

SAC GFCM Sub-Committee on Stock Assessment

Date*

6	July	2010
---	------	------

Code*

MUT0710Ang

Authors*

Angélique Jadaud*, Antoni Quetglas**, Beatriz Guijarro**, Henri Farrugio* and Enric Massutí*
--

Affiliation*

(*) IFREMER, 1 rue Jean Monnet, BP 171, 34203 Sète (France); (**) IEO- Centre Oceanogràfic de les Balears, Moll de Ponent s/n, 07015 Palma de Mallorca (Spain)
--

Species Scientific name*

1	<i>Mullus barbatus</i> - <i>MUT</i> 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	

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form	Sheet #0
Basic data on the assessment	

Code: MUT0710Ang

Date*	6	Jul	2010	Authors*	Angélique Jadaud*, Antoni Quetglas**, Beatriz Guijarro**, 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*	2004-2009
------	--------------------	-----------------	-----------

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 (Leonart & 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	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-Rodríguez 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.

Leonart 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.

Comments bibliography etc

Comments, Biography, etc.

A large, empty rectangular box with a thin black border, intended for handwritten or typed notes, comments, or a biography.

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet B
Biology of the species

Code: MUT0710Ang

Biology

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

		Units	Sex			
			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 |

A large, empty rectangular box with a thin black border, intended for entering comments.

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P1

General information about the fishery

Code: MUT0710Ang

Data source*	IFREMER, IEO and French and Spanish official data	Year (s)*	2004-2009
Data aggregation (by year, average figures between years, etc.)*		Average 2004-2009	

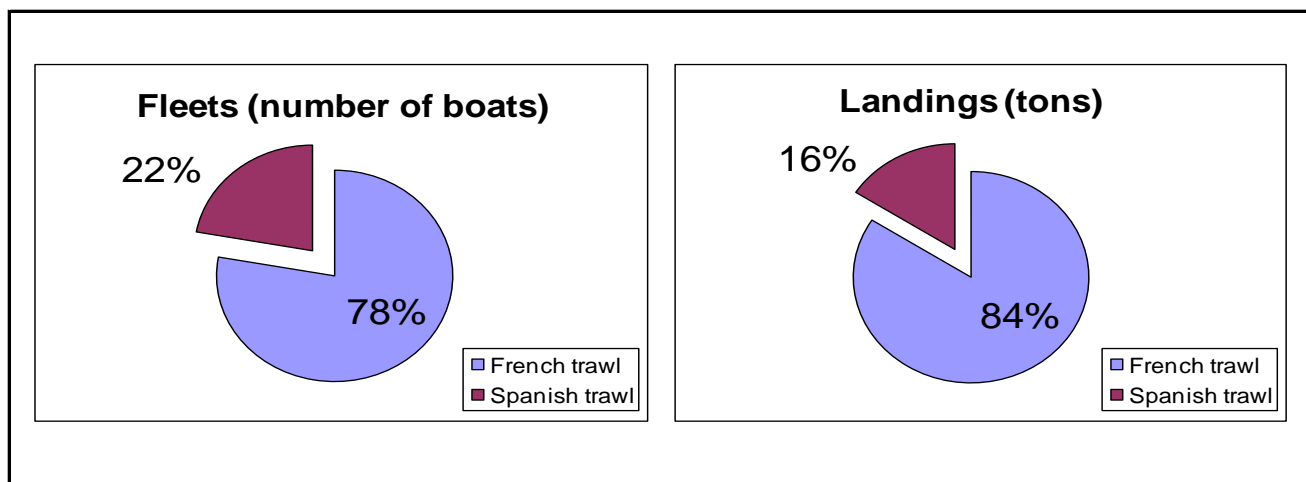
Fleet and catches (please state units)

	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	FRA	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	109	Tons	148	D. labrax, Pagellu	No		days
FRA 07 E 03 33 - MUT	31	Tons	28	Pagellus spp., M	No		days
Total	140		176				

Legal minimum size	11 cm total length
--------------------	--------------------

Comments



Comments

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2a
Fishery by Operational Unit

Code: MUT0710Ang

Page 1 / 2

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

Time series

Year*	2004	2005	2006	2007	2008	2009
Catch	151	148	183	172	111	120
Minimum size	7	7	9	7	8	8
Average size Lc	13.5	14.0	13.8	14.1	15.2	13.9
Maximum size	25	29	24	24	25	26
Fleet	121	114	111	101	86	80

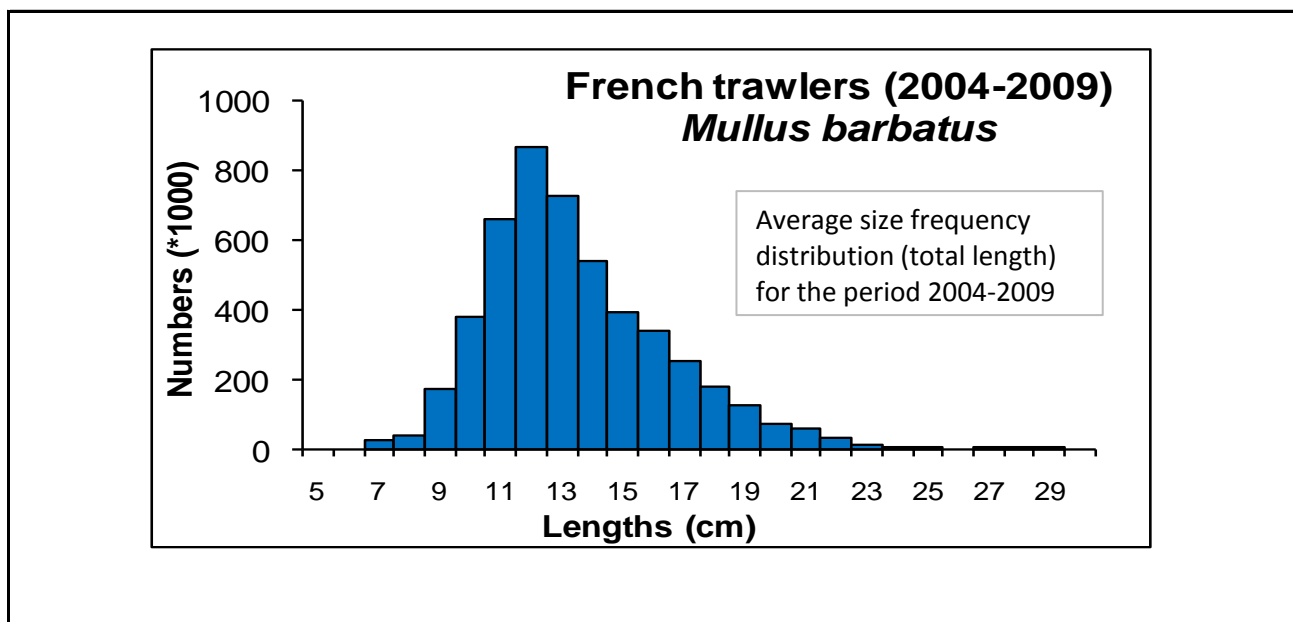
Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

Remarks

L25	6.9	Parameters for 40 mm diamond mesh in the cod-end From García-Rodríguez and Fernández (2005) from GSA 06 (Northern Spain).
L50	7.8	
L75	8.9	
Selection factor	1.95	

Structure by size or age



Structure by size or age

A large, empty rectangular box with a thin black border, occupying most of the page. It is intended for a drawing or diagram related to the section header 'Structure by size or age'.

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2a
Fishery by Operational Unit

Code: MUT0710Ang

Page 2 / 2

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

Time series

Year*	2004	2005	2006	2007	2008	2009
Catch	26	28	33	37	21	26
Minimum size	7	8	5	9	9	5
Average size Lc	13.4	14.7	14.2	15.2	16.4	14.5
Maximum size	26	29	29	27	28	26
Fleet	33	37	29	24	27	33

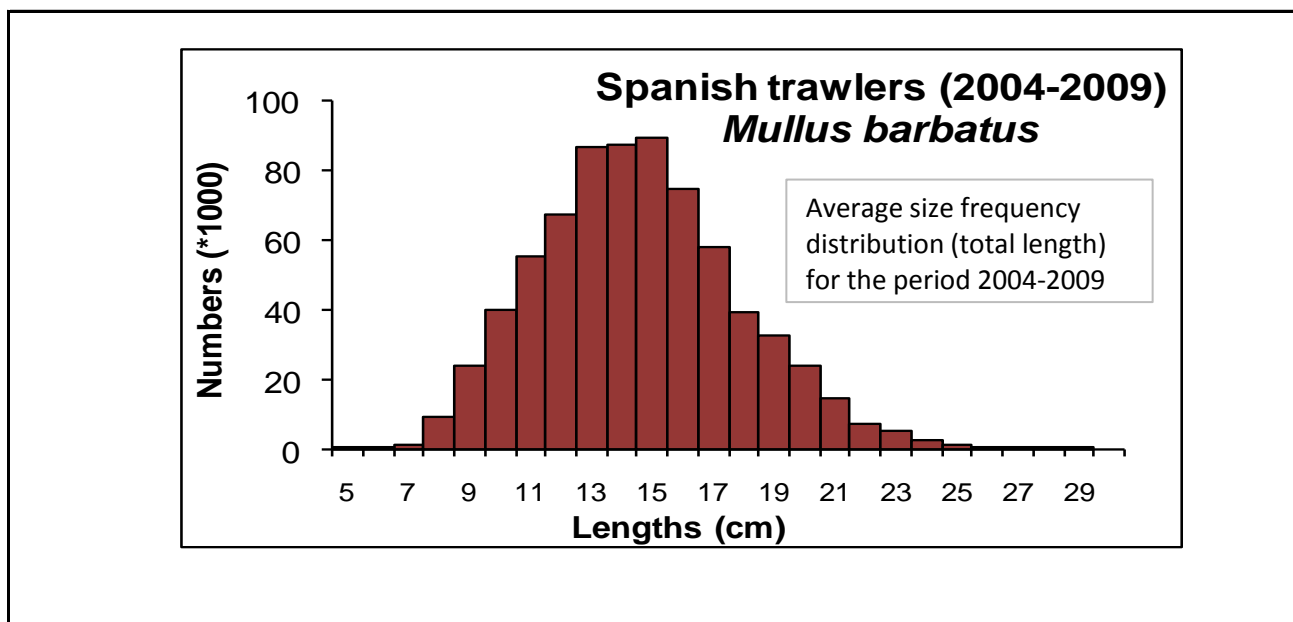
Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

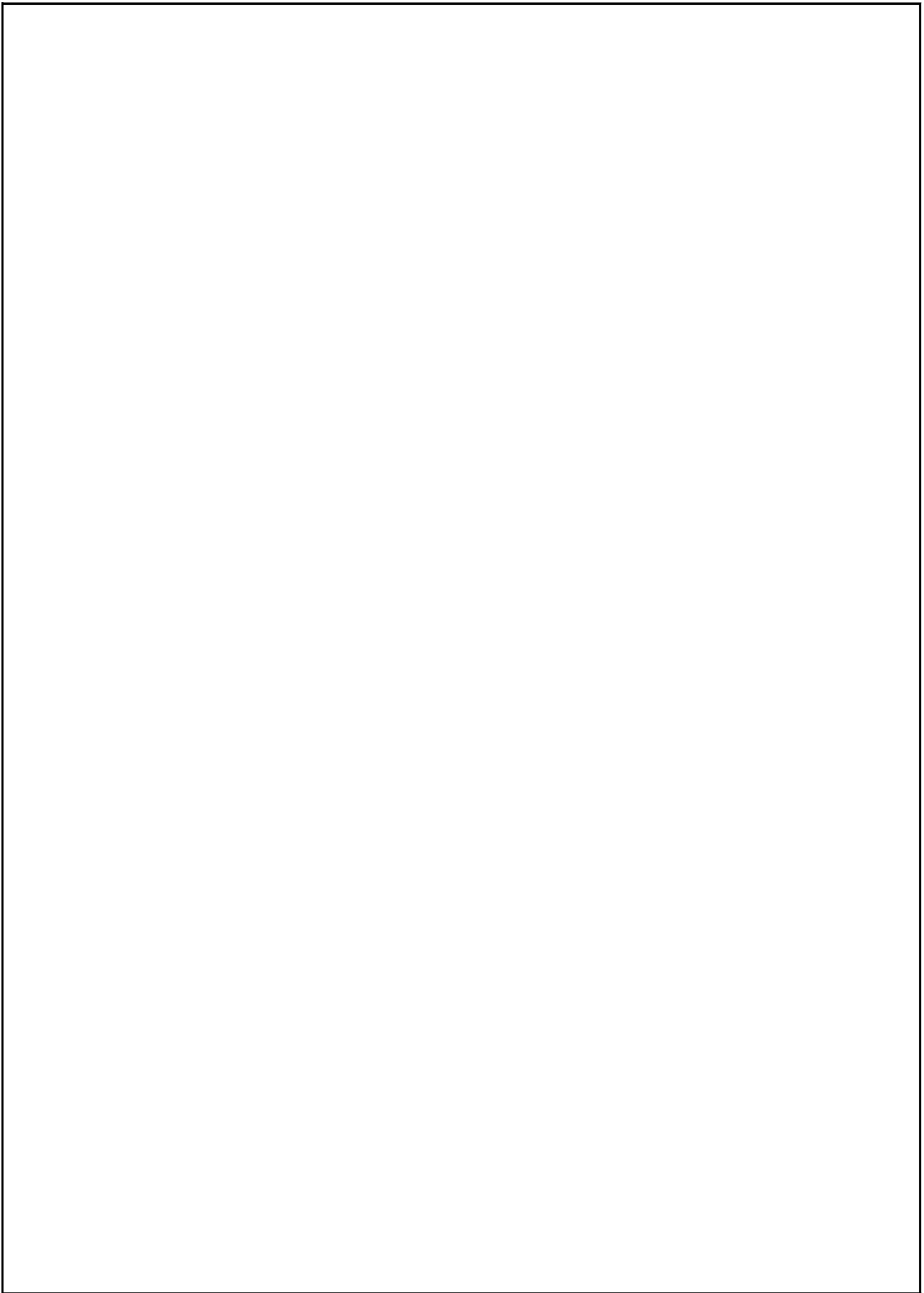
Selectivity

Remarks

L25	6.9	Parameters for 40 mm diamond mesh in the cod-end From García-Rodríguez and Fernández (2005) from GSA 06 (Northern Spain).
L50	7.8	
L75	8.9	
Selection factor	1.95	

Structure by size or age



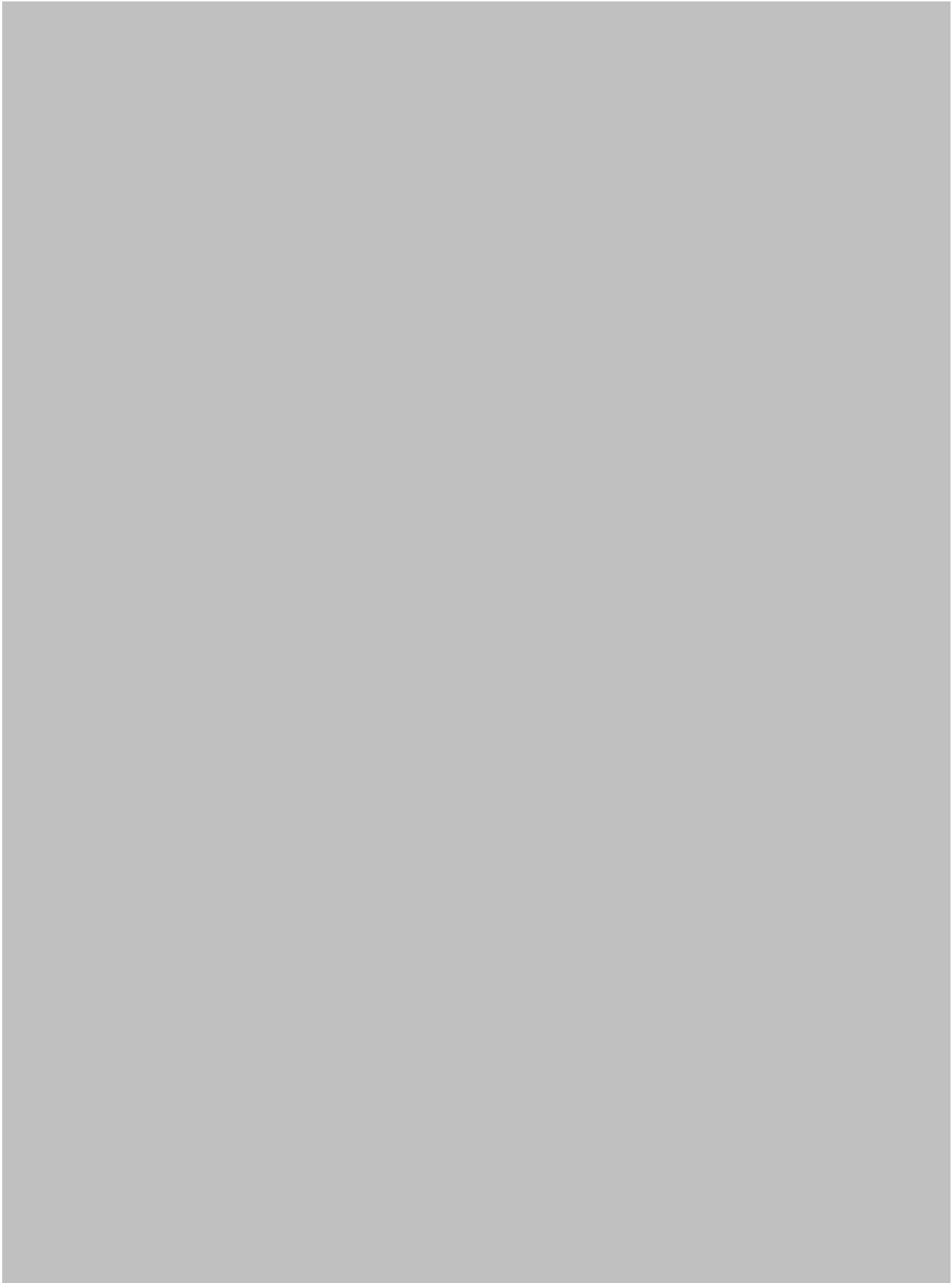


SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2a
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in Code: MUT0710Ang



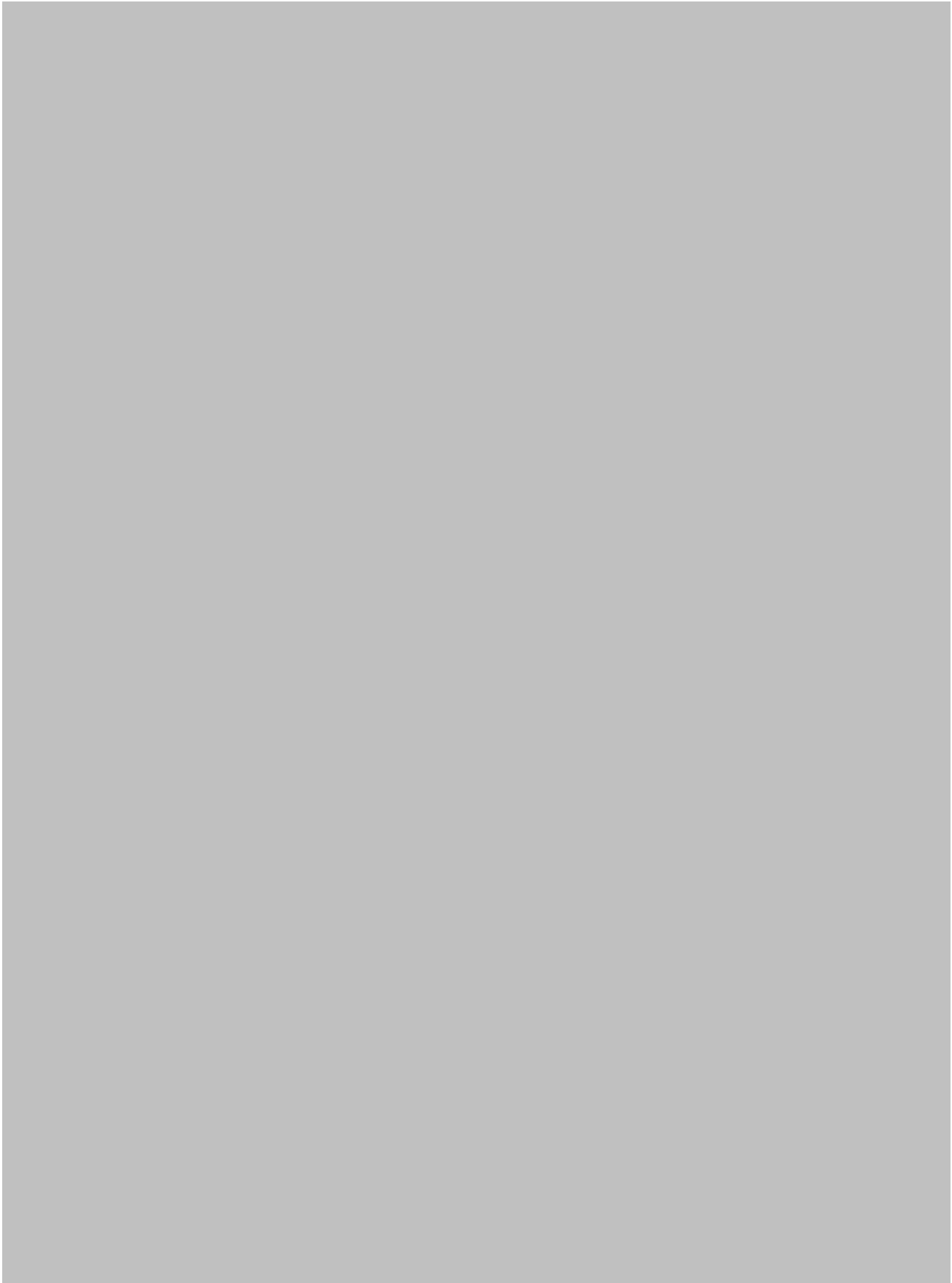


SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2a
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in Code: MUT0710Ang





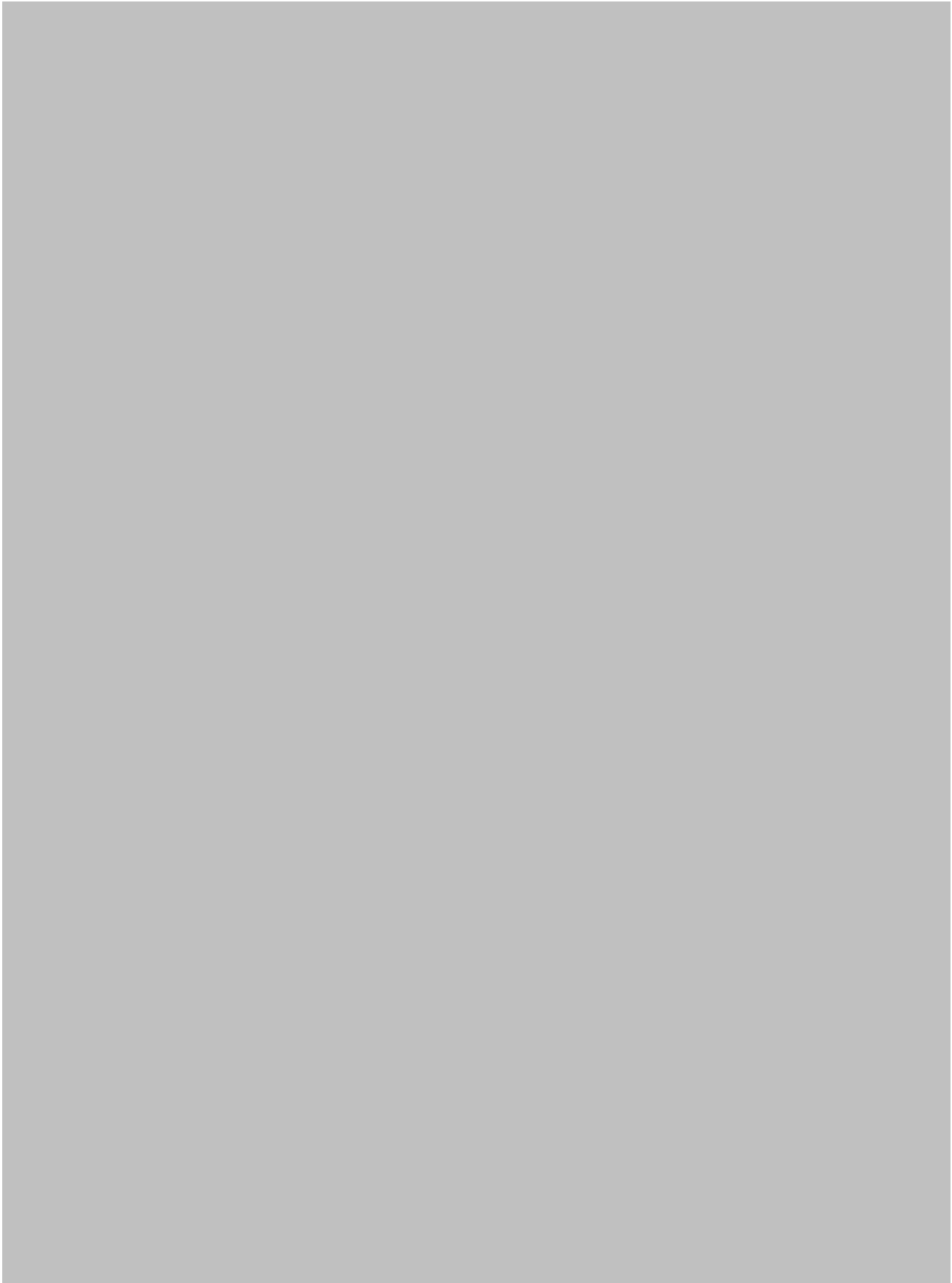
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2a
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in

Code: MUT0710Ang





SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2b
Fishery by Operational Unit

Code: MUT0710Ang

Page 1 / 2

Data source* IFREMER

OpUnit 1* FRA 07 E 03 33 - MUT

Regulations in force and degree of observance of regulations

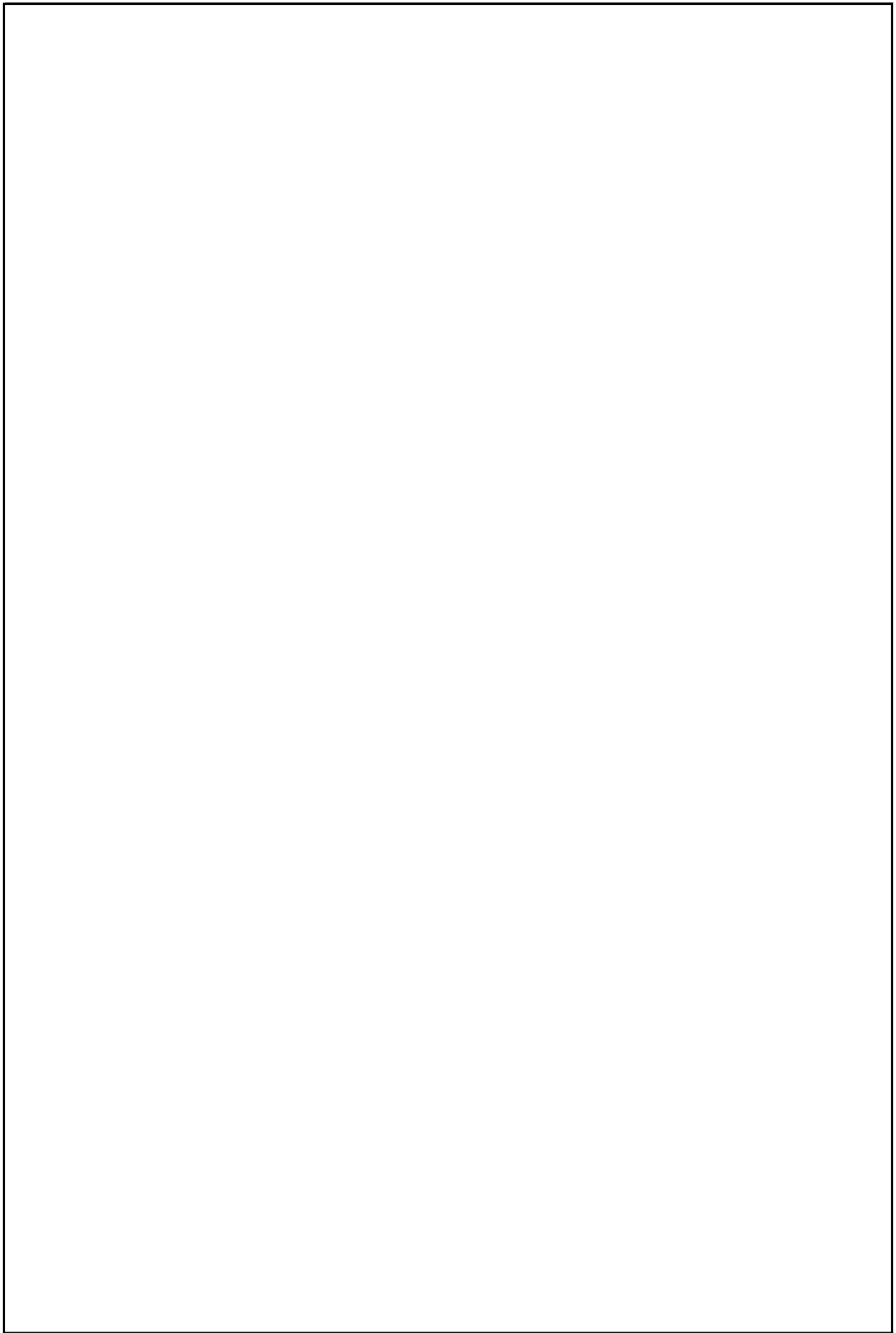
- Fishing license: fully observed
- Engine power limited to 316 KW or 500 CV: not observed
- Cod-end mesh size (bottom trawl: 40 mm; pelagic trawl: 20 mm): not fully observed
- Fishing forbidden within 3 miles (France): not fully observed

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

...



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2b
Fishery by Operational Unit

Code: MUT0710Ang

Page 2 / 2

Data source* IEO

OpUnit 2* 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
- 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

...

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2b
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in

Code: MUT0710Ang



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2b
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in

Code: MUT0710Ang



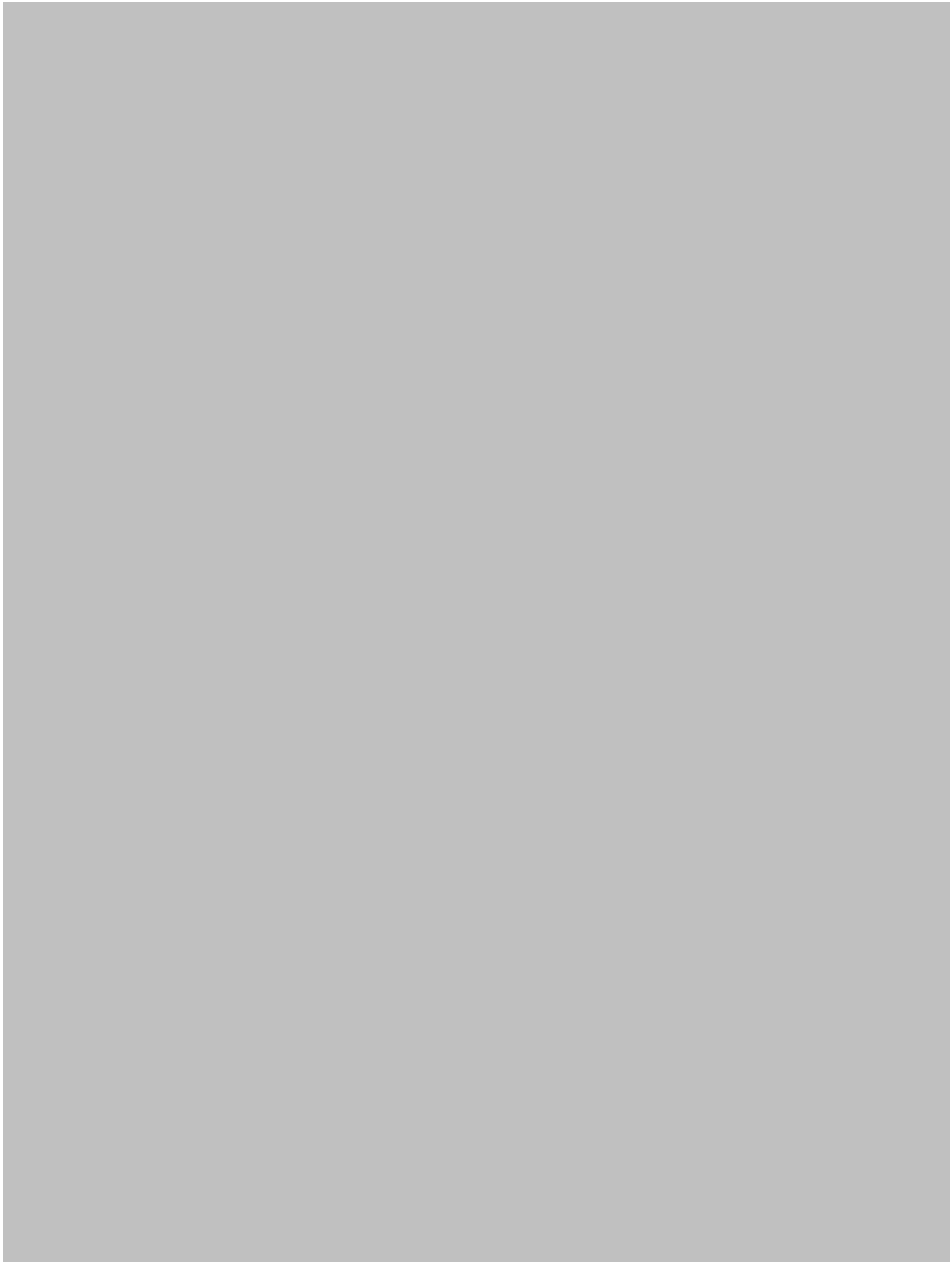
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P2b
Fishery by Operational Unit

This sheet will be activated once the Operational Unit information (P1 section) will be successfully filled in

Code: MUT0710Ang



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: MUT0710Ang

Page 1 / 1

Sex* Unsexed

Analysis # * 1

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Catch equation	Tuning method	No tuning
# of gears	2	Software	VIT (Leonart and Salat, 1992)
$F_{terminal}$	0.526		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	13	48.9
Average	9.9	0.9	Average population	21.2	229.1
Maximum			Virgin population		1130.9
Critical	11.3	1	Turnover		116.3
				SSB	81.9
				millions	tons

Average mortality

	Total	Gear			
		French Trawl	Spanish Trawl		
F_1	0.698	0.567	0.131		
F_2	0.389	0.335	0.053		
Z	0.948				

(F_1 and F_2 represent different possible calculations. Please state them)

Comments

Biomass at the beginning of the year:
 Recalculated Total Biomass= $N_{initial} * W_{mean} = 389$ t
 Recalculated Recruitment Biomass= $N_{initial} * W_{mean} = 69.2$ t

$B_{now}/B_{virgin}(\%) = 20.3\%$

$F_1 = \text{mean } F$
 $F_2 = \text{global } F$
 $Z = M + F_1$

Code: MUT0710Ang
Page 2 / 1

Sex*

Analysis # *

Time series

Data	Size	Age
(mark with X)	<input type="checkbox"/>	<input type="checkbox"/>

Model	Cohorts	Pseudocohorts
(mark with X)	<input type="checkbox"/>	<input type="checkbox"/>

Equation used	Tunig method
# of gears	Software
F _{terminal}	

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum	<input type="checkbox"/>	<input type="checkbox"/>	Recruitment	<input type="checkbox"/>	<input type="checkbox"/>
Average	<input type="checkbox"/>	<input type="checkbox"/>	Average population	<input type="checkbox"/>	<input type="checkbox"/>
Maximum	<input type="checkbox"/>	<input type="checkbox"/>	Virgin population	<input type="checkbox"/>	<input type="checkbox"/>
Critical	<input type="checkbox"/>	<input type="checkbox"/>	Turnover	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

Average mortality

	Total	Gear				
F ₁	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F ₂	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Z	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Comments

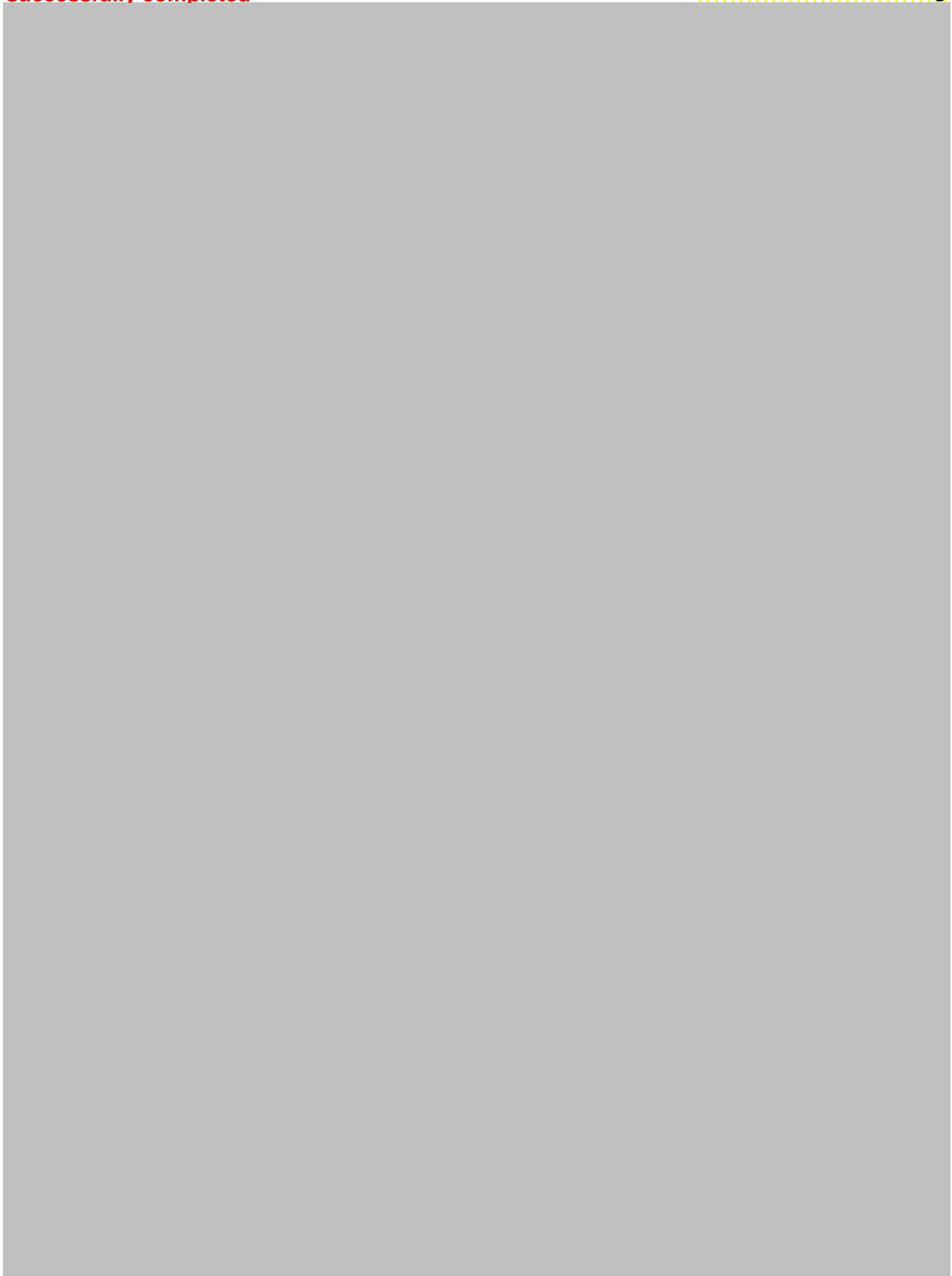
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A1
Indirect methods: VPA, LCA

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



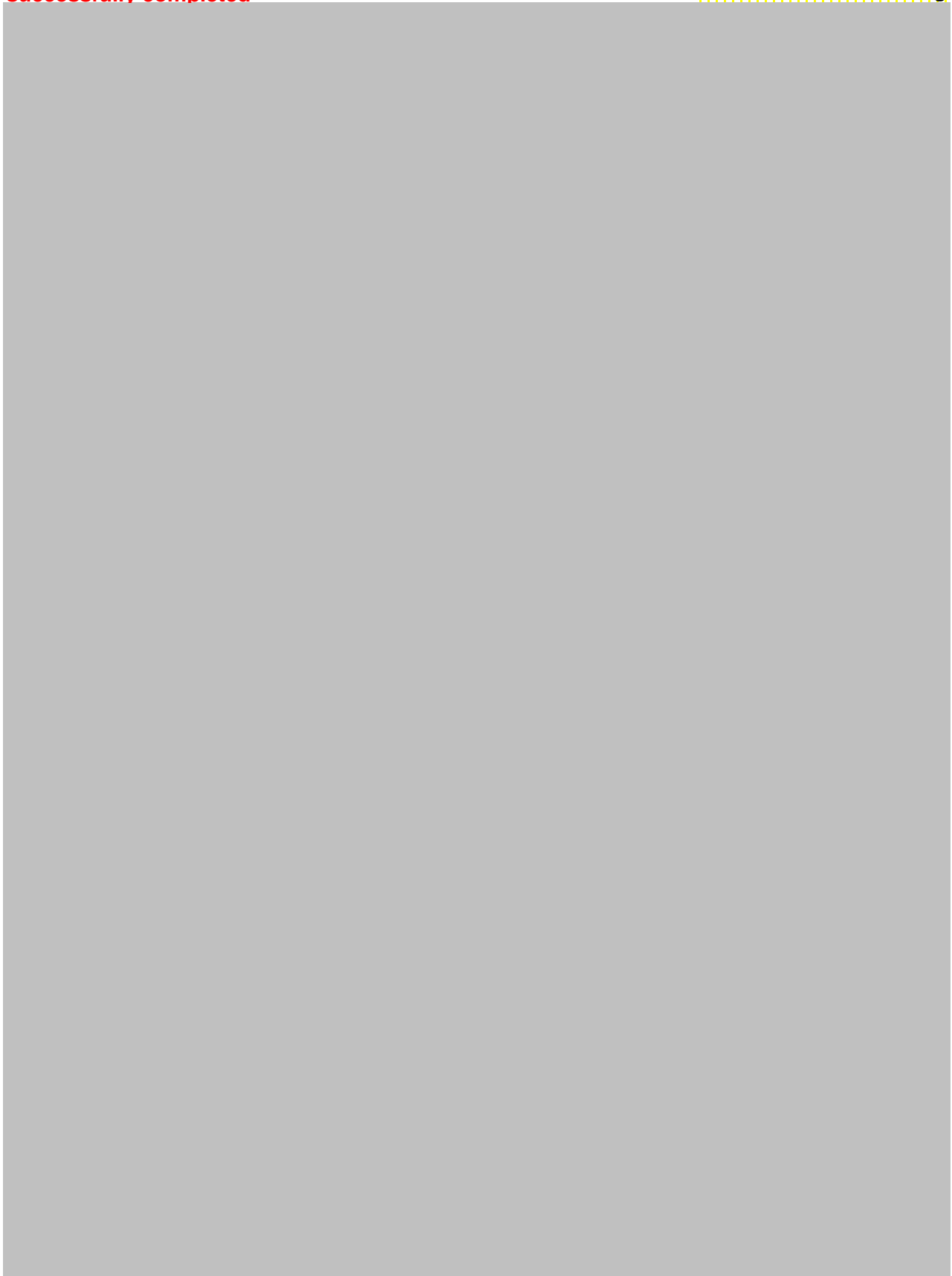
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A1
Indirect methods: VPA, LCA

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

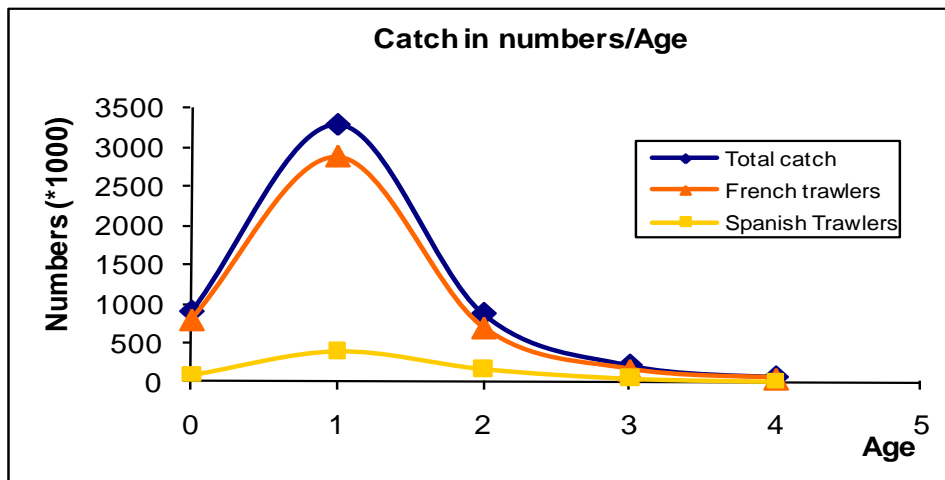
Sheet A2
Indirect methods: data

Code: MUT0710Ang

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

Data source Catch number by age

Data



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

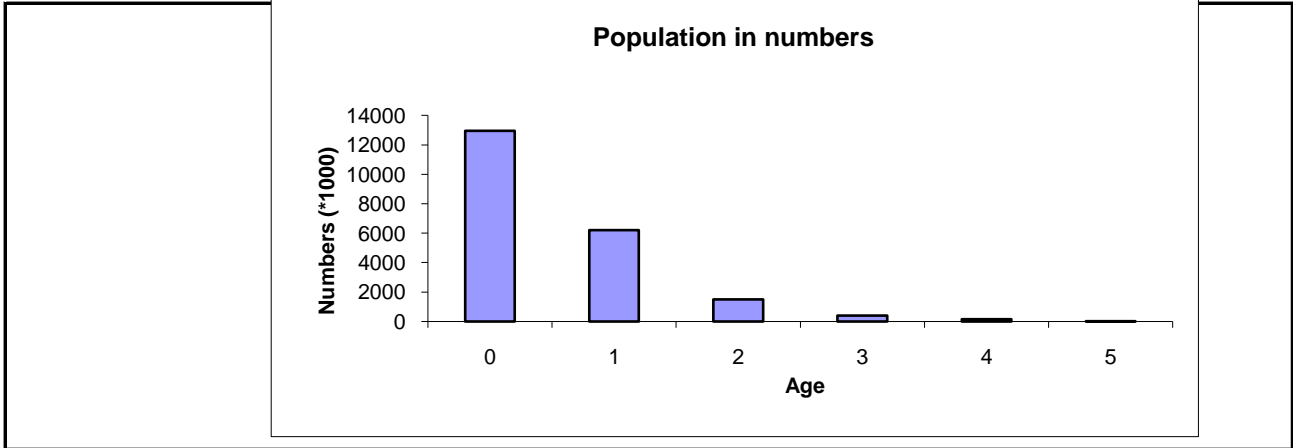
Sheet A3
Indirect methods: VPA results

Code: MUT0710Ang

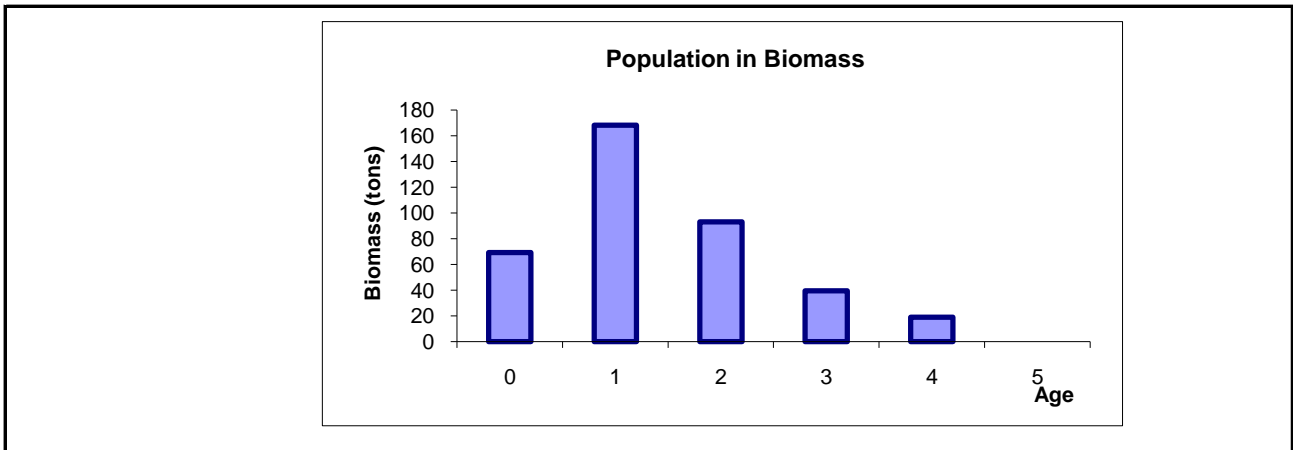
Page 1 / 1

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

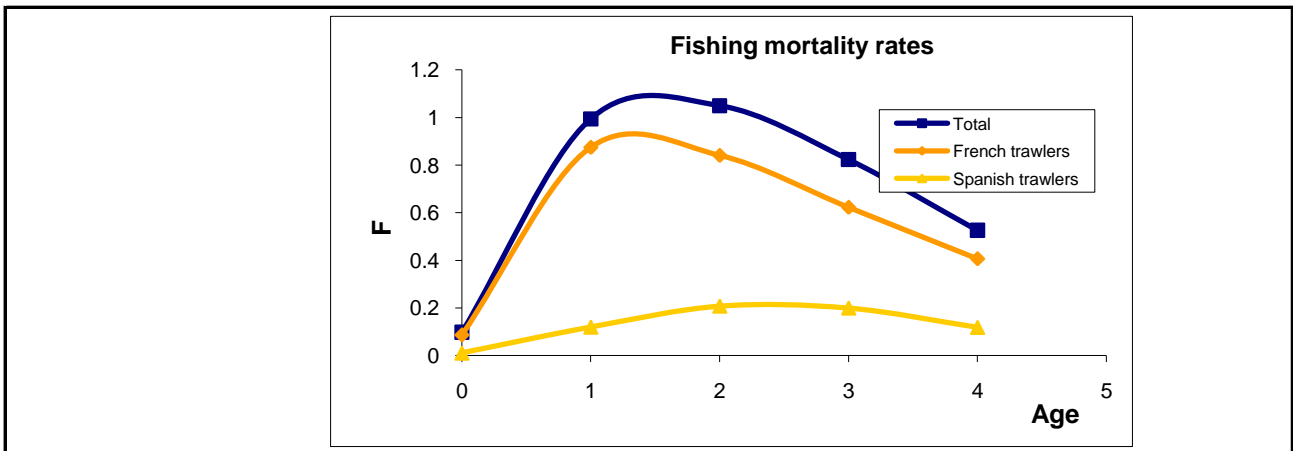
Population in figures



Population in biomass



Fishing mortality rates



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A3
Indirect methods: VPA results

Code: MUT0710Ang

Page 2 / 1

Sex*

Gear*

Analysis #*

Population in figures

--

Population in biomass

--

Fishing mortality rates

--

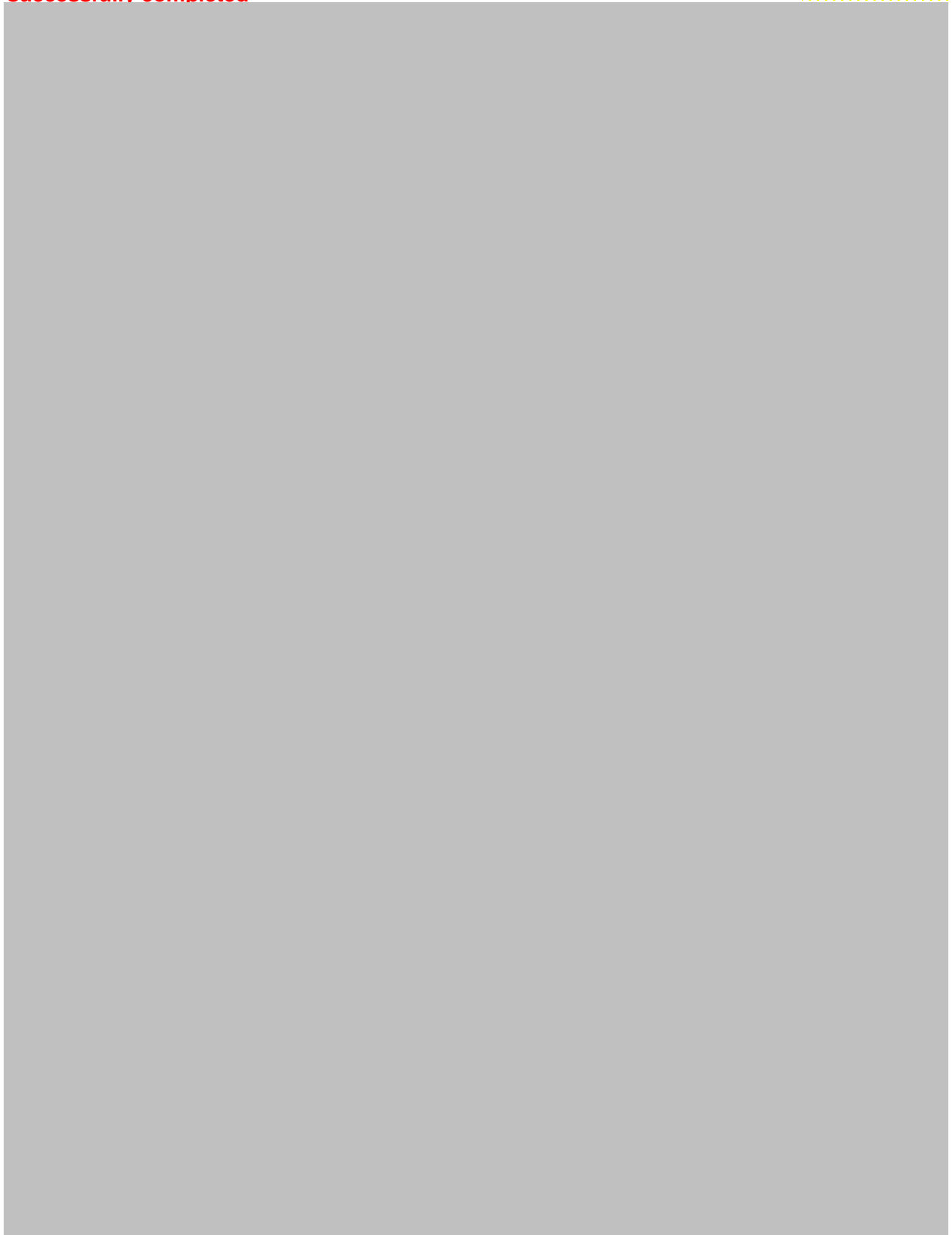
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A3
Indirect methods: VPA results

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



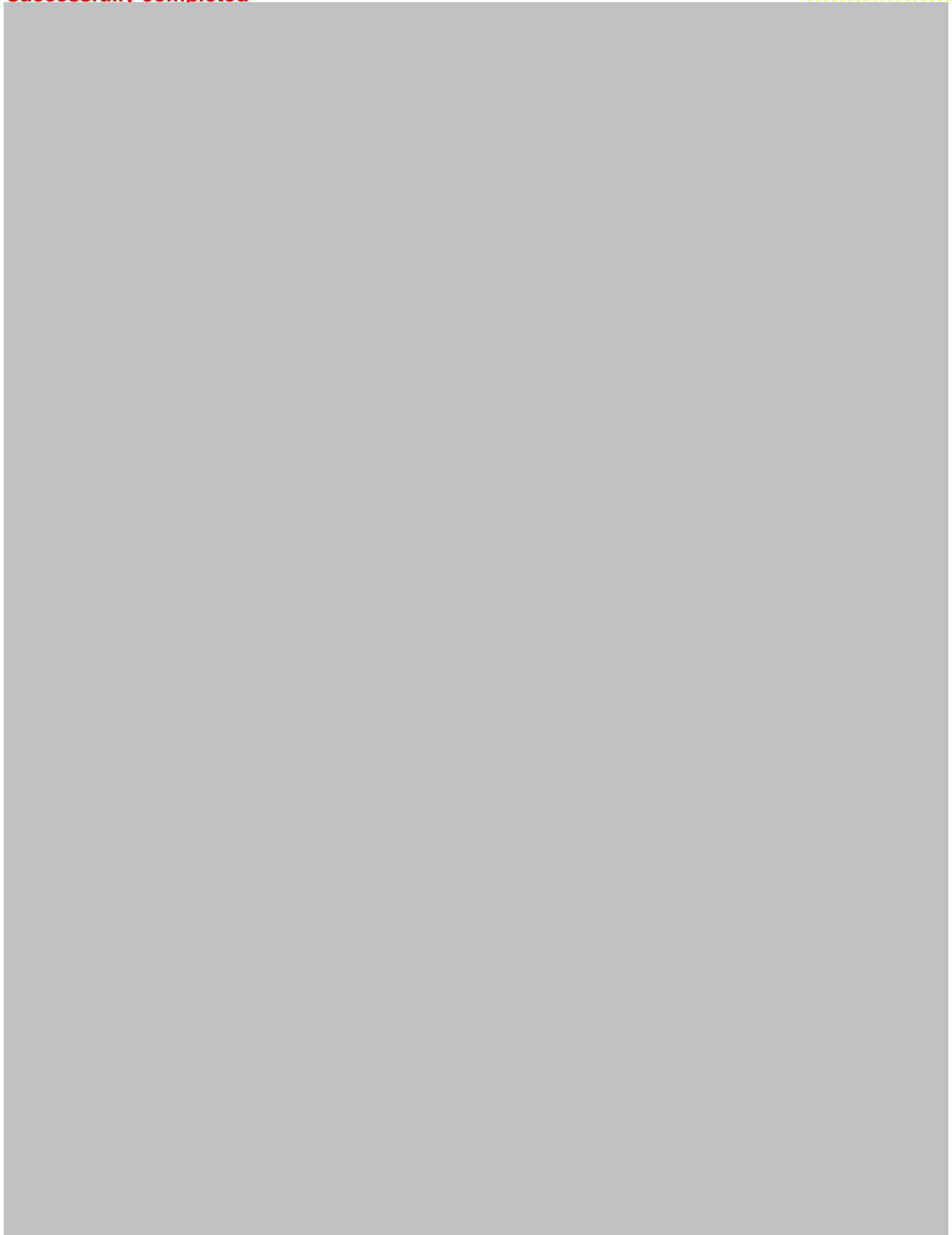
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A3
Indirect methods: VPA results

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form Sheet Y
Indirect methods: Y/R

Code: MUT0710Ang

Sex Unsexed

Analysis #

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

Parameters used

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

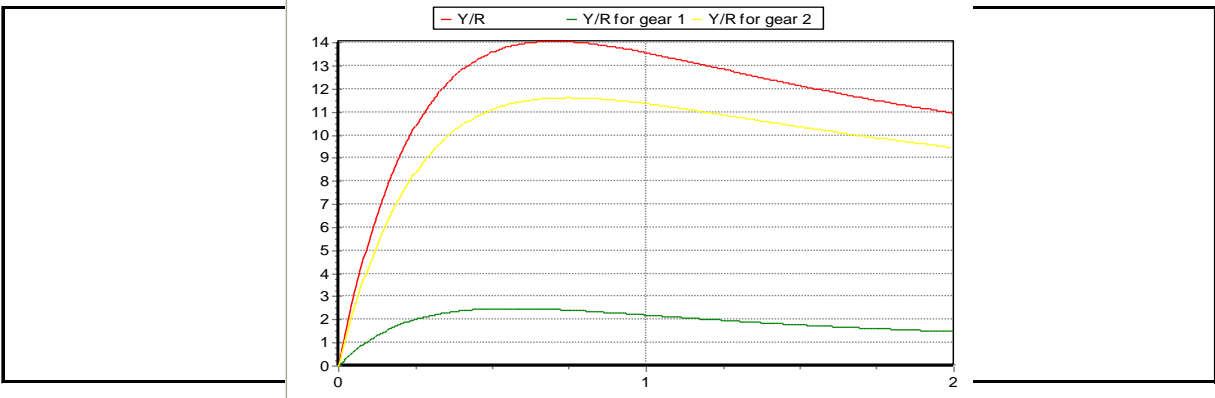
Model characteristics

From calculated mean weights (2004-2009)

Results

	Total	Gear			
		French Trawl	Spanish Trawl		
Current Y/R	13.58	11.37	2.21		
Maximum Y/R	14.06	11.61	2.45		
Y/R 0.1	13.85	11.36	2.49		
F _{max}	0.7	0.76	0.71		
F _{0.1}	0.57				
Current B/R	17.67				
Maximum B/R	23.71				
B/R 0.1	31.01				

Comments



Comments

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet other

Code: MUT0710Ang

Page 1 / 1

Other assessment methods

Sensitive analysis was performed. Changings of K and F by 20% +/- have impact on the Y/R, B and SSB especially with an higher K.

Parameters	0.2	Y/R	Biomass	SSB	Y/R G. 1	Y/R G. 2
'00000000'	current	13.58	17.68	6.32	2.21	11.37
'0-0000-00'	K- Fterm-	8.79	11.86	4.81	1.46	7.33
'0-0000+00'	K- Fterm+	8.91	10.97	4.11	1.48	7.43
'0+0000-00'	K+ Fterm-	18.46	25.66	8.89	2.95	15.51
'0+0000+00'	K+ Fterm+	18.73	24.13	7.72	2.99	15.74

Transition analysis was performed and didn't show any significant change on the Y/R when reducing the current F. This is due to the fact that the Y/R max (14.06) is not very far from the current Y/R (13.58).

Other assessment methods

[Empty rectangular box for text entry]

[Empty rectangular box for text entry]

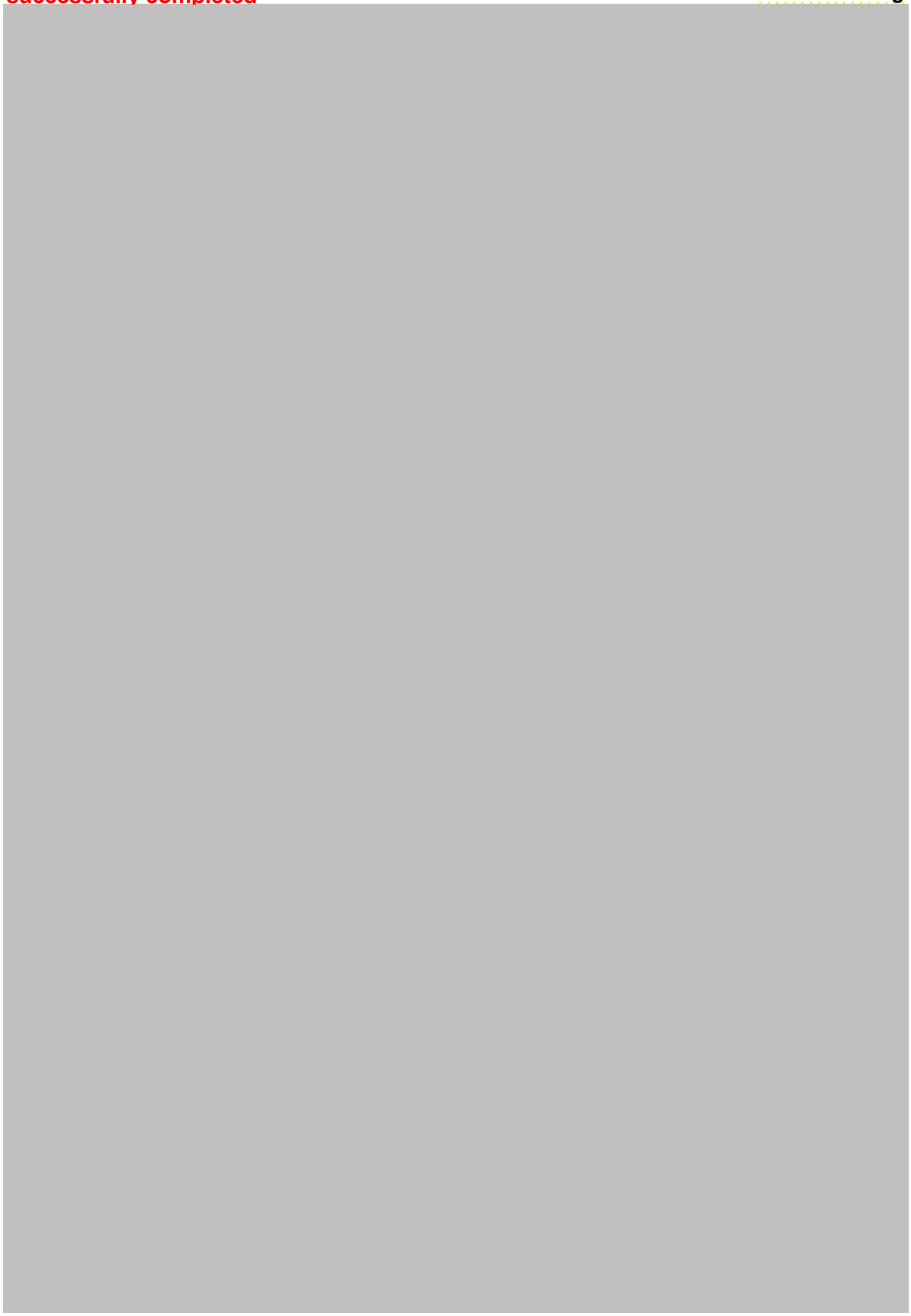
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet other

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



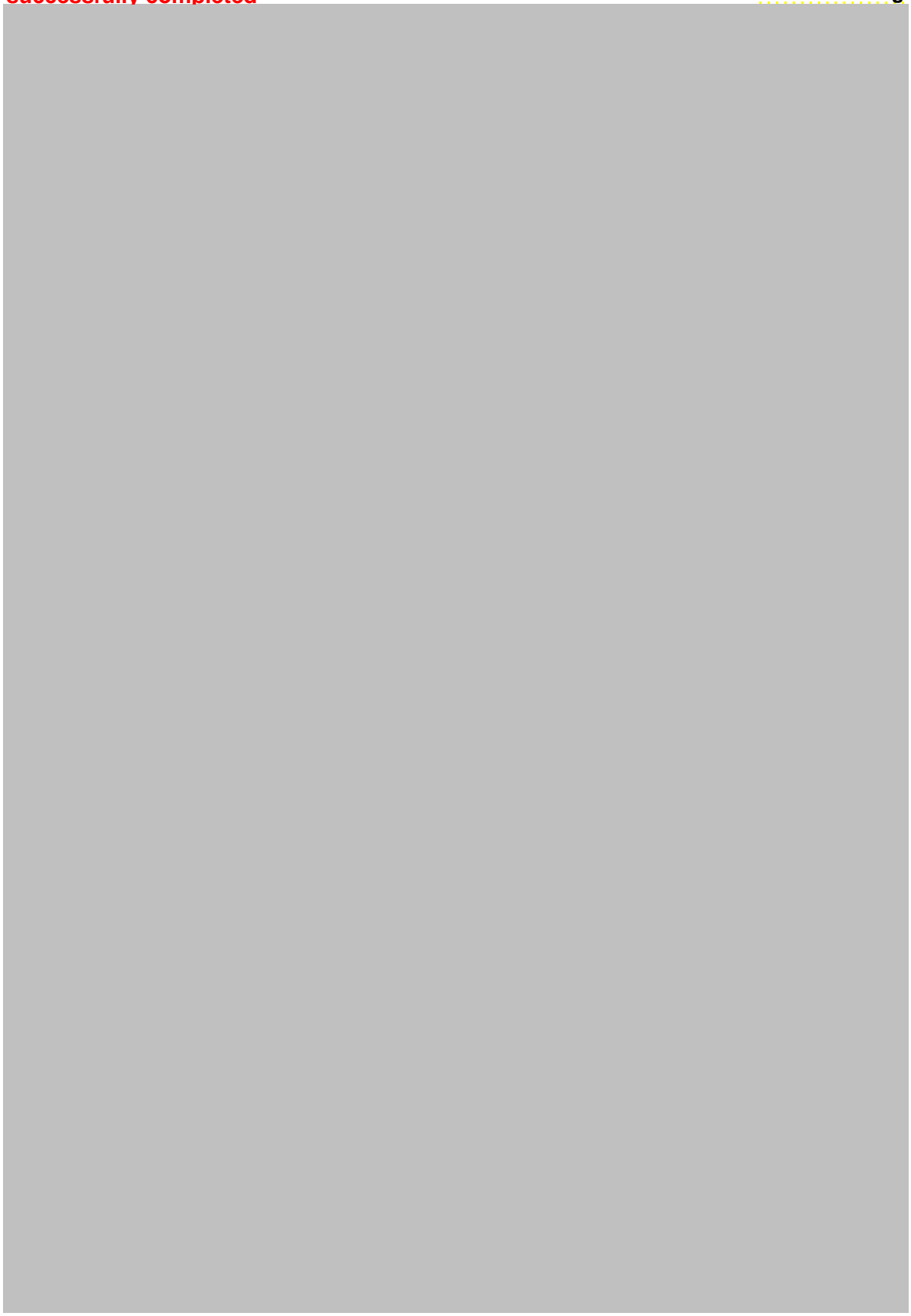
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet other

This sheet will be activated once the previous page will be successfully completed

Code: MUT0710Ang



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet D
Diagnosis

Code: MUT0710Ang

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	<input type="radio"/>	? - (or blank) Not known or uncertain. Not much information is available to make a judgment;
	<input type="radio"/>	U - Underexploited, undeveloped or new fishery. Believed to have a significant potential for expansion in total production;
	<input type="radio"/>	M - Moderately exploited, exploited with a low level of fishing effort. Believed to have some limited potential for expansion in total production;
	<input type="radio"/>	F - Fully exploited. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion;
	<input checked="" type="radio"/>	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;
	<input type="radio"/>	D - Depleted. Catches are well below historical levels, irrespective of the amount of fishing effort exerted;
	<input type="radio"/>	R - Recovering. Catches are again increasing after having been depleted or a collapse from a previous;

Bidimensional	Exploitation rate		Stock abundance	
	<input type="radio"/>	No or low fishing	<input type="radio"/>	Virgin or high abundance
	<input checked="" type="radio"/>	Moderate fishing	<input checked="" type="radio"/>	Intermediate abundance
	<input type="radio"/>	High fishing mortality	<input type="radio"/>	Depleted
	<input type="radio"/>	Uncertain / Not assessed	<input type="radio"/>	Uncertain / Not assessed

Comments

Slightly overexploited (current F has to be reduced by 30% to reach the Fmax and by about 40% to reach the F0.1) with no risk of stock depletion or collapse.

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet Z
Objectives and recommendations

Code: MUT0710Ang

Management advice and recommendations*

Current F has to be reduced by 30% to reach F_{max} and by about 40% to reach $F_{0.1}$.

Advice for scientific research*

ADVICE FOR SCIENTIFIC RESEARCH

To improve the biological and growth parameters.
We also reiterate the importance of VMS as a valuable source of data for having precise informations on effort distribution.

Abstract for SCSA reporting

Authors Angélique Jadaud*, Antoni Quetglas**, Beatriz Guijarro**, Henri Farrugio* and Enric Massutí* **Year** 2010

Species Scientific name Mullus barbatus - MUT
Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 07 - Gulf of Lions

Fisheries (brief description of the fishery)*

In the Gulf of Lions (GFCM-GSA07, red mullet (*Mullus barbatus*) is exploited by both French and Spanish trawlers. Around 120 boats are involved in this fishery. According to official statistics, total annual landings for the period 2004-2009 have oscillated around a mean value of 193 tons. Most boats and catches correspond to the French trawling fleet (77% and 86% respectively). In French and Spanish landings, modal lengths are 13 and 14 cm, respectively.

In GSA 7, the trawl fishery is a multi-specific fishery. In addition to *M. barbatus*, the following species can be considered important by-catches: *Merluccius merluccius*, *Lophius* sp., *Pagellus* sp., *Trachurus* sp., *Mullus surmuletus*, *Octopus vulgaris*, *Eledone* sp., *Scyliorhinus canicula*, *Trachinus* sp., *Triglidae*, *Scorpaena* sp.

Length at first capture is about 7 cm. Catch is mainly composed by individuals of age 0 and 1, while the oldest age class (5+ group) is poorly represented. Catch rates decreased a little along the analyzed period. The number of French boats decreased also about 30 % during that period.

Source of management advice*

(brief description of material -data- and methods used for the assessment)

The assessment of this stock has been carried out by means of VPA (VIT) on a mean pseudo-cohort for the period 2004-2009, considering French and Spanish trawl and yield-per-recruit (Y/R). VPAs were also performed for each year of the period, in order to have a first approach of the temporal trends of the results. Since no exceptional year was observed in the time series, results based on the mean pseudo-cohort are the base for the diagnostics and recommendation. The information used for the assessment of the stock consisted in annual size composition of French and Spanish trawler landings and biological parameters used by the EU SGMED-08-03 Subgroup on the Mediterranean (June 2008). A vector of natural mortality by age was calculated from Caddy's formula, using the PROBIOM Excel spreadsheet (Abella et al., 1997).

Stock Status*

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;

Exploitation rate

Moderate fishing mortality

Stock abundance

Intermediate abundance

Comments

Management advice and recommendations*

Area for management advice and recommendations, marked with a light blue dotted background.

Advice for scientific research*

1. Identify the research question or hypothesis.

2. Review the literature to understand the current state of knowledge.

3. Design a study that is valid and reliable.

4. Collect and analyze data.

5. Interpret the results and draw conclusions.

6. Communicate the findings to the scientific community.