SAC GFCM
Sub-Committee on Stock Assessment

Date*	19	February	2009	Code*	MUT0709Ang

Authors*

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Species Scientific name*

1 ***Mullus barbatus - MUT***
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area*

Gulf of Lions

Geographical Sub-Area (GSA)*

07 - Gulf of Lions

Combination of GSAs
1
2
3

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Assessment form

Sheet #0

Basic data on the assessment

Code: MUT0709Ang

Date*	19	Feb	2009	Authors*	Angélique Jadaud*, Beatriz Guijarro**, María Valls**, Henri Farrugio* and Enric Massutí*

Species Scientific name*	Mullus barbatus - MUT	Species common name*	Red mullet

Data Source

GSA*	07 - Gulf of Lions	Period of time*	2004-2008

Description of the analysis

Type of data*	Size composition of catches, official landings	Data source*	IFREMER and IEO
Method of assessment*	Pseudo-cohort (LCA, Y/R) analysis	Software used*	VIT (Lleonart & Salat, 1992)

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	Other	D	Z	C
1	1	2	2	---	1	1	1	1	---	1	1	---

Comments, bibliography, etc.

Abella, A., Caddy, J.F., Serena, F. (1997). Do natural mortality and availability decline with age? An alternative yield paradigm for juvenile fisheries, illustrated by the hake Merluccius merluccius fishery in the Mediterranean. Aquat. Liv. Res., 10: 257–269.

García-Rodriguez M. and Fernández A.M .2005. Influencia de la geometría de la malla del copo en las capturas, selectividad y rendimientos de algunas especies de peces comerciales en el Golfo de Alicante (SE de la península Ibérica). Inf. Tec. Ins. Esp. Oceanogr. 185.

Lleonart J. and J. Salat (1997) VIT: Software for fishery analysis. User´s manual. FAO Computerized Information Series (Fisheries). Nº 11. Rome, FAO, 105 pp.

Report of the Scientific, Technical and Economic Committee for Fisheries. Evaluation of the report of the SGMED-08-03 Subgroup on the Mediterranean part III. Ispra, 9-13th June 2008.

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Assessment form — **Sheet B** — **Biology of the species**

Code: MUT0709Ang

Biology

Somatic magnitude measured (LH, LC, etc)*	Total length	Units*	cm

Sex	Fem	Mal	Both	Unsexed		
Maximum size observed				29	Reproduction season	?
Size at first maturity				12.1 (1)	Reproduction areas	?
Recruitment size				5	Nursery areas	?

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	cm				26
	K	years-1				0.41
	t0	years				-0.4
	Data source	SGMED-08-03 (2)				
Length weight relationship	a					0.0081
	b					3.113
	M					0.25(3)
	sex ratio (mal/fem)					

Comments

(1) Spanish National Data Collection Programme

(2) Report of the Scientific, Technical and Economic Committee for Fisheries. Evaluation of the report of the SGMED-08-03 Subgroup on the Mediterranean part III. Ispra, 9-13th June 2008.

(3) Vector of M at age, calculated from Caddy (1991) equation using the PROBIOM Excel spreadsheet (Abella et al., 1997):

Age	M
0	0.64
1	0.43
2	0.27
3	0.18
4	0.15
5+	0.12
Mean	0.25

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Assessment form

Sheet P1

General information about the fishery

Code: MUT0709Ang

Data source*	IFREMER, IEO and French and Spanish official data	Year (s)*	2004-2008
Data aggregation (by year, average figures between years, etc.)*	Average 2004-2008		

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	FRA	07	E - Trawl (12-24 metres)	03 - Trawls	33 - Demersal shelf species	MUT
Operational Unit 2	ESP	07	E - Trawl (12-24 metres)	03 - Trawls	33 - Demersal shelf species	MUT
Operational Unit 3						
Operational Unit 4						
Operational Unit 5						

Operational Units*	Fleet (n° of boats)*	Kilos or Tons	Catch (species assessed)	Other species caught	Discards (species assessed)	Discards (other species caught)	Effort units
FRA 07 E 03 33 - MUT	105	Tons	153.1	D. labrax, Pagellu	No		days
ESP 07 E 03 33 - MUT	30	Tons	28.9	Pagellus spp., M	No		days
Total	135		182				

Legal minimum size	11 cm total length

Comments

Data source*	IFREMER and French official data	OpUnit 1*	FRA 07 E 03 33 - MUT

Time series

Year*	2004	2005	2006	2007	2008	
Catch	151	148	183	172	111	
Minimum size	7	7	9	7	8	
Average size Lc	13.5	14.0	13.8	14.1	15.2	
Maximum size	25	29	24	24	25	
Fleet	121	114	111	101	78	

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

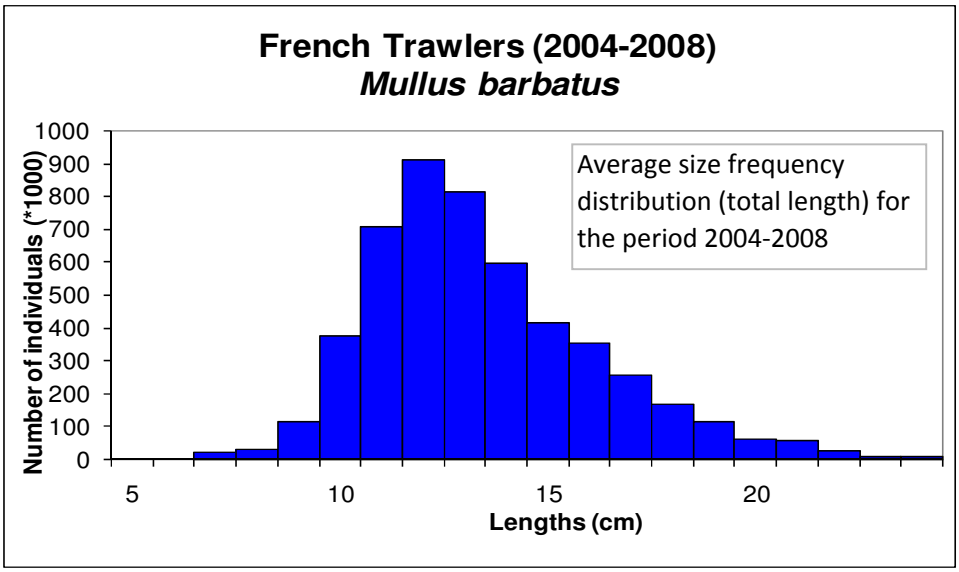
Selectivity

L25	6.9
L50	7.8
L75	8.9
Selection factor	1.95

Remarks

Parameters for 40 mm diamond mesh in the cod-end
From García-Rodriguez and Fernández (2005) from GSA 06 (Northern Spain).

Structure by size or age



Data source*	IEO and Spanish official data	OpUnit 2*	ESP 07 E 03 33 - MUT

Time series

Year*	2004	2005	2006	2007	2008	
Catch	26	28	33	37	21	
Minimum size	7	8	5	9	9	
Average size Lc	13.4	14.7	14.2	15.2	16.4	
Maximum size	26	29	29	27	28	
Fleet	33	37	29	24	27	

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

L25	6.9
L50	7.8
L75	8.9
Selection factor	1.95

Remarks

Parameters for 40 mm diamond mesh in the cod-end
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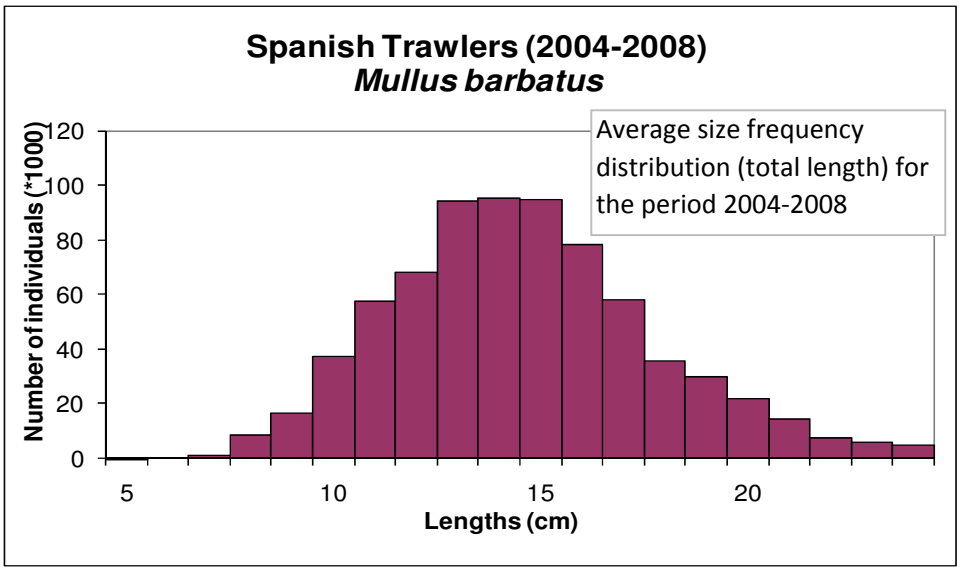

Data source*	IFREMER	OpUnit 1*	FRA 07 E 03 33 - MUT

Regulations in force and degree of observance of regulations

- Fishing license: fully observed
- Engine power limited to 316 KW or 500 CV: not observed
- Cod-end mesh size (bottom trawl: 40 mm; pelagic trawl: 20 mm): not fully observed
- Fishing forbidden within 3 miles (France): not fully observed

Accompanying species

French trawl fishery developed along the continental shelf of the Gulf of Lions is a multi-specific fishery. In addition to *M. barbatus* , the following species can be considered as important in landings:

- *Mullus surmuletus*
- *Merluccius merluccius*
- *Pagellus acarne*
- *Pagellus erythrinus*
- *Trachurus* spp
- *Scyliorhinus canicula*
- *Trachinus* spp
- Triglidae
- *Scorpaena* spp
- *Octopus vulgaris*
- *Eledone* spp
- *Lophius* spp

...

Data source*	IEO	OpUnit 2*	ESP 07 E 03 33 - MUT

Regulations in force and degree of observance of regulations

- Fishing license: fully observed
- Engine power limited to 316 KW or 500 CV: not observed
- Mesh size in the codend (40 mm diamond): fully observed
- Fishing forbidden <50 m depth: fully observed
- Time at sea: fully observed

Accompanying species

Spanish trawl fishery developed along the continental shelf of the Gulf of Lions is a multi-specific fishery. In addition to *M. barbatus* , the following species can be considered as important in landings:

- *Mullus surmuletus*
- *Merluccius merluccius*
- *Pagellus acarne*
- *Pagellus erythrinus*
- *Trachurus* spp
- *Scyliorhinus canicula*
- *Trachinus* spp
- Triglidae
- *Octopus vulgaris*
- *Eledone* spp
- *Lophius* spp

...

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Assessment form — **Sheet A1** — **Indirect methods: VPA, LCA**

Code: MUT0709Ang

Sex*	Unsexed

Analysis # *	1

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Catch equation	Tunig method	No tuning
# of gears	2	Software	VIT (Lleonart and Salat, 1992)
$F_{terminal}$	0.25		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	13.4	71.9
Average	10.1	0.9	Average population	22.3	437.7
Maximum			Virgin population		1538.9
Critical	11.3	1	Turnover		103.9
				SSB	183.1
				millions	tons

Average mortality

		Gear					
	Total	French Trawl	Spanish Trawl				
F_1	0.54	0.44	0.1				
F_2	0.37	0.32	0.05				
Z	0.79						

(F1 and F2 represent different possible calculations. Please state them)

Comments

Bnow/Bvirgin(%)= 17.6%
F1= mean F
F2= global F
Biomass= Ninitial * Wmean
Z= M+F1

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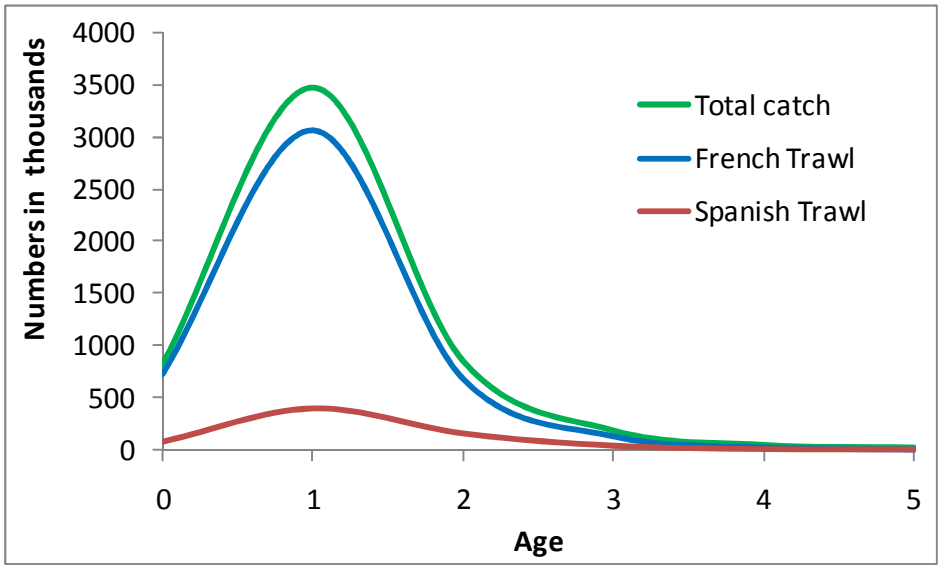
Assessment form	**Sheet A2** **Indirect methods: data**

Code: MUT0709Ang

Sex*	Unsexed	Gear*	French and Spanish Trawl	Analysis # *	1

Data source	Catch number by age

Data



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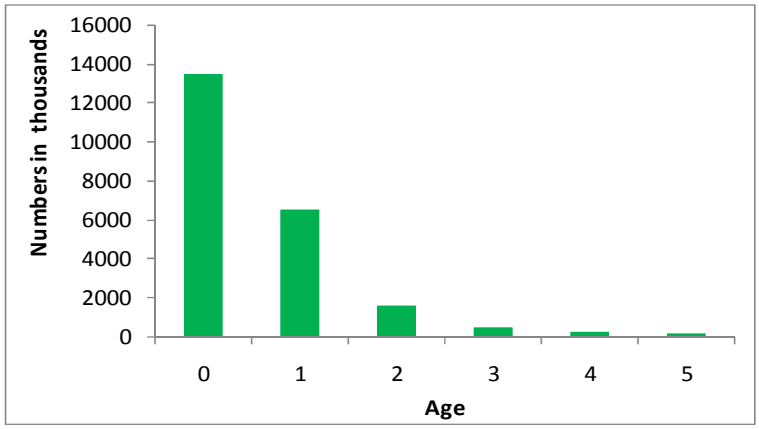
Assessment form	**Sheet A3** **Indirect methods: VPA results**

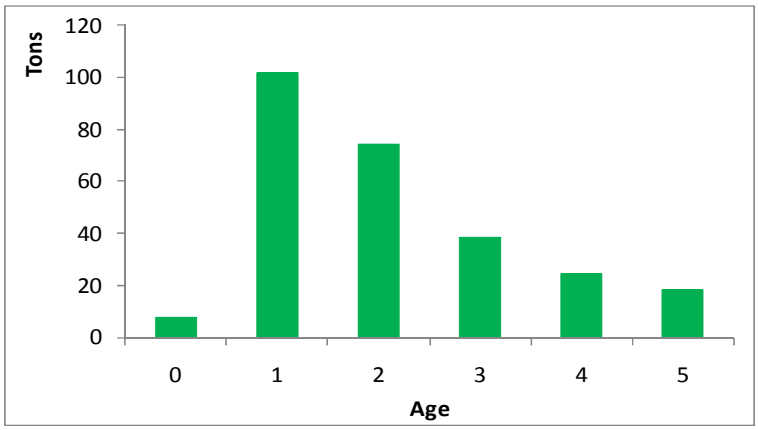
Code: MUT0709Ang

Sex*	Unsexed	Gear*	French and Spanish Trawl	Analysis #*	1

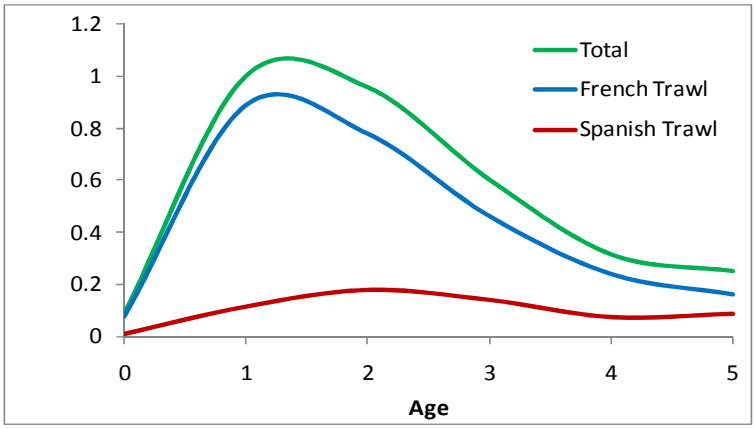
Population in figures



Population in biomass



Fishing mortality rates



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Assessment form — **Sheet Y** — **Indirect methods: Y/R**

Code: MUT0709Ang

Sex	Unsexed	Analysis #	1

# of gears	2	Software	VIT programme (Lleonart and Salat, 1992)

Parameters used

Vector F	From pseudocohort analysis
Vector M	See sheet B
Vector N	From pseudocohort analysis

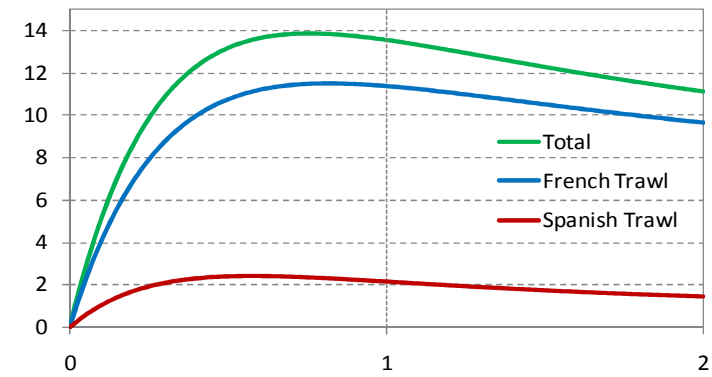
Model characteristics

From calculated mean weights (2004-2008)

Results

	Total	Gear			
		French Trawl	Spanish Trawl		
Current YR	13.54	11.39	2.15		
Maximum Y/R	13.85	11.51	2.42		
Y/R 0.1	13.34	10.93	2.41		
F_{max}	0.77	0.83	0.59		
$F_{0.1}$	0.53				
Current B/R	20.12				
Maximum B/R	39.89				
B/R 0.1	39.89				

Comments



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Assessment form	**Sheet D Diagnosis**

Code: MUT0709Ang

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B					
SSB					
F					
Y					
CPUE					

Stock Status* Use one (or both) of the following two systems for the stock assessment status description

Unidimensional

☐	? - (or blank) **Not known or uncertain**. Not much information is available to make a judgment;
☐	U - **Underexploited, undeveloped or new fishery**. Believed to have a significant potential for expansion in total production;
☐	M - **Moderately exploited**, exploited with a low level of fishing effort. Believed to have some limited potential for expansion in total production;
☉	F - **Fully exploited**. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion;
☐	O - **Overexploited**. The fishery is being exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse;
☐	D - **Depleted**. Catches are well below historical levels, irrespective of the amount of fishing effort exerted;
☐	R - **Recovering**. Catches are again increasing after having been depleted or a collapse from a previous;

Bidimensional

Exploitation rate

☐	No or low fishing
☉	Moderate fishing
☐	High fishing mortality
☐	Uncertain / Not assessed

Stock abundance

☐	Virgin or high abundance
☉	Intermediate abundance
☐	Low abundance

☐	Depleted
☐	Uncertain / Not assessed

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Assessment form	**Sheet Z** **Objectives and recommendations**

Code: MUT0709Ang

Management advice and recommendations*

Not to increase the fishing effort.

Advice for scientific research*

To improve the biological and growth parameters