

Stock Annex: Tusk (*Brosme brosme*) in subareas 4 and 7–9, and in divisions 3.a, 5.b, 6.a, and 12.b (Northeast Atlantic)

Stock specific documentation of standard assessment procedures used by ICES.

Stock: Tusk

Working Group: Working Group on Biology and Assessment of Deep-sea Fisheries Resources (WGDEEP)

Created:

Authors:

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Last updated by: Kristin Helle (WGDEEP)

A. General

A.1. Stock definition

In 2007, WGDEEP examined the available evidence of stock discrimination in this species. Based on the genetic investigation, the Group suggested that Tusk in other areas (3.a, 4.a, 5.b, 6.a, 7, 8, 9 and other Areas of 12) should be treated as one unit.

A.2. Fishery

Tusk is a bycatch species in the trawl, gillnet and longline fisheries in these Subareas/Divisions. Norway has traditionally landed a dominant portion of the total, and around 90% of the Norwegian landings are taken by longliners.

When areas 3–4 and 6.a–14 are pooled over the period 1988–2010, 36% of the landings have been in area 4, 46% in area 5.b, and 15% in area 6.a.

A.3. Ecosystem aspects

B. Data

B.1. Commercial catch

Full landings data are available from 1988 to present but it is thought that fisheries in some of these areas pre-date the time series. Incomplete landings data are available from Norwegian longline fisheries from 1889 onwards. Additional landings data from other areas may be available from 1950 onwards.

B.2. Biological

Length data for the Norwegian reference fleet in other areas have been routinely collected since 2002.

Considerable general information is available on the life history characteristics of this species.

B.3. Surveys

Data from Faroese summer and autumn surveys are available for the period 1994 onwards

B.4. Commercial CPUE

Catch and effort data for Norwegian and Faroese longliners and Danish trawlers are available. Abundance indices and length frequency data from the Faroese groundfish surveys were presented.

A cpue series for Danish trawlers fishing in 4.a was available for the period 1992–2010

Data from Faroese summer and autumn surveys were available for the period 1994 onwards

A cpue series for the Faroese longliners (>100 GRT) for the period 1987–2009 was also available .

Norway started in 2003 to collect and enter data from official logbooks into an electronic database and data are now available for the period 2000–2009. Vessels were selected that had a total landed catch of ling, tusk and blue ling exceeding 8 t in a given year. The logbooks contain records of the daily catch, date, position, and number of hooks used per day. Cpue were calculated as the average total catch of ling per vessel (C), and the average number of hooks per set and per vessel (N) associated with these catches. Then, for each year and catch category, the estimated cpue for the entire fleet was determined as C/N . Thus the estimated cpue for each year and Subarea was the mean catch in kg per hook for the entire fleet.

The boats that provided logbooks are the primary sampling units, and C and N are both random variables. It follows that this is a ratio-type estimator, therefore the standard errors of the cpue estimates could be calculated as described in Cochran (1977, page 32). This cpue estimator is a weighted average, that is the more hooks a boat sets, the more

influence it has on the estimate (Cochran, 1977). For comparison, an unweighted cpue series was also constructed (i.e. the average cpue per boat).

A standardised series will be developed in preparation for WGDEEP 2012.

B.5. Other relevant data

C. Assessment: data and method

Model used: The stock is assessed using trends in catch and cpue.

Software used:

Model Options chosen:

Input data types and characteristics:

TYPE	NAME	YEAR RANGE	AGE RANGE	VARIABLE FROM YEAR TO YEAR
				YES/No
Caton	Catch in tonnes	1988-2010		
Canum	Catch at age in numbers			
Weca	Weight at age in the commercial catch			
West	Weight at age of the spawning stock at spawning time.			
Mprop	Proportion of natural mortality before spawning			
Fprop	Proportion of fishing mortality before spawning			
Matprop	Proportion mature at age			
Natmor	Natural mortality			

Tuning data:

TYPE	NAME	YEAR RANGE	AGE RANGE
Tuning fleet 1			
Tuning fleet 2			
Tuning fleet 3			
....			

D. Short-Term Projection

Model used:

Software used:

Initial stock size:

Maturity:

F and M before spawning:

Weight at age in the stock:

Weight at age in the catch:

Exploitation pattern:

Intermediate year assumptions:

Stock recruitment model used:

Procedures used for splitting projected catches:

E. Medium-Term Projections

Model used:

Software used:

Initial stock size:

Natural mortality:

Maturity:

F and M before spawning:

Weight at age in the stock:

Weight at age in the catch:

Exploitation pattern:

Intermediate year assumptions:

Stock recruitment model used:

Uncertainty models used:

1. Initial stock size:
2. Natural mortality:
3. Maturity:
4. F and M before spawning:
5. Weight at age in the stock:
6. Weight at age in the catch:
7. Exploitation pattern:
8. Intermediate year assumptions:
9. Stock recruitment model used:

F. Long-Term Projections

Model used:

Software used:

Maturity:

F and M before spawning:

Weight at age in the stock:

Weight at age in the catch:

Exploitation pattern:

Procedures used for splitting projected catches:

G. Biological Reference Points

No biological reference points have been defined

	TYPE	VALUE	TECHNICAL BASIS
MSY	MSY Btrigger	xxx t	Explain
Approach	FMSY	Xxx	Explain
	Blim	xxx t	Explain
Precautionary	Bpa	xxx t	Explain

Approach	Flim	Xxx	Explain
	Fpa	Xxx	Explain

H. Other Issues

H.1. Historical overview of previous assessment methods

Summary of data ranges used in recent assessments:

DATA	2006 ASSESSMENT	2007 ASSESSMENT	2008 ASSESSMENT	2009 ASSESSMENT
Catch data	Years: 1978–(AY-1) Ages: 1–8+	Years: 1978–(AY-1) Ages: 1–8+	Years: 1978–(AY-1) Ages: 1–8+	Years: 1978–(AY-1) Ages: 1–8+
Survey: A_Q1	Years: 1985–AY Ages: 1–7	Years: 1985–AY Ages 1–7	Years: 1985– AY Ages 1–7	Years: 1985– AY Ages 1–7
Survey: B_Q4	Years: 1996–(AY-1) Ages: 1–5	Years: 1996– AY-1) Ages 1–7	Years: 1996– AY-1) Ages 1–7	Years: 1996– AY-1) Ages 1–7
Survey: C	Not used	Not used	Not used	Not used

AY – Assessment year

I. References

Cochran, W.G. 1977. Sampling Techniques, 3rd. edn. John Wiley, New York. 428 pp.