Stock Annex: Greater forkbeard in all Ecoregions

Stock specific documentation of standard assessment procedures used by ICES.

Stock	Greater forkbeard in all ecoregions; **gfb-comb_SA**
Working Group	WGDEEP
Date:	March 2015
Revised by	WGDEEP 2015 /Guzman Diez

A. General

A.1. Stock definition

The Greater forkbeard is a gadoid fish which is widely distributed in the Northeastern Atlantic from Norway and Iceland to Cape Blanc in West Africa and the Mediterranean (Svetovidov, 1986; Cohen *et al.*, 1990). It is distributed along the continental shelf and slope in depths ranging between 60 and 800 meters but recent observations onboard of commercial longliners and research surveys extend the depth range to below 1000 m (Stefanescu *et al.*, 1992).

Unfortunately very little is known about stock structure of the species. Currently ICES considers greater forkbeard as a single stock for all the ICES area greater forkbeard in the Northeast Atlantic. Probably the stocks structure is more complex, but further studies needs to be implemented to allow a scientific basis for the stock structure.

A.2. Fishery

Greater forkbeard is as a bycatch species in the traditional demersal trawl and longline mixed fisheries targeting species such as hake, megrim, monkfish, ling, and blue ling in Subareas VI, VII, VIII and IX.

Since 1988, 71% of landings have come from Subareas VI and VII. Spanish, French and UK trawl and longline are the main fleets involved in this fishery. The Irish mixed deep-water fishery around Porcupine Bank historically landed important quantities of this species, but since 2006 the landings of this country have been reduced strongly. Russian fisheries in the Northeast Atlantic land small quantities of greater forkbeard as bycatch of the trawler fleet targeting roundnose grenadier, tusk and ling on Hatton and Rockall Banks.

A further 20% of landings in this period come the French and Spanish trawl and longline fleets in Subareas VIII and IX (mainly from VIII). In Subarea IX since 2001 small amounts of Phycis spp (probably *Phycis phycis*) have been landed in ports of Strait of Gibraltar by the longliner fleet targeting scabbardfish in Algeciras, Barbate and Conil. Portuguese

landings of *P. blennoides* are scarce but however important amounts of other Phycis species are reported every year in Subarea IX.

Minor quantities of *Phycis blennoides* are landed by Portugal in Subarea X and by Norwegian and in recent years Faroese vessels in Divisions Va and Vb. The Azores deep-water fishery is a multispecies and multigear fishery dominated by the main target species *Pagellus bogaraveo*. Target species can change seasonally according to abundance and market prices, but *P. blennoides*, representing less than 1% of total deep-water landings in the last three years, can be considered as bycatch.

A.3. Ecosystem aspects

For greater forkbeard can be applied the same ecosystem considerations of other deep-water fisheries in the areas defined for the stocks. Fishing is a major disturbance factor of the continental shelf communities of the regions. As the fishery of Greater forkbeard is mainly a bycatch of trawler fishery in all ecoregions the main affections on the ecosystem is the impact on the sediment compound.

B. Data

B.1. Commercial catch

Landings by country and subareas are presented in the historical series. Discards are available for 2013 and 2014 in Subareas VI, VII, VIII and IX. The discards estimates in 2013 and 2014 accounted 36% and 34% of the total catches respectively. The discards in the rest of subareas remain unknown.

B.2. Biological

The biology of the species is poorly known. In general most of biological data are not reliable or not available (e.g. age composition, maturity, growth, natural mortality…). In Tables 3and 4 a compilation of biological available data is shown. (WGDEEP 2001 (ICES C.M. 2001/ACFM:23; Lorance, 2010)). The spawning areas and seasonality are also not well (or at all) identified. Only historical series of length frequencies from surveys were available.

Biological Reference Points based on the L$_{MAX}$ and AFC from Casas and Piñeiro, 2000 [1] (VIIIc and IXa) and Muus and Nielsen, 1999 [2] (Mediterranean Sea):

		L$_{MAX}$	AFC	L$_{INF}$	K	M	T0	A$_{GEMAX}$	A$_{GEMAT}$
Greater forkbeard	females	84 (1)	1y (1)	113.3 (1)	0.0886 (1)		0.663 (1)	14 (1)	3–4 y (2)
	males	44 (1)	1y (1)	54.9 (1)	0.217 (1)		0.556 (1)	6 (1)	3–4 y (2)

The following BRP have been extracted from the Table 1, Gislason *et al.*, 2008:

	Lmax	Linf	k	Age Mat	Fmax	F0.1	F10	F20	F30	F35	F40
females	84	86.6	0.181215	3.1	0.24	0.14	0.34	0.22	0.15	0.13	0.11
males	44	45.8	0.272311	2	0.48	0.26	0.61	0.38	0.27	0.23	0.2

WKLIFE Gislason spreadsheet was applied using values for L_{MAX} and AFC derived from Casas and Piñeiro, 2000 and Muus and Nielsen, 1999. Some of the parameters estimated by the model (L_{inf}, k,) were different from those derived by those authors. Notwithstanding, if $F_{40\%SPR}$ is adopted as a proxy for F_{MSY} the values obtained do not seem unrealistic.

Table 3. Life-history characteristics of Greater forkbeard (from WGDEEP 2001 (ICES C.M. 2001/ACFM:23; Lorance, 2010).

LHC	SEX	ESTIMATE	AREA (month)	REFERENCE
Maximum observed length (TL, cm)	combined	50	VIIIc and IXa	Sanchez *et al.*, 1995
	female	84	VIIIc and IXa	Casas and Piñeiro, 2000
	male	44	VIIIc and IXa	Casas and Piñeiro, 2000
Maximum observed age (year)	female	14	VIIIc and IXa	Casas and Piñeiro, 2000
	male	6	VIIIc and IXa	Casas and Piñeiro, 2000
	combined	2	Atlantic	Cohen *et al.*, 1990
	female	9	NE Atlantic	Kelly, 1997
	male	7		
	combined	15	NE Atlantic	EC FAIR, 1999, Sub-t. 5.12, Doc.55
Length at 50% maturity (PAFL, cm)	female	33 cm	NE Atlantic	Cohen *et al.*, 1990(1,2)
	male	18 cm	Mediterranean	Cohen *et al.*, 1990(1,2)
	female	32 cm	NE Atlantic	Kelly, 1997
	male	31 cm	Mediterranean	
Age at 50% maturity Combined (year)	combined	3-4 yrs	Mediterranean sea	Muus and Nielsen, 1999
Length of smallest individuals caught (TL)	combined	6 cm	VIIIc and IXa	Casas and Piñeiro, 2000
		8 cm	VIIIa,b,d (Oct.–Nov.)	Data from French western IBTS
		8 cm	VIIg-k (Oct.–Nov.)	Data from French western IBTS
Age of youngest individuals caught (year)	combined	< 1yr	VIIIc and IXa	Casas and Piñeiro, 2000
Length of the first mode of the length distribution	combined	13.9 cm	VIIIc, IXa (Apr.)	Casas and Piñeiro, 2000
		16.9 cm	VIIIc, IXa (Sept.)	Casas and Piñeiro, 2000
		17.4 cm	VIIIc, IXa (Oct.)	Casas and Piñeiro, 2000
		16 cm	VIIIa,b,d (Oct.–Nov.)	Data from French western IBTS

Unclear whether it is mean length at first maturity or length of smallest mature individual.

Table 4. Growth parameters of greater forkbeard. (from WGDEEP 2001 (ICES C.M. 2001/ACFM:23; Lorance, 2010)).

SEX	L∞	K	T0	AREA	REFERENCE
Male	41.7	0.208	N/A	Gulf of Lions (Med.)	Nony, 1983 (from FishBase)
Female	51.2	0.258	N/A	Gulf of Lions (Med.)	Nony, 1983 (from FishBase)
Combined	57.7	0.168	-0.66	Aegean sea (Med.)	Papaconstantinou *et al.*, 1993
Male	54.9	0.217	-0.663	VIIIc and IXa	Casas and Piñeiro, 2000
Female	113.3	0.0886	-0.556	VIIIc and IXa	Casas and Piñeiro, 2000

B.3. Surveys (use the ICES surveys acronym)

Data of abundance, and biomass of *P. blennoides* and spatial distribution have been collected in Subareas III, IV, V, VI, VII, VIII and Division IXa of six different surveys: SP-PorcGFS, French EVHOE IBTS, Irish IGFS, SP-NGFS, NS-IBTS, SWC-IBTS.

B.4. Commercial effort and cpue

Commercial Effort data (kWd) of the Spanish, Swedish and Irish fleets (OTB, LLS and GTR) by subarea have been provided in 2104.

B.5. Other relevant data

Landings and effort data in XIIb should be included into the assessment if they become reliable. Landings and discards from all areas and fisheries where greater forkbeard occur, should be compiled. Because greater forkbeard is a bycatch in shelf and slope fisheries and is subject to discards data on total catch are essential to assess the stock (s).

Greater forkbeard is caught in a number of surveys that are likely to provide reliable trends in either total abundance, recruitment of both. It is recommended that survey data are used to assess stocks trends.

Stock identity knowledge is lacking for greater forkbeard in the Northeast Atlantic. Survey based population indicators of greater forkbeard should be calculated from all relevant survey and provided to WGDEEP. The recommended indicators are: abundance, log abundance, mean length, quantiles of mean length, biomass, per strata and for the whole survey. Interpretation of trends by survey and strata should be used to define the overall trend of greater forkbeard in areas where it is caught.

C. Assessment: data and method

Model used:

Survey trends-based assessment

Software used: Not applicable

Model Options chosen: Not applicable

Input data types and characteristics: (table below is just an example; adapt the description of input accordingly)

Type	Name	Year range	Age range	Variable from year to year Yes/No
Caton	Catch in tonnes			
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

<u>Not applicable</u>

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

<u>Not applicable</u>

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

Based on the L_{MAX} and AFC from Casas and Piñeiro, 2000 [1] (VIIIc and IXa) and Muus and Nielsen, 1999 [2] (Mediterranean Sea).

		Lmax	AFC	Linf	k	M	t0	Agemax	Agemat
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H. Other issues

H.1. Historical overview of previous assessment methods (this subsection is optional. See example below.)

Summary of data ranges used in recent assessments:

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

AY – Assessment year

(The historic perspective, as well as all the other section on the stock annex, should only update in a benchmark workshop. If there is any reason to deviate from the stocks annex, this should be explain in the Working Group report and only update this deviation in the historic perspective after consultation with ICES Secretariat and WG Chair).

I. References