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North Sea and Kattegat scoping for mixed fisheries (STECF-12-04)

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This report was reviewed by the STECF during its' 39th plenary meeting held from 16 to 20 April 2012 in Brussels, Belgium

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

NORTH SEA AND KATTEGAT SCOPING FOR MIXED FISHERIES (STECF-12-04)

THIS REPORT WAS REVIEWED DURING ITS' 39TH PLENARY MEETING HELD FROM 16 TO 20 APRIL 2012 IN BRUSSELS, BELGIUM

Request to the STECF

STECF is requested to review the report of the **EWG-12-02** held from March 26 – 30, 2012 in Rostock, evaluate the findings and make any appropriate comments and recommendations.

Introduction

The report of the Expert Working Group on North Sea and Kattegat Scoping For Mixed Fisheries (Stecf-12-XX) was reviewed by the STECF during its 39th plenary meeting held from 16 to 20 April 2012 in Rostock, Germany. The following observations, conclusions and recommendations represent the outcomes of that review.

STECF observation

This report forms the basis of work towards Impact Assessments which will be dealt with by STECF at later plenaries in 2012, as such it does not constitute final work that can form the basis of an STECF opinion

STECF conclusions

STECF draws no specific conclusions from this report as it describes work in progress

STECF recommendations

STECF makes no specific recommendations from this report as it describes work in progress

REPORT TO THE STECF

EXPERT WORKING GROUP ON NORTH SEA AND KATTEGAT SCOPING FOR MIXED FISHERIES (EWG-12-02)

Rostock Germany 26-30 March 2012

This report does not necessarily reflect the view of the STECF and the European Commission and in no way anticipates the Commission's future policy in this area

1 EXECUTIVE SUMMARY

A meeting was held 26 to 30 March in Rostock, Germany for preparation of Impact Assessments for multispecies management plans for the Baltic and review progress and the requirements to provide Impact Assessments on mixed fisheries plans for North Sea and Kattegat. This report records preliminary discussion and scoping the work for giving medium term Impact Assessments for the mixed fisheries in North Sea and Kattegat.

The state of stocks and exploitation rates were evaluated, for NS most stocks except NS cod are near to exploitation at Fmsy. Mixed fisheries considerations for NS therefore relate only to exploitation of cod. Work needs for NS include the influence of multi-species considerations and changes in M. Development of mixed fisheries advice in the short term is available for NS. Development of mixed fisheries advice for the NS in the medium term is not possible by June.

For Kattegat fisheries are dominated by single species fisheries with minor bycatch. Although some Kattegat cod are caught the amounts are below the current TACs Work needs for the Kattegat are dominated by need to give catch advice for cod in the absence of an agreed assessment.

There is an urgent need for development of integrated bioeconomic models.

2 CONCLUSIONS OF THE WORKING GROUP

The main conclusions for the session on mixed fish work for NS and Kat are:-

- For NS most stocks except NS cod are near to exploitation at Fmsy
- Mixed fisheries considerations for NS therefore relate only to exploitation of cod
- Work needs for NS include the influence of multi-species considerations and changes in M.
- Development of mixed fisheries advice in the short term is available for NS.
- Development of mixed fisheries advice for the NS in the medium term is not possible by June.
- For Kattegat fisheries are dominated by single species fisheries with minor bycatch.
- Although some Kattegat cod are caught the amounts are below the current TACs
- Work for the Kattegat is dominated by need to give catch advice for cod in the absence of an agreed assessment.
- There is an urgent need for development of integrated bioeconomic models.

3 RECOMMENDATIONS OF THE WORKING GROUP

Discussion should be held with the Commission regarding ToR for June meeting.

4 INTRODUCTION

This report records preliminary discussion and scoping the work for giving medium term Impact Assessments for the mixed fisheries in North Sea and Kattegat.

4.1 Terms of Reference for EWG-12-02

Hold a meeting 26 to 30 March in Rostock, Germany for preparation of Impact Assessments for multispecies management plans for the Baltic and review progress and the requirements to provide Impact Assessments on mixed fisheries plans for North Sea and Kattegat.

b) Mixed fisheries plans for North Sea and Kattegat, including cod, haddock, whiting, saithe, plaice, sole, Nephrops,

- Describe and, where possible, quantify technical linkages between stocks in the area.
- Describe single species approaches and targets currently in force and consider if these need to be modified
- Identify and discuss approaches to incorporating the technical linkages into multi-annual management plans, and into MSY objectives for those plans.
- Consider how other objectives, relating to ecological and economic sustainability could be addressed within a management plan, and how progress towards these objectives might be evaluated.
- Identify candidate management measures that could contribute to the delivery of the objectives of the plan.
- Comment on the suitability of existing management measures for achieving MSY targets and where necessary suggest additional or alternative measures.

ToR a) dealing with multispecies in Baltic is dealt with in STECF EWG 12-XX.

4.2 Participants

The full list of participants at EWG-12-02 is presented in section 9.

5 STATUS OF STOCKS - WITH RESPECT TO MSY TARGET AND RELATIVE TO ICES PROGRESS TO MSY

5.1 Status of North Sea stocks

The stocks taken into account in the mixed fisheries evaluation in the North Sea are:

- **Cod IIIa –IV-VIId**
- **Haddock IIIa-IV**
- **Whiting IV-VIId**
- **Saithe IIIa-IV-VI**
- **Plaice IV**
- **Sole IV**
- **Farn Deeps *Nephrops***
- **Fladen *Nephrops***
- **Firth of Forth *Nephrops***
- **Moray Firth *Nephrops***

Using information from ICES (2011B) and their clarification legend below, the stock status for the finfish are summarised in Figure 5.1.1 and Table 5.1.1, and for Nephrops in Figure 5.1.2 and Table 5.1.2.

	Undesired situation		Trend
	In-between situation		Trend
	Desired situation		Trend
	Unknown situation		

Cod IIIa –IV-VIId

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	✖	✖	✖	Above target
Precautionary approach (F_{pa},F_{lim})	O	O	O	Incresead risk
Management plan (F_{MP})	✖	✖	✖	Above target

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✖	✖	✖	Below trigger
Precautionary approach (B_{pa},B_{lim})	✖	✖	✖	Reduced reproductive capacity
Management plan (SSB_{MP})	✖	✖	✖	Below trigger

Haddock IIIa-IV

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	✔	✔	✔	Appropriate
Precautionary approach (F_{pa},F_{lim})	✔	✔	✔	Harvested sustainably
Management plan (F_{MP})	✔	✔	✔	Below target

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✔	✔	✔	Above trigger
Precautionary approach (B_{pa},B_{lim})	✔	✔	✔	Full reproductive capacity
Management plan (SSB_{MP})	✔	✔	✔	Above target

Whiting IV-VIId

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	?	?	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	?	?	Unknown
Qualitative evaluation	→	→	→	Stable

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	?	?	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	?	?	Unknown
Qualitative evaluation	↗	↗	↗	At recent average

Saithe IIIa-IV-VI

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	✖	✖	✖	Above target
Precautionary approach (F_{pa},F_{lim})	✔	O	✔	Harvested sustainably
Management plan (F_{MP})	✖	✖	✖	Above target

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✔	✔	✖	Below trigger
Precautionary approach (B_{pa},B_{lim})	✔	✔	O	Increased risk
Management plan (SSB_{MP})	✔	✔	✖	Below trigger

Plaice IV

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	✔	✔	✔	Appropriate
Precautionary approach (F_{pa},F_{lim})	✔	✔	✔	Harvested sustainably
Management plan (F_{MP})	✔	✔	✔	Below target

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✔	✔	✔	Above trigger
Precautionary approach (B_{pa},B_{lim})	✔	✔	✔	Full reproductive capacity
Management plan (SSB_{MP})	✔	✔	✔	Above target

Sole IV

F (Fishing Mortality)				
	2008	2009	2010	
MSY (Fmsy)	✖	✖	✖	Above target
Precautionary approach (F_{pa},F_{lim})	✔	✔	✔	Harvested sustainably
Management plan (F_{MP})	✔	✔	✔	Below target

SSB (Spawning-Stock Biomass)				
	2009	2010	2011	
MSY ($B_{trigger}$)	✖	✔	✔	Above trigger
Precautionary approach (B_{pa},B_{lim})	O	✔	✔	Full reproductive capacity
Management plan (SSB_{MP})	✖	✔	✔	Above target

Figure 5.1.1 – Stock status for the North Sea finfish stocks assessed by ICES (2011B)

Table 5.1.1 – Summary of stock status for the North Sea finfish stocks assessed by ICES (2011B)

Summary	**F(2010)**	**F(2012) MP Advice**	**Fmsy or Target**	**SSB 2012 (‘000 t)**	**SSB 2013 (‘000 t)**	**SSB Trigger (‘000 t)**
Cod IIIa-IV-VIId	0.676	0.32	0.4 (MP) 0.19 (Fmsy)	67	107	150
Haddock IIIa-IV	0.233	0.29	0.3	256	230	140
Whiting IV-VIId	0.272	0.23	0.3 (MP)	200	211	n/a
Saithe IIIa-IV-VI	0.383	0.32	0.3	166	183	200
Plaice IV	0.240	0.29	0.3 (stage 2)	556	558	230
Sole IV	0.339	0.31	0.2 (stage 2)	46	46	35

Table 5.1.2 – Stock status for the North Sea nephrops stocks assessed by ICES (2011B)

Farn Deep *Nephrops*

Basis	Harvest rate	Landings (tonnes)
	2.0%	330
	4.0%	670
	6.0%	1000
	7.0%	1200
F_{MSY}	8.0%	1300
MSY transition	8.2%	1400
F_{2011}	10.7%	1800
	11.5%	1900
	12.1%	2000
	12.7%	2100
	14.0%	2300
	16.0%	2700

Fladen *Nephrops*

Basis	Harvest rate	Landings (tonnes)
	5.0%	6800
	8.0%	11000
	9.0%	12300
F_{2011}	9.8%	13400
	10.0%	13700
MSY framework	10.3%	14100
	12.4%	17000
	15.0%	20500
	18.5%	25300
	20.0%	27400

Firth of Forth *Nephrops*

Basis	Harvest rate	Landings (tonnes)
	5.0%	500
	9.4%	900
	10.0%	1000
	12.7%	1200
MSY framework	16.3%	1600
MSY transition	17.5%	1700
	20.0%	1900
F_{2011}	21.8%	2100

Moray Firth *Nephrops*

Basis	Harvest rate	Landings (tonnes)
	5.0%	500
	7.8%	700
	10.0%	900
F_{2011}	11.2%	1000
MSY framework	11.8%	1100
	15.0%	1400
	14.9%	1400
	20.0%	1800

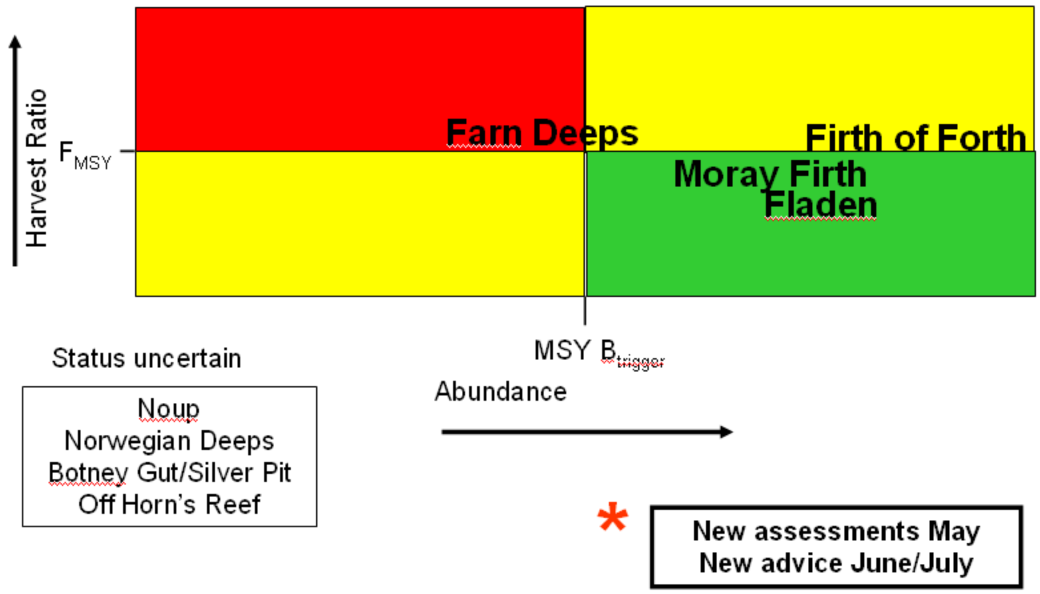

Figure 5.1.2 – Summary of stock status for the North Sea nephrops stocks assessed by ICES (2011B)

5.2 Status of Kattegat stocks

The stocks

In the Kattegat, the assessment used for advice on Kattegat cod suffers from uncertainty in the fishing mortality. This uncertainty is caused by uncertain estimates of unallocated removals (UR). As concluded by the benchmark assessment in 2009 (ICES 2009), the results from runs with and without estimating unallocated removals should both be considered as final assessments (ICES ICES 2011A). This is because the proportion of the fisheries and biology driven factors (migration patterns) in estimated unallocated removals can at present not be specified. Therefore, the estimates from both runs might be misleading, especially concerning the current level of fishing mortality. SSB of cod in the Kattegat steadily declined from around 35 000 tons in the late 1970s to a level of 5000-6000 tons in the end of the 1990s (Figure 5.2.1). Since about 2000, the SSB is estimated in both assessments to be well below B_{lim} (6000 tons). Recruitment in recent years has been among the lowest in the time series without any sign of improvement since 2000.

In contrast, the Nephrops stock seems to be in good shape. LPUEs in functional unit 3 and 4 (Skagerrak and Kattegat) substantially increased over the last years (Figure 5.2.2). The sole stock is around MSY Btrigger (2000 t) and fishing mortality is around Fmsy (0.4). For plaice in IIIa no accepted assessment is available. However, landings of plaice substantially decreased since the 70ies and are currently at a very low level (497 tonnes). The biomass of data poor stocks (ling, rays and skates, pollack) is presently low. Overall F probably decreased due to effort reductions.

Status of the fishery

Officially reported landings of Kattegat cod decreased substantially (Figure 5.2.1) and the reported landings of cod in the Kattegat in 2010 were 155 tons, while the TAC was 379 tons. Landings of Nephrops increased in recent years. Landings of plaice decreased as already described, while landings of sole are more or less stable since 2000.

The main fisheries in the Kattegat target Nephrops (and sole) using predominantly trawls (around 83% of the total effort, and 95% of the regulated effort 2010), primarily in the gear class TR2 (80% of total effort in 2010 and 92 % of the regulated effort 2010, STECF 2011B). Beam trawls are forbidden in Kattegat. The effort deployed by passive gears (GN1, GT and LL1) is relatively small, with a stable share of around 5% of the total regulated effort since 2005. According to STECF 2011B there are two derogations from the cod management plan in place in Kattegat, Cpart 13 and Cpart 11. All Danish and German effort in gear category TR2 in 2010 is under the category Cpart 13 (<5% of total catches is cod and/or technical measures reduce discard mortality of cod to the same amount as envisaged by effort reductions). On the other hand, only Sweden reported under the derogation CPart11 in gear category TR2 in this case achieving the <1.5% cod catch by using a sorting grid, and this represented 63% of the effort deployed by this country in this gear category in 2010 (48 % in 2009).Taking Denmark as an example, the most valuable fisheries are currently on Nephrops, sole, sprat and herring (Table 1). Cod only plays a minor role from an economic point of view (Table 5.2.1).

In recent years, there was a general decrease in effort deployed from both the Danish and Swedish fleet (-31% in total effort from 2004 to 2011; STECF 2011B). Germany only plays a very minor role (8 vessels fished in 2010 in the Kattegat responsible for 2% of total effort) and other countries are not allowed to fish in the Kattegat. By-catch rates of cod are generally low (197 t of cod catch (landings + discard) in 2010 compared to 3120 t of Nephrops (including discard information from Denmark); STECF EWG 11-11). Fishing impact (proxy for Fishing mortality) on Kattegat cod, age 2 and older, from the Danish TR2 fishery has further been reduced by around 50% from 2007 to 2011 as estimated by analysis of VMS and stock distribution data (Vinther et al. 2012) Table 5.2.2). Closed areas with the highest concentration of cod and minimization of cod by-catch using selective gears (e.g. sorting grids and escape windows) were implemented as management measures by Denmark and Sweden. In addition, TR1 fisheries used for a mixed fishery on cod, plaice and sole nearly disappeared from the Kattegat (-60% effort reduction between 2004 and 2010, only 82663 kw-days in 2010). Therefore, with the present target species and effort level catches for species other than cod are most likely not an issue.

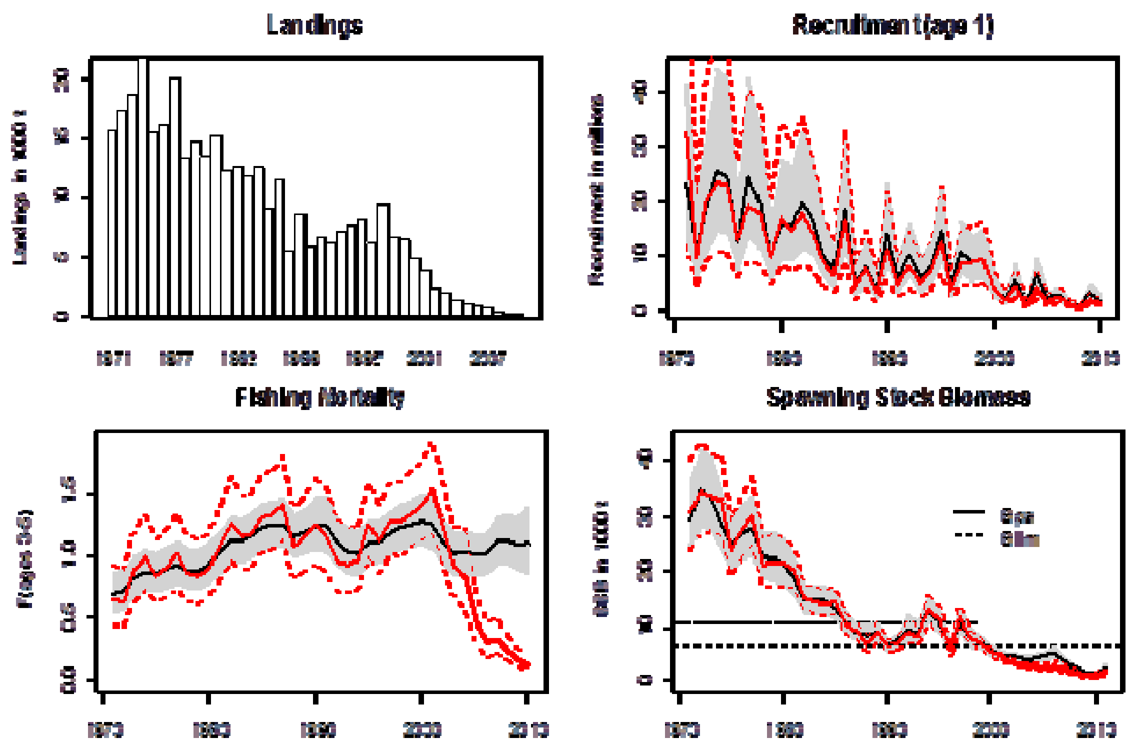

Figure 5.2.1: Status of Kattegat cod

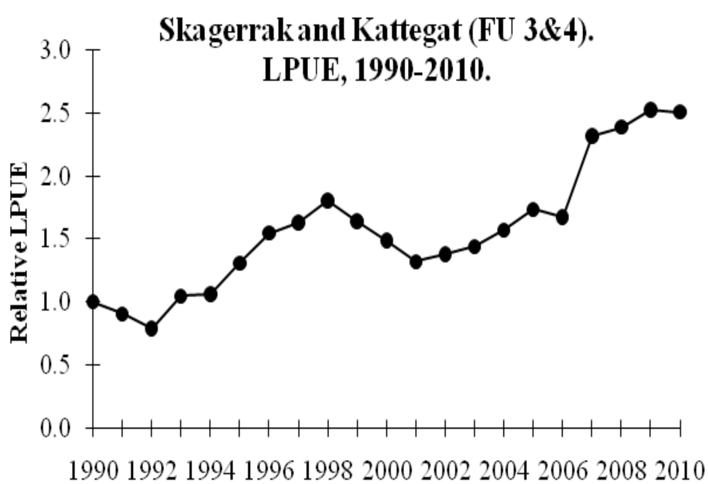

Figure 5.2.2: LPUE time series for Nephrops in IIIa

Table 5.2.1. Landings and value of landings from the Danish fleet

	tonnes	Value (1000kr)
Nephrops	1742	98829
Sole	277	21949
Plaice	415	3011
cod	111	1530
Total	2545	125319
Spart and hering		18000
Blue mussels		3046
brill and turbot		4100
All species in Kattegat		164578

Table 5.2.2: Relative fishing impact on Kattegat cod from the Danish TR2 segment

Year	Age 1	Age 2	Age 3+	Average, Age 2 and 3+
2007	100%	100%	100%	100%
2008	97%	93%	90%	92%
2009	91%	70%	57%	64%
2010	90%	66%	55%	61%
2011	97%	54%	36%	45%

6 CONCLUSIONS TO AREA STOCK NEEDS

6.1 North Sea

At present the finfish stocks taken into account in a mixed fisheries evaluation are cod in IIIa-IV-VIId, haddock in IIIa-IV, whiting in IV-VIId, saithe in IIIa-IV-VI, plaice in IV and sole in IV. It appears that for haddock, whiting, saithe, plaice and sole current fishing mortality and SSBs are close to the proposed Fmsy and Btrigger values. The current status of cod is the only stock for which fishing mortality and SSB are far from the proposed Fmsy and Btrigger and therefore the focus of management attention can be placed on this species. However, it should also be noticed that there is a relative high uncertainty on the latest saithe assessment in 2011. The results of the 2012 assessment therefore need to confirm the current stock status.

Most Nephrops stocks with a TV assessment in the North Sea appear to be close to Fmsy targets and above biomass trigger levels. In the Farn Deeps estimated stock biomass is very close to the biomass trigger level and requires careful monitoring.

It is most likely that in 2012, there will be an assessment and advice for anglerfish in IIIa-IV-VI. Currently it is not known whether exploitation rates are considered by ICES to be above or below MSY. In 2012 angler fish catch data is not included in the ICES MIXFISH/WGNSSK data call and thus it will not be possible to include angler fish ion the mixfish evaluation in June. An integration of anglerfish in the mixed fisheries evaluation could be taken into account when the advice and data are available.

6.2 Kattegat

In the current situation with low by-catch of cod and hardly any mixed fishery left, focus on mixed fisheries considerations to limit fishing mortality on species other than cod is not necessary.

The inability to estimate F in the assessment is a major concern. Alternative harvest control rules are needed that do not rely on F estimates from the assessment.

The 2008 EU multi-annual plan ((EC) No 1342/2008) aims at protecting and restoring the cod stock in Kattegat. According to the management plan, TAC and effort should be further reduced in the coming years, since it is continuously advised that the catches of cod should be reduced to the lowest possible level.

The current reported annual landing of cod are extremely low, around 110 tons. The total mortality of cod in Kattegat is though estimated fairly high, with year classes disappearing at a high rate. However, the estimate of fishery mortality F itself is unknown as it is impossible to ascertain the respective importance of the various sources of mortality arising from both fishing and non-fishing. The cod TAC is not a restrictive factor since the TAC uptake (landings estimates) at present is less than 50%. However, the discard estimates, although uncertain, are considered high (about same tonnage as landings, but higher discards in numbers than landed in numbers). On the contrary, the estimation of biomass of cod in Kattegat is considered more robust and reliable, at about 3000 tons nowadays.

The former mixed nature of the fishery in Kattegat has drifted towards a directed *Nephrops* fishery and a seasonal fishery for sole at the end of the year. There is no direct cod fishery in Kattegat. The catch of cod is taken as bycatch in the *Nephrops* and sole fishery, and cod represented less than 1% of the total revenue of the Danish fishery in the Kattegat in 2010 (and less than 1.5% of the revenue from demersal fisheries alone (statistics from the Danish AgriFish Agency)

In conclusion, it is considered that the mixed-fisheries issues in the Kattegat are not currently of the same nature than in the North Sea, and should therefore not be dealt with in the same way. Considering the current level of cod landings, below TAC and the absence of cod targeting, it is unclear if further effort reduction in Kattegat would have significant effect on the possible recovery of the cod stock. However, they would clearly have very negative effects on the other fisheries on Nephrops and sole, which are currently estimated to be within sustainable limits and exploited close to MSY levels. Given the impossibility to provide a reliable F estimate, monitoring and evaluating the effect of this extra effort on the cod stock is virtually impossible. Without an assessment or an accepted alternate estimate of mortality, the fishing industry has currently no alternative to the decreasing effort ceilings. However, a central issue remains the amount of discarding, which should be lowered.

Workplan for June :

There is a need to look into the current situation in Kattegat – what is the best way to protect the cod stock in Kattegat and at the same time consideration of the economy in the fishery. Given the current caveats and lack of success of the current plan design, a number of surrogate measures have been suggested in place of further effort reductions. Since it is not expected that a significant revision of the plan might take place over 2012, it is mostly considered how improvements can be brought in within the frame of the current plan. This includes the following:

- It is not expected that better F estimates will be available in the near future. However, given the higher robustness of the SSB estimates, it is suggested to replace the F-based monitoring of the fishing mortality by a harvest rate-based monitoring, i.e. estimating the ratio of catches to biomass. This quantitative measure would be readily available and a good candidate for better indicator for buying effort back, its robustness needs to be tested.
- There needs to be discussed what kind of documentation is needed to document that less cod is caught, as well as defining what are the acceptable levels of cod catch to beneficiate from articles 11 and 13 exemptions.
- A central uncertainty is the amount of discarding, and the factors causing this. Sustained effort must be deployed by the fishing industry to avoid catching cod. Cod avoidance in the Kattegat fishery is currently based on more selective gears (SELTRA and Nephrops grid) seasonal and year-round area closures in the south-east of Kattegat. A comprehensive evaluation of this closure is programmed for early June 2012, and the results of this will therefore be directly available for the STECF meeting.
- As part of this evaluation, it might be important to investigate the possibilities to move away from a fixed closure and towards Real Time Closures as implemented now in the North Sea and Skagerrak
- Some social impact assessment is planned over the first semester of 2012, which may potentially lead to better evaluate the needs for improved legitimacy and commitment from the fishing industry. Provisional results will be made available to STECF in June.

7 MODELLING MIXED FISHERIES TO 5-10 YEARS

7.1 Mixed Fisheries Short Term Analysis

In its current use, the Fcube model is primarily used in a deterministic short term context mimicking the single-species short-term forecast (STF, 2 years) used by ICES for delivering TAC advice for the following year. If Y is the current year, data are available until Y-1. A 2 years mixed-fisheries forecast involve the following steps :

- Using single-stock 2 years forecast as a baseline. This forecast builds on some assumptions on the F-levels during the Intermediate (current) year (Y) while the advice in the TAC year (Y+1) follows the rules stipulated in the respective management plans or ICES MSY framework
- Application of mixed-fisheries scenarios during the Intermediate year leading to new assumptions on F levels in Y

- New mixed fisheries advice for Y+1 re-running the single-stocks forecasts with these alternative F in Y but still following the rules of the management plans
- Applications of mixed-fisheries scenarios during TAC year again.

As such the risks of potentially over- or undershooting the TACs for the individual stocks are quantified for both years.

The model includes the six main North Sea demersal stocks (cod, haddock, whiting, sole, plaice and saithe) as well as the eight Nephrops FU. All scenarios in the current set of runs presented so far by ICES 2011C build on default assumptions of constant effort share by fleet across métiers and constant catchability by stock, fleet and métier (typically one or three years average). This set of scenarios is :

- Max : fleets stop fishing when last quota is exhausted
- Min : fleets stop fishing when first quota is exhausted
- Cod : fleets stop fishing when cod quota is exhausted
- Sq_E :status quo effort, fleet effort is same as last year
- Ef_Mgt : Effort of EU fleets in TR1 and TR2 métiers is reduced according to the Cod Plan
- Val : fleets effort corresponding to the mean across the various quota share weighted by quota value (revenue)

There is also a standard set of outputs displaying mainly aggregated results at the stock and/or fleet level, although detailed results are of course available for any desired combination of year * country * fleet * métier * stock.

See ICES 2011C and Ulrich et al. (2011) for further information.

For 2012, there are a number of changes in the way the ICES 2011C will deliver its advice. Up to 2011, the advice was delivered in October, based on data collected after the publication of the June advice. In 2012, this advice will be integrated into the June advice following the workplan below :

- December 2011 : Completion of a trial data call combining data needs for single species assessment and advice (ICES WGNSSK) and for mixed fisheries advice (ICES WGMIXFISH) on the basis of DCF métiers
- February 2012 : Official data call issued by ICES requesting data for 2011
- 30th March 2012 : Deadline for delivery of national data into ICES InterCatch database
- 27 April- 3rd May 2012 : ICES WGNSSK delivering single-species assessment and forecast
- 21-25 May 2012 : ICES WGMIXFISH delivering mixed-fisheries advice – on the same basis as delivered in August 2011
- 30th June 2012 : Publication of ICES North Sea advice
- 27-31 August 2012: New ICES WGMIXFISH meeting aiming at further methodological development and / or application to the West of Scotland fisheries. As a specific point, it is planned to include anglerfish into the North Sea mixed fisheries, after its assessment in ICES WGCSE in May 2012.

Considering the current short-term and deterministic setup (i.e. TAC advice 2013), it is technically possible to produce a number of alternative results and/or outputs with little additional workload, involving for example differential scenarios of effort and catchability, as could be imagined e.g. for some proxies of article 13-like adaptations (for example cod avoidance translating into changes in catchability etc). It is also easy to produce very coarse economic proxies of value and VPUE as an assessment of the impact of the various scenarios.

7.2 Bioeconomic models

7.2.1 Flat fish Dynamic State Variable model

A mixed fishery is a fishery catching fish of a variety of species. Such mixed fisheries offer a challenge to fisheries management because of the limited possibility in targeting fish of a specific species within the mix of species. The possibility of targeting a specific species depends on the spatial and temporal segregation among the fish species and the possibility of changing the selectivity of the gear, bounded by economic constraints.

A quantitative analysis of the possibility of targeting within a fishing fleet should be based on the individual choices of fishers, taking account of the spatial and temporal segregation among the species, the selectivity of the gear, and the economic constraints. Dynamic State Variable Models (DSVM) allow such an analysis where annual management rules affect economic constraints on fishing by posing fines on over-quota landings or effort.

DSVMs assume that optimal fishing behaviour can be calculated under the assumption that each individual is a utility maximizer. There is some empirical evidence for profit as the metric of utility. DSVMs allow the combination of time-scales of short-term choices and long-term constraints such as fishers facing an annual individual quota system but making daily, weekly, or monthly decisions on where to fish and which fish to keep on board. The individual vessels in the model may be constrained by their quota and will respond by changing their fishing pattern in terms of (i) the number of fishing trips, (ii) the choice of fishing areas, and (iii) the choice to discard the over-quota part of their catch. The problem for the individual is therefore to optimize the utility function, in this case the net revenue at the end of year. The net revenue is based on total landings for different species and their respective prices, the total fishing effort and travel time and the variable costs, taking into account the total fine for a vessel exceeding its individual.

A DSVM has been used to successfully explain the fleet response to reductions in plaice quota of the Dutch beam trawl fleet (Poos et al. 2010). This is a fleet in a mixed fishery for a number of target flatfish species. The model accounted for the two main target species: sole and plaice. The spatial and temporal segregation between the two species, was mimicked by dividing the North Sea in three areas, each with a different statistical distribution of catch rates during the year. Plaice was migrating seasonally between feeding grounds in the North and the spawning grounds in the South. Currently, extensions of existing model are being developed for an English Channel case study. That model contains 5 target species. Each ICES statistical rectangle is considered a single fishing ground.

When appropriately calibrated with biological and economic data, DSVM models offer the opportunity to quantify the flexibility of fishing fleets to target different species and adapt to changes in the individual quota of a range of species. Quantifying this flexibility is important to evaluate the socio-economic impacts of management plans.

7.2.2 Evaluation of the economic performances of the flatfish management plan on the Dutch beam trawlers using FishRent

The FishRent model was used by LEI (Heleen Bartelings) to evaluate the effect of the North Sea flatfish management plan on the economic performances of Dutch beam trawl segments for the years 2008 and 2009. In the first two years of the management plan, external factors have impacted the economic results of the Dutch flatfish fleet. A decommissioning scheme was implemented at the beginning of 2008, leading to a reduction of the capacity. In addition, the prices of fuel and of fish have changed dramatically in 2008 and 2009, the fuel price increased by more than 30% in 2008 and decreased by nearly 40% in 2009 and in 2009 the average price of plaice dropped by 30%. To separate the effects of the decommissioning scheme and prices from the effects of the management plan, simulations were run using the FishRent bio-economic model.

The FISHRENT model was developed as a part of the EU funded study 'Remuneration of spawning stock biomass' (Salz et al., 2010) on the basis of earlier experiences of the team in bio-economic modelling, inter alia EIAA, BEMMFISH, TEMAS, AHF and other models which were evaluated within the project 'Survey of existing bio-economic models' (Prellezo et al., 2009). The model comprises six modules, each focussing on a different aspect of the functioning of the fisheries system: biology (stocks), economy (costs, earnings and profits), policy (TACs, effort and access fees), behaviour (investments), prices (fish and fuel) and an interface linking the modules together. Input, calculation and output are clearly separated. The model produces a standard set of graphics, which provide a quick insight into the results of any model run (full manual available: http://www.lei.dlo.nl/publicaties/PDF/2011/2011-024.pdf). The developers ensured to keep a close link between the input data needed and the available economic (DCF data) and biological data (biomass available in ICES) in order to allow empirical applications. This model simulates values of biological and economic variables and shows explicitly the consequences of different policy decisions. The model generates basic economic indicators like gross value added, net profits. The model generates also a variety of other results, e.g. size of stocks and fleets, production, costs, catches and landings

The model was successfully applied to the two largest Dutch beam trawl segments and the economic results of the two largest beam trawl segments would have been significantly worse in 2008 and 2009 without the decommissioning scheme. In that case, the management plan could potentially have worsened the economic performance of the fleet in the short term, especially in 2008, when the segments were under pressure of the high fuel price. However this also depends on how the TAC's would have developed without the management plan. Due to bad economic performance it also would have been likely that the segments would have started to shift to other more profitable fishing techniques, thus reducing the capacity by a similar amount as the decommissioning scheme over the period 2008-2010 and bringing the available capacity more in line with the effort requirements of the management plan. Other external effects highly influencing the economic results of the segments were the high fuel price in 2008 and a consequent drop in the fuel price in 2009 and the low plaice price in 2009. Without these effects the potential profits in 2008 and 2009 would have been significantly higher.

By using a modelling approach it was possible to separate the external effects for the effects of the flatfish management plan and determine the potential economic performance. However, two years of available data may be a bit thin to really determine the effects thus this kind of analysis should be repeated when more economic data is available.

In the future, the model can also be used to project economic results of Dutch fishing sector given expected stock projections. Although the model uses a fairly simple stock growth function to predict future stocks, the predicted stocks are fairly close to the stock predictions of IMARES. To predict the future economic results of the Dutch flatfish sector it is however important to further develop the catch function. The catch function determines how much fish is caught per segment. Catches depend on effort and catchability. Most of the Dutch vessels target sole and catch plaice as a bycatch. Given the expected trend in plaice and sole TAC's, plaice TAC is going to increase and sole TAC is going to decrease for some years. It may very well be that some vessels will start to specifically target plaice instead of sole. The model has some possibilities to take this behaviour into account but this should be researched further.

7.3 Development of Models and Software for Mixed Fisheries Analysis

7.3.1 Extension towards stochastic medium-term forecast projections

To really evaluate the impact of the mixed-fisheries implications for North Sea management (in particular with regards to cod), STECF considered that the current deterministic short-term set up should be extended towards stochastic and medium-term projections.

The minimal technical requirements that must be developed to achieve this are:

- Single-stock Management Strategies Evaluations (MSE) running in parallel. Some work is already on the way following the methodology as used for e.g. the North Sea whiting MSE (STECF 2011A), but there need to be answered basic parameterization questions such as
    - Functional form and parameters of the stock-recruitment relationship – this should ideally be as used in previous fora for the various individual stocks, e.g. during the management plans evaluations
    - Assessment error in the MSE through e.g. a full assessment model (e.g. FLXSA) or random noise
    - Observation error in the catch
    - Future growth and selectivity at age
    - Set-up of the short-term forecasts within the MSE (e.g. geometric mean of past recruitments etc)
    - Handling of unallocated mortality in North Sea cod assessment and projection
- Inclusion of Fcube within the MSE : should Fcube be included in the STF stage, i.e. mimicking the current mixed-fisheries advice, where the feed-back on the operating model the following year occurs through the single-species TAC ? Or should this be included as a regular implementation error on F in the operating model? Technically, Fcube is a simple single-year function working with FLR objects , and can therefore handle multiple iterations. It is not a priori expected that this function should be modified as such (although general coding optimization might help readability and computing speed), but depending where it is applied within the MSE loop can potentially yield different outcomes
- Agreement on scenarios, results and evaluation criteria
- Ideally, an economic module could certainly be added calculating relevant economic indicators at the fleet level

7.3.2 Development of Fishrent

To assess the impact of alternative policies on the natural resources and human welfare there is growing interest in models that combine biology and economy. Such bio-economic models are necessary for policy analysis to understand pathways of development and fishery behaviour (Prellezo, 2012). Generally, there is a close link between the resource and the resource user that can be described as the fishing mortality, which results from the extractive activity. Due to this link, factors affecting the biological side (e.g., nutrients, hydrographical conditions and biological interactions such as predators) impact the economic side of fisheries (Prellezo, 2012). The reverse is also true: factors affecting the economic side (e.g., management, fuel costs) impact the biological system. Hence the necessity of bio-economic models comes from the fact that biological and economical systems are interrelated.

In Europe, a number of these models have been developed, several of which are listed in (Prellezo, 2012). However, thus far these models tend to be “unbalanced” in the sense that they either put much focus on the biology and little on the economics, or vice versa. Such a division in models also became apparent during the meeting, where "Fcube" was found to have much biological detail but little economic detail, while "FishRent" was found to have much economic detail but little biological detail. There seems to be the need for a collaborative workshop where the biological and economical processes in the different models are described in detail and discuss the possible links between the different models. Only by doing both, the biology and the economy can be incorporated in "balanced" bio-economic models that are purposely made to evaluate the impact of alternative policies on the natural resources and human welfare.

FishRent has been presented as the first bio-economic model of fisheries developed by a team of European economists that meet the following requirements:

- Integrate simulation (of different management strategies) and optimisation (to determine optimum value of resource rent and other variables).
- Integrate output- and input-driven approaches, so that one model could be consistently applied to different situations in the EU, particularly the Atlantic and the Mediterranean/Black Sea areas.
- Accommodate multi-species/multi-fleet fisheries, with flexible number of species and segments.
- Close link to available economic and biological data, to allow empirical applications.
- Balanced composition between various components: biology-economics-policy.
- Dynamic behaviour over a long period, including stock-growth, investment and effort functions, to allow simulation of adjustment paths to an optimum.
- Flexibility for applications of various types of relations (e.g. different stock-growth functions, approaches to payment for access, etc.).

While the economic part is agreed upon, the polynomial growth functions describing the dynamics of the stocks have been deemed simplistic. To improve this and obtain a model that would satisfy both the economists and the biologists, the biological module is being extended with an age structured model of fish population including stochastic recruitment within the EU FP7-project VECTORS. This module will not be ready before the June meeting but will be available in 2013.

To facilitate the data transfer between biologists and economists, the data needed for the biological module should be compatible with and directly extractable from the FLR objects used in ICES working groups. This will be implemented in FishRent

If the necessary funds are found, the FishRent model will be applied to the same case study as the one on which Fcube will be applied for the MIXFISH working group (6 species, 27 fleets, 13 metiers).

7.3.3 Combined further development

JRC was requested to assess the possibility of extending Fcube and merging it with Fishrent. Extending Fcube and making the software ready for production by June's meeting is not possible due to other commitments. However, JRC is interested in developing a mixed fishery bio-economic model based on Fishrent and Fcube algorithms in FLR. AZTI (Spain) is developing an FLR economic framework and in coordination with other institutions and JRC, it may be possible to implement such model on the next 10-12 months. Those involved are discussing this possibility.

7.4 Scenarios

The following scenarios without fleet adaptation that are standardly run in WGMIXFISH will be run:

- Min; fishing stops as soon as the first quota is exhausted;
- Max; fishing continues until the last quota is exhausted;
- Cod; fishing continues until and stops when the cod quota is exhausted;
- Sq_E; fishing effort remains at current level;
- Ef_Mgt; fishing effort is at the level as required by the management plan under Article 12.
- Val; fishing occurs according at a level which is a weighted average of the levels needed for quota share exhaustion of the various species, where the weighting is provided by the monetary value (revenue) of the species; this scenario is not meant to reflect any economic model; it is only used as an artificial proxy for what may be happening in reality because the outcomes of the hindcasting resemble the true outcomes.

In addition, scenarios will be run in which we mimic in a crude way what the consequences would be if the fleets would be able to adapt to various extents to the requirement of the cod management plan (through avoidance/targeting/selective gear/closures, etc.). We are interested in the (economic) consequences at the fleet level as well as the biological consequences for the various stocks.

The following scenarios with fleet adaptation will be run:

0. (A 'Base Case' scenario where each single-species target is exactly achieved. The rationale is that here all fleets fully adapt to the fishing opportunities, which could be for example the case under catch quota.)

1. Max+adaptation: as Max, except:
   a. The cod catchability is lowered such that the required F is fully achieved;
   b. As a., but the cod catchability is lowered such that it goes half-way in achieving the required F (i.e. half-way between the Max scenario without adaptation and the scenario 1.a).

   The rationale for these scenarios is that the fisheries continue fishing until all TACs are exhausted while (partly) avoiding cod as required.

2. Val+adaptation: as Val with value-weighting for all other species except cod. For cod, adaptation is:
   a. As 1.a.
   b. As 1.b. (i.e. half-way between the Val scenario without adaptation and the scenario 2.a).

   The rationale is slightly the same as for scenario 1. It differs in that the fishery does not continue until all TACs are exhausted but makes a trade-off loosely based on value, and in addition partial or full achievement of the required cod F.

Depending on the amount of human resources available and also depending on a preliminary evaluation of how useful the results of the above scenarios are, a few optional additional scenarios may be run:

3. Sq_E+adaptation: as Sq_E, except:
   a. As 1.a.
   b. As 1.b. (i.e. halfway between Sq_E without adaptation and the scenario 3.a).

   The rationale here is fishing at status quo levels with partial or full achievement of the required cod F.

4. Ef_Mgt+adaptation: as Ef_Mgt, except:
    a. As 1.a.
    b. As 1.b. (i.e. halfway between Ef_Mgt without adaptation and the scenario 4.a).
    The rationale here is fishing at levels required by the management plan with partial or full achievement of the required cod F.

5. Article-13 with the interpretation that buy-back is up to previous year's level.
    a. All fleets that are under the effort regime operate under Article 13 deploying effort as in previous year and fully achieve required partial cod F. The other fleets fish according to Max or "Value" or Effort-ManagementPlan.
    b. All fleets that are under the effort regime operate under Article 13 deploying effort as in previous year but achieve only half of the required cod partial F. The other fleets fish according to Max or Val or Ef_Mgt.

6. As 5., but Article-13-interpretation is that buy-back is to the 2008-level. a. and b.

8 References

ICES. 2009. Report of the Benchmark and Data Compilation Workshop for Roundfish (WKROUND) . 16-23 January, Copenhagen. ICES CM 2009/ACOM:32, 259 pp.

ICES. 2011A. Report of the Baltic Fisheries Assessment Working Group . 12 - 19 April, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:10 , 843 pp.

ICES. 2011B Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). 4 - 10 May, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:13 , 1214 pp.

ICES. 2011C. Report of the Working Group on Mixed Fisheries Advice for the North Sea (WGMIXFISH) . 29 August - 2 September 2011, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:22, 94 pp.

Poos, J. J.; Bogaards, J. A.; Quirijns, F. J.; Gillis, D. M. and Rijnsdorp, A. D. 2010. Individual quotas, fishing effort allocation, and over-quota discarding in mixed fisheries. ICES Journal of Marine Science. 67:2. pp 323-333

Prellezo, R.; Accadia, P.; Andersen, J.; Andersen, B; Buisman, E.; Little, A.; Nielsen, J.R.; Poos, J.J.; Powell, J. and Röckmann, C. 2012. A review of EU bio-economic models for fisheries: The value of a diversity of models. Marine Policy, 36:2, pp. 423 – 431.

STECF. 2011A. Evaluation of multi-annual plans for cod in Irish Sea, Kattegat, North Sea, and West of Scotland (STECF-11-07). (eds. Simmonds E. J & Kraak, S.). Publications Office of the European Union, Luxembourg, EUR 24901 EN, JRC66051, 330 pp.

STECF. 2011B. Evaluation of Fishing Effort Regimes in the Baltic Sea (STECF-11-11). (eds. Bailey N. & Mitrakis N.) Publications Office of the European Union, Luxembourg, EUR 25035 EN, JRC67717, 107 pp.

Ulrich, C., Reeves, S. A., Vermard, Y., Holmes, S. J., and Vanhee, W. 2011. Reconciling single-species TACs in the North Sea demersal fisheries using the Fcube mixed-fisheries advice framework. – ICES Journal of Marine Science, 68: 1535–1547.

Vinther, M., Ahm Krag, L. Egekvist, j., Eero, M., Jørgensen O. and Storr-Paulsen, M. 2012. Changes in fishing mortality of cod in the Kattegat 2007-2011 induces by the Danish TR2 gear segment. Appendix 1 to Memorandum to the Danish AgriFish Agency, 27 February 2012. 44 pp.

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Abstract

This document forms a report of work in progress of STECF EWG 12-02 which met in Rostock, Germany to provide an evaluation of status of stocks and fisheries in the North Sea and Kattegat. For NS most stocks except NS cod are near to exploitation at Fmsy. Mixed fisheries considerations for NS therefore relate only to exploitation of cod. Work needs for NS include the influence of multi-species considerations and changes in M. Development of mixed fisheries advice in the short term is available for NS. Development of mixed fisheries advice for the NS in the medium term is not possible by June.

For Kattegat fisheries are dominated by single species fisheries with minor bycatch. Although some Kattegat cod are caught the amounts are below the current TACs Work needs for the Kattegat are dominated by need to give catch advice for cod in the absence of an agreed assessment.

There is an urgent need for development of integrated bioeconomic models.

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

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