



GENERAL FISHERIES COMMISSION FOR  
THE MEDITERRANEAN  
COMMISSION GÉNÉRALE DES PÊCHES  
POUR LA MÉDITERRANÉE



**SAC GFCM**  
**Sub-Committee on Stock Assessment**

**SCSA Assessment Forms**



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

### PLEASE READ CAREFULLY BEFORE STARTING THE DATA ENTRY

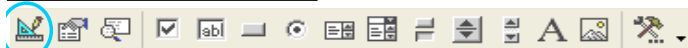
#### Macro - Security settings

In order to ensure the proper full working of this Data Entry System, **the macros must be allowed to run.**

To change the security settings, please go to: **Tools --> Macro --> Security** and then select the **Medium** level. Close and re-open the file.

Now you are ready to start by clicking on the Cover button!

#### Control toolbox settings



The Design Mode button must be **OFF**.









#### Warnings

⚠ Please do not try to **Delete, Rename, Move** or **Copy** any Excel Worksheets.

⚠ Right now it is not possible to **Print** the completed worksheets only.

⚠ Once the data entry process is completed, the **file size** will be increased significantly. Before sending it by email, please compress the file by using any zip tool available in your pc.

#### Colours and symbols meaning

|  |  |                                    |
|--|--|------------------------------------|
| W<br>O<br>R<br>K<br>S<br>H<br>E<br>E<br>T<br>S | Blue Gray ▶     | Not compulsory sheet               |
|  | Pale Blue ▶     | Compulsory sheet                   |
|  | Red ▶           | Not completed sheet                |
|  | Green ▶         | Completed sheet                    |
| C<br>E<br>L<br>L<br>S                          | Black asterisk ▶ *   | Compulsory sheet/field             |
|  | Turquoise ▶     | Compulsory field not yet completed |
|  | White ▶         | Free cell                          |
|  | Light green ▶   | Cell with the scroll-down menu     |
|  | Light yellow ▶  | Auto-complete cell                 |

#### Excel shortcuts

|                    |                          |
|--------------------|--------------------------|
| <b>Ctrl + C</b>    | Copy                     |
| <b>Ctrl + V</b>    | Paste                    |
| <b>Ctrl + X</b>    | Cut                      |
| <b>Ctrl + Z</b>    | Undo                     |
| <b>Ctrl + P</b>    | Print                    |
| <b>Alt + Enter</b> | Line break within a cell |

For more detailed information about Excel shortcut and function keys, please refer to the Microsoft website.

**SAC GFCM**  
**Sub-Committee on Stock Assessment**

**SCSA Assessment Forms Release 2 (2007) beta version**

Since the SAC, and SCSA, inception (1999) a set of assessment forms were made available to scientists in order to provide a common framework to present assessments.

It has been decided to present a new release of these forms to facilitate their use. We took advantage of these upgrade to modify and amend some aspects. We would like to receive comments and suggestions from the users in order to improve the forms.

The structure of this new release is basically the same. The differences are:

- Migration from Word to Excel
- Some fields (yellow) are filled automatically
- Some sheets have been added
  - o A cover sheet with title, authors, species and GSAs
  - o A new sheet "other" allowing to include assessments based on methodologies other than the usual ones.
  - o An abstract sheet to be included (copy/paste) in the SCSA report
- It is more clear what sheets or fields are compulsory to fill
- The sheets for direct methods have not been yet upgraded

**Excerpts from the presentation of 1st version of the assessment forms (1999), however the sheet "other" can be used in such a case**

Each assessment consists of several sheets. Each assessment will take, at least, one sheet of paper numbered "0" (Sheet #0) and will also include no less than one copy of sheets "B", "P1" and "P2a" (now using the current "operational units" terminology). It is not compulsory to fill out any of the other sheets that make up this assessment form, but the person in charge is supposed to fill out some of them: otherwise no assessment is actually made. There may be more than one copy in several cases. Sheets "D" (diagnosis) and "Z" (conclusions and recommendations) should be considered as essential too.

| Sheet | Title                                    | Contents  | # of sheets                           | Priority                  |
|-------|--|---|---------------------------------------|---------------------------|
| 0     | Preliminary basic data on the assessment | Species, person in charge, date and code. All the sheets that belong to the same assessment share this code.        | 1                                     | Indispensable             |
| B     | Biology of the species                   | Biological parameters used in the analyses (it is assumed that only one set of parameters is used).                 | 1                                     | Indispensable             |
| P1    | General information about the fishery    | Catches by gear and associated fleet.   | 1 or more                             | Indispensable             |
| P2a   | Fishery by Operational Unit              | Time series for the operational in question, including structure by size (or age).                                  | At least as many as the OU numbers    | Indispensable             |
| P2b   | Fishery by Operational Unit              | Accompanying species and regulations applicable to operational unit.  | At least as many as the OU numbers    | If available              |
| G     | Indirect methods: global model           | Description of model, data, parameters and results of each analysis.  | As many as used in the analysis       | If available              |
| A1    | Indirect methods: VPA, LCA               | Description of model used and of general results of an analysis.  | As many as used in the analysis       | If available              |
| A2    | Indirect methods: data                   | Description of data used by gear for the analysis in A1.  | As many as used in the analysis by OU | If available, requires A1 |
| A3    | Indirect methods: results of VPA         | Detailed description of results by gear, structured by size or age.   | As many as used in the analysis by OU | If available, requires A1 |
| Y     | Indirect methods: Y/R                    | Description of model, data, parameters and results.   | As many as used in the analysis       | If available              |
| Other | Other assessment methods                 | Description of model, data, parameters and results of other assessment methods not included in the previous sheets. | 1                                     | If available              |
| D     | Diagnosis                                | Synthesis of results of analyses and diagnosis on the state of resources.   | 1                                     | Indispensable             |
| Z     | Objectives and recommendations           | Set the objectives to be attained and recommendations for their attainment.   | 1                                     | Indispensable             |
| C     | Comments                                 | At the option of the person in charge.  | Unspecified                           | If available              |

**SAC GFCM**  
**Sub-Committee on Stock Assessment**

---

**Date\***

|    |         |      |
|----|---------|------|
| 18 | October | 2011 |
|----|---------|------|

**Code\***

|            |
|------------|
| MUR0511Que |
|------------|

**Authors\***

|                                      |
|--------------------------------------|
| Quetglas A., Ordines F., González N. |
|--------------------------------------|

**Affiliation\***

|                                    |
|------------------------------------|
| IEO-Centre Oceanogràfic de Balears |
|------------------------------------|

**Species Scientific name\***

|                                |
|--------------------------------|
| <i>Mullus surmuletus</i> - MUR |
|--------------------------------|

Source: GFCM Priority Species

**Geographical area\***

|          |
|----------|
| Mallorca |
|----------|

**Geographical Sub-Area (GSA)\***

|                      |
|----------------------|
| 05 - Balearic Island |
|----------------------|

Combination of GSAs    

|   |  |
|---|--|
| 1 |  |
| 2 |  |
| 3 |  |

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

Assessment form

Sheet #0

Basic data on the assessment

Code: MUR0511Que

|       |    |     |      |          |                                      |
|-------|----|-----|------|----------|--------------------------------------|
| Date* | 18 | Oct | 2011 | Authors* | Quetglas A., Ordines F., González N. |
|-------|----|-----|------|----------|--------------------------------------|

|                          |                         |                      |                    |
|--------------------------|-------------------------|----------------------|--------------------|
| Species Scientific name* | Mullus surmuletus - MUR | Species common name* | Striped red mullet |
|--------------------------|-------------------------|----------------------|--------------------|

### Data Source

|      |                      |                 |           |
|------|----------------------|-----------------|-----------|
| GSA* | 05 - Balearic Island | Period of time* | 2000-2010 |
|------|----------------------|-----------------|-----------|

### Description of the analysis

|                       |  |                |  |
|-----------------------|--|----------------|--|
| Type of data*         | Size composition of commercial catches, official landings, CPUE from | Data source*   | IEO, Fishermen Association, Autonomous Government, Ministry of Fisheries |
| Method of assessment* | Tuned cohort analysis (XSA), pseudocohort analysis and yield per     | Software used* | Lowestoft (Darby and Flatman, 1994), VIT (Leonart and Salat, 1997)       |

### Sheets filled out

| B | P1  | P2a   | P2b   | G     | A1 | A2 | A3    | Y | Other | D | Z | C     |
|---|-----|-------|-------|-------|----|----|-------|---|-------|---|---|-------|
| 1 | --- | #REF! | #REF! | #REF! | 1  | 1  | #REF! | 1 | #REF! | 1 | 1 | #REF! |

### 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.

Alemany F. and F. Álvarez (2003) Determination of effective fishing effort on hake *Merluccius merluccius* in a Mediterranean trawl fishery. *Sci. Mar.*, 67(4): 491–499.

Astudillo A. y J.F. Caddy (1986) Periodicidad de los desembarcos de merluza (*Merluccius merluccius*) y salmonete (*Mullus sp. sp.*) en la Isla de Mallorca. *Int. Symp. Long Term Changes Mar Fish Pop.*, Vigo: 221–233.

Bruno J., P. Oliver, A. Astudillo, X. Pastor and E. Daroca (1979) Contribution a la connaissance de la biologie du merlu (*Merluccius merluccius* L.) et du rouget (*Mullus surmuletus* L. et *Mullus barbatus* L.). *Rapp. Comm. Int. Mer Médit.*, 25/26(10): 79–86.

Caddy, J.F., 1991. Death rates and time intervals: is there an alternative to the constant natural mortality axiom? *Rev. Fish. Biol. Fish.*, 2: 109–138.

Darby, C.D. and Flatman, S., 1994. Virtual Population Analysis: version 3.1 (Windows/DOS) user guide. *Info. Tech. Ser.*, MAFF Direct. Fish. Res., Lowestoft, n° 1, 85 pp.

Leonart J. and J. Salat (1997) VIT: Software for fishery analysis. User's manual. *FAO Computerized Information Series (Fisheries)*. N° 11. Rome, FAO, 105 pp.

Mas, X, Goñi, R, Fernández, JL (2004) Yields, bycatch and discards in the *Mullus surmuletus* gillnet fishery off southeastern Mallorca (western Mediterranean). *Rapp. Comm. int. Mer Médit.*, 37: 397.

Morales-Nin B. (1991) Parámetros biológicos del salmonete de roca *Mullus surmuletus* (L. 1758) en Mallorca. *Bol. Inst. Esp. Oceanogr.* 7: 139–147

Oliver P. (1993) Analysis of fluctuations observed in the trawl fleet landings of the Balearic Islands. *Sci. Mar.*, 57(2-3): 219–227.

Pauly, D. (1980) On the interrelationships between natural mortality, growth parameters, and mean environmental temperature in 175 fish stocks. *J. Cons. CIEM*, 39(2): 175–192.

Reñones O., E. Massutí and B. Morales-Nin (1995) Life history of the red mullet *Mullus surmuletus* from the bottom-trawl fishery off the Island of Majorca (north-west Mediterranean). *Mar. Biol.*, 123: 411-419.

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

Assessment form

Sheet B  
Biology of the species

Code: MUR0511Que

**Biology**

| Sex                    | Somatic magnitude measured (LH, LC, etc)* |     |      | Total length | Units*              | cm                |
|------------------------|---|-----|------|--------------|---------------------|-------------------|
|                        | Fem                                       | Mal | Both | Unsexed      |                     |                   |
| Maximum size observed  |   |     |      | 39(1)        | Reproduction season | Spring(4)         |
| Size at first maturity |   |     |      | 14.2(2)      | Reproduction areas  |                   |
| Recruitment size       |   |     |      | 10(3)        | Nursery areas       | Continental shelf |

**Parameters used (state units and information sources)**

| Sex                   | Unsexed   |  |  |  |  |  |  |  |
|-----------------------|---|--|--|--|--|--|--|--|
| Growth model          | on Bertalanffy  |  |  |  |  |  |  |  |
| Data source           | Otolith readings of individuals from the Balearic Islands in the framework of the Spanish Nat |  |  |  |  |  |  |  |
| $L_{\infty}$ (growth) | 40,05   |  |  |  |  |  |  |  |
| K (growth)            | 0,164   |  |  |  |  |  |  |  |
| $t_0$ (growth)        | -1,883  |  |  |  |  |  |  |  |
| length-weight         | Biological samplings of individuals from the Balearic Islands in the framework of the Spanis  |  |  |  |  |  |  |  |
| a (length-weight)     | 0,0084  |  |  |  |  |  |  |  |
| b (length-weight)     | 3,118   |  |  |  |  |  |  |  |
| sex ratio             |   |  |  |  |  |  |  |  |
| M                     | Vector of M at age(5)   |  |  |  |  |  |  |  |

**Comments**





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

Assessment form

Sheet P1

General information about the fishery

Code: MUR0511Que

|  |   |           |           |
|--|---|-----------|-----------|
| Data source*   | Size composition of trawl and small-scale catches: IE | Year (s)* | 2000-2010 |
| Data aggregation (by year, average figures between years, etc.)* | By year for XSA                                       |           |           |

### Fleet and catches (please state units)

|                     | Country | GSA | Fleet Segment                            | Gear Class                        | Group of Target Species       |
|---------------------|---------|-----|--|-----------------------------------|-------------------------------|
| Operational Unit 1* | ESP     | 05  | E - Trawl (12-24 metres)                 | 03 - Trawls                       | 33 - Demersal inshore species |
| Operational Unit 2  | ESP     | 05  | C - Minor gear with engine (6-12 metres) | 07 - Gillnets and Entangling Nets | 33 - Demersal inshore species |
| Operational Unit 3  |         |     |  |                                   |                               |
| Operational Unit 4  |         |     |  |                                   |                               |
| Operational Unit 5  |         |     |  |                                   |                               |

| Operational Units* | Fleet (n° of boats)* | Catch (species assessed) | Other species caught | Discards (species assessed) | Discards (other species caught) | Effort units |
|--------------------|----------------------|--------------------------|----------------------|-----------------------------|---------------------------------|--------------|
|                    | 37                   | 92,51                    | See sheet P2b        | No(3)                       | Yes (3)                         | days         |
| ESP 05 C 07 33     | 67                   | 21,78                    | See sheet P2b        | Yes (4)                     | Yes (4)                         | days         |
|                    |                      |                          |                      |                             |                                 |              |
|                    |                      |                          |                      |                             |                                 |              |
| <b>Total</b>       | <b>104</b>           | <b>114,29</b>            |                      |                             |                                 |              |

|                    |       |
|--------------------|-------|
| Legal minimum size | 11 cm |
|--------------------|-------|

### Comments

(1) Fleets (n° of boats) refers to: 1) the average number of trawlers in Mallorca during 2000-2010; and 2) the average number of boats from the small-scale fleet that targeted the species during this period.

(2) Catch is the average landings, in tons, of Mallorca during the period 2000–2010.

(3) Carbonell (1997).

(4) Since Mas *et al.* (2004), twelve species were discarded at least in one occasion, and the discarded fraction in this fishery was 1.4% in number. *M. surmuletus* were discarded in 19% of the fishing sets and made up the largest fraction of the discards (42.8% in number).

- The GFCM geographical sub-area 05 includes the waters around the Balearic Islands. This Archipelago is constituted by the islands of Mallorca, Menorca, Ibiza and Formentera. From

The percentage is constituted by the islands of Mallorca, Menorca, Ibiza and Formentera. From official landings, the red mullet *Mullus surmuletus* represents the following percentages by island: 94.8% Mallorca, 2.7% Menorca and 2.5% Ibiza-Formentera. The present assessment has been performed considering exclusively data from Mallorca because: 1) reliability and availability of fishery statistics; and 2) both length and biological (growth, maturity, length-weight) samplings were carried out in this island. Hence, it must be taken into account that the present assessment represents approximately 95% of the total GSA-05.

- From official data, the total trawl fleet of the whole geographical sub-area 05 (Balearic Islands) is composed by 53 boats: on average, 41 TRB, 53 GT and 239 HP. Some of these units (smaller vessels) operate almost exclusively on the continental shelf (target species: red mullets, picarel, octopuses, hake and sea breams), others (bigger vessels) operate almost exclusively on the continental slope (target species are decapod crustaceans) and the rest can operate indistinctly on the continental shelf and slope fishing grounds, depending on the season, the weather conditions and also economic factors (e.g. landings price). In Mallorca, the percentage of these trawl fleet segments have been estimated (Alemany & Alvarez, 2003) 30, 40 and 30% of the boats, respectively.

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

Assessment form

Sheet P2a  
Fishery by Operational Unit

Code: MUR0511Que

Page 1 / 5

|              |   |           |   |
|--------------|---|-----------|---|
| Data source* | IEO: size composition of trawl catches; Official la | OpUnit 1* | 0 |
|--------------|---|-----------|---|

### Time series

| Year*              | 2000  | 2001   | 2002   | 2003  | 2004  | 2005  |
|--------------------|-------|--------|--------|-------|-------|-------|
| Catch              | 84,99 | 117,06 | 105,29 | 81,87 | 82,96 | 93,92 |
| Minimum size       | 8     | 7      | 9      | 7     | 9     | 9     |
| Average size $L_c$ | 17    | 16,9   | 16,8   | 16,6  | 16,5  | 16,5  |
| Maximum size       | 30    | 31     | 29     | 30    | 29    | 30    |
| Fleet              | 41    | 39     | 39     | 37    | 37    | 37    |

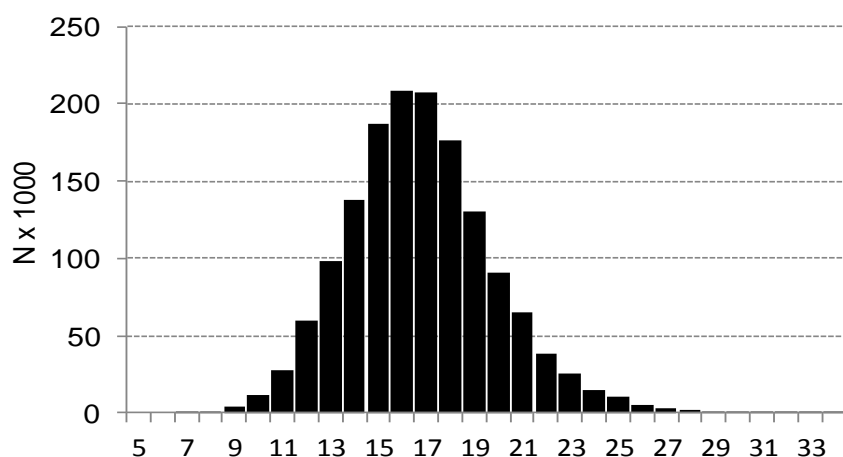
| Year               | 2006  | 2007   | 2008  | 2009  | 2010  |  |
|--------------------|-------|--------|-------|-------|-------|--|
| Catch              | 90,77 | 114,22 | 81,92 | 73,94 | 90,64 |  |
| Minimum size       | 8     | 10     | 8     | 8     | 7     |  |
| Average size $L_c$ | 16    | 17,2   | 17,3  | 16,7  | 16,9  |  |
| Maximum size       | 33    | 32     | 32    | 33    | 33    |  |
| Fleet              | 36    | 36     | 34    | 32    | 33    |  |

### Selectivity

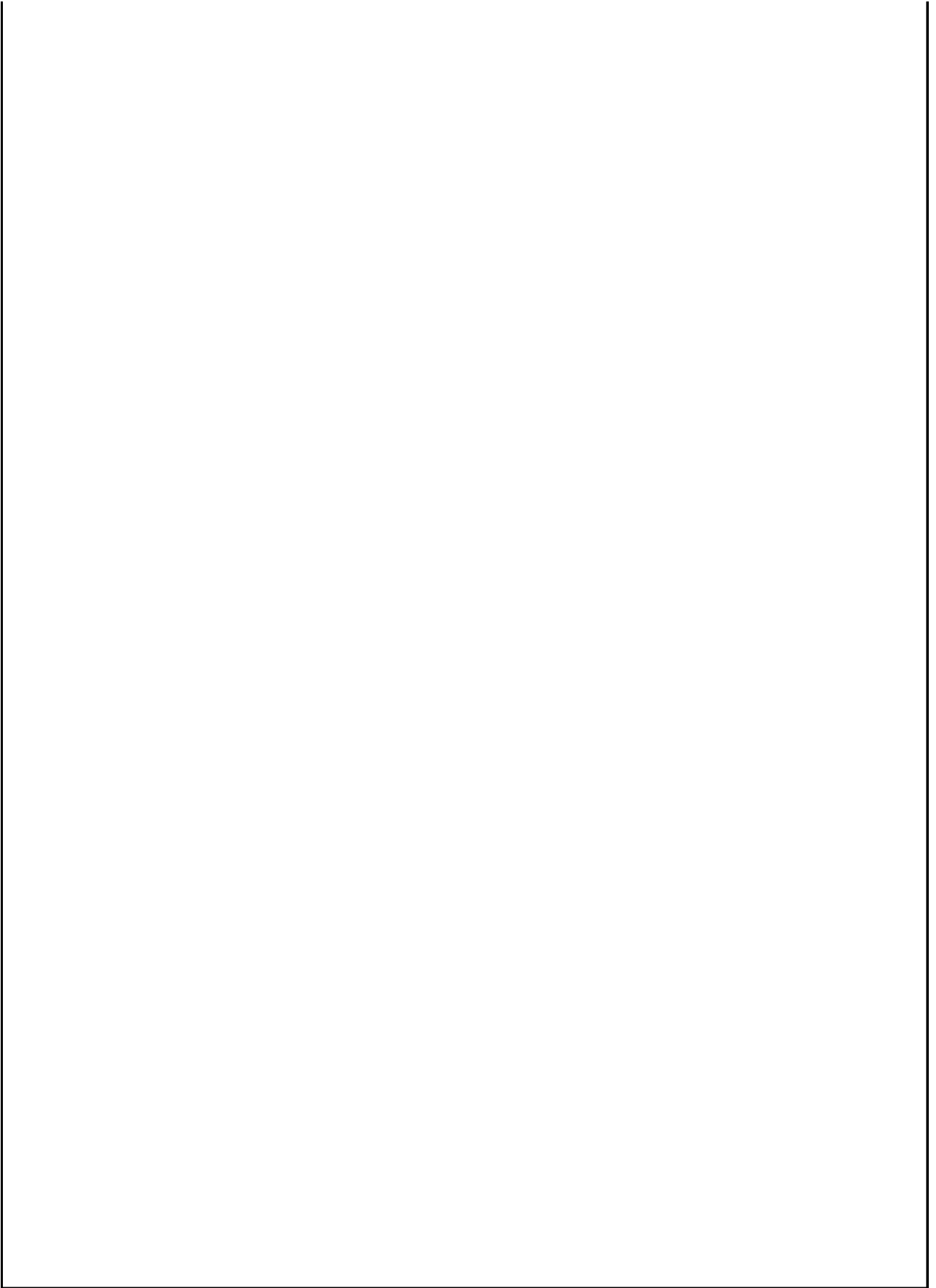
### Remarks

|                  |         |  |
|------------------|---------|--|
| $L_{25}$         | 6.5 cm  | This data corresponds to 40 or 40 diameter mesh in the cod Data. Data of Masutí E., Masutí E., Quintas y B. Gomar (2003) Ponencia 2005. Informe científico de una acción piloto de selectividad de artes de arrastre en aguas de Mallorca (Illes Balears). Informe Secretaría General de Pesca Marítima, 76 pp.<br>científico de una acción piloto de selectividad de artes de arrastre en aguas de Mallorca (Illes Balears). Informe Secretaría General de Pesca Marítima, 76 pp. |
| $L_{50}$         | 8.5 cm  |  |
| $L_{75}$         | 10.5 cm |  |
| Selection factor |         |  |
|                  |         |  |

### Structure by size or age



Average size frequency distribution (cm; total length) of trawl catches in the geographical sub-area 05 (Balearic Islands) for the period 2000–2010. Size composition of catches have been obtained from monthly length sampling (stratified random method) on board trawl fishing vessels at different ports of Mallorca.



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

Assessment form

Sheet P2a  
Fishery by Operational Unit

Code: MUR0511Que

Page 2 / 5

|              |  |           |                |
|--------------|--|-----------|----------------|
| Data source* | IEO: size composition of small-scale catches; Offi | OpUnit 2* | ESP 05 C 07 33 |
|--------------|--|-----------|----------------|

### Time series

|                    |       |       |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|-------|
| Year*              | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  |
| Catch              | 21,49 | 27,31 | 25,72 | 19,75 | 17,57 | 28,61 |
| Minimum size       | 15,0  | 15,0  | 15,0  | 15,0  | 15,0  | 15,0  |
| Average size $L_c$ | 20,7  | 20,7  | 20,7  | 20,7  | 20,7  | 20,7  |
| Maximum size       | 33    | 33    | 33    | 33    | 33    | 33    |
| Fleet              | 75    | 86    | 81    | 68    | 56    | 72    |

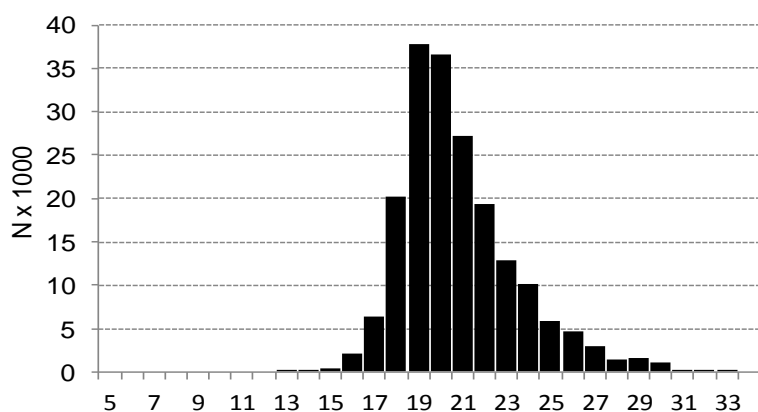
|                    |       |       |       |       |       |  |
|--------------------|-------|-------|-------|-------|-------|--|
| Year               | 2006  | 2007  | 2008  | 2009  | 2010  |  |
| Catch              | 22,13 | 21,29 | 19,88 | 15,87 | 19,99 |  |
| Minimum size       | 15,0  | 15    | 13    | 15    | 15    |  |
| Average size $L_c$ | 21,5  | 20,1  | 21,9  | 21,7  | 20,2  |  |
| Maximum size       | 31    | 33    | 33    | 33    | 32    |  |
| Fleet              | 65    | 60    | 54    | 51    | 52    |  |

### Selectivity

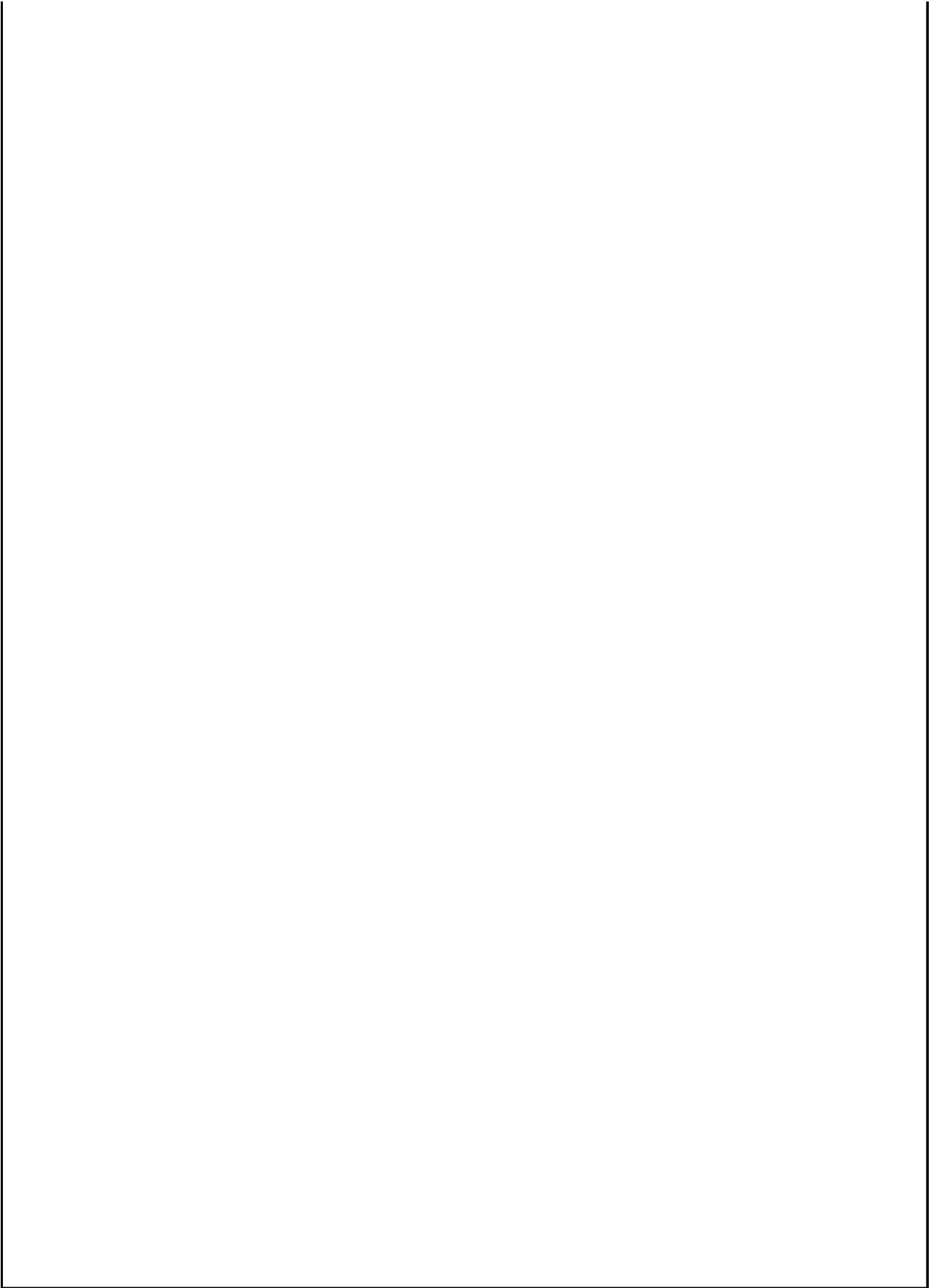
### Remarks

|                  |  |  |
|------------------|--|--|
| $L_{25}$         |  |  |
| $L_{50}$         |  |  |
| $L_{75}$         |  |  |
| Selection factor |  |  |
|                  |  |  |

### Structure by size or age



Average size frequency distribution (cm; total length) of small-scale catches in the geographical sub-area 05 (Balearic Islands) for the period 2000–2010. Size composition of catches have been obtained from on port monthly length sampling (stratified random method).



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

Assessment form

Sheet P2b  
Fishery by Operational Unit

Code: MUR0511Que  
####

|              |   |           |   |
|--------------|---|-----------|---|
| Data source* | IEO and EU research project on discards (1) | OpUnit 1* | 0 |
|--------------|---|-----------|---|

### Regulations in force and degree of observance of regulations

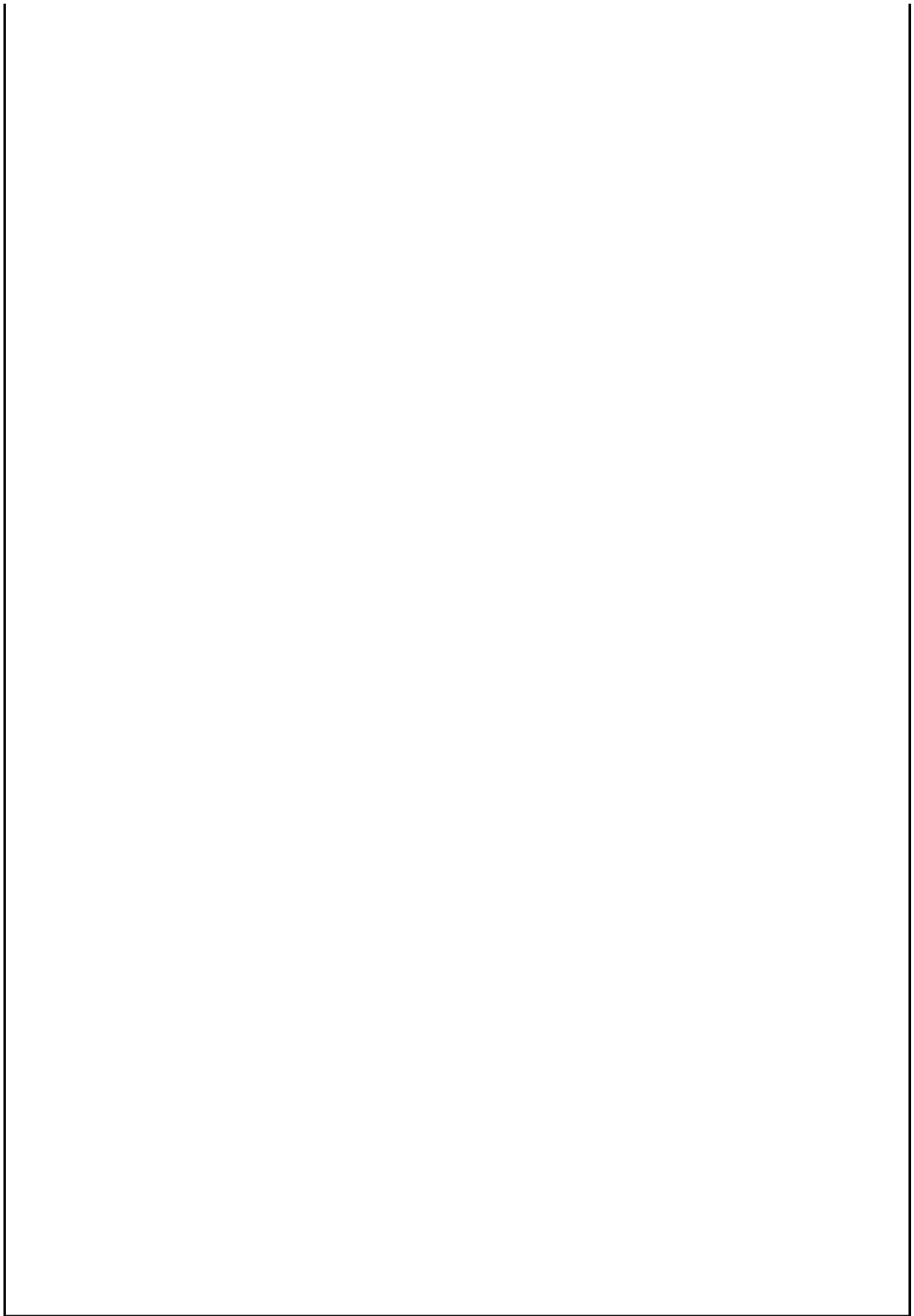
- Fishing license: fully observed
- Engine power limited to 316 KW or 500 CV: not observed
- Mesh size in the cod-end (before Jun 1st 2010: 40 mm diamond; from Jun 1st 2010: 40 mm square or 50 mm diamond -by derogation-): fully observed
- Fishing forbidden upper 50 m depth: not fully observed
- Time at sea (12 hours per day and 5 days per week): fully observed

### Accompanying species

Trawl fishery developed along the continental shelf of the Balearic Islands is a multi-specific fishery. It is performed mainly on detritic bottoms of rhodophytic and corallinic algae. In addition to *M. surmuletus*, the following species can be considered as important in landings:

- *Spicara smaris*
- *Mullus barbatus*
- *Pagellus acarne*
- *Pagellus erythrinus*
- *Trachurus mediterraneus*
- *Scyliorhinus canicula*
- *Serranus cabrilla*
- *Trachinus draco*
- *Scorpaena notata*
- *Trigloporus lastoviza*
- *Scorpaena scrofa*
- *Octopus vulgaris*
- *Eledone moschata*
- *Sepia officinalis*
- *Loligo vulgaris*





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

Assessment form

Sheet P2b  
Fishery by Operational Unit

Code: MUR0511Que  
####

|              |   |           |                |
|--------------|---|-----------|----------------|
| Data source* | IEO and EU research project on discards (1) | OpUnit 2* | ESP 05 C 07 33 |
|--------------|---|-----------|----------------|

### Regulations in force and degree of observance of regulations

- Fishing license: fully observed
- Fishing season (July to December): fully observed
- Maximum length of nets (2000 m/fisherman and 5000 m/boat): not fully observed
- Minimum mesh size (50 mm): fully observed
- Limitation to 6 fishing days per week: fully observed
- Time at sea (from sunrise to sunset): not fully observed

### Accompanying species

Since Mas *et al.* (2004), the main by-catch species were the following commercially important fish species:

- *Diplodus annularis*
- *Spicara maena*
- *Diplodus vulgaris*
- *Serranus scriba*

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

Assessment form

Sheet A1  
Indirect methods: VPA, LCA

Code: MUR0511Que

Sex\* Unsexed

Analysis # \* 1

### Time series

| Data          | Size | Age |
|---------------|------|-----|
| (mark with X) | X    | X   |

| Model         | Cohorts | Pseudocohorts         |
|---------------|---------|-----------------------|
| (mark with X) | X       | 2 (more A1 sheets are |

|                       |                |               |   |
|-----------------------|----------------|---------------|---|
| Equation used         | Catch equation | Tuning method | Extended Survivor Analysis                    |
| # of gears            | 2              | Software      | Lowestoft VPA suite (Darby and Flatman, 1994) |
| $F_{\text{terminal}}$ | 0,625          |               |   |

### Population results (please state units)

|          | Sizes | Ages |                    | Amount        | Biomass |
|----------|-------|------|--------------------|---------------|---------|
| Minimum  |       |      | Recruitment        | 7,61          | 203,91  |
| Average  |       |      | Average population | 11,44         | 482,1   |
| Maximum  |       |      | Virgin population  | SSN           | SSB     |
| Critical |       |      | Turnover           | 3,22          | 205,63  |
|          |       |      |                    | N in millions | in tons |

### Average mortality

|       | Total | Gear |  |  |  |  |
|-------|-------|------|--|--|--|--|
| $F_1$ | 0,581 |      |  |  |  |  |
| $F_2$ | 0,074 |      |  |  |  |  |
| Z     | 1,061 |      |  |  |  |  |

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

### Comments

$F_1$  was calculated averaging  $F_{\text{BAR0-5}}$  from 2000–2010;  $F_{\text{BAR0-5}}$  is an arithmetic mean calculated for each year over all the range of ages (0–5 years).

$F_2$  is the  $F$  at age 0

$$Z = 0.48 + F_1$$

The vector of fishing mortalities by age in the last year was obtained from a previous separable VPA:

| Age (years) | F     |
|-------------|-------|
| 0           | 0.113 |
| 1           | 0.441 |
| 2           | 0.695 |
| 3           | 0.667 |
| 4           | 0.555 |
| 5           | 0.625 |

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

Assessment fo

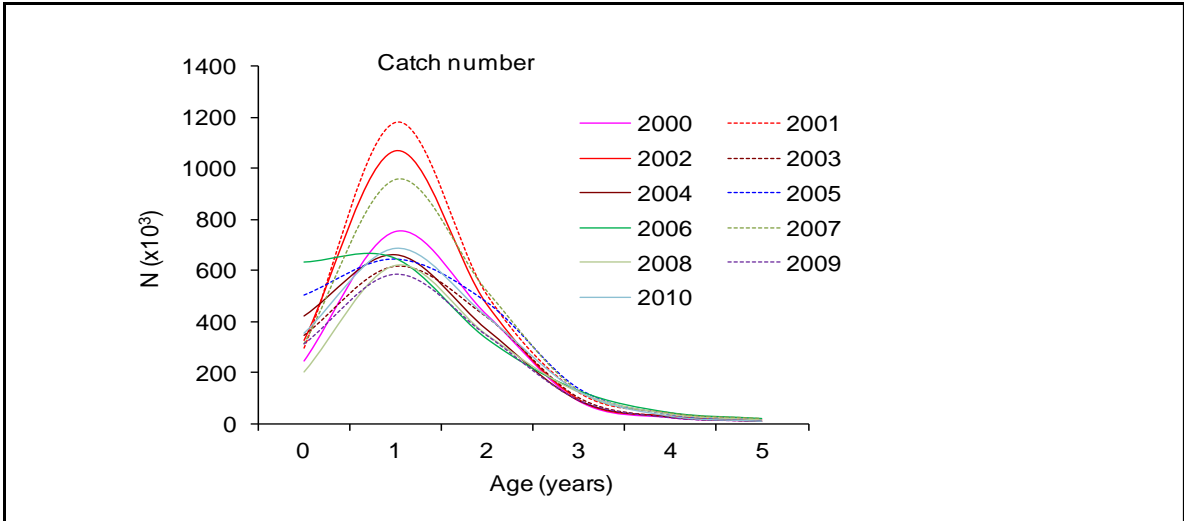
Sheet A2  
Indirect methods: data

Code: MUR0511Que

|      |         |       |  |              |   |
|------|---------|-------|--|--------------|---|
| Sex* | Unsexed | Gear* | Trawl+Small-scale(trammel nets and gillnets) | Analysis # * | 1 |
|------|---------|-------|--|--------------|---|

|      |   |
|------|---|
| Data | Catch in number by age and CPUE from surveys and commercial fleet |
|------|---|

**Data**



VPA tuning were performed using CPUE data from scientific surveys (N individuals per km<sup>2</sup>) and daily landings from one port of Mallorca (Santanyi). It was used this port, situated in the SE of the island, because its fleet works basically on the continental shelf, and thus it can be considered that their CPUEs are a good indicator of the species abundance (*Mullus surmuletus* inhabits mainly on the shelf). The landings of this port represented 12–30% of the total catch of Mallorca during the assessed period.

Abundance indices from surveys were calculated considering different bathymetric strata. For tuning VPA, the values obtained in the stratum corresponding to the continental shelf (<100 m depth) were used because they best reflected the evolution of commercial landings.

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

Assessment fo

Sheet A3

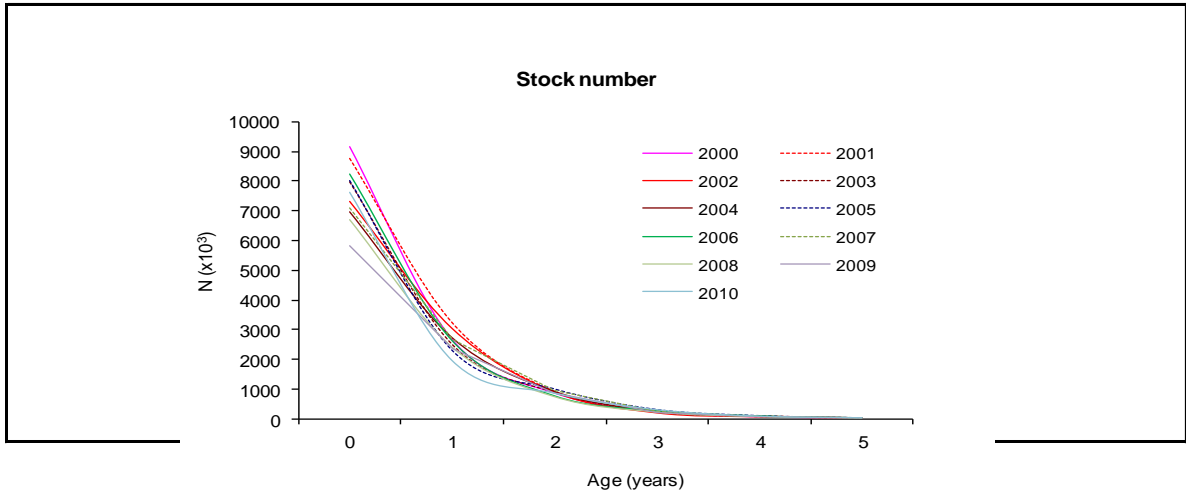
Indirect methods: VPA results

Code: MUR0511Que

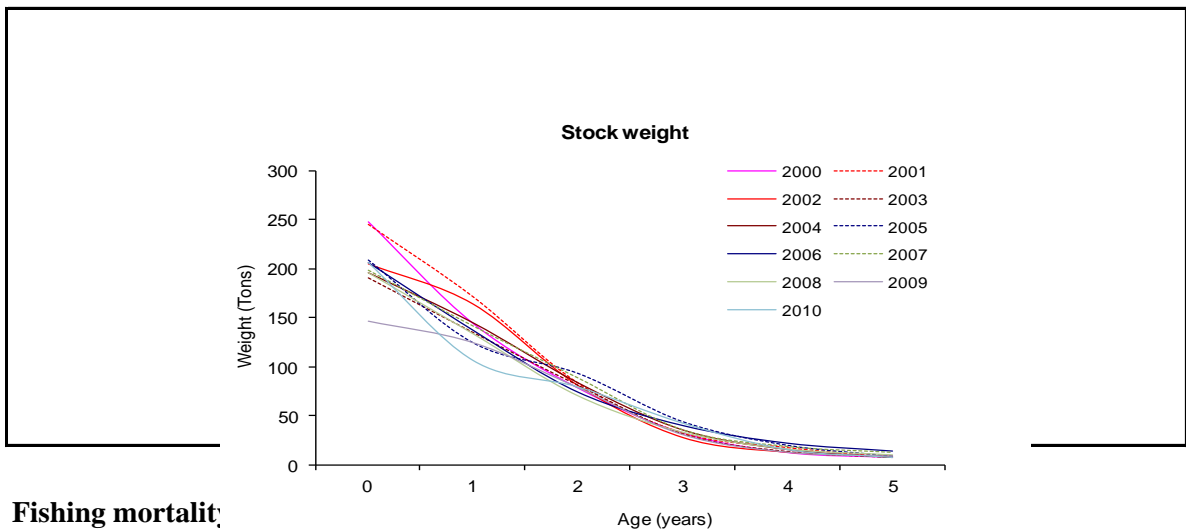
#REF!

|      |         |       |                                    |             |   |
|------|---------|-------|------------------------------------|-------------|---|
| Sex* | Unsexed | Gear* | Trawl + Small-scale (trammel nets) | Analysis #* | 1 |
|------|---------|-------|------------------------------------|-------------|---|

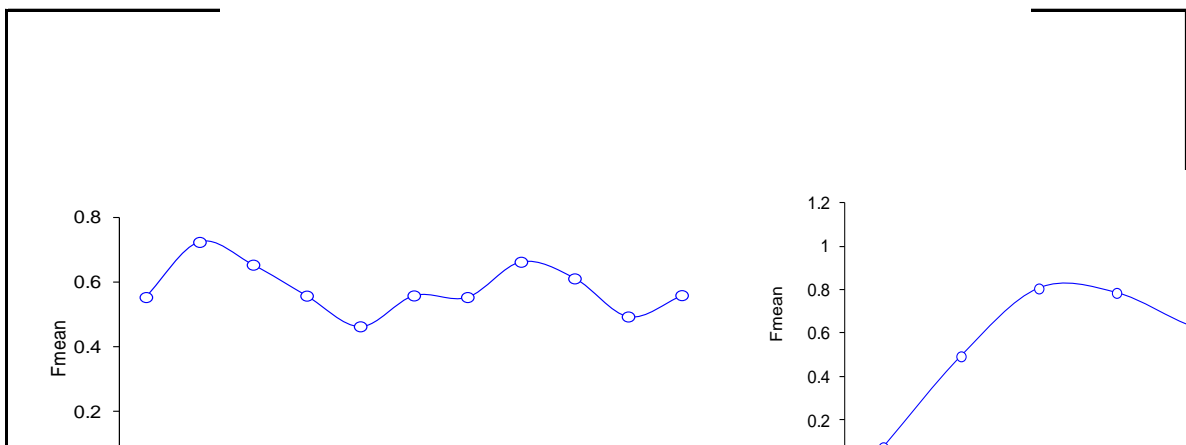
## Population in figures



## Population in



## Fishing mortalit;



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

Assessment fo

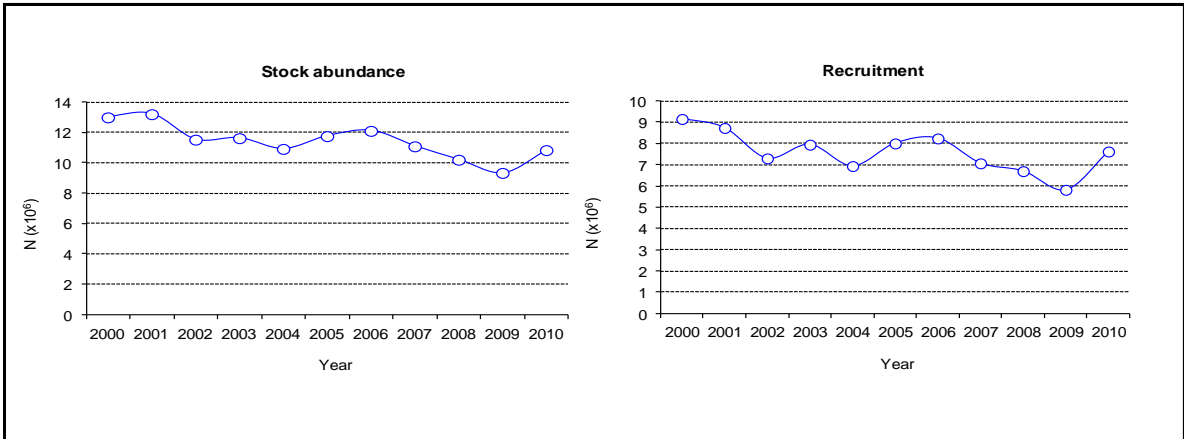
Sheet A3  
Indirect methods: VPA results

Code: MUR0511Que

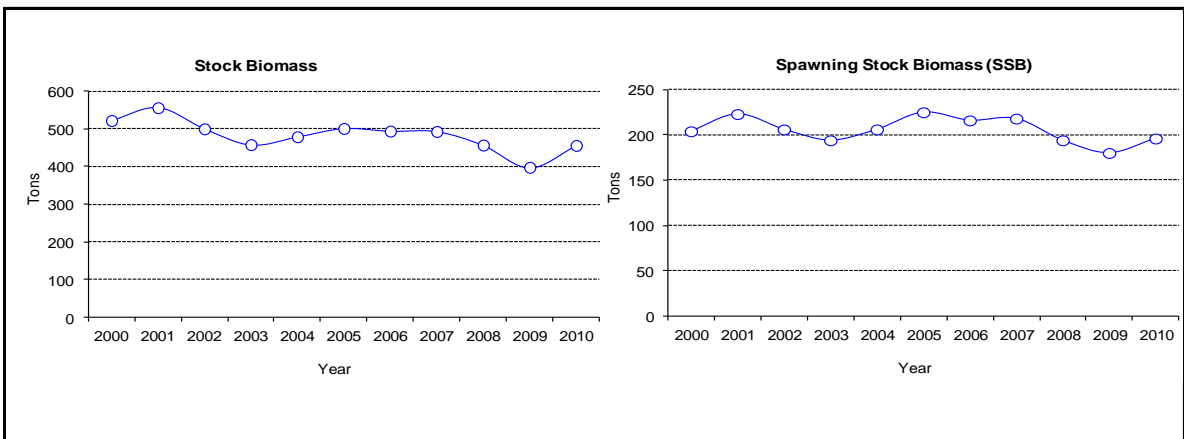
#REF!

|      |        |       |                                   |             |   |
|------|--------|-------|-----------------------------------|-------------|---|
| Sex* | Unsexe | Gear* | Trawl + Small-scale (trammel nets | Analysis #* | 1 |
|------|--------|-------|-----------------------------------|-------------|---|

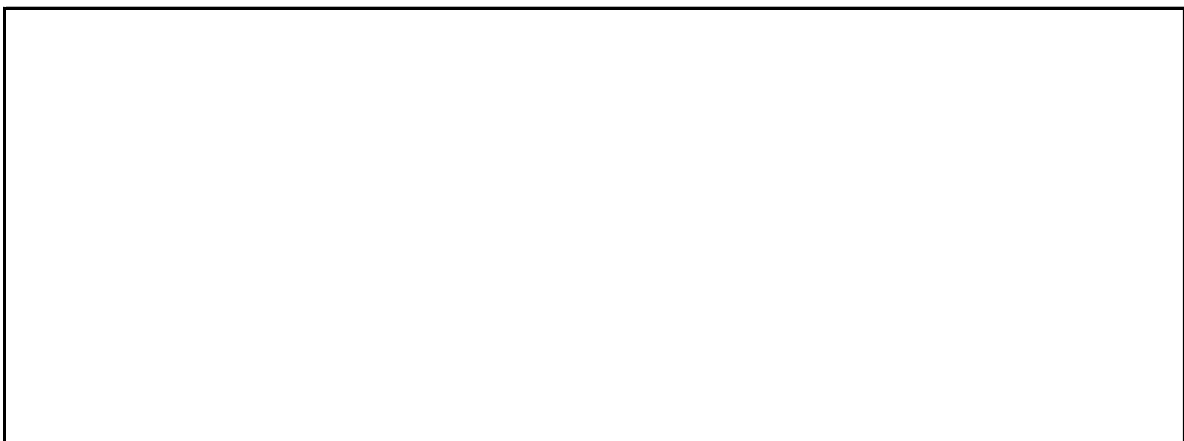
## Population in figures



## Population in biomass



## Fishing mortality rates



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

Assessment form

Sheet A1  
Indirect methods: Y/R

Code: MUR0511Que

|     |       |
|-----|-------|
| Sex | Total |
|-----|-------|

|            |   |
|------------|---|
| Analysis # | 2 |
|------------|---|

|            |   |          |                   |
|------------|---|----------|-------------------|
| # of gears | 2 | Software | Excel spreadsheet |
|------------|---|----------|-------------------|

**Parameters used**

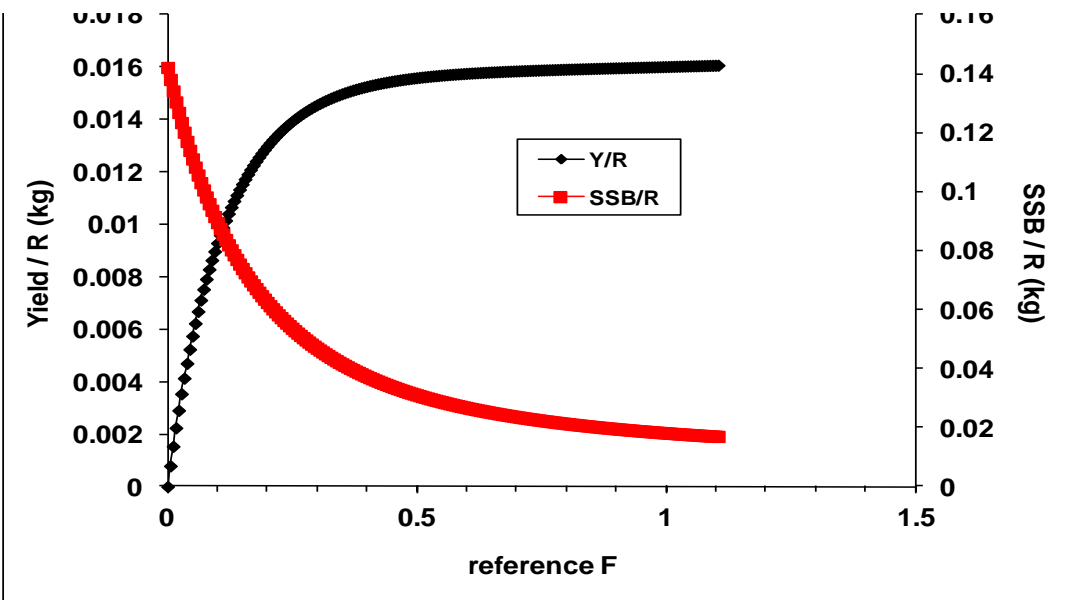
|          |  |
|----------|--|
| Vector F |  |
| Vector M |  |
| Vector N |  |
|          |  |
|          |  |

**Model characteristics**

**Results**

|             | Total | Gear |  |  |  |
|-------------|-------|------|--|--|--|
|             |       |      |  |  |  |
| Current YR  | 15,71 |      |  |  |  |
| Maximum Y/R | 16,08 |      |  |  |  |
| Y/R 0.1     | 14,02 |      |  |  |  |
| $F_{max}$   | 1,10  |      |  |  |  |
| $F_{0.1}$   | 0,26  |      |  |  |  |
| Current B/R | 65,20 |      |  |  |  |
| Maximum B/R | 51,74 |      |  |  |  |
| B/R 0.1     | 91,04 |      |  |  |  |
| Fref        | 0,55  |      |  |  |  |
|             |       |      |  |  |  |
|             |       |      |  |  |  |

**Comments**





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

Assessment form

Sheet D  
Diagnosis

Code: MUR0511Que

**Reference points**

| Criterion | Current value | Units | Reference Point | Trend | Comments  |
|-----------|---------------|-------|-----------------|-------|---|
| B         | 455           | tons  | 482             | -     | Bmean as reference point (B <sub>low</sub> = 397)     |
| SSB       | 196           | tons  | 205             | -     | SSBmean as reference point (SSB <sub>low</sub> = 180) |
| F         | 0,56          |       | 0,58            | -     | Fmean as reference point (F <sub>low</sub> = 0.460)   |
| Y         | 111           | tons  | 114             | -     | Ymean as reference point (Y <sub>low</sub> = 89.82)   |
| CPUE      |               |       |                 |       |   |
| CPUE      |               |       |                 |       |   |
| Density   |               |       |                 |       |   |
|           |               |       |                 |       |   |
|           |               |       |                 |       |   |

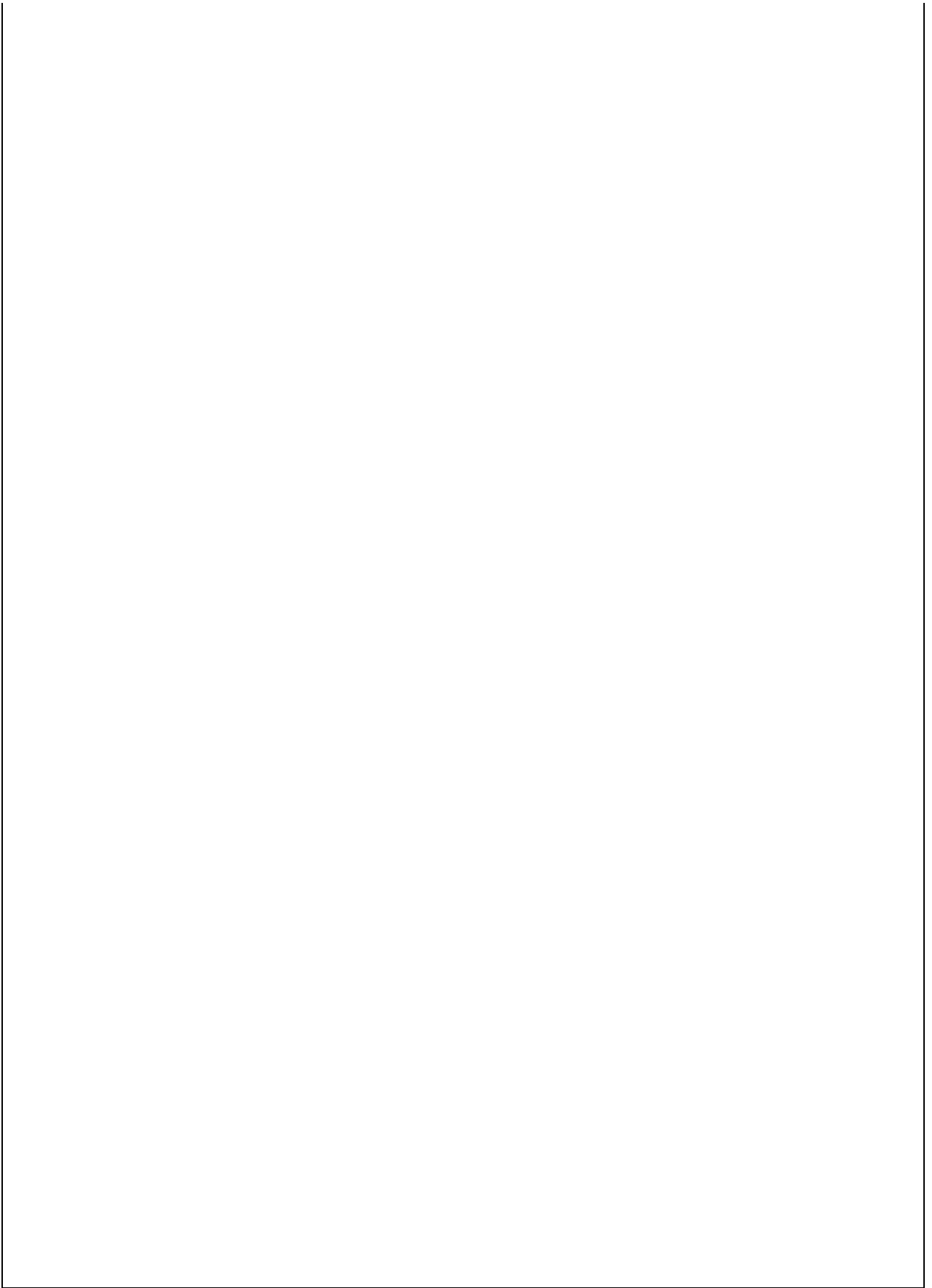
**Stock Status\*** Use one (or both) of the following two systems for the stock assessment status description

|                       |                       |  |
|-----------------------|-----------------------|--|
| <b>Unidimensional</b> | <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 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;   |

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

**Comments**

The stock is in overfishing status.



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

Assessment form

Sheet Z

Objectives and recommendations

Code: MUR0511Que

**Management advice and recommendations\***

To reduce fishing mortalities by reducing the effort activity and improving the selection pattern of the fishery.

**Abstract for SCSA reporting**

|                                |  |             |      |
|--------------------------------|--|-------------|------|
| <b>Authors</b>                 | Quetglas A., Ordines F., González N.                     | <b>Year</b> | 2011 |
| <b>Species Scientific name</b> | Mullus surmuletus - MUR<br>Source: GFCM Priority Species |             |      |
| <b>Geographical Sub-Area</b>   | 05 - Balearic Island                                     |             |      |

**Fisheries (brief description of the fishery)\***

Striped red mullet (*Mullus surmuletus*) is one of the most important target species in the trawl fishery developed by around 37 vessels off Mallorca (Balearic Islands, GFCM-GSA05). A fraction of the small-scale fleet (~50 boats) also directs to this species during the second semester of the year, using both trammel nets and gillnets. During the last decade, the annual landings of this species have oscillated between 74-117 and 16-29 tons in the trawl and small-scale fishery, respectively.

**Source of management advice\*  
(brief description of material -data- and methods used for the assessment)**

The stock of *Mullus surmuletus* of the GFCM-GSA05 has been assessed using data from both the trawl and the small-scale fishery on a time series covering ten years (2000-2010). The assessment has been carried out applying tuned VPA (Extended Survivor Analysis, XSA) on the cohorts present during 2000-2010 and both VPA and Y/R analysis on a mean pseudo-cohort from that period. These approaches were performed using monthly size composition of catches, official landings and the biological parameters estimated within the framework of the Data Collection Programme (2003-2004). The VPA was tuned with CPUE from commercial trawl fleet (2000-2010) and bottom trawl surveys (2001-2010). The vector of natural mortality by age was calculated from Caddy's (1991) formula, using the PROBIOM Excel spreadsheet (Abella et al., 1997). The XSA were run using the Lowestoft VPA program (Darby and Flatman, 1994) and the Y/R was done in an Excel spreadsheet.

**Stock Status\***

**Exploitation rate**

**Stock abundance**

Moderate fishing mortality

Intermediate abundance

**Comments**

The stock is in overfishing status.

**Management advice and recommendations\***

To reduce fishing mortalities by reducing the effort activity and improving the selection pattern of the fishery.