



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



SAC GFCM
Sub-Committee on Stock Assessment

SCSA Assessment Forms

> Enter <



| | |
|---|--------------------------------|
| Tool designer (GFCM consultant) | Federico De Rossi |
| FAO backstopping officer for SCSA | Jordi Lleonart |
| SCSA coordinator | Constantina Karlou-Riga |
| GFCM Bio-Statistician | Matthew Camilleri |
| GFCM Deputy Executive Secretary / Adviser fisheries management | Abdellah Srour |

Ctrl + X Cut
Ctrl + Z Undo
Ctrl + P Print
Alt + Enter Line break within a cell

For more detailed information about Excel shortcut and function keys, please refer to the Microsoft website. > [CLICK HERE](#) <

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*

| | | |
|---|--------|------|
| 4 | August | 2008 |
|---|--------|------|

 Code*

| |
|------------|
| HKE0608Gar |
|------------|

Authors*

| |
|--|
| García-Rodríguez*1 M., J. L. Pérez-Gil2, A. Esteban2, E. Barcala2 and N. Carrasco2 |
|--|

Affiliation*

| |
|---|
| 1IEO- Servicios Centrales Madrid, 28002 Madrid (Spain) 2IEO-Centro Oceanográfico Murcia, P. O. Box 022. 30740 San Pedro del Pinatar (Spain) <i>(*) Corresponding author: mariano.garcia@md.ieo.es</i> |
|---|

Species Scientific name* **1**
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area*

| |
|--------------------------|
| Mediterranean 37.1.1 FAO |
|--------------------------|

Geographical Sub-Area (GSA)*

| |
|---------------------|
| 06 - Northern Spain |
|---------------------|

Combination of GSAs

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

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

Assessment form

Sheet #0

Basic data on the assessment

Code: HKE0608Gar

| | | | | | |
|-------|---|-----|------|----------|--|
| Date* | 4 | Aug | 2008 | Authors* | García-Rodríguez*1 M., J. L. Pérez-Gil2, A. Esteban2, E. Barcala2 and N. Carrasco2 |
|-------|---|-----|------|----------|--|

| | | | |
|--------------------------|-----------------------------|----------------------|---|
| Species Scientific name* | Merluccius merluccius - HKE | Species common name* | European Hake Merluza Merlu, Naselo |
|--------------------------|-----------------------------|----------------------|---|

Data Source

| | | | |
|------|---------------------|-----------------|-----------|
| GSA* | 06 - Northern Spain | Period of time* | 1992-2007 |
|------|---------------------|-----------------|-----------|

Description of the analysis

| | | | |
|-----------------------|---|----------------|--|
| Type of data* | Size composition of commercial landings | Data source* | I.E.O. Sampling and Information Network. |
| Method of assessment* | Extended Survivor Analysis (XSA); Y/R | Software used* | VIT ; Lowestof VPA suite ; FLR |

Sheets filled out

| B | P1 | P2a | P2b | G | A1 | A2 | A3 | Y | Other | D | Z | C |
|---|----|-------|-------|-------|-------|----|----|---|-------|---|---|-------|
| 1 | 1 | #REF! | #REF! | #REF! | #REF! | 1 | 3 | 1 | 4 | 1 | 1 | #REF! |

Comments, bibliography, etc.

García-Rodríguez M. And Esteban A. Algunos aspectos sobre la biología y pesca de la merluza mediterránea *Merluccius merluccius* (Linnaeus, 1758) en la Bahía de Santa Pola (sureste de la península ibérica). (1995). Bol.Inst,Esp.Oceanogr; 11(1).3-25.

García-Rodríguez M. And Esteban A. (2002). How fast does hake grow?. A study on the Mediterranean hake (*Merluccius merluccius* L.) comparing whole otoliths readings and length frequency distributions data. SCI .MAR.,66(2):145-156.

Leonart J. and J. Salat (1992) VIT. Programa de Análisis de Pesquerías. Inf. Téc. Sci. Mar., 168-169.

Martín P., P. Sartor and M. García-Rodríguez (1999) Exploitation patterns of the European hake *Merluccius merluccius*, red mullet *Mullus barbatus* and striped red mullet *Mullus surmuletus* in the western Mediterranean. Journal of Applied Ichthyology, 15: 24-28.

Maynou F., J. Leonart and J.E. Cartes (2003) Seasonal and spatial variability of hake (*Merluccius merluccius* L.) recruitment in the NW Mediterranean. Fisheries Research, 60: 65-78.

Orsi Relini L., C. Papaconstantinou, S. Jukic-Peladic, A. Souplet, L. Gil de Sola, C. Piccinetti, S. Kavadas and M. Rossi (2002) Distribution of the Mediterranean hake populations (*Merluccius merluccius smiridus* Rafinesque, 1810) (Osteichthyes: Gadiformes) based on six years monitoring by trawl-surveys: some implications for management. Scientia Marina, 66(Suppl. 2): 21-38.

Comments, bibliography, etc.

Sheet #0 (page 2)

Sartor P., L. Recasens, C. Viva and J. Lleonart (2001) Analysis of the impact of the fishery on the adult population of European hake in the northwestern Mediterranean. *Rapp. Comm. Int. Mer Médit.*, 36: 321-322.

García Rodríguez, M. and A. M. Fernández, 2005. Influencia de la geometría de la malla del copo de arrastre en las capturas, selectividad y rendimientos de algunas especies de peces comerciales en el Golfo de Alicante (S.E. España). *Inf. Téc. Inst. Espa. Oceanog.*185. 27 pp

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

Assessment form

Sheet B
Biology of the species

Code: HKE0608Gar

Biology

| | | | | | | |
|---|-----|-----|------|---------|---------------------|-------------------|
| Somatic magnitude measured (LH, LC, etc)* | | | | TL | Units* | cm |
| Sex | Fem | Mal | Both | Unsexed | | |
| Maximum size observed | 76 | 53 | 76 | | Reproduction season | All year: Feb and |
| Size at first maturity | 31 | 25 | 33 | | Reproduction areas | Upper Slope |
| Recruitment size | 4 | 4 | 4 | | Nursery areas | Continental Shelf |

Parameters used (state units and information sources)

| | | Units | Sex | | | |
|----------------------------|---------------------|---|--------|------|------|---------|
| | | | female | male | both | unsexed |
| Growth model | L_{∞} | 85.0 cm | | | | |
| | K | 172 cm year ⁻¹ | | | | |
| | t0 | -0,177 | | | | |
| | Data source | Otoliths readings PN 2003-2006; INBIO, n=1000 | | | | |
| Length weight relationship | a | 0,0048 | | | | |
| | b | 3,12 | | | | |
| | M | 0,54 | | | | |
| | sex ratio (mal/fem) | 0,31 | | | | |

Comments

Although several biological data sets of this species are available in the western Mediterranean, we have used those from National data collection programme (Pérez Gil et al, 2006) and García and Esteban (1995-2002), carried out in one of the sampling ports used for the present assessment (Santa Pola). In this assessment, a new set of parameters (fast growth hypothesis) were considered . M is mean of a Natural mortality vector, PROBIOM Caddy and Abella, 1999.

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: HKE0608Gar

| | | | |
|--|--|-----------|-----------|
| Data source* | I.E.O. Sampling and Information Network. | Year (s)* | 1992-2007 |
| Data aggregation (by year, average figures between years, etc.)* | By year | | |

Fleet and catches (please state units)

| | Country | GSA | Fleet Segment | Fishing Gear Class | Group of Target Species | Species |
|---------------------|---------|-----|--------------------------|--------------------|-----------------------------|---------|
| Operational Unit 1* | ESP | 06 | E - Trawl (12-24 metres) | 03 - Trawls | 33 - Demersal shelf species | HKE |
| Operational Unit 2 | | | | | | |
| 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 |
|----------------------|----------------------|---------------|--------------------------|----------------------|-----------------------------|---------------------------------|--------------|
| ESP 06 E 03 33 - HKE | 600 | Tons | 3800 | | | | boat/day |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Total | 600 | | 3800 | | | | |

| | |
|--------------------|--------------------|
| Legal minimum size | 20 cm total length |
|--------------------|--------------------|

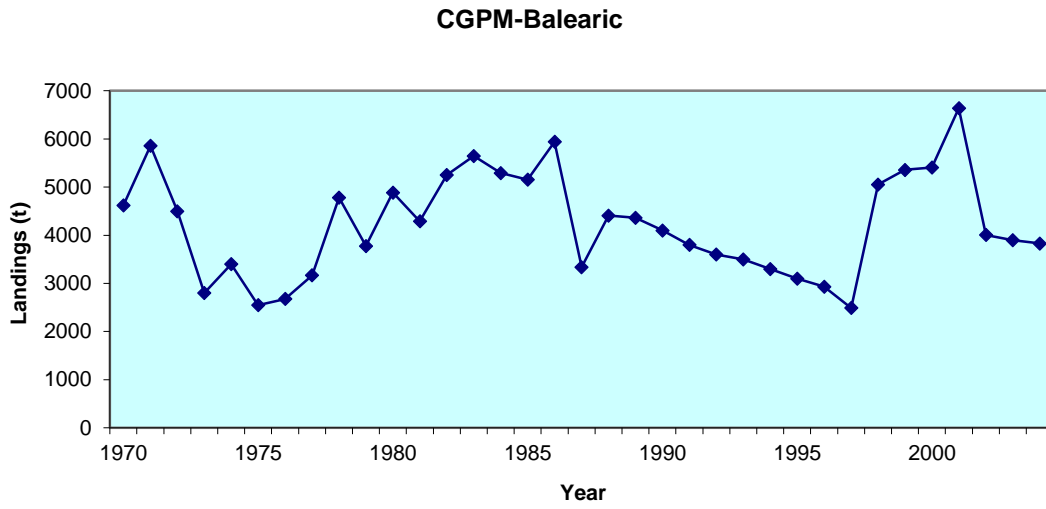
Comments

From official data, the total trawl fleet of the whole geographical sub-area 06 (Northern Spain) is made up by 647 boats: on average, 47 TRB, 58 GT and 297 HP. Some of these units (smaller vessels) operate almost exclusively on the continental shelf (targeted at red mullet, octopus, hake and sea breams), others (bigger vessels) operate almost exclusively on the continental slope (targeted at 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). The percentage of these trawl fleet segments have been estimated* around 30, 40 and 30% of the boats, respectively.

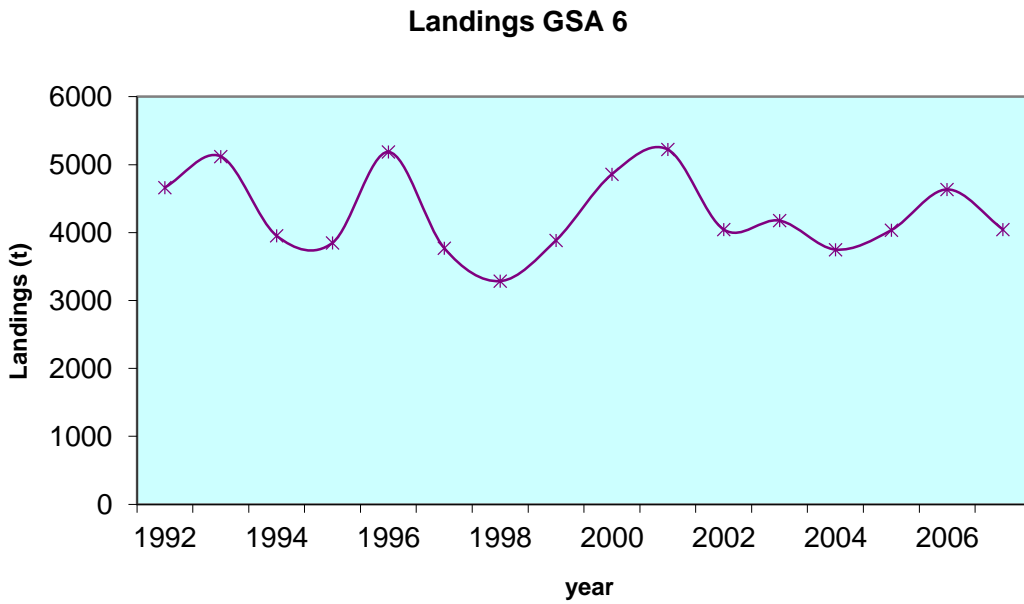
Sheet P1 (page 2)

Comments

Comments



Estimated landings (FAO data) of *Merluccius merluccius* in the Balearic area for the period 1970 – 2004.



Evolution of *Merluccius merluccius* landings in the GSA 6 (Northern Spain) for the period 1992 – 2007.

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Assessment form

Sheet P2a
Fishery by Operational Unit

Code: HKE0608Gar

#REF!

| | | | |
|--------------|---|-----------|----------------------|
| Data source* | IEO: size composition of trawl catches. Official la | OpUnit 1* | ESP 06 E 03 33 - HKE |
|--------------|---|-----------|----------------------|

Time series

| Year* | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------|------|------|------|------|------|------|
| Catch | 4664 | 5122 | 3953 | 3850 | 5187 | 3770 |
| Minimum size | 4 | 4 | 4 | 4 | 4 | 4 |
| Average size Lc | 12 | 12,9 | 10,7 | 12 | 9,2 | 10,5 |
| Maximum size | 68 | 68 | 68 | 68 | 74 | 78 |
| Fleet | 647 | 647 | 647 | 647 | 647 | 647 |

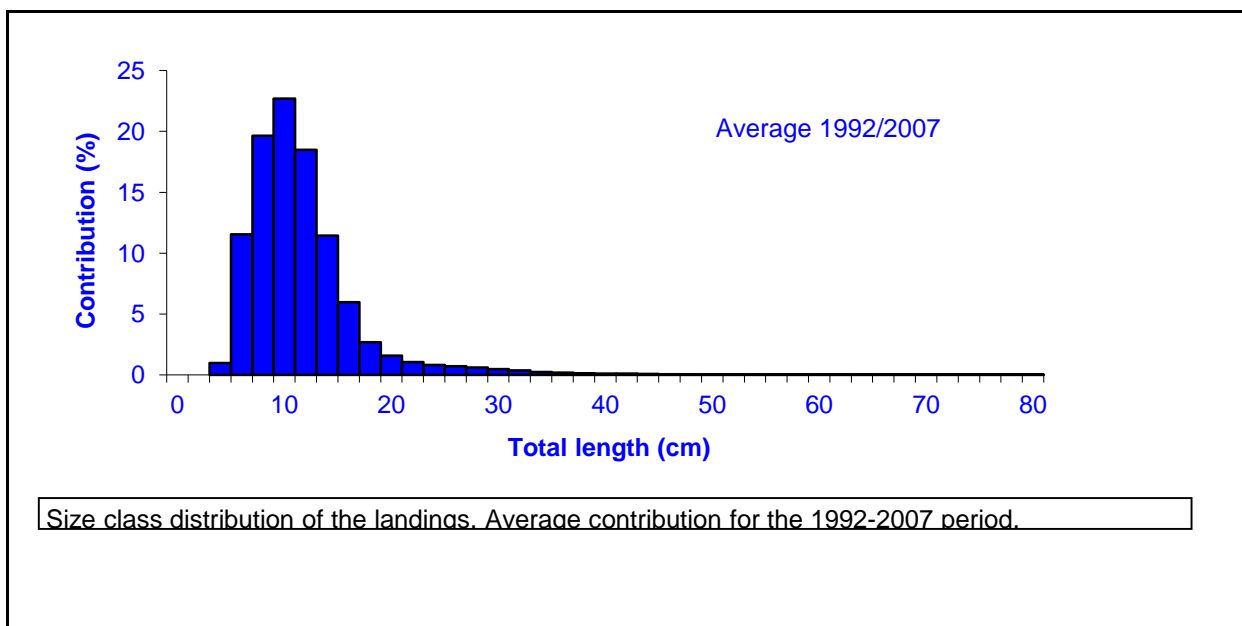
| Year | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------|------|------|------|------|------|------|
| Catch | 3462 | 4497 | 3269 | 3195 | 3411 | 3441 |
| Minimum size | 4 | 4 | 4 | 4 | 4 | 4 |
| Average size Lc | 10,9 | 11,6 | 11,4 | 11 | 12,4 | 12,6 |
| Maximum size | 80 | 76 | 70 | 60 | 66 | 70 |
| Fleet | 647 | 647 | 647 | 647 | 647 | 647 |

Selectivity

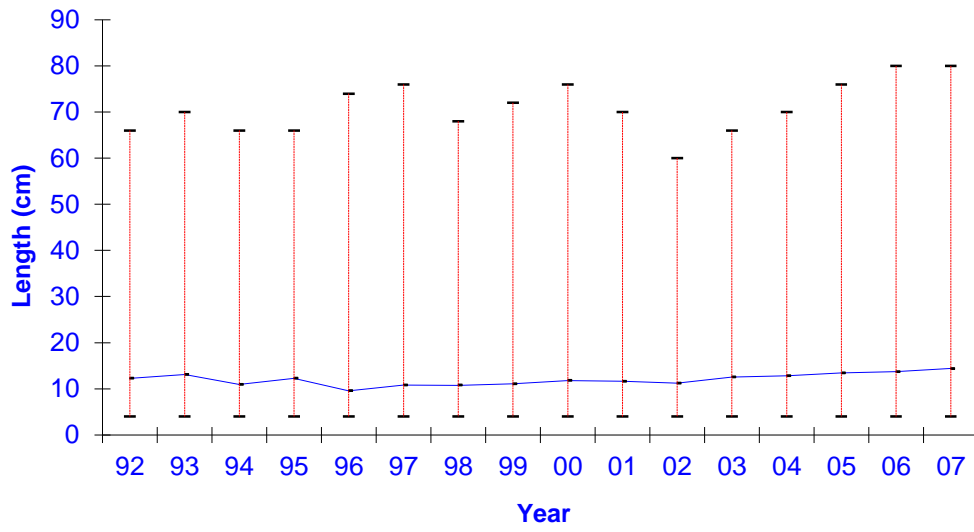
Remarks

| | | |
|------------------|---------|---|
| L25 | 8.8 cm | García Rodríguez, M. and A. M. Fernández, 2005. |
| L50 | 10.3 cm | |
| L75 | 11.9 cm | |
| Selection factor | 2,57 | |
| | | |

Structure by size or age



Structure by size or age



Yearly maximum, minimum ad average length observed in the 1992-2007 landings.

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Assessment form

Sheet P2b
Fishery by Operational Unit

Code: HKE0608Gar
####

| | | | |
|--------------|--|-----------|----------------------|
| Data source* | IEO: size composition of trawl catches. Official landi | OpUnit 1* | ESP 06 E 03 33 - HKE |
|--------------|--|-----------|----------------------|

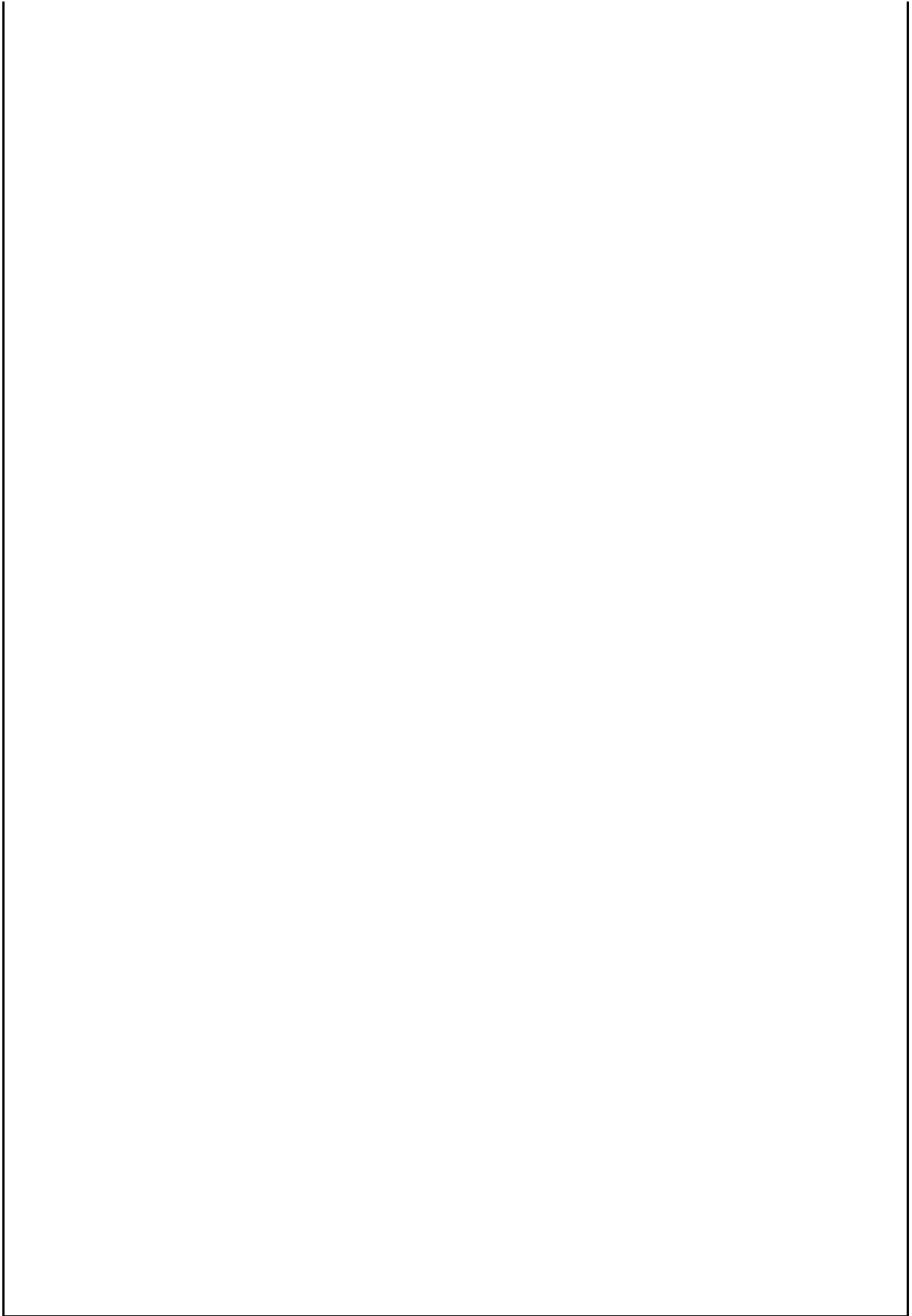
Regulations in force and degree of observance of regulations

- Fishing license : fully observed
- Engine power limited to 316 KW or 500 HP: not fully observed
- Mesh size in the codend (40 mm stretched): fully observed
- Fishing forbidden within upper 50 m depth: not fully observed
- Time at sea (12 hours per day and 5 days per week): fully observed

Accompanying species

- Conger conger
- Galeus melastomus
- Helicolenus dactylopterus
- Lepidopus caudatus
- Lepidorhombus spp.
- Lophius spp.
- Micromesistius poutassou
- Mullus barbatus
- Mullus surmuletus
- Nephrops norvegicus
- Octopus vulgaris
- Pagellus bogaraveo
- Phycis blennoides
- Parapenaeus longirostris
- Scyliorhinus canicula
- Scorpaena spp.
- Trisopterus minutus capelanus

#REF!



| | |
|--|--|
| SAC GFCM - Sub-Committee on Stock Assessment (SCSA) | |
| Assessment form | Sheet A1 Indirect methods: VPA, LCA |

| | |
|------|---|
| Sex* | B |
|------|---|

| | |
|------------------|-------|
| Code: HKE0608Gar | #REF! |
|------------------|-------|

| | |
|--------------|-----|
| Analysis # * | VPA |
|--------------|-----|

Time series

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

| | | |
|---------------|---------|---------------|
| Model | Cohorts | Pseudocohorts |
| (mark with X) | X | |

| | | | |
|-----------------------|----------------|---------------|-------------------------|
| Equation used | Catch equation | Tuning method | XSA |
| # of gears | 1 | Software | Lowestof VPA suite; FLR |
| F _{terminal} | 0,5998 | | |

Population results (please state units)

| | Sizes | Ages | | Amount | Biomass |
|----------|--------|------|--------------------|----------------|------------|
| Minimum | 4 | 0 | Recruitment | 1603 (mill) | 138.9 (mt) |
| Average | 7,671 | 0,39 | Average population | 542,3 | 6839 |
| Maximum | 76 | 19 | Virgin population | | 87278 |
| Critical | 15,635 | 1 | Turnover | | 177,05 |
| | | | | B(max)/B(mean) | 31 |
| | | | | B(max)/D | 17,5 |

Average mortality

| | Total | Trawl | Gear | | | |
|----------------|--------|-----------|------|--|--|--|
| F ₁ | 0,5997 | Fbar 2-7 | | | | |
| F ₂ | 0,8 | F bar 0-3 | | | | |
| Z | 1,14 | | | | | |

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

Comments

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Assessment form

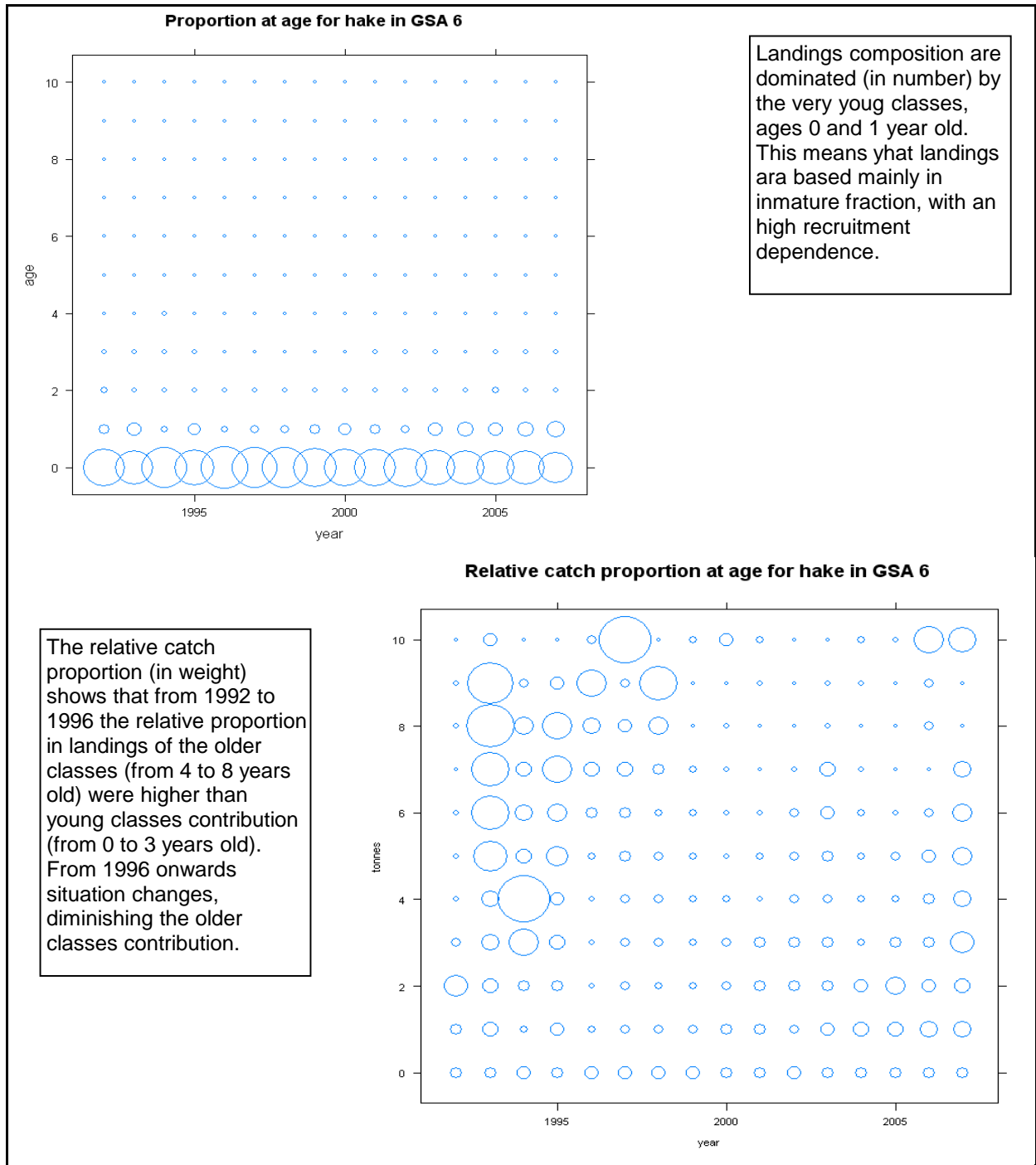
Sheet A2
Indirect methods: data

Code: HKE0608Gar

| | | | | | |
|------|---|-------|-------|--------------|-----|
| Sex* | B | Gear* | Trawl | Analysis # * | VPA |
|------|---|-------|-------|--------------|-----|

| | |
|------|---------------------|
| Data | Catch number by age |
|------|---------------------|

Data



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

Assessment form

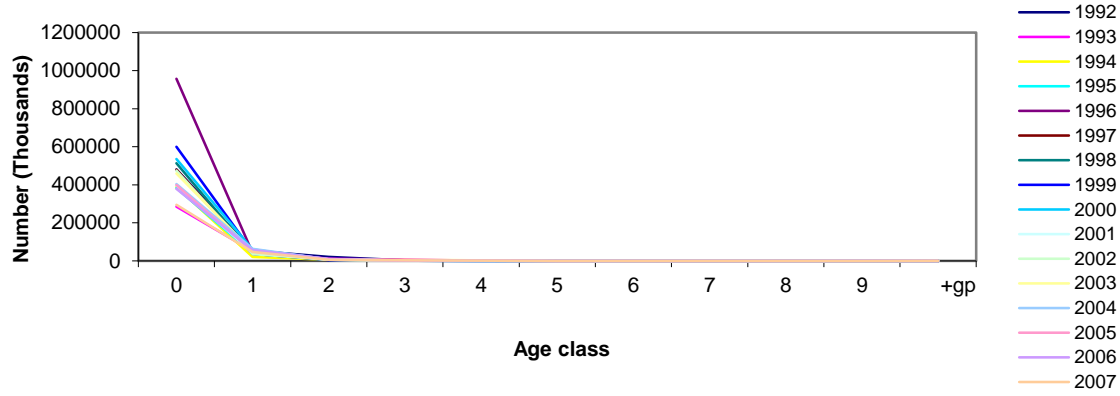
Sheet A3
Indirect methods: VPA results

Code: HKE0608Gar

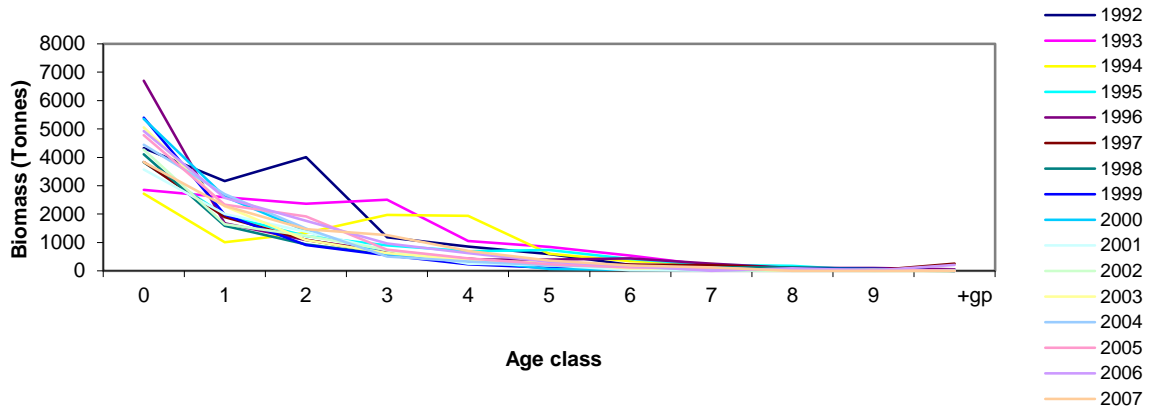
Page 1 / 3

| | | | | | |
|------|---|-------|-------|-------------|-----|
| Sex* | B | Gear* | Trawl | Analysis #* | XSA |
|------|---|-------|-------|-------------|-----|

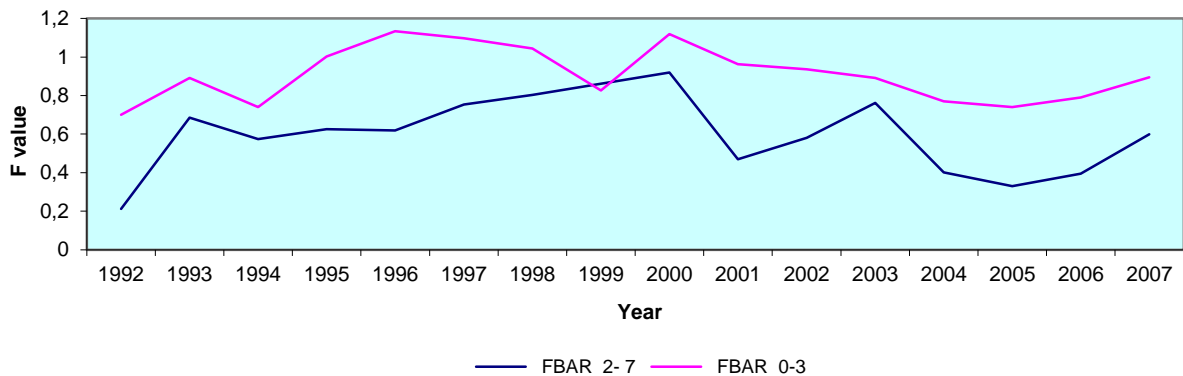
Population in figures



Population in biomass



Fishing mortality rates



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Assessment form

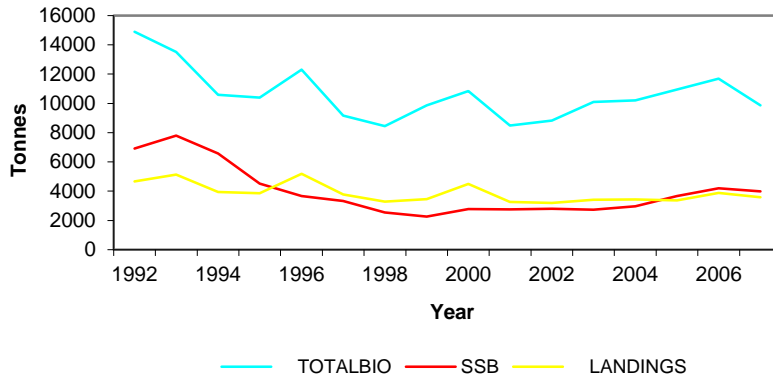
Sheet A3
Indirect methods: VPA results

Code: HKE0608Gar

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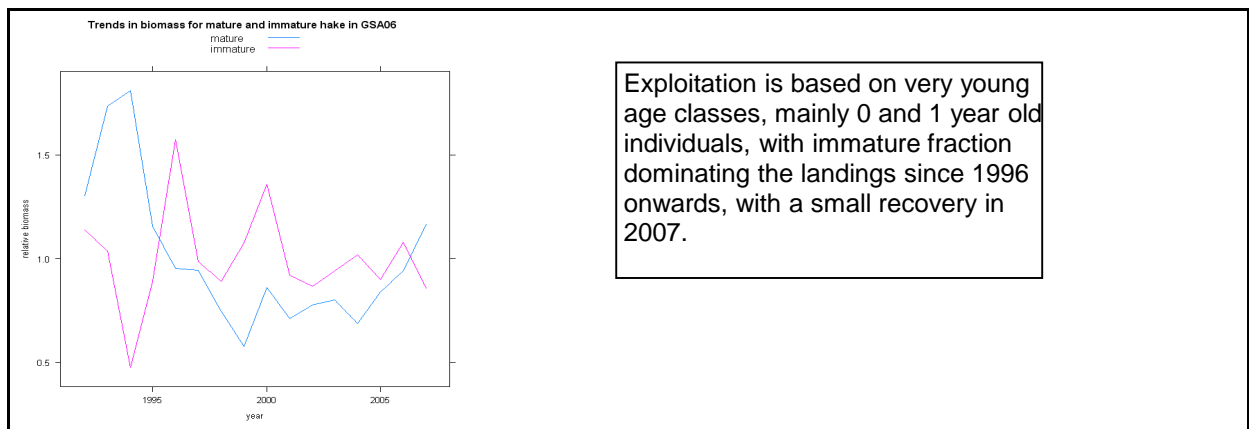
| | | | | | |
|-------------|---|--------------|-------|--------------------|-----|
| Sex* | B | Gear* | Trawl | Analysis #* | VPA |
|-------------|---|--------------|-------|--------------------|-----|

Population in figures



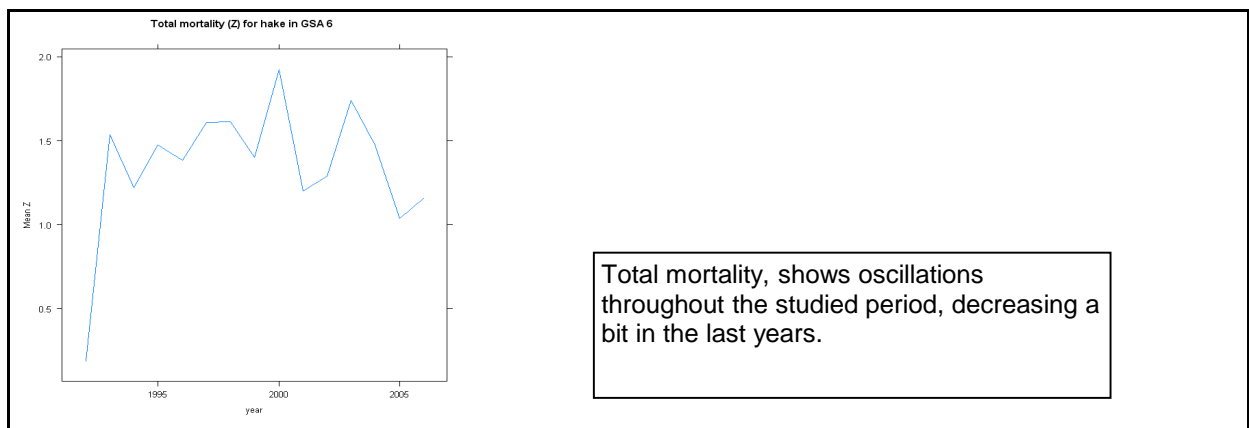
Decreasing trends in Total biomass, SSB and landings, with some recovery since 2003, but desending in 2007.

Population in biomass



Exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fraction dominating the landings since 1996 onwards, with a small recovery in 2007.

Fishing mortality rates



Total mortality, shows oscillations throughout the studied period, decreasing a bit in the last years.

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Assessment form

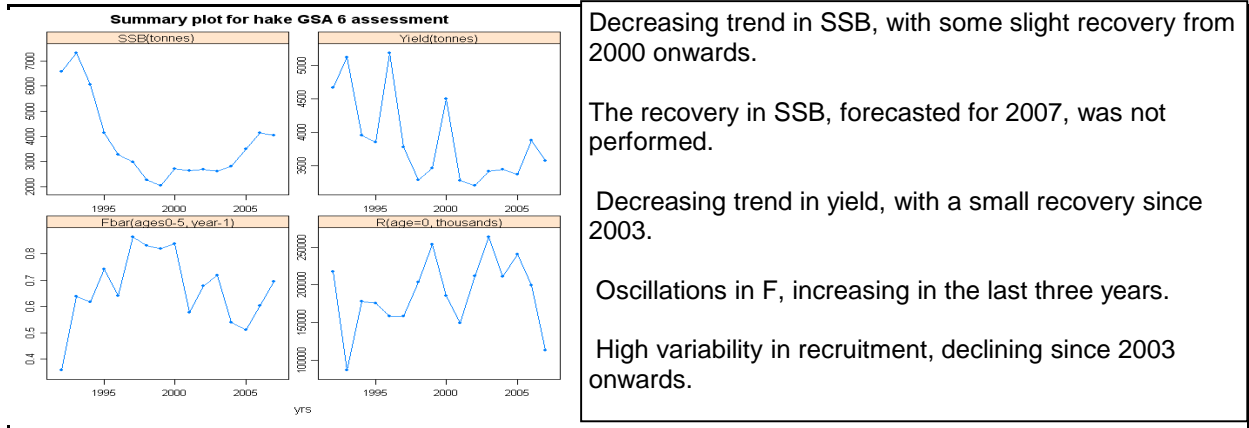
Sheet A3
Indirect methods: VPA results

Code: HKE0608Gar

Page 3 / 3

| | | | | | |
|------|---|-------|-------|-------------|-----|
| Sex* | B | Gear* | Trawl | Analysis #* | VPA |
|------|---|-------|-------|-------------|-----|

Population in figures



Decreasing trend in SSB, with some slight recovery from 2000 onwards.

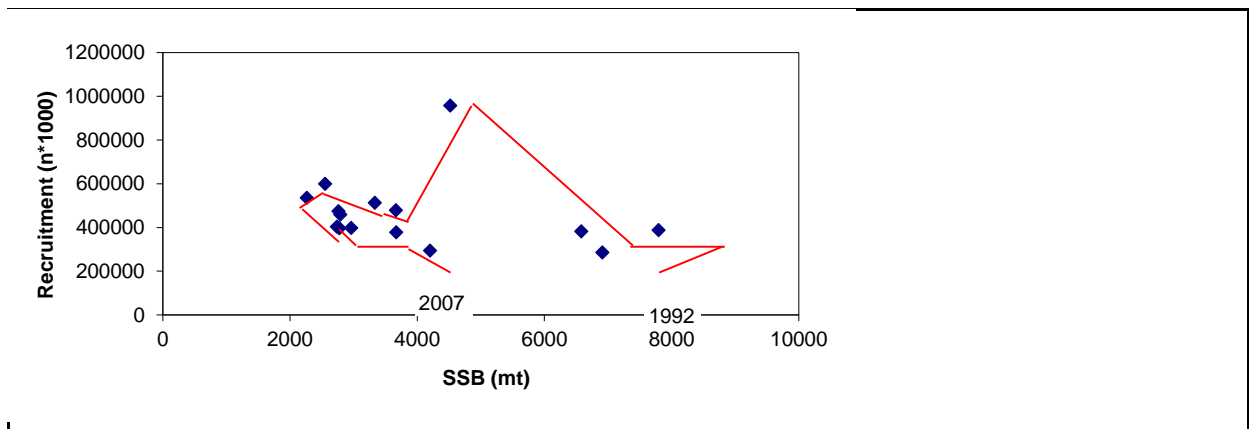
The recovery in SSB, forecasted for 2007, was not performed.

Decreasing trend in yield, with a small recovery since 2003.

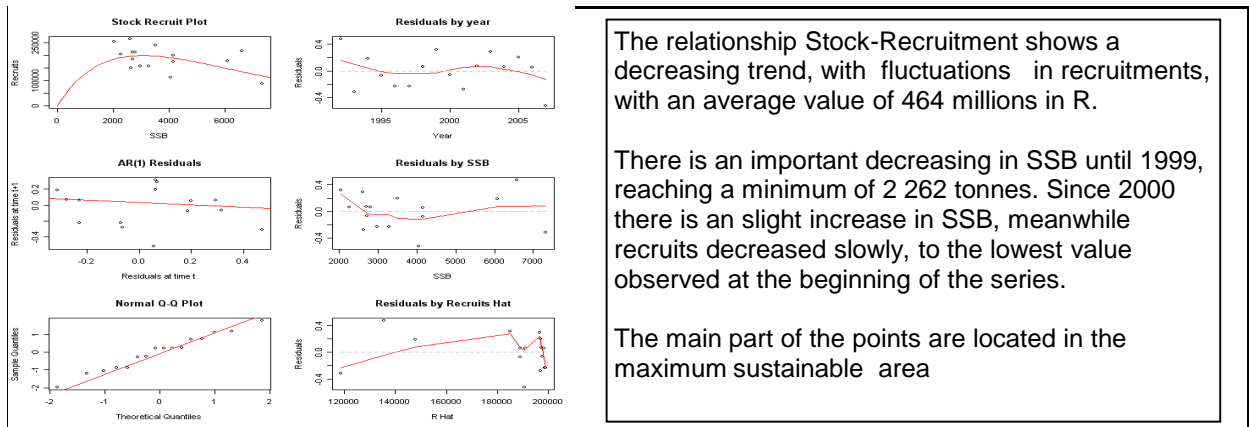
Oscillations in F, increasing in the last three years.

High variability in recruitment, declining since 2003 onwards.

Population in biomass



Fishing mortality rates



The relationship Stock-Recruitment shows a decreasing trend, with fluctuations in recruitments, with an average value of 464 millions in R.

There is an important decreasing in SSB until 1999, reaching a minimum of 2 262 tonnes. Since 2000 there is a slight increase in SSB, meanwhile recruits decreased slowly, to the lowest value observed at the beginning of the series.

The main part of the points are located in the maximum sustainable area

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Assessment form

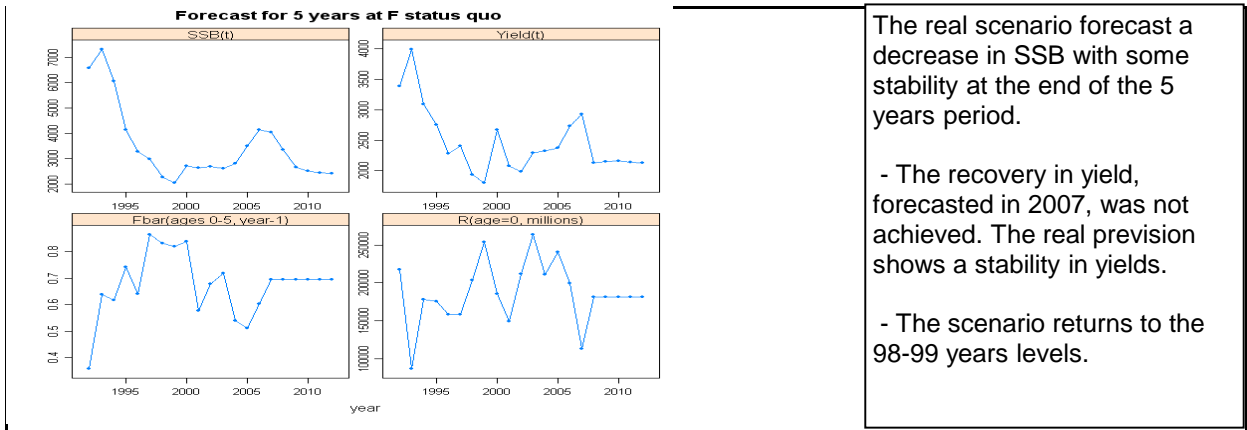
Sheet A3
Indirect methods: VPA results

Code: HKE0608Gar

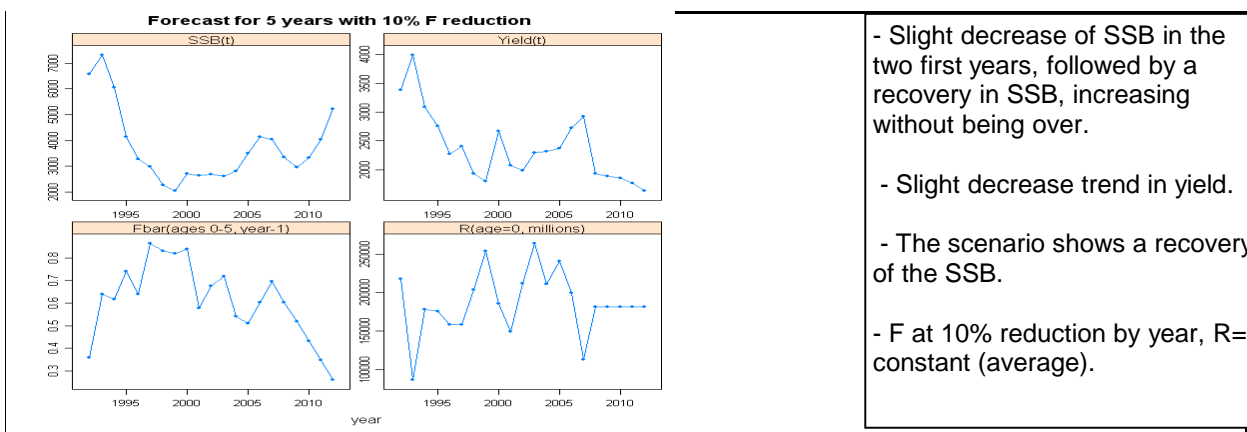
Page 4 / 3

| | | |
|------|-------|-------------|
| Sex* | Gear* | Analysis #* |
|------|-------|-------------|

Population in figures



Population in biomass



Fishing mortality rates



| | |
|--|----------------------------------|
| SAC GFCM - Sub-Committee on Stock Assessment (SCSA) | |
| Assessment form | Sheet Y Indirect methods: Y/R |

| | | | |
|-----|---|------------|------------------|
| Sex | B | | Code: HKE0608Gar |
| | | Analysis # | Y/R |

| | | | |
|------------|---|----------|-----|
| # of gears | 1 | Software | VIT |
|------------|---|----------|-----|

Parameters used

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

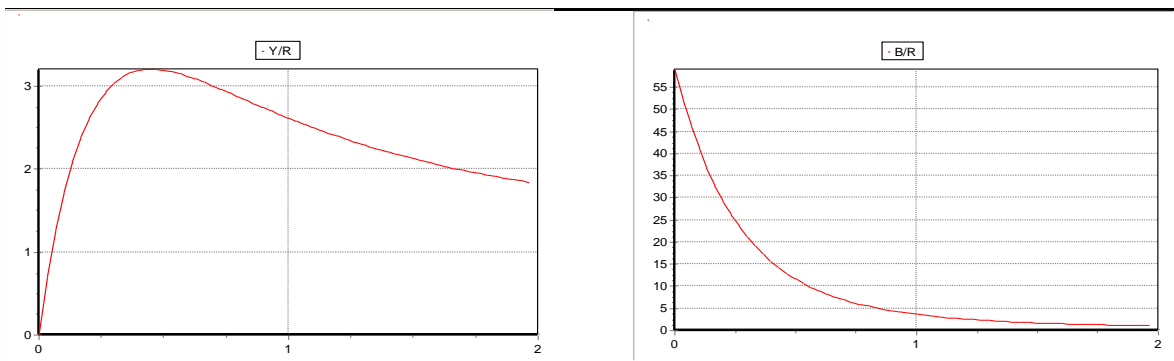
Model characteristics

| |
|-------------------------|
| Calculated mean weights |
|-------------------------|

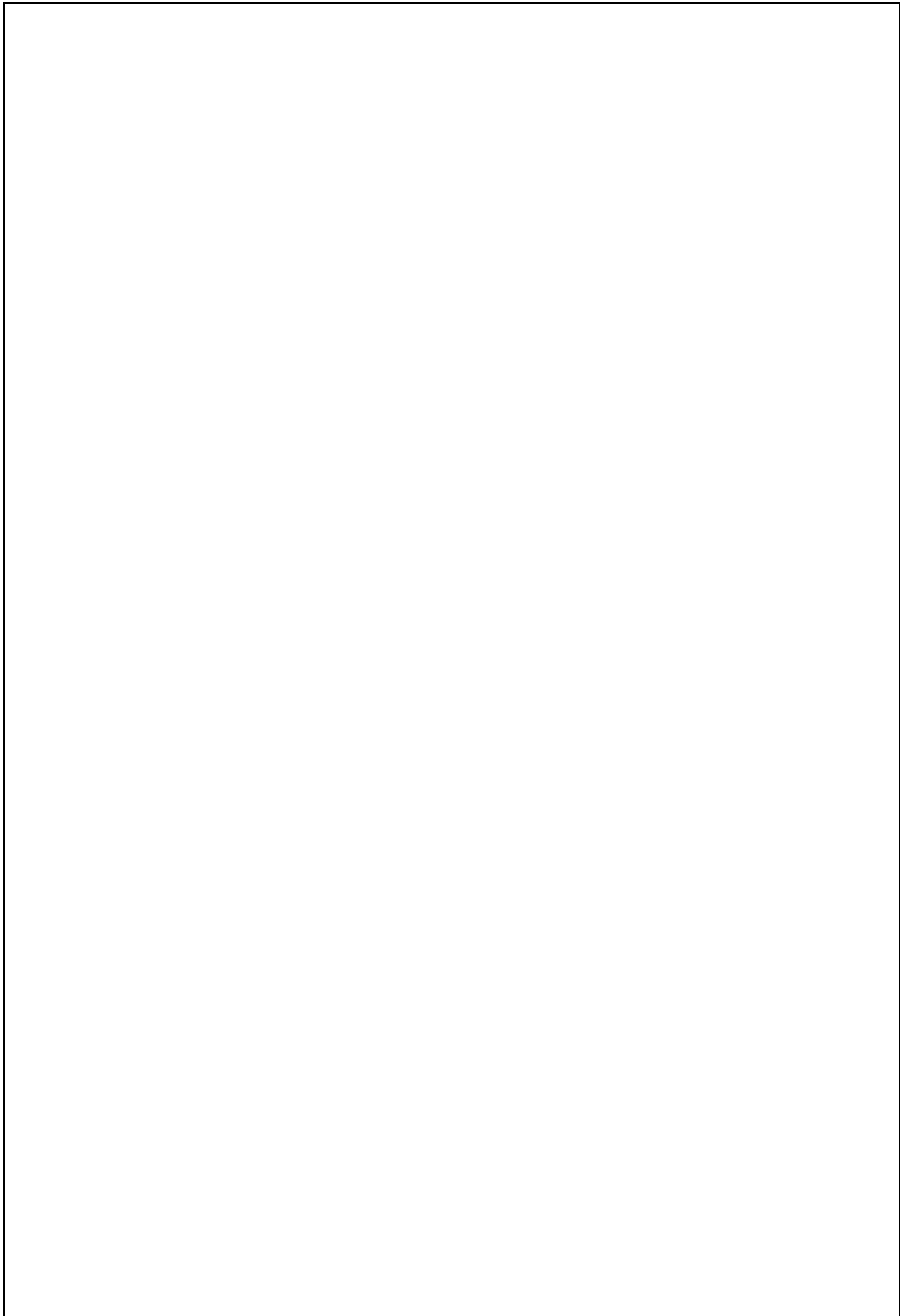
Results

| | Total | Gear | | | |
|------------------|--------|-------|--|--|--|
| | | Trawl | | | |
| Current YR | 2,616 | 2,616 | | | |
| Maximum Y/R | 3,2 | 3,2 | | | |
| Y/R 0.1 | 3,084 | 3,084 | | | |
| F _{max} | 0,46 | 0,46 | | | |
| F _{0.1} | 0,32 | 0,32 | | | |
| Current B/R | 3,687 | | | | |
| Maximum B/R | 13,396 | | | | |
| B/R 0.1 | 19,767 | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Comments



Comments

A large, empty rectangular box with a thin black border, intended for entering comments. It occupies the majority of the page's vertical space.

Other assessment methods

XSA COMBINED ANALYSIS

Trawl and Gillnets.

Considering the two main gears in fishing hake:

- Bottom trawl (80 % of landings)
- Gillnets (20 %)

Trawling fleet c.a. 647 vessels

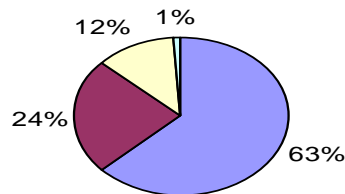
Small scale fleet c.a. 1 300 vessels.

Length distributions: Monthly samplings from Santa Pola port 1997-2007.

Data expanded to the GSA06.

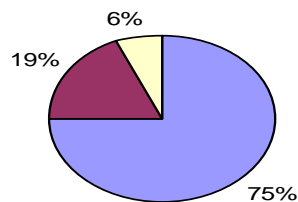
An XSA of the combined data was carried out.

GSA06-North



■ Trawl ■ Nets ■ Bottom lines □ Lines

GSA06-South



■ Trawl ■ Nets ■ Bottom Lines

Other assessment methods

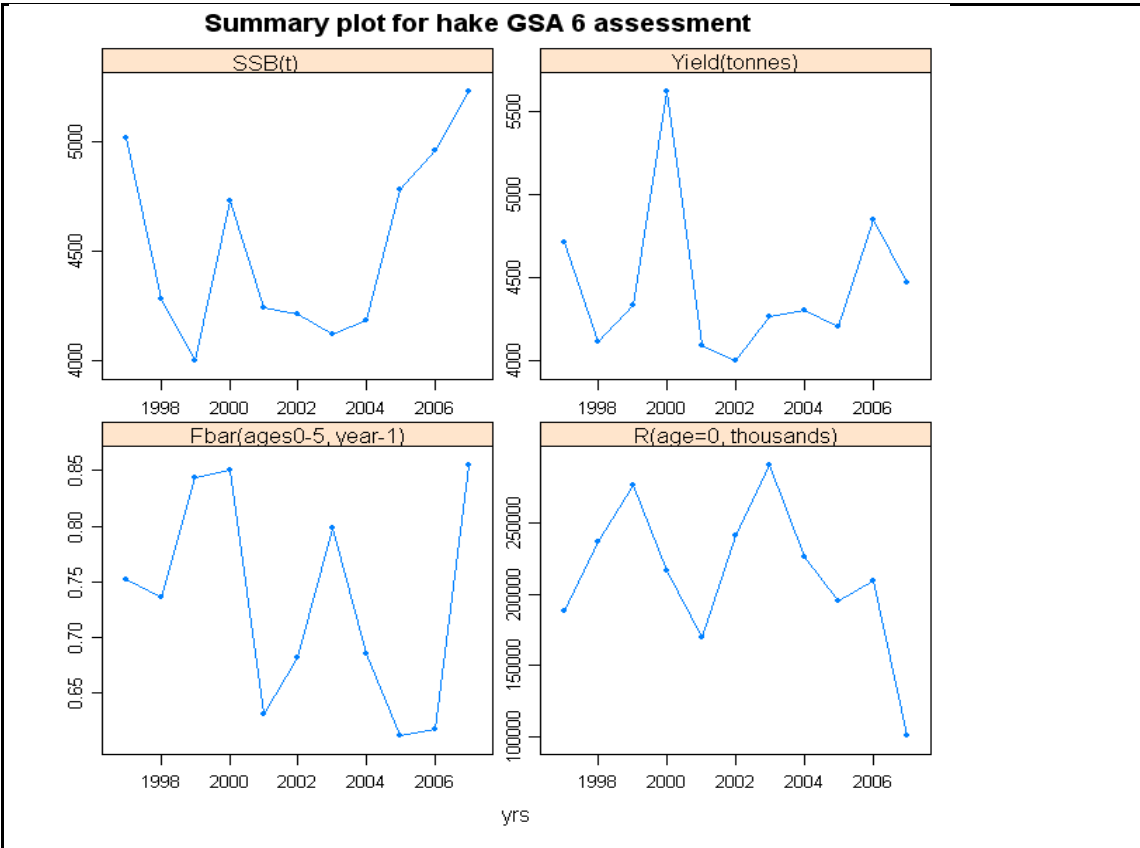
Summary of Results:

There are a increase in SSB in the last tree years.

Slight increasing trend in yield since 2003.

Oscillations in F, with a sharp increase in 2007.

High variability in recruitment, declining from 2003 onwards



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Assessment form

Sheet other

Code: HKE0608Gar

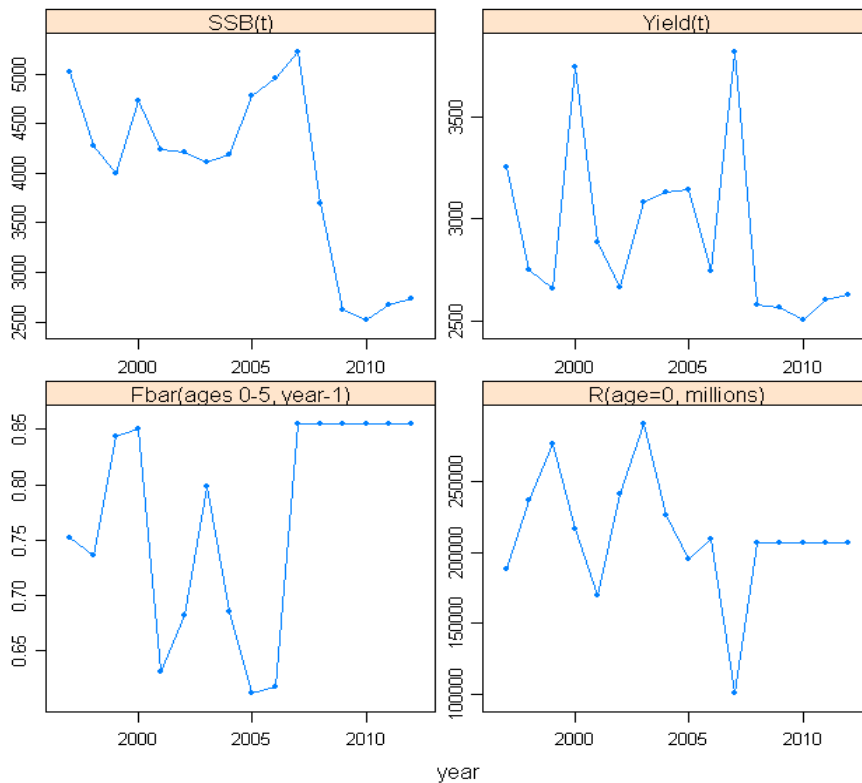
Page 3 / 4

Other assessment methods

Forecast for 5 years at status quo:

Sharp decrease in SSB and Yield.

Forecast for 5 years at F status quo



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Assessment form

Sheet other

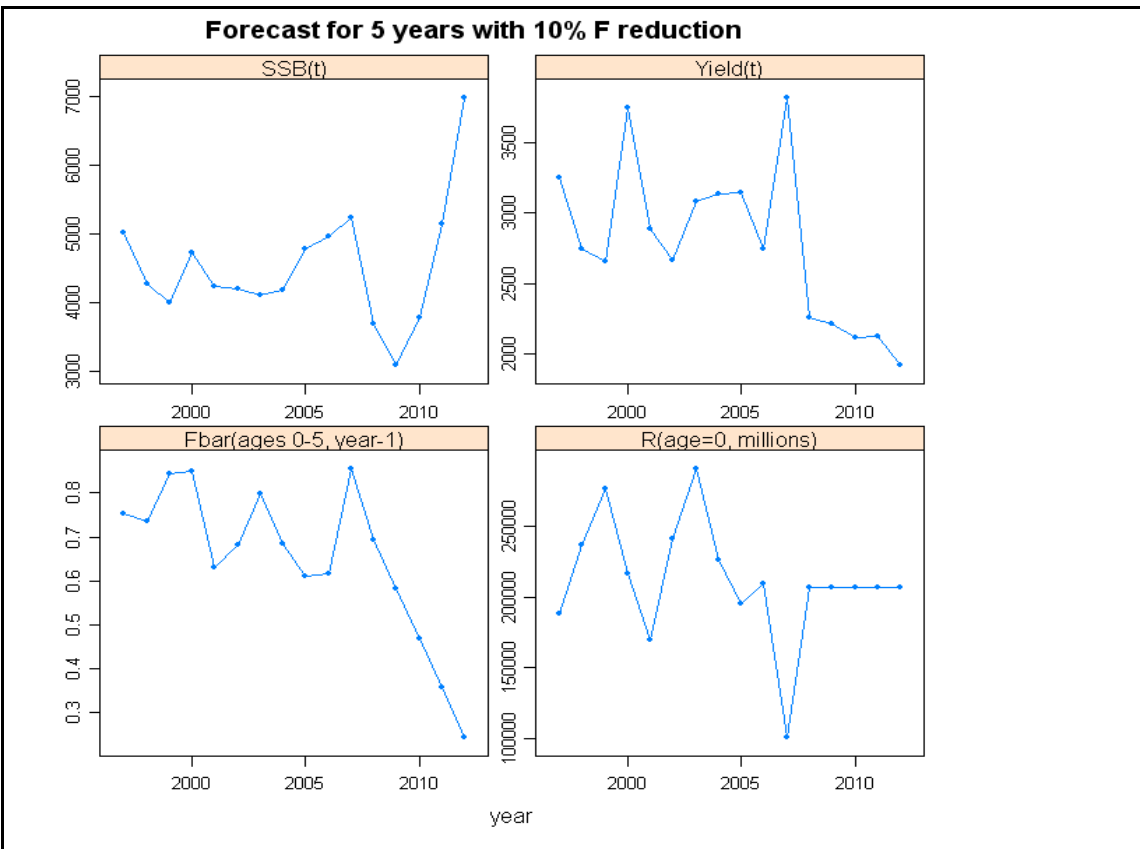
Code: HKE0608Gar

Page 4 / 4

Other assessment methods

Forecast for 5 years, with an 10% reduction in F.

Decrease in SSB in the first two years, followed by a strong recovery from the third year onwards.



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Assessment form

Sheet D
Diagnosis

Code: HKE0608Gar

Indicators and reference points

| Criterion | Current value | Units | Reference Point | Trend | Comments |
|-----------|---------------|--------|-----------------|-------|--|
| B | 9859 | t | Bmean | - | Bnow is below Bmean (10631 t), ad is over the Bloss (8445 t) |
| SSB | 3994 | t | SSBmean | - | SSB now is similar the SSBmean (3970 t), but over the SSBloss (2262 t) |
| F | 0,89 | | Fbar0-3 | + | Fnow is lower than Fmean (0.91) and over the Floss (0.72) |
| Y | 3572 | t | Ymean | - | Ynow is below Ymean (3870 t), ad is slightly over the actual Yloss (319) |
| CPUE | 34,31 | kg/day | CPUEmean | - | CPUEnow is similar to the CPUEmean (34.71 kg/day), and over the CP |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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 type="radio"/> | Moderate fishing | <input type="radio"/> | Intermediate abundance |
| | <input checked="" type="radio"/> | High fishing mortality | <input checked="" type="radio"/> | Low abundance |
| | <input type="radio"/> | Uncertain / Not assessed | <input type="radio"/> | Depleted |
| | | | <input type="radio"/> | Uncertain / Not assessed |

Comments

The general results are similar to those obtained in previous assessments. Exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fraction dominating the landings. On observe a decreasing trend, both in landings and yields along the studied period, with a small recovery since 2003. Total mortality (Z) shows oscillations throughout the studied period decreasing a bit in the last years, in opposing to the fishing mortality (F_{bar}) that increased from 2003 onwards. The current Y/R value represents an 83% of Y/R_{max} , meanwhile B/R represents a 30 % of the B/R_{max} , being necessary a reduction of 53% in the current effort to reach the Y/R_{max} values. Total biomass of the stock decreases slowly, being stabilised at around the 8 000 t. The SSB represents only a 37% of the total biomass in average. The SSB-R relationship also shows a decreasing trend, with some stability around the R_{max} , with recruitments showing a slight tendency to increase. Abundance indices show a slight reduction on 2007.

The increasing trend of SSB and yield was stopped in 2007. Recruitments are declining since 2003 onwards. Forecast at status quo predicts a decline of SSB and yields, with some stability at the end of the period. If we consider a 10% yearly reduction in F , a recovery of SSB will be achieved. If we analyse trawling and gillnet fisheries together (80 % for trawling and 20 % for gillnet) for the current scenario, the results show a significant increasing in SSB. On the contrary, forecast at status quo, offers a sharp decrease both in SSB and yield, with some stability at the end of the five years forecasted period. A proportional shared 10% reduction in F , provide us a more optimistic scenario, with SSB showing a strong recovery.

Changes in cod end mesh geometry, result effectiveness than effort reductions. Only a change of mesh shape in the cod end would result in a significant increment in the Y/R and SSB/R . If this management measure were applied, there would be gains in the second year.

The influence of the interaction between trawl and artisanal fishery, mainly gill net, can endanger the forecasted SSB increase, due to the expansion since 1996 of this fishery.

It can be concluded that the resource is over-exploited (growth over-fishing), with a risk of recruitment over-exploitation, that can be avoided by reducing effort. The use of 40 mm square mesh in the cod-end could improve yields and the state of the stock. The resource should be considered object of a special surveillance. The first step must be not to increase fishing mortality at all, both for trawl as well as for artisanal, being accompanied by a change in the cod end mesh type, being recommended a yearly 10% reduction of effort to ensure the increment in SSB.

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

Assessment form

Sheet Z

Objectives and recommendations

Code: HKE0608Gar

Management advice and recommendations*

OBJETIVES

To reduce growth overfishing:

- Reduce the effort of trawl.
- Improve the fishing pattern of the trawl to arise the minimum length of catches equal the minimum legal landing size.

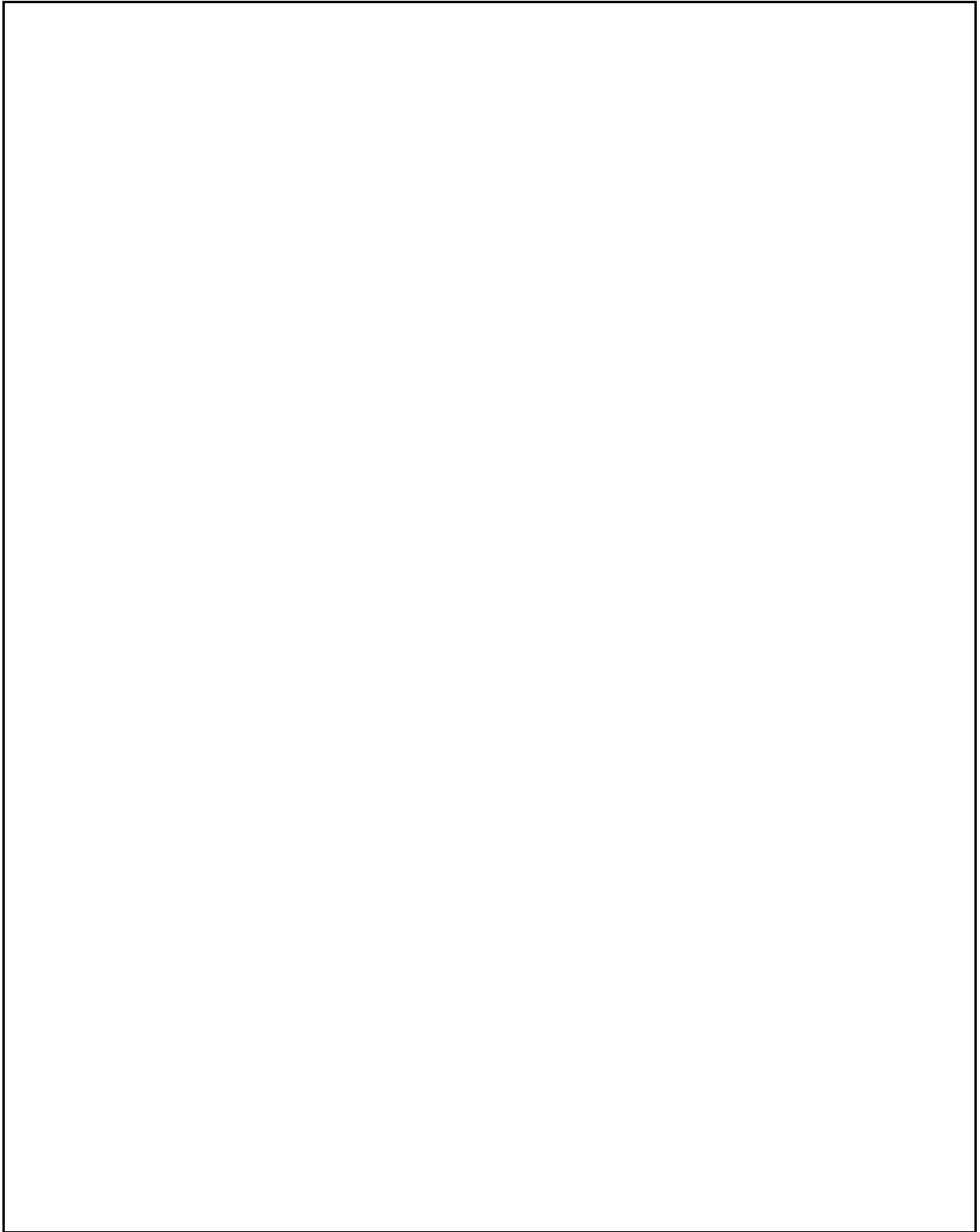
To avoid recruitment overfishing:

- Reduce the effort of long line and gillnets in order to increase (or at least maintain) the SSB

RECOMMENDATIONS

- Special surveillance on fishing activities related with hake.
- Effort limitation, both in trawl as well as in artisanal, mainly gillnet and long line.
- Implement the use of 40 mm square mesh size in the cod end in trawl gears.
- Establish temporal closures for long line and gillnet during the period of maximum spawning, as well as for trawling in recruitment period.
- Establish area closures to fishing (Fishing Reserves).

Advice for scientific research*



Abstract for SCSA reporting

Authors

García-Rodríguez*1 M., J. L. Pérez-Gil2, A. Esteban2, E. Barcala2 and N. Carrasco2

Year

2008

Species Scientific name

Merluccius merluccius - HKE

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area

06 - Northern Spain

Fisheries (brief description of the fishery)*

Hake (*Merluccius merluccius*) is one of the most important target species for the trawl fisheries developed by around 647 vessels along the GFCM geographical sub-area Northern SPAIN (GSA-06). In last years, the average of the annual landings of this species, which are mainly composed by juveniles living on the continental shelf, were situated around 3800 tons in the whole area.

Source of management advice*

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

The state of exploitation was assessed for the period 1992-2007 by means of a VPA Separable, tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys. Analysis was carried out applying the Extended Survivor Analysis (XSA) method (Lowestoft suite; Darby and Flatman, 1994; Fisheries Library in R) over the period 1992-2007. In addition, a yield-per-recruit (Y/R) analysis (VIT program; Leonart and Salat, 1992) was applied on the mean pseudo-cohort 1992-2007 for the GFCM geographical sub-area Northern Spain (GSA-06).

Both methods were performed from size composition of trawl catches (obtained from on board and on port monthly sampling) and official landings, transforming length data to age data by slicing (L2AGE program). Transition analysis was also made to simulate different management strategies for the improvement of the state of this resource. In this assessment, a new set of parameters (fast growth hypothesis) were considered and a natural mortality vector (PROBIOM, Caddy and Abella, 1999) was applied.

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

High fishing mortality

Stock abundance

Low abundance

Comments

The general results are similar to those obtained in previous assessments. Exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fraction dominating the landings. On observe a decreasing trend, both in landings and yields along the studied period, with a small recovery since 2003. Total mortality (Z) shows oscillations throughout the studied period decreasing a bit in the last years, in opposing to the fishing mortality (Fbar) that increased from 2003 onwards. The current Y/R value represents an 83% of Y/Rmax, meanwhile B/R represents a 30 % of the B/Rmax, being necessary a reduction of 53% in the current effort to reach the Y/Rmax values. Total biomass of the stock decreases slowly, being stabilised at around the 8 000 t. The SSB represents only a 37% of the total biomass in average. The SSB-R relationship also shows a decreasing trend, with some stability around the Rmax, with recruitments showing a slight tendency to increase. Abundance indices show a slight reduction on 2007.

The increasing trend of SSB and yield was stopped in 2007. Recruitments are declining since 2003 onwards. Forecast at status quo predicts a decline of SSB and yields, with some stability at the end of the period. If we consider a 10% yearly reduction in F, a recovery of SSB will be achieved. If we analyse trawling and gillnet fisheries together (80 % for trawling and 20 % for gillnet) for the current scenario, the results show a significant increasing in SSB. On the contrary, forecast at status quo, offers a sharp decrease both in SSB and yield, with some stability at the end of the five years forecasted period. A proportional shared 10% reduction in F, provide us a more optimistic scenario, with SSB showing a strong recovery.

Changes in cod end mesh geometry, result effectiveness than effort reductions. Only a change of mesh shape in the cod end would result in a significant increment in the Y/R and SSB/R. If this management measure were applied, there would be gains in the second year.

The influence of the interaction between trawl and artisanal fishery, mainly gill net, can endanger the forecasted SSB increase, due to the expansion since 1996 of this fishery.

Management advice and recommendations*

OBJECTIVES

To reduce growth overfishing:

- Reduce the effort of trawl.
- Improve the fishing pattern of the trawl to arise the minimum length of catches equal the minimum legal landing size.

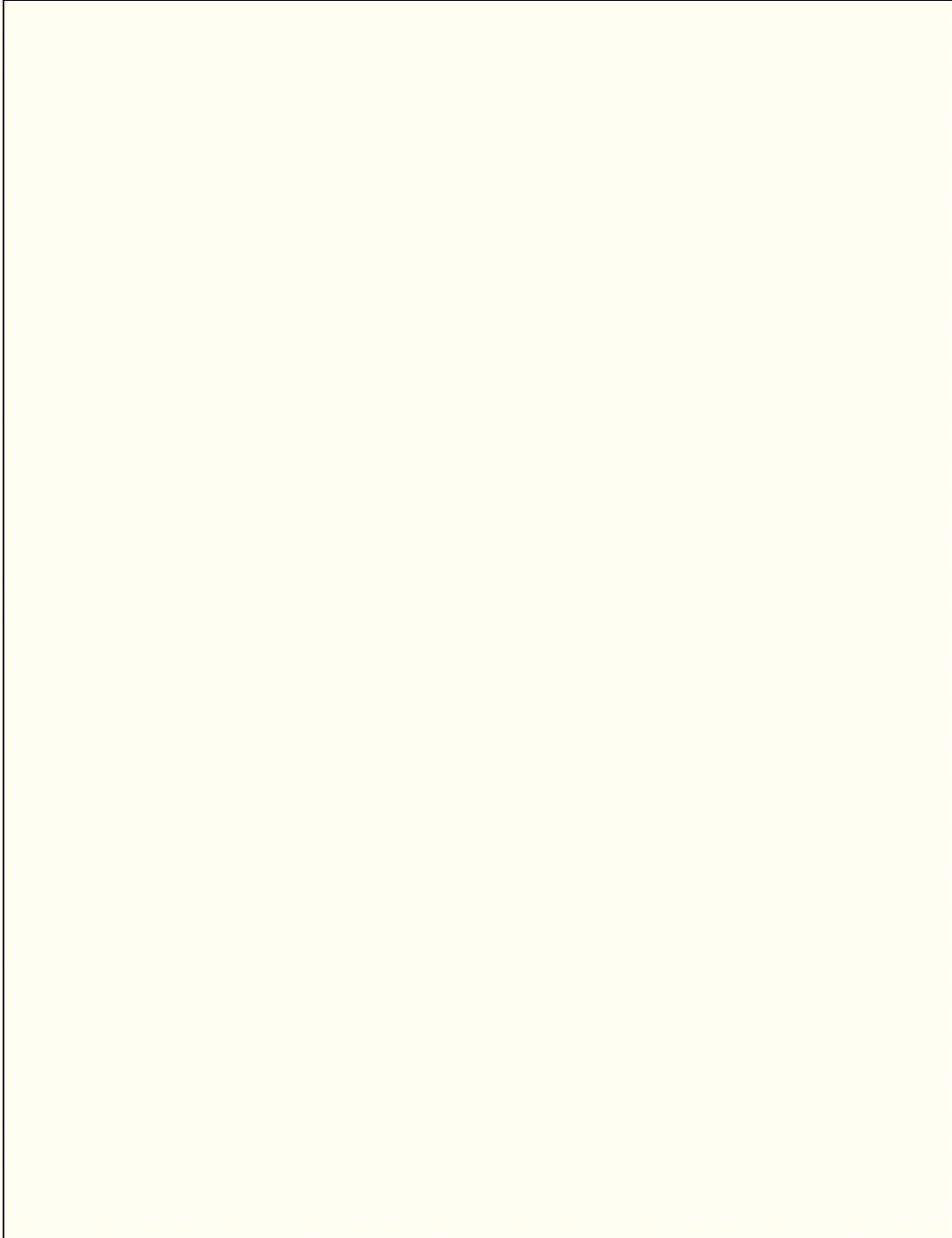
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- Reduce the effort of long line and gillnets in order to increase (or at least maintain) the SSB

RECOMMENDATIONS

- Special surveillance on fishing activities related with hake.
- Effort limitation, both in trawl as well as in artisanal, mainly gillnet and long line.
- Implement the use of 40 mm square mesh size in the cod end in trawl gears.
- Establish temporal closures for long line and gillnet during the period of maximum spawning, as well as for trawling in recruitment period.
- Establish area closures to fishing (Fishing Reserves).

Advice for scientific research*



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

Assessment of European Hake Merluza Merlu, Naselo (*Merluccius merluccius* - HKE) from 06 - Northern Spain. García-Rodríguez*1 M., J. L. Pérez-Gil2, A. Esteban2, E. Barcala2 and N. Carrasco2

Description of fishery: Hake (*Merluccius merluccius*) is one of the most important target species for the trawl fisheries developed by around 647 vessels along the GFCM geographical sub-area Northern SPAIN (GSA-06). In last years, the average of the annual landings of this species, which are mainly composed by juveniles living on the continental shelf, were situated around 3800 tons in the whole area.

Source of management advice: The state of exploitation was assessed for the period 1992-2007 by means of a VPA Separable, tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys. Analysis was carried out applying the Extended Survivor Analysis (XSA) method (Lowestoft suite; Darby and Flatman, 1994; Fisheries Library in R) over the period 1992-2007. In addition, a yield-per-recruit (Y/R) analysis (VIT program; Leonart and Salat, 1992) was applied on the mean pseudo-cohort 1992-2007 for the GFCM geographical sub-area Northern Spain (GSA-06).

Both methods were performed from size composition of trawl catches (obtained from on board and on port monthly sampling) and official landings, transforming length data to age data by slicing (L2AGE program). Transition analysis was also made to simulate different management strategies for the improvement of the state of this resource. In this assessment, a new set of parameters (fast growth

Exploitation rate: High fishing mortality

Stock abundance: Low abundance

Comments: The general results are similar to those obtained in previous assessments. Exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fraction dominating the landings. On observe a decreasing trend, both in landings and yields along the studied period, with a small recovery since 2003. Total mortality (Z) shows oscillations throughout the studied period decreasing a bit in the last years, in opposing to the fishing mortality (Fbar) that increased from 2003 onwards. The current Y/R value represents an 83% of Y/Rmax, meanwhile B/R represents a 30 % of the B/Rmax, being necessary a reduction of 53% in the current effort to reach the Y/Rmax values. Total biomass of the stock decreases slowly, being stabilised at around the 8 000 t. The SSB represents only a

Management advice and recommendation: OBJETIVES

To reduce growth overfishing:

- Reduce the effort of trawl.
- Improve the fishing pattern of the trawl to arise the minimum length of catches equal the minimum legal landing size.

To avoid recruitment overfishing:

- Reduce the effort of long line and gillnets in order to increase (or at least maintain) the SSB

Advice for scientific research:

