regulation believed to remove incentives to discard and misreport catches.

The assessments were well documented overall. It was noted that the request by ICES on the changes to the structure of the report could not be addressed entirely and that this would require intersessional work (e.g. Quality Control in Annex, etc.). It was observed that there is still some confusion on the format and expected end-product and that fishery-based advice was not yet a fully operational approach. Also, the Review Group suggested that it would be useful in future reports of the NWWG to document the response of the Working Group to the comments and recommendations of the NWRG in each of the stock sections. The report rather focus on the technical aspects on assessment. In order to be able to formulate advice ACFM also needs additional information on the nature of the fisheries, regulations, biological stock and fisheries interaction. This information is also required to feed specific paragraphs in the single stock summary

It was noted that the assessments had been using a variety of models (e.g. ADAPT using the USA National Marine Fisheries Service software, AD-CAM, etc.) and that this was useful in evaluating the results. Some of these models provide a quantification of errors through bootstrap or analytically using Hessian-based calculations. The NWRG feels that these constitute a good first step in evaluation uncertainties in assessment. One of the remaining questions is how such estimates of uncertainty could be used by ACFM for providing advice. In practice, the advice is still based on point estimates and ACFM notes the questions from WG on the use of uncertainties in the determination of advice on stock status and TAC levels (what format, etc.). It was noted that where methods providing a quantification of uncertainty in stock abundance estimates have been applied, they are often used to provide a quantification of risks of various management options or catch levels.

This also raises that issue of how to deal with multiple formulations of assessments. The consideration of multiple approaches to these assessments results in a certain lack of standardization in the WG report. However, alternative approaches serve to give some confidence in assessment results when the results show consistency across models. The NWRG welcomes the inclusion of the results of alternative models in the report of the NWWG and believes that this warrants further discussions within ACFM as to how this should be used in the advisory process.

The WG chair provided an overview of the WG report using slides. One of the synthetic slide compared the trends in assessment results against the long term average. These were found to be very useful by the Review Group.

Icelandic Cod

This assessment is based on the same procedure as last year (SPALY). The principal issues discussed were:

- Calculation of SSB. Difference with old calculation is large. The reason is that the mean weight and maturity ogive is now based on survey (1st Q) information whereas it earlier were based on information from the fisheries.
- Previously available capelin stock size was used in calculation of mean weight for the stock in the forecast but the current stock size estimate is zero. Consequently, the forecast used survey weights information to predict catch weights.

It was observed that fishing mortalities continue to be high under the current catch rule which aims at reducing effort. The catch rule was changed. There are some concerns that simulations to evaluate the catch rule are sensitive to the stock recruit assumptions. Another issue is that the simulations do not assume implementation or assessment error. While it was pointed out that the assessment error was 15% but not on one side (i.e. bias was not tested). The evaluation of the catch rule also assumes that managers will follow the catch rules. This may not be the case and the implementation error should account for this, together with lack of adherence to the TACs.

The question of the level of discards was raised in the context of their impact on the medium term projections. It seems that the situation has improved but, in practice, the recent estimates are unbelievably low. The Review Group noted that there was no new information on the discards and that the information available was what has been produced and reviewed last year.

With respect to the revised estimates of SSB (the entire time series), it was noted that the new estimates are very different than the old estimates (see page 239). The new SSB calculation uses the maturity ogive, from the survey instead of that of the catch. There is quite a difference in the maturity at age from these two sources (see page 220 and compare maturity from spring survey data to maturity from catches Jan-May). In particular, the change in noted for ages 4-5. While the NWWG believes that survey-based maturities are better indication of maturation, the reasons for this are unclear but could be investigated by having a closer look at the sampling data. It was also noted that the consequence of a change in SSB estimates on the assessment is not important as the management rule is based on B₄₊ and the B_{PA} is not defined for the stock. However, if we need to define a limit reference point based on SSB, the reason for the differences between maturity estimates from the two sources would have to be clarified.

The Review Group notes that alternative methods give similar results, which gives confidence in the assessment results.

With respect to the use of the capelin biomass in the forecast, the absence of a biomass estimate for capelin fro 2003 add a complexity to the forecast but the Review Group is satisfied with the new model for predicting weight at age in catch from survey.

The use of AD-Cam for final assessment was discussed. It was noted that the other methods used gave similar results and the diagnostics revealed no particular issue (no strong retrospective). However, future assessments should also consider using the October survey, which is now composed of nine data points, as an additional tuning index.

Icelandic Haddock

There is a haddock outburst, being driven by incoming recruits. This is seen clearly in the surveys and confirmed in assessment results. However, there are large survey residuals, in particular in 2003 and 2004 (above model estimates, year effect). This could be due to warming and its possible effect on survey catchability.

The Review Group asked if the absence of discard information could explain large residuals or trends in residuals. These residuals may not be related to the surveys but could be arising from the catch data. The concern is that there could be high discards or incidental mortality associated with mesh size. The issue is that there is no discard info other than what reported last year. The Review Group is really missing that information (this is a general comment for all stocks).

The use of many assessment models was welcomed but the final choice of the model should be discussed in the report (also valid for other stocks). It is also unclear where we can find the output from the selected run (e.g see page 289, what is the assessment based on, which method). Instead of the XSA, we need for instance the final output of the AD-CAM (now provided in annex of the Minutes).

On Page 293, the report is also missing the maturity and other biological data needed to do the short term projections. What is presented is the detailed output table. What is needed is “input” which is not provided (now provided in the annex of the Minutes).

While ACFM had not adopted AD-CAM, we are using AD-CAM to obtain an indication of stock trends in the short term. As such, the details of the model input should be provided and documented. Page 274, some ambiguity in the text on input data. “For 2004, the mean of 2001-2003 was then used.....” This is an incomplete sentence. This needs to be checked. What is used in the catch forecast needs to be specified.

Last para on input data: page 274. It is specified that the exploitation pattern for the past 25 years is used. The Review Group had a discussion on the relation of input data for the yield-per-recruit and the purpose of the exercise. Consideration should be given to using the most recent exploitation pattern as it is the most recent fishery that needs to be evaluated in terms of long term yield per recruit. As for maturity and weight, it is likely appropriate in most situations to use the long term historical information. It was noted that another purpose might be to use yield per recruit to determine the optimum exploitation pattern. However, unless specified otherwise, the assumption should be the reason for providing yield per recruit calculations is related to evaluating the current situation in relation to growth overfishing.

Icelandic saithe

This stock has been previously assessed by ICES through TSA (NWWG 2002), using surveys as independent stock index. No assessment were made of this stock by the NWWG in 2003 However, in a Icelandic domestic 2003 assessment , the Camera model, a CAGEAN-type model, was applied to surveys using ages 3-14. The NWWG 2004 proposes to use Camera values as point estimators (ages 3-14). It was noted that a lot done but that the model still required proper documentation. However, the results look promising in hindsight.

The Review Group asked that the results of the retrospective model be checked in the quality control sheets as some values seem to be anomalous.

There is no indication in the report how the new SSB was calculated back in time (i.e. prior to the surveys which starts in 1985. The Review Group asked that that the SSB time series be produced for the old and the new (i.e. to revise table 3.2.7.8).

Regarding the catch forecast, it was noted that a TAC of 50Kt constraint was assumed for 2004. This implies a F-reduction of about 24%. This appears to be a good case for using F status quo for 2004 as F goes back up in 2005 and 2006 (See page 182). It was reported that we know little about the catch in 2004. So making the forecast with status quo F would be more appropriate. We should use 0.32 in absence of anything else.

This is a noisy assessment (not precise, see page 204) but there is no indication of precision in the projections. There are some concerns with the level of catches that come out of the projections.

Some formatting issues were reported and will be corrected in the final report. There are concerns with using camera as this method is still under development but the progress made in its application are noted.

The recruitment in the most recent year is the lowest one in the time series. It was also used in the prediction. This should have been mentioned somewhere, because now ACFM lost time by checking this not to be an error.

Faroe Plateau – Cod

This is a benchmark assessment. Last year, the assessment was based on the summer surveys only (1996-2002); this year, the spring surveys (1994-2004) were added.

While the final results are based on XSA, experimental runs were made using ADAPT. These gave similar results.

The principal issues are the year-effect in surveys, the basis for F in forward projections, the relation for LL catchability and environment, and very high Fs in 2003.

We suspect there is a year effect in the 2004 spring survey, as well as in the summer and spring 2003 surveys. Also the spring 2003 assessment was not used in the last assessment. So we now have three new survey points. So we now have three surveys now showing relatively low values. It was pointed out that the distribution of cod was not normal in the last summer.

It was noted that the signal of decline is seen not only in the survey index but also in the catch (from catch ratio analysis done by WG chair).

On page 47, the XSA residuals should have been shown in a bubble plot. Observed surveys in summer 2003 appear to be lower than predicted. Same thing, for the spring 2004. In other words, these low survey observations are not adhered to completely in the XSA results. So the model is more optimistic than the surveys themselves.

An ADAPT was done. ADAPT results in a higher F for ages 5,6,7 but lower for 8 and 9 in comparison to XSA. The power assumption is not supported strongly by the data. ADAPT gives similar results without it.

Another suggestion was to try omitting 9 year olds from the tuning.

It was observed that the recent Fs are high despite the harvest rule in place.

The review group had a look at the ranking of survey results as a means to extract information on yc strengths and stock trends from the indices themselves.

It was noted that this is an effort control system. Given this, it appears that the increase in F cannot be explained by days at sea or effort observed.

The review group run a XSA with a standard shrinkage of 0.5, as a sensitivity test. The Fbar (3-7) from this run in 2002 and 2003 were estimated at 0.73 and 0.71, respectively, as compared to 0.83 and 0.99 in the accepted run. Although lower, the fishing mortality still is very high, more than twice the Fpa of 0.35. Inspecting the diagnostics and retrospective analysis of this XSA shrunk 0.5 the review group found no reason to reject the XSA as accepted by the WG.

The use of a plus-group was discussed. The Working Group should revisit the inclusion of a plus-group and the argument by which it was taken out.

On the indices, it was observed that the two surveys are much in line with each other and in line with trawl fleet but not in line with the Long Liners.

It was noted that the results of the assessment was not carried forward in catch forecasts last year. In this case, we have an effort management control system and what is the point of doing projections.

It was noted that the results are predicting high Fs in 2003. The Fs have been estimated to go up rapidly. There is a concern that the effort regulation doesn't work. Perhaps effort control is not sufficient because catchability cannot be controlled (This should be investigated by plotting q over time, e.g. as F/E. One management objective is to keep F on average to 0.45. A relationship (in 1996) between number of days, etc. was used to reduce number of days until they reach 0.45. This is not clearly stated in the WG report. Also, simulations should be done to verify the validity of the objective and management approach.

In that context, it was observed in the graph showing primary production against LL q for ages 3-6 that catchability went down after 1997 to 2001. In other words, F went down not because effort went down but because catchability went down (and, at the same time, effort-days went up, see Table 2.1.1). Since 2001, q going back up to what it was.

It should be noted that ACFM looking at what kind of advice could be developed under an effort-based framework. This year's ACFM advice does not completely achieve this.

We also need to develop the monitoring, data and analyses in support of an effort management system.

Faroe Bank cod

Catch and effort data are uncertain as fishing trips may concurrent cover fisheries on the bank and on the plateau and the stock assessment is therefore based solely on interpreting trends in survey abundance. For its future assessments the working group may consider using more formalized analytical approaches as e.g. SURBA.

Faroe Haddock

The principal issues are that a proxy is used for current exploitation rate.

F_{bar} for the terminal year is driven by noise at age 7. There might be a sampling problem for smaller age-groups as well. Are there are few otoliths for age 7. This needs to be looked at. There is a concern that the arithmetic average on that data does not reflect fishing mortality for that stock. However, weighted averages have other disadvantages.

The haddock fishery follows year-classes which are strong. Neighboring year-classes are generally low. This is generating spurious Fs for these cells in the F matrix. Accordingly, using models that mimic the behavior of fleet selectivity or PR could offer a solution, perhaps like Camera or AMCI, etc.. This should be considered for the next benchmark assessment.

With respect to the difference between ADAPT and XSA results, it was suggested that shrinkage could explain it (page 113). Alternatively, this could be due to different estimates of abundance for the 1999 year-class or to the way the March 2004 survey was handled in ADAPT. [Was checked and seem to be OK]

Page 76. Unusual to have last two years of the spring survey almost the same for all age groups (except age 0). The survey results were accepted since length distributions by strata and the ALK's used to calculate indices at age are different in the two years. However, the WG needs to check this in details.

A new short term prediction were done, now the selectivity pattern was estimated as the average F in 2001-2003 for ages 3-5, and average F in 2000-2002 for ages 6-7, not rescaled. Input data and results are presented below.

Faroe Saithe

The assessment is calibrated with commercial CPUE data only ("the Cuba trawlers") and a principal issues are the presence of blocks in the XSA residuals and a q-trend that indicates that a technological creep has taken place in the fisheries. The trend has been observed for many years and last year the review group recommended to further investigate the issue. Since then new research (Bjarti Thomsen : Case study on efficiency change in Faroese pair-trawler fleet, ICES-FAO FTFBWG, April 2004) have documented a considerable increase in catch efficiency for the Cuba trawlers including an increase in fishing time per day of 5% and an increase in trawl speed from 3.5 to 4 knots (equivalent to an increase of 14% in swept area) during the late 1990's. The WWG report do not reflect on the recommendation provided by last year review but the WG chairman documented that XSA runs using only commercial CPUE series for the last decade had been conducted and scrutinized by the group. However, the resulting assessment from this XSA run were in essence similar to the final run that used the entire tuning series.

A wrong maturity at age was used in last year's assessment. This was a technical error that has now been corrected (Table attached). A comparison of the wrong maturity at age in that was used in last years assessment with the one used in this years assessment is shown in table 6. The biggest discrepancy is in age 3 and 4 with the values used in last years assessment being substantially higher than the ones used presently. This resulted in a much higher SSB estimation last year compared with this year. Although no calculation was one, it is considered that the error in the SSB estimation last year would not have changed the basis of the advice last year. This judgment is based on the retrospective pattern provided in this years report (figure 2.5.5.3) where it can be seen that the SSB in 2002 is estimated to be above B_{pa} .

The precision of the ADAPT estimates could be used to give a statement on the probability that SSB is below B_{lim} . The group debated the value of doing this. It was suggested that using the uncertainty around the point estimates of ADAPT or any other similar method would be a better way to convey uncertainties and provide an evaluation of the risk of various actions. As such, it is believed that this could have direct value in deriving the advice by capturing the variation in input data, describing the precision of the estimates and providing a way to calculate the probability of F not exceeding F_{pa} .

It was noted that the retrospective errors are small both for XSA and ADAPT.

For the projections, it was agreed that it is better to use the model weights rather than the 3-year average weights. These were compared in a graph and the model based predicted weights appear to have less of a tendency to overestimate when the weights are declining.

It was noted that this reduces SSB by about 10%.

An inconsistency in F_{max} on page 136 (0.3956) and the value appearing on page 116 in the text table (0.441) were different because they were based on different input. Need to take out the values appearing on Page 116. F_{max} calculated for ACFM should be based on long term data.

Also, on the draft Summary sheet, the catch forecast table has to be revised as it doesn't agree with B-Table.

Sebastes marinus

BORMICON. It was observed that the last two years of the survey appear as outliers in the model. The WG should investigate if it could use the October survey in addition to the March survey to do the fit. The October survey would appear to be more consistent with the trends in the BORMICON results.

It was observed that one more year of high survey changes the perspective on the 10 year forecast but not bad for the 2005 forecast.

Last year, a 25% reduction in F was sought by ACFM. But since the survey index is above U_{pa} , is there a need to project at 25% reduction? Applying a *status quo* F would give 41kt. (i.e. no 25% reduction). A catch of 38kt would correspond to 25% reduction in F. Not straight justification to use 25% reduction.

From BORMICON, any catch above 37000 t would lead to a decrease in fishable biomass. Noting that the WG proposed to use this model as a basis for advice, there is agreement that BORMICON is informative and useful for providing advice. However, as there are no reference points based on this new model, the advice will be cast in relation to precautionary limits expressed in U_{pa} and U_{lim} . As this model is now becoming the basis for the advice, the WG should present the results so that the typical output for SSB (or proxy), total biomass, F, etc, is presented in a table. Also, reference points based on BORMICON should be derived.

Catches in the range of 30-35kt (until 2009) lead to constant biomass. It was observed the model did not include a catch of about 2000 t by other countries (or areas as implied from Table 8.1.1). However, this represents a small fraction of catch in the past many years. So the advice will be 37000 t for 2005. This should be clarified in the next assessment.

The WG is encouraged to work on reference points. They should look at limit reference points in relation to targets. Also, F_{max} is in a species like redfish is often seen as a limit as opposed to a target.

Also, information on the fisheries and regulations should be provided. Can something been said on biology, environmental effect, etc., to assist in support the current efforts for reporting by ICES (using the new format) in this area?

Greenland Halibut

It was observed that the XSA is not applicable as the cohorts cannot be traced consistently in catch data. Accordingly, the assessment uses trends in various surveys and CPUE information and a production model (ASPIC) has been the basis for ACFM advice in recent years. The model uses CPUE and survey info for the Iceland area.

The production model trends do not match the dynamics observed in the surveys and the pattern of residuals and retrospective performance are worrisome. Also, this year's model results are very different than those observed in previous years. See page 367, now around twice F_{MSY} . There is a lot of "freedom" in this model. The WG chairman reported that, within the WG, there was no consensus if we should use the results of the production model or not. The fact that ASPCI is now giving completely different results is worrisome. The Review Group concluded that the ASPIC model should not be used as a basis for the advice.

It was noted that the indices went down by a factor of two in recent years. While the present stock is unknown, the indices suggest a low biomass in recent years compared to the 1980s.

The Review Group discussed the basis for advice. With the addition of the data point in 2003, the production model does not follow the trends in the input data in the last decade. There is, however, no doubt that the present state of the stock is poor in relation to that what is was in 1985. Historically, Division Va been the principle fishing ground and it is the area from which the highest yield has been taken (Figure 6.1.1.) and the area from which the longest information about likely population trends are available (Figure 6.2.1). The annual landings in Va of well above 20 thousand tonnes in the period from 1985-1996 were maintained by ever increasing effort (see in text figure below, based on data in table 6.2.1.) Although temporary reduction in effort were observed in the latter part of the 90s, effort has increased in the last three years and is presently within the order of that observed in the earlier part of the period. ACFM proceeded in formulating the advice on the basis of a catch reduction using the following argument:

- Given the likely state of the stock it is proposed that the present effort should be reduced to 1/3 of the present(60), which level led in the late 1990s to stock some recovery. That level of effort (20) also coincides with the lowest observed in the time series (1998) when the landings in Va where around 10 000 t. This would imply a reduction in landings in Division Va by 50% compared with that taken in 2003. Given that the Greenland halibut in the whole area are the same stock, a similar reduction in landings in Division Vb and XIVb is advised. The 2003 landings in those areas were around 10 thousand tonnes. Using this logic, the advice for all areas is a restriction of catches to no more than 15 thousand tonnes.

The figure with cumulative length (6.6.1) is does not well communicate the intended message. It is used in ACFM report but likely not been understood by the users (managers). We have problems to understand it ourselves. It is recommended to make this picture more user friendly.

Cod stocks in the Greenland area

The cod stocks in Greenland has been on a very low level for more than a decade with no directed cod fisheries taken plaice offshore since the early 1990's. Catch at age information from the fisheries are lacking for several years and the assessment is based only on time series from surveys and by-catch CPUE from the fisheries.

Given that few stock indicators are available more effort could have been given for describing the GLM model used for analyzing the commercial catch rates (sec. 5.1.1.1).

The German survey (table 5.1.4) indicates that 96% of the offshore stock weight is comprised of spawners. This proportion appears high considering the age structure of the catches (table 5.1.5 and 5.1.6) and should be scrutinized in next years report.

The inshore gill-net survey indicates an improved recruitment in the northern area (NAFO div. 1B) in the most recent years and most of the recent landings also appear in that area. However, a significant amount of the inshore catch that has been transshipped to foreign vessels has not been allocated to areas. To clarify the development of the inshore stocks on the geographical scale attempts should be made to allocate these landings to NAFO areas.

Editorial:

Fig.6.6.1. The caption should clarify the intent of these graphs as the legends are not self explanatory (use of > and < intended to identify segments of population (index of recruitment vs index of fishable biomass)).

Fig. 6.6.4 . The caption text referencing this figure needs to be corrected.

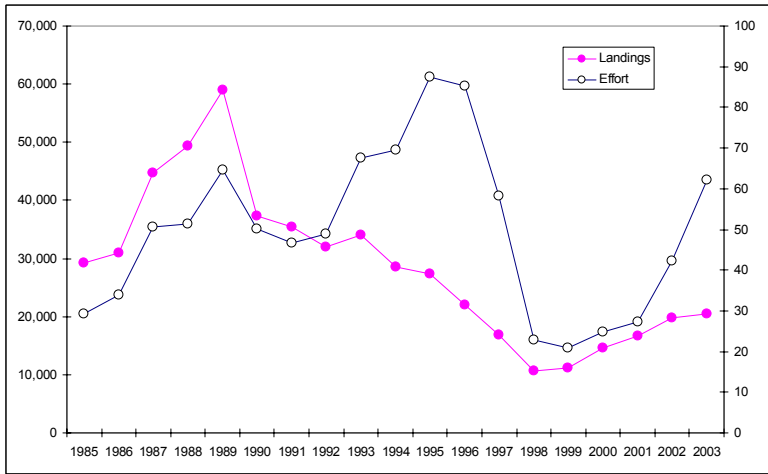


Figure x : Effort and landings in Va

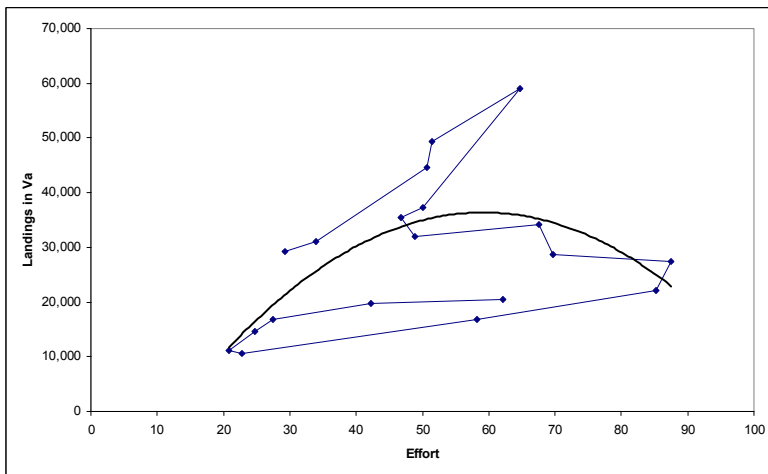


Figure x: Effort and landings in Va

Table 1. Haddock Va. Measured (1985-2004 spring survey) and predicted stock weight

year /age	1	2	3	4	5	6	7	8	9
1979	37	185	481	910	1409	1968	2496	3077	3300
1980	37	185	481	910	1409	1968	2496	3077	3300
1981	37	185	481	910	1409	1968	2496	3077	3300
1982	37	185	481	910	1409	1968	2496	3077	3300
1983	37	185	481	910	1409	1968	2496	3077	3300
1984	37	185	481	910	1409	1968	2496	3077	3300
1985	36	244	568	1187	1673	2371	2766	3197	3331
1986	35	239	671	1134	1943	2399	3190	3293	3728
1987	31	162	550	1216	1825	2605	3030	3642	3837
1988	37	176	457	974	1830	2695	3102	3481	3318
1989	26	182	441	887	1510	2380	3009	3499	3195
1990	29	184	457	840	1234	1965	2675	3052	3267
1991	31	176	501	1003	1406	1884	2496	3755	3653
1992	28	157	503	894	1365	1891	2325	2936	3682
1993	41	168	384	878	1492	1785	2562	2573	3266
1994	33	181	392	680	1235	1766	1717	2977	2131
1995	37	167	440	755	1065	1857	2689	5377	1306
1996	41	174	453	813	1076	1477	2171	2426	4847
1997	50	174	424	817	1221	1425	1915	2390	3692
1998	41	203	415	753	1241	1747	1996	2342	3076
1999	33	206	480	715	1189	1956	2366	2782	2922
2000	29	179	552	889	1159	1767	2612	2917	3132
2001	36	190	490	1056	1437	1509	2169	2765	3300
2002	67	172	475	889	1460	1949	2137	1990	3709
2003	40	230	412	801	1268	1873	3139	2343	3301
2004	34	176	556	807	1282	1690	2454	3236	2942
2005	47	193	447	1020	1233	1760	2298	2874	3383
2006	47	193	447	1020	1233	1760	2298	2874	3383
2007	47	193	447	1020	1233	1760	2298	2874	3383
2008	47	193	447	1020	1233	1760	2298	2874	3383

Table 2. Haddock Va. Measured (1979-2003) and predicted catch weight

Year/age	1	2	3	4	5	6	7	8	9
1979	-1	620	960	1410	2030	2910	3800	4560	4720
1980	-1	837	831	1306	2207	2738	3188	3843	4506
1981	-1	584	693	1081	1656	2283	3214	3409	4046
1982	-1	330	819	1365	1649	2329	3012	3384	3965
1983	-1	655	958	1436	1827	2355	2834	3569	4308
1984	-1	980	1041	1476	2105	2460	3028	3014	3807
1985	-1	599	1002	1783	2201	2727	3431	3783	4070
1986	-1	867	1187	1755	2377	2710	3591	3760	4135
1987	-1	446	1048	1629	2373	2984	3550	4483	4667
1988	-1	468	808	1474	2230	2934	3545	3769	4574
1989	-1	745	856	1170	2010	2879	4109	4035	4706
1990	-1	357	716	1039	1542	2403	3458	4186	4969
1991	-1	409	868	1111	1546	2035	2849	3464	4642
1992	-1	320	856	1253	1597	2088	2529	3133	4022
1993	-1	420	756	1372	1870	2360	2888	2975	3442
1994	-1	568	720	1058	1742	2380	2785	3447	3156
1995	-1	475	874	1145	1366	2079	2853	3251	3899
1996	-1	387	841	1189	1528	1816	2641	3499	3526
1997	-1	450	829	1192	1663	1934	2360	3059	3010
1998	-1	475	702	1108	1646	2222	2478	2839	3359
1999	-1	616	866	1096	1638	2205	2681	2863	3229
2000	-1	517	957	1324	1469	2107	2701	3253	3600
2001	-1	542	933	1451	1759	1836	2309	2966	3533
2002	-1	573	918	1256	1741	2192	2224	2844	3392
2003	-1	559	908	1266	1700	2297	2699	2626	2897
2004	-1	558	882	1292	1688	2197	2755	3113	2876
2005	-1	558	920	1324	1733	2108	2411	2812	3137
2006	-1	558	920	1324	1733	2108	2411	2812	3137
2007	-1	558	920	1324	1733	2108	2411	2812	3137
2008	-1	558	920	1324	1733	2108	2411	2812	3137

Table 3. Haddock Va. Measured and predicted maturity (1985-2004 spring survey) at age

Year/age	1	2	3	4	5	6	7	8	9
1979	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1980	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1981	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1982	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1983	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1984	-1.000	0.080	0.301	0.539	0.722	0.821	0.868	0.904	0.963
1985	-1.000	0.016	0.144	0.536	0.577	0.765	0.766	0.961	0.934
1986	-1.000	0.021	0.205	0.413	0.673	0.845	0.884	0.952	0.986
1987	-1.000	0.022	0.137	0.426	0.535	0.778	0.776	1.000	0.969
1988	-1.000	0.013	0.221	0.394	0.767	0.793	0.928	0.914	1.000
1989	-1.000	0.041	0.202	0.532	0.727	0.818	0.998	1.000	1.000
1990	-1.000	0.114	0.334	0.634	0.814	0.843	0.918	0.882	1.000
1991	-1.000	0.063	0.224	0.592	0.739	0.817	0.894	0.495	1.000
1992	-1.000	0.050	0.227	0.419	0.799	0.901	0.901	0.858	1.000
1993	-1.000	0.124	0.362	0.481	0.670	0.904	0.977	0.908	0.867
1994	-1.000	0.248	0.312	0.573	0.762	0.846	1.000	0.907	1.000
1995	-1.000	0.124	0.479	0.382	0.750	0.753	0.606	0.985	1.000
1996	-1.000	0.191	0.362	0.590	0.648	0.787	0.739	0.949	0.908
1997	-1.000	0.093	0.436	0.587	0.683	0.750	0.783	0.880	1.000
1998	-1.000	0.026	0.454	0.668	0.770	0.733	0.849	0.899	1.000
1999	-1.000	0.050	0.397	0.683	0.724	0.749	0.892	0.761	0.920
2000	-1.000	0.107	0.261	0.632	0.808	0.868	0.873	1.000	0.780
2001	-1.000	0.091	0.377	0.522	0.753	0.895	0.916	0.918	1.000
2002	-1.000	0.047	0.286	0.633	0.800	0.934	0.928	1.000	1.000
2003	-1.000	0.062	0.347	0.685	0.867	0.922	0.946	1.000	1.000
2004	-1.000	0.037	0.361	0.570	0.831	0.910	1.000	1.000	1.000
2005	-1.000	0.049	0.331	0.629	0.833	0.922	0.958	1.000	1.000
2006	-1.000	0.049	0.331	0.629	0.833	0.922	0.958	1.000	1.000
2007	-1.000	0.049	0.331	0.629	0.833	0.922	0.958	1.000	1.000
2008	-1.000	0.049	0.331	0.629	0.833	0.922	0.958	1.000	1.000

Table 4. Estimated (1979-2003) and projected fishing mortality by age and year (F_y) from ADCAM. Projection is based on assumed catch constraint in 2004 and F=0.47 in 2005-2008.

Year/age	1	2	3	4	5	6	7	8	9	F4-7
1979	-1.00	0.00	0.02	0.17	0.42	0.69	0.86	0.86	0.86	0.54
1980	-1.00	0.01	0.02	0.13	0.31	0.57	0.75	0.87	0.87	0.44
1981	-1.00	0.00	0.02	0.12	0.33	0.70	0.80	0.89	0.89	0.49
1982	-1.00	0.00	0.03	0.15	0.35	0.54	0.79	0.92	0.92	0.46
1983	-1.00	0.00	0.03	0.26	0.37	0.66	0.68	0.92	0.92	0.49
1984	-1.00	0.00	0.04	0.24	0.43	0.72	0.64	0.92	0.92	0.51
1985	-1.00	0.01	0.12	0.33	0.49	0.75	0.69	0.96	0.96	0.56
1986	-1.00	0.00	0.13	0.44	0.64	0.96	0.79	0.98	0.98	0.71
1987	-1.00	0.01	0.12	0.40	0.68	0.78	0.78	0.99	0.99	0.66
1988	-1.00	0.00	0.09	0.39	0.64	0.82	0.81	1.00	1.00	0.66
1989	-1.00	0.00	0.09	0.30	0.48	0.90	0.84	1.02	1.02	0.63
1990	-1.00	0.02	0.13	0.35	0.54	0.73	0.83	1.02	1.02	0.61
1991	-1.00	0.03	0.09	0.35	0.59	0.74	0.82	1.02	1.02	0.63
1992	-1.00	0.02	0.13	0.40	0.68	0.84	0.87	1.03	1.03	0.70
1993	-1.00	0.01	0.10	0.37	0.65	0.80	0.94	1.03	1.03	0.69
1994	-1.00	0.01	0.12	0.34	0.64	0.80	0.96	1.05	1.05	0.69
1995	-1.00	0.03	0.21	0.34	0.59	0.82	0.95	1.08	1.08	0.68
1996	-1.00	0.04	0.20	0.46	0.52	0.83	0.98	1.10	1.10	0.70
1997	-1.00	0.02	0.16	0.42	0.64	0.66	0.91	1.09	1.09	0.66
1998	-1.00	0.02	0.12	0.44	0.63	0.80	0.86	1.09	1.09	0.68
1999	-1.00	0.02	0.14	0.39	0.75	0.89	0.91	1.08	1.08	0.73
2000	-1.00	0.02	0.20	0.36	0.62	0.86	0.98	1.08	1.08	0.70
2001	-1.00	0.02	0.14	0.35	0.43	0.69	0.95	1.08	1.08	0.61
2002	-1.00	0.01	0.10	0.30	0.47	0.57	0.88	1.09	1.09	0.55
2003	-1.00	0.01	0.05	0.23	0.42	0.53	0.93	1.12	1.12	0.53
2004	-1.00	0.01	0.09	0.23	0.38	0.50	0.65	0.77	0.77	0.44
2005	-1.00	0.01	0.10	0.25	0.40	0.53	0.70	0.82	0.82	0.47
2006	-1.00	0.01	0.10	0.25	0.40	0.53	0.70	0.82	0.82	0.47
2007	-1.00	0.01	0.10	0.25	0.40	0.53	0.70	0.82	0.82	0.47
2008	-1.00	0.01	0.10	0.25	0.40	0.53	0.70	0.82	0.82	0.47

Table 5. Haddock Va. Estimated and projected population numbers by age and year (Nay) and SSB from ADCAM. Year classes 2004-2007 are assumed geometric mean.

Year/age	1	2	3	4	5	6	7	8	9	SSB
1979	45251	78996	120120	26732	20080	21202	3215	772	116	95.835
1980	11825	37049	64431	96176	18397	10767	8703	1110	267	115.951
1981	51628	9681	29913	51539	68902	11024	4963	3368	380	138.987
1982	36974	42269	7899	23978	37424	40740	4474	1818	1135	135.784
1983	22947	30272	34549	6249	16961	21680	19384	1657	596	109.297
1984	51774	18788	24749	27582	3948	9631	9159	8072	540	80.977
1985	106859	42389	15327	19511	17821	2107	3835	3941	2636	63.293
1986	203059	87489	34388	11135	11484	8943	819	1569	1239	55.314
1987	53765	166250	71392	24743	5868	4950	2795	304	483	44.026
1988	30446	44019	134412	52063	13517	2427	1867	1053	93	66.846
1989	28664	24927	35892	100632	28996	5844	877	680	316	100.099
1990	98677	23468	20312	26974	60808	14705	1943	309	201	109.655
1991	204358	80790	18845	14543	15612	28953	5783	693	92	86.960
1992	44020	167314	64068	14127	8408	7069	11331	2077	204	64.854
1993	48130	36041	134561	45998	7721	3483	2501	3891	608	69.291
1994	86279	39406	29284	99478	25910	3290	1277	796	1134	80.171
1995	43897	70639	31975	21203	57844	11131	1213	399	229	80.473
1996	119567	35940	55879	21288	12323	26266	4001	384	111	67.483
1997	18865	97893	28395	37409	10996	5980	9394	1226	105	57.387
1998	58957	15446	78843	19786	20208	4730	2528	3102	337	62.109
1999	145061	48270	12447	57050	10453	8800	1744	874	854	60.445
2000	180817	118766	38582	8838	31562	4050	2969	576	242	57.608
2001	200936	148040	95131	25987	5054	13894	1400	915	159	64.320
2002	59910	164513	119214	67783	15000	2696	5701	443	255	91.229
2003	226536	49051	133756	88149	41044	7684	1247	1943	121	135.236
2004	474229	185472	39906	103650	57411	22054	3693	403	518	163.867
2005	71118	388266	150232	29873	67412	32179	10952	1573	153	195.669
2006	71118	58227	314271	111793	19134	36846	15458	4465	567	246.998
2007	71118	58227	47130	233861	71606	10458	17700	6302	1610	310.604
2008	71118	58227	47130	35071	149792	39138	5024	7216	2272	286.869

Table 6. Haddock Va. Estimated catch at age (1979-2003) and projected catch at age based on catch constraint in 2004 and F=0.47 in 2005-2008.

Year/age	1	2	3	4	5	6	7	8	9	Yield
1979	-1	271	2403	3874	6325	9692	1709	410	62	57.633
1980	-1	465	1343	10918	4493	4305	4211	594	143	53.817
1981	-1	31	567	5294	17443	5097	2519	1823	206	61.796
1982	-1	64	242	2964	9976	15606	2250	1004	626	69.717
1983	-1	39	780	1298	4740	9615	8730	918	330	63.380
1984	-1	61	833	5292	1255	4537	3980	4464	299	49.181
1985	-1	351	1569	4997	6303	1016	1759	2235	1495	47.905
1986	-1	263	3784	3622	4981	5090	411	902	713	44.526
1987	-1	1884	7085	7513	2662	2451	1385	176	279	41.142
1988	-1	164	10439	15185	5843	1245	952	615	54	53.516
1989	-1	107	2673	24012	10082	3193	459	400	186	64.296
1990	-1	409	2315	7206	23270	7009	1007	181	118	66.847
1991	-1	2301	1443	3896	6387	13865	2983	409	54	54.775
1992	-1	2685	7163	4286	3807	3689	6048	1230	121	45.778
1993	-1	247	11855	13088	3392	1766	1407	2309	361	49.707
1994	-1	319	3076	26277	11281	1661	727	477	679	59.611
1995	-1	2166	5433	5608	23578	5736	685	243	140	59.620
1996	-1	1142	9264	7176	4588	13591	2306	236	68	55.611
1997	-1	1445	3842	11615	4780	2650	5156	751	64	45.415
1998	-1	220	8322	6408	8664	2388	1343	1900	206	42.028
1999	-1	1039	1501	16876	5052	4757	957	534	521	44.979
2000	-1	2332	6221	2430	13362	2151	1705	352	148	40.819
2001	-1	2205	11211	6989	1607	6353	791	557	97	40.108
2002	-1	1036	10484	16080	5128	1073	3060	272	156	49.802
2003	-1	280	6493	16402	12875	2901	694	1210	76	60.638
2004	-1	1793	3104	19391	16515	7930	1624	199	255	79.917
2005	-1	4001	12426	5918	20446	12159	5041	809	79	97.239
2006	-1	600	25993	22145	5803	13923	7115	2296	291	117.501
2007	-1	600	3898	46326	21718	3952	8147	3240	828	142.575
2008	-1	600	3898	6947	45432	14789	2313	3710	1168	142.701

Table 2.4.14 (revised)

Faroe haddock. Management option table - Input data

MFDP version 1

Run: man

Time and date: 23:50 5/2/04

Fbar age range: 3-7

2004									
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	
2	40167	0.2	0	0	0	0.571	0.0320	0.571	
3	16102	0.2	0.31	0	0	0.783	0.1784	0.783	
4	23883	0.2	0.96	0	0	0.928	0.3489	0.928	
5	33908	0.2	0.99	0	0	1.296	0.3532	1.296	
6	4333	0.2	1	0	0	1.834	0.3386	1.834	
7	974	0.2	1	0	0	2.078	0.2703	2.078	
8	91	0.2	1	0	0	2.226	0.3797	2.226	
9	282	0.2	1	0	0	2.365	0.3565	2.365	
10	2240	0.2	1	0	0	2.792	0.3565	2.792	

2005									
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	
2	14600	0.2	0.05	0	0	0.571	0.0320	0.571	
3		0.2	0.42	0	0	0.783	0.1784	0.783	
4		0.2	0.97	0	0	1.015	0.3489	1.015	
5		0.2	0.99	0	0	1.192	0.3532	1.192	
6		0.2	1	0	0	1.546	0.3386	1.546	
7		0.2	1	0	0	1.994	0.2703	1.994	
8		0.2	1	0	0	2.212	0.3797	2.212	
9		0.2	1	0	0	2.288	0.3565	2.288	
10		0.2	1	0	0	2.792	0.3565	2.792	

2006									
Age	N	M	Mat	PF	PM	SWt	Sel	CWt	
2	14500	0.2	0.05	0	0	0.571	0.0320	0.571	
3		0.2	0.42	0	0	0.783	0.1784	0.783	
4		0.2	0.97	0	0	1.015	0.3489	1.015	
5		0.2	0.99	0	0	1.305	0.3532	1.305	
6		0.2	1	0	0	1.423	0.3386	1.423	
7		0.2	1	0	0	1.681	0.2703	1.681	
8		0.2	1	0	0	2.123	0.3797	2.123	
9		0.2	1	0	0	2.273	0.3565	2.273	
10		0.2	1	0	0	2.792	0.3565	2.792	

Input units are thousands and kg - output in tonnes

Table 2.4.15 (revised)

Faroe haddock. Management option table - Results

MFDP version 1

Run: jak

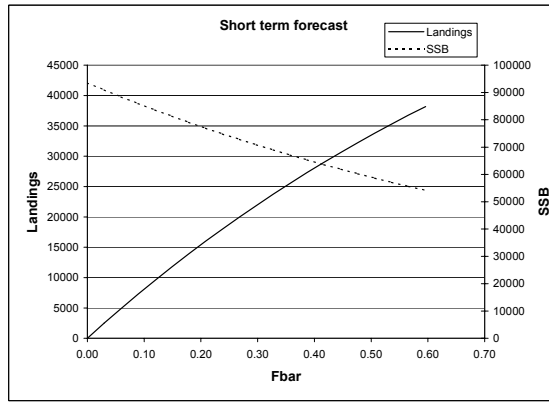
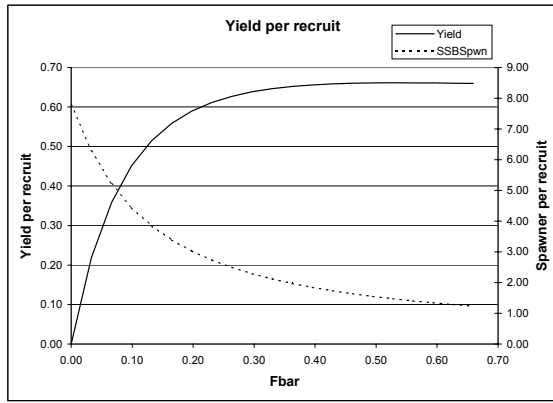
Index file 02/05/2004

Time and date: 12:17 5/31/04

Fbar age range: 3-7

2004						
Biomass	SSB	FMult	FBar	Landings		
118746	85785	1	0.2979	24869		
2005					2006	
Biomass	SSB	FMult	FBar	Landings	Biomass	SSB
104467	79921	0	0	0	107748	93542
.	79921	0.1	0.0298	2499	105116	90945
.	79921	0.2	0.0596	4924	102563	88428
.	79921	0.3	0.0894	7277	100089	85988
.	79921	0.4	0.1192	9560	97689	83622
.	79921	0.5	0.1489	11775	95362	81329
.	79921	0.6	0.1787	13926	93106	79106
.	79921	0.7	0.2085	16012	90918	76951
.	79921	0.8	0.2383	18038	88796	74862
.	79921	0.9	0.2681	20004	86738	72836
.	79921	1	0.2979	21913	84741	70871
.	79921	1.1	0.3277	23766	82805	68966
.	79921	1.2	0.3575	25564	80926	67119
.	79921	1.3	0.3873	27311	79104	65327
.	79921	1.4	0.417	29007	77336	63589
.	79921	1.5	0.4468	30654	75621	61904
.	79921	1.6	0.4766	32253	73956	60269
.	79921	1.7	0.5064	33807	72341	58684
.	79921	1.8	0.5362	35316	70774	57146
.	79921	1.9	0.566	36781	69253	55653
.	79921	2	0.5958	38205	67777	54206

Input units are thousands and kg - output in tonnes



MFYPR version 1
 Run: ypr-final
 Time and date: 10:36 5/3/04

Reference point	F multiplier	Absolute F
Fbar(2-10)	1.0000	0.3296
FMax	1.6306	0.5375
F0.1	0.5845	0.1927
F35%SPR	0.7018	0.2313
Flow	3.0562	1.0075
Fmed	0.7302	0.2407
Fhigh	3.0562	1.0075

Weights in kilograms

MFDP version 1
 Run: jak
 Index file 02/05/2004
 Time and date: 12:17 5/31/04
 Fbar age range: 3-7

Input units are thousands and kg - output in tonnes

Faroe haddock predictions (revised May 2004)

Table 7. Saithe in Vb. Comparison between the maturity at age used in the 2003 assessment (left) and 2004 assessment (right).

Year/age	3	4	5	6	7	8	9	Year/age	3	4	5	6	7	8	9
1983	0.10	0.28	0.61	0.88	0.96	0.99	1.00	1983	0.02	0.23	0.74	0.94	0.97	1.00	1.00
1984	0.12	0.28	0.51	0.86	0.97	0.99	1.00	1984	0.03	0.25	0.57	0.93	0.98	1.00	1.00
1985	0.11	0.28	0.62	0.83	0.97	1.00	1.00	1985	0.03	0.25	0.75	0.89	0.99	1.00	1.00
1986	0.15	0.28	0.55	0.80	0.94	0.99	1.00	1986	0.05	0.23	0.64	0.86	0.94	0.99	1.00
1987	0.13	0.27	0.50	0.78	0.93	0.98	0.99	1987	0.04	0.24	0.56	0.83	0.94	0.99	0.99
1988	0.12	0.28	0.44	0.75	0.92	0.97	0.99	1988	0.04	0.26	0.49	0.78	0.91	0.97	0.99
1989	0.11	0.25	0.42	0.68	0.92	0.98	0.99	1989	0.03	0.20	0.45	0.69	0.91	0.98	1.00
1990	0.10	0.23	0.41	0.62	0.85	0.97	0.99	1990	0.02	0.17	0.42	0.58	0.80	0.97	0.99
1991	0.10	0.22	0.41	0.64	0.83	0.94	0.99	1991	0.02	0.15	0.40	0.62	0.73	0.92	0.99
1992	0.10	0.22	0.44	0.69	0.87	0.97	0.99	1992	0.02	0.16	0.45	0.69	0.82	0.96	0.99
1993	0.11	0.26	0.49	0.77	0.91	0.97	0.99	1993	0.03	0.20	0.54	0.82	0.91	0.97	0.99
1994	0.12	0.27	0.48	0.75	0.94	0.98	0.99	1994	0.03	0.22	0.52	0.78	0.95	0.99	1.00
1995	0.12	0.30	0.51	0.74	0.91	0.98	0.99	1995	0.03	0.27	0.57	0.77	0.90	0.99	0.99
1996	0.11	0.26	0.52	0.79	0.91	0.98	1.00	1996	0.03	0.23	0.58	0.84	0.90	0.99	1.00
1997	0.12	0.25	0.44	0.72	0.90	0.98	1.00	1997	0.03	0.19	0.47	0.74	0.89	0.98	1.00
1998	0.11	0.26	0.51	0.75	0.91	0.98	0.99	1998	0.03	0.19	0.42	0.67	0.84	0.96	0.99
1999	0.11	0.27	0.51	0.78	0.93	0.98	1.00	1999	0.04	0.17	0.42	0.64	0.77	0.96	0.99
2000	0.11	0.24	0.41	0.67	0.84	0.97	0.99	2000	0.04	0.21	0.44	0.65	0.78	0.92	0.99
2001	0.12	0.22	0.44	0.65	0.86	0.94	0.99	2001	0.04	0.19	0.46	0.68	0.81	0.94	0.98
2002	0.11	0.22	0.39	0.69	0.86	0.96	0.98	2002	0.02	0.18	0.39	0.60	0.80	0.92	0.98
								2003	0.02	0.11	0.41	0.58	0.74	0.95	0.99
Average	0.114	0.257	0.481	0.742	0.907	0.975	0.993	Average	0.03	0.20	0.51	0.74	0.87	0.97	0.99

Table 1. Saithe in Va. Summary table based on catch weights and maturity.

Year	RECRUITS	BIO4+	TOTSPBIO	Landings	Yield/SSB	FBAR 4-9
1962	30	187	101	50	0.50	0.288
1963	77	205	107	48	0.45	0.351
1964	54	289	114	60	0.53	0.269
1965	84	360	150	60	0.40	0.249
1966	68	471	212	52	0.25	0.199
1967	67	560	280	76	0.27	0.258
1968	63	604	336	78	0.23	0.230
1969	88	632	374	116	0.31	0.268
1970	64	668	384	113	0.29	0.319
1971	52	642	370	134	0.36	0.429
1972	27	553	327	108	0.33	0.378
1973	18	461	296	111	0.38	0.336
1974	21	383	278	98	0.35	0.310
1975	26	317	236	88	0.37	0.320
1976	30	269	190	82	0.43	0.357
1977	20	237	149	62	0.42	0.302
1978	44	220	137	50	0.36	0.323
1979	54	240	132	64	0.48	0.370
1980	27	268	146	58	0.40	0.332
1981	19	261	149	59	0.40	0.333
1982	23	245	156	69	0.44	0.370
1983	31	227	154	58	0.38	0.228
1984	42	258	170	63	0.37	0.319
1985	34	278	162	57	0.35	0.285
1986	65	298	177	65	0.37	0.320
1987	94	314	169	81	0.48	0.391
1988	50	397	163	77	0.47	0.319
1989	31	384	169	82	0.49	0.311
1990	21	367	183	98	0.54	0.336
1991	31	299	178	102	0.57	0.305
1992	15	281	182	80	0.44	0.323
1993	19	238	169	72	0.42	0.386
1994	17	192	144	64	0.45	0.504
1995	33	147	108	49	0.45	0.419
1996	26	151	99	40	0.41	0.405
1997	17	157	97	37	0.38	0.367
1998	8	155	99	32	0.32	0.373
1999	28	125	92	31	0.34	0.337
2000	32	132	90	33	0.37	0.353
2001	46	154	96	32	0.33	0.315
2002	56	199	111	42	0.38	0.334
2003	99	250	125	52	0.42	0.317
2004	9	365	140			

Table 2. Saithe in Va. Short term prediction input data with catch weights and maturity - 'old SSB'.

Mean weight in the catches:

age/year	2004	2005	2006	2007	2008
3	1.370	1.370	1.370	1.370	1.370
4	1.896	2.020	1.929	1.929	1.929
5	2.550	2.503	2.972	2.972	2.972
6	3.334	3.329	3.225	3.225	3.225
7	4.398	4.306	4.258	4.258	4.258
8	5.411	5.571	5.472	5.472	5.472
9	6.800	6.800	6.800	6.800	6.800
10	7.730	7.730	7.730	7.730	7.730
11	8.780	8.780	8.780	8.780	8.780
12	9.740	9.740	9.740	9.740	9.740
13	10.790	10.790	10.790	10.790	10.790
14	11.490	11.490	11.490	11.490	11.490

Mean weight at spawning time:

age/year	2004	2005	2006	2007	2008
3	1.370	1.370	1.370	1.370	1.370
4	1.896	2.020	1.929	1.929	1.929
5	2.550	2.503	2.972	2.972	2.972
6	3.334	3.329	3.225	3.225	3.225
7	4.398	4.306	4.258	4.258	4.258
8	5.411	5.571	5.472	5.472	5.472
9	6.800	6.800	6.800	6.800	6.800
10	7.730	7.730	7.730	7.730	7.730
11	8.780	8.780	8.780	8.780	8.780
12	9.740	9.740	9.740	9.740	9.740
13	10.790	10.790	10.790	10.790	10.790
14	11.490	11.490	11.490	11.490	11.490

Sexual maturity:

age/year	2004	2005	2006	2007	2008
3	0.04	0.04	0.04	0.04	0.04
4	0.20	0.20	0.20	0.20	0.20
5	0.41	0.41	0.41	0.41	0.41
6	0.64	0.64	0.64	0.64	0.64
7	0.81	0.81	0.81	0.81	0.81
8	0.93	0.93	0.93	0.93	0.93
9	0.96	0.96	0.96	0.96	0.96
10	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00
13	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00

Table 2 (continued). Saithe in Va. Short term prediction input data with catch weights and maturity - 'old SSB'.

Natural mortality (M):

age/year	2004	2005	2006	2007	2008
3	0.2	0.2	0.2	0.2	0.2
4	0.2	0.2	0.2	0.2	0.2
5	0.2	0.2	0.2	0.2	0.2
6	0.2	0.2	0.2	0.2	0.2
7	0.2	0.2	0.2	0.2	0.2
8	0.2	0.2	0.2	0.2	0.2
9	0.2	0.2	0.2	0.2	0.2
10	0.2	0.2	0.2	0.2	0.2
11	0.2	0.2	0.2	0.2	0.2
12	0.2	0.2	0.2	0.2	0.2
13	0.2	0.2	0.2	0.2	0.2
14	0.2	0.2	0.2	0.2	0.2

Selection pattern:

age/year	2004	2005	2006	2007	2008
3	0.022	0.022	0.022	0.022	0.022
4	0.105	0.105	0.105	0.105	0.105
5	0.201	0.201	0.201	0.201	0.201
6	0.291	0.291	0.291	0.291	0.291
7	0.374	0.374	0.374	0.374	0.374
8	0.466	0.466	0.466	0.466	0.466
9	0.466	0.466	0.466	0.466	0.466
10	0.466	0.466	0.466	0.466	0.466
11	0.466	0.466	0.466	0.466	0.466
12	0.466	0.466	0.466	0.466	0.466
13	0.466	0.466	0.466	0.466	0.466
14	0.466	0.466	0.466	0.466	0.466
F4-9	0.317	0.317	0.317	0.317	0.317

Stock in numbers in starting year (millions):

age/year	2004	Recruitment=	30.000
3	9.01445		
4	79.5898		
5	33.2701		
6	18.0873		
7	7.69142		
8	3.72209		
9	0.530578		
10	0.547548		
11	0.415498		
12	0.248813		
13	0.0603699		
14	0.0294727		
Total=	153.207		

F-factor: F04=Fsq, F05 and onwards are Fsq factors in relation to Fpa

	2004	2005	2006	2007	2008	Fsq/Fpa
Opt1	1	0.09	0.09	0.09	0.09	0.10
Opt2	1	0.23	0.23	0.23	0.23	0.25
Opt3	1	0.47	0.47	0.47	0.47	0.50
Opt4	1	0.70	0.70	0.70	0.70	0.74
Opt5	1	0.84	0.84	0.84	0.84	0.89
Opt6	1	0.94	0.94	0.94	0.94	0.99
Opt7	1	1.03	1.03	1.03	1.03	1.09
Opt8	1	1.17	1.17	1.17	1.17	1.24
Opt9	1	1.41	1.41	1.41	1.41	1.49
Opt10	1	0.00	0.00	0.00	0.00	0.00

Table 3. Saithe in Va. Short term prediction with catch weights and maturity - 'old SSB'.

Icelandic SAITHE. Division Va.

**Projection of stock and spawning stock biomass (thousand tonnes)
in 2005-2007 for different management strategies.**

2004				2005					2006	
Stofn 4+	Hrygn- stofn	F	Afli	Stofn 4+	Hrygn- stofn	F/Fpa	F	Afli	Stofn 4+	Hrygn- stofn
<i>Stock</i>	<i>Spawnin</i> <i>g</i> <i>stock</i>		<i>Catch</i>	<i>Stock</i>	<i>Spawn.</i> <i>stock</i>			<i>Catch</i>	<i>Stock</i>	<i>Spawn.</i> <i>stock</i>
365	165	0.32	63	329	194	0.10	0.03	8	382	262
				329	193	0.25	0.07	19	369	252
				329	194	0.50	0.15	37	349	236
										221
				329	194	0.90	0.27	63	320	213
				329	194	1.00	0.30	69	313	208
				329	194	1.10	0.33	74	306	202
				329	194	1.35	0.37	83	297	195
				329	194	1.50	0.45	96	281	183
				329	194	0.00	0.00	0	391	269