SAC GFCM
Sub-Committee on Stock Assessment

Date*	27	September	2010	Code*	DPS0510Gui

Authors*

Guijarro, Beatriz; González, Natalia and Massutí, Enric

Affiliation*

IEO- Centre Oceanogràfic de les Balears; Moll de Ponent s/n; 07015 Palma (Spain)

Species Scientific name*

1 *Parapenaeus longirostris* - *DPS*
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area*

05 - Balearic Islands

Geographical Sub-Area (GSA)*

05 - Balearic Island

Combination of GSAs
1
2
3

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Assessment form

Sheet #0
Basic data on the assessment

Code: DPS0510Gui

Date*	27	Sep	2010	Authors*	Guijarro, Beatriz; González, Natalia and Massutí, Enric

Species Scientific name*	Parapenaeus longirostris - DPS	Species common name*	Pink shrimp

Data Source

GSA*	05 - Balearic Island	Period of time*	2001-2009

Description of the analysis

Type of data*	Size composition of commercial trawl catches and official landings, CPUE data from survey and commercial fleet	Data source*	IEO, Fishermen Association, Ministry of Fisheries, Regional Government
Method of assessment*	VPA - Extended Survivor Analysis (XSA), Yield per recruit analysis	Software used*	Lowestoft VPA V3.2 (Darby & Flatman, 1994), EXCEL

Sheets filled out

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

Comments, bibliography, etc.

Abella A, JF Caddy and F Serena (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. Living Resour., 10: 257-269.

Abella A, JF Caddy and F Serena (1997) Do natural mortality and availability decline with age? An alternative yield Astudillo A. and J.F. Caddy (1986)

Darby CD and Flatman, S (1994) Virtual Population Análisis: version 3.1 (Windows/DOS) user guide. Info. Tech. Ser., MAFF Direct. Fish. Res., Lowestoft, nº 1, 85 pp.

Guijarro B and E Massutí (2006) Selectivity of diamond- and square-mesh codends in the deepwater crustacean trawl fishery off the Balearic Islands (W Mediterranean). ICES J. Mar. Sci., 62: 52-67.

Guijarro B, Massutí E, Moranta J and Cartes JE (2009) Short spatio-temporal variations in the population and biology of the deep-water rose shrimp Parapenaeus longirostris (Decapoda: Crustacea) in the western Mediterranean. Sci Mar, 73(1): 183-197.

Massutí E and O Reñones (2005) Demersal resource assemblages in the trawl fishing grounds off the Balearic Islands (western Mediterranean). Sci. Mar., 69 (1): 167-181.

Comments, bibliography, etc.

Ordines F, E Massutí, B Guijarro and R Mas (2006) The effect of mesh geometry on the selectivity of a multi-species bottom trawl fishery in the Mediterranean: diamond vs. square mesh in the codends. Aquat. Liv. Res., 19: 329-338.

Palmer M, A Quetglas, B Guijarro, J Moranta, F Ordines and E Massutí (2009) Performance of artificial neural networks and discriminant analysis in predicting fishing tactics from multispecific fisheries. Can. J. Fish. Aquat. Sci., 66: 224-237.

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Assessment form

Sheet B
Biology of the species

Code: DPS0510Gui

Biology

Somatic magnitude measured (LH, LC, etc)*		LC		Units*	mm
Sex	Fem	Mal	Both	Unsexed	
Maximum size observed	42	37			Reproduction season	see comments
Size at first maturity	28.5*				Reproduction areas	
Recruitment size	17**	16**			Nursery areas	

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	mm	44	31.3	40	
	K		0.67	1	0.89	
	t0		-0.21	-0.49	-0.49	
	Data source	Guijarro et al. (2009)				
Length weight relationship	a		0.0022	0.0024	0.0022	
	b		2.5626	2.5335	2.5682	
M			0.37	0.431	0.438	
sex ratio (mal/fem)						

Comments

* Guijarro et al. (2009)
** Minimum length in catches

Reproduction: continuous spawning, with two peaks (spring-summer and autumn), being the most important in summer (Guijarro et al., 2009)

M from PROBIOM (Abella et al., 1997):

Age	0	1	2	3
F	0.872	0.289	0.184	0.137
M	0.840	0.447	0.271	0.168
F+M	0.850	0.454	0.276	0.173

Sex-ratio estimated from length frequency distributions (sheet P2a)

Comments

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Assessment form

Sheet P1
General information about the fishery

Code: DPS0510Gui

Data source*	IEO, Spanish Data Collection Programme (DCF, EU), Fishermen Association and Regional Government	Year (s)*	2001-2009
Data aggregation (by year, average figures between years, etc.)*	By year (2001-2009 for XSA and 2009 for Y/R)		

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	ESP	05	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	DPS
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 05 E 03 34 - DPS	37	Tons	16.9	See comments	Almos null	See comments	1301**
Total	37		16.9				

Legal minimum size	

Comments

Pink shrimp catches from the Balearic fleet comes exclusively from bottom trawl. Fleet and catch data correspond to average 2000-2009 from Mallorca island, represent around >75% of the Balearic Islands.

(*) Total number of bottom trawlers

(**) Estimated standardised effort in days (average 2000-2009; from Palmer et al., 2009): Four different fishing tactics (shallow shelf : SS; deep shelf: DS; upper slope: US; middle slope: MS) and their combinations.
US & US+SS & US+DS & US+MS = 1301 days

OTHER SPECIES CAUGHT on US (350-600 m): important Nephrops norvegicus, large Merluccius merluccius, Lepidorhombus spp., Lophius spp. and Micromesistius poutassou (Guijarro and Massutí 2006).

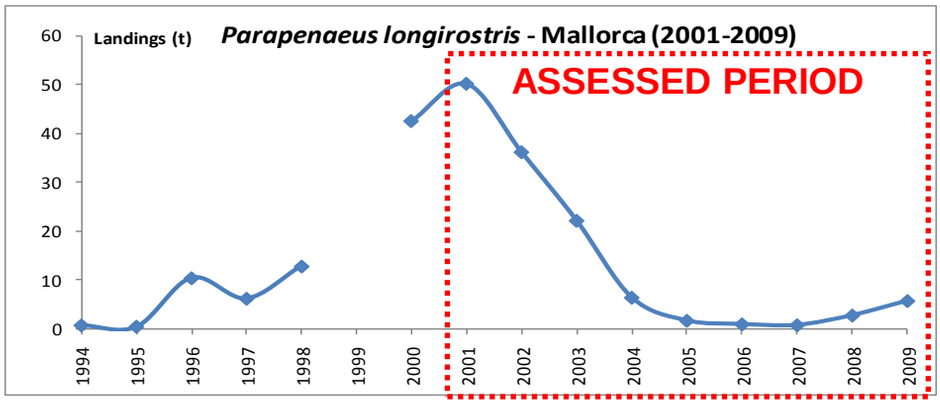
Total DISCARDS on US have been estimated up to 18% (autumn) 45% (spring) of captured biomass. They are mainly composed by the following species (Guijarro and Massutí, 2006):

Comments

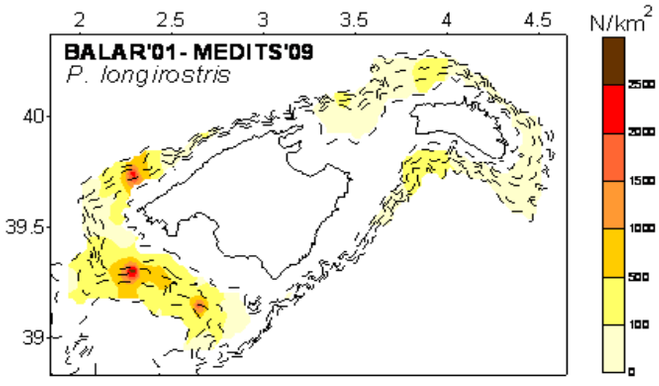
- Elasmobranchs: Dipturus oxyrinchus, Scyliorhinus canicula and Galeus melastomus.
- Teleosts: Argentina sphyraena, Argyropelecus hemigymnus, Arnoglossus rueppelli, Bathysolea profundicola, Capros aper, Cetrolophus niger, Chauliodus sloani, Citharus linguatula, Conger conger, Epigonus telescopus, Epigonus denticulatus, Gadiculus argenteus, Hoplostethus mediterraneus, Lepidopus caudatus, Molva dypterigia , Myctophidae, Notacanthus bonapartei, Notolepis rissoi, Peristedion cataphractum, Stomias boa, Symphurus nigrescens, Synchiropus phaeton, Caelorinchus caelorinchus, Hymenocephalus italicus and Nezumia aequalis.
- Crustaceans: Macropipus tuberculatus, Munida spp., Paromola cuvieri, Pasiphaea sivado, Pasiphaea multidentata, Plesionika heterocarpus and Sergestes arcticus.
- Cephalopods: Bathypolypus sponsalis, Octopus salutii, Histioteuthis spp. and Sepietta oweniana.
- Others: Echinidae, Gryphus vitreus, Porifera and Salpidae.

Guijarro B. and E. Massutí (2006) Selectivity of diamond- and square-mesh codends in the deepwater crustacean trawl

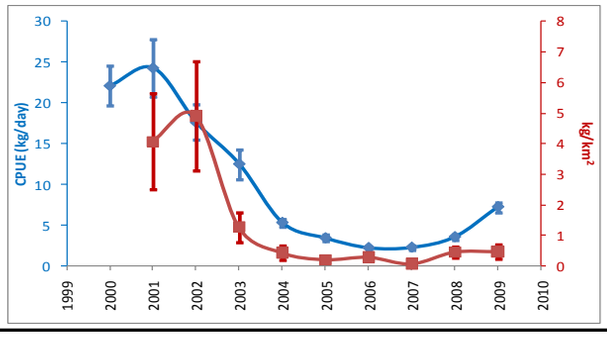
FISHERY: ANNUAL LANDINGS AND STANDARDIZED CPUEs



BOTTOM TRAWL SURVEYS (MEDITS)



FISHERY AND SURVEYS



Data source*	Size composition of commercial trawl catches from monthly sampling on board	OpUnit 1*	ESP 05 E 03 34 - DPS

Time series

Year*	2001	2002	2003	2004	2005	2006
Catch	50.2	36.2	22.1	6.4	1.6	0.9
Minimum size	18	17	19	17	17	21
Average size Lc	27	25	29	28	29	30
Maximum size	42	39	42	40	41	40
Fleet	27	27	27	26	22	31

Year	2007	2008	2009			
Catch	0.7	2.7	5.7			
Minimum size	24	16	18			
Average size Lc	30	27	29			
Maximum size	39	40	38			
Fleet	31	31	29			

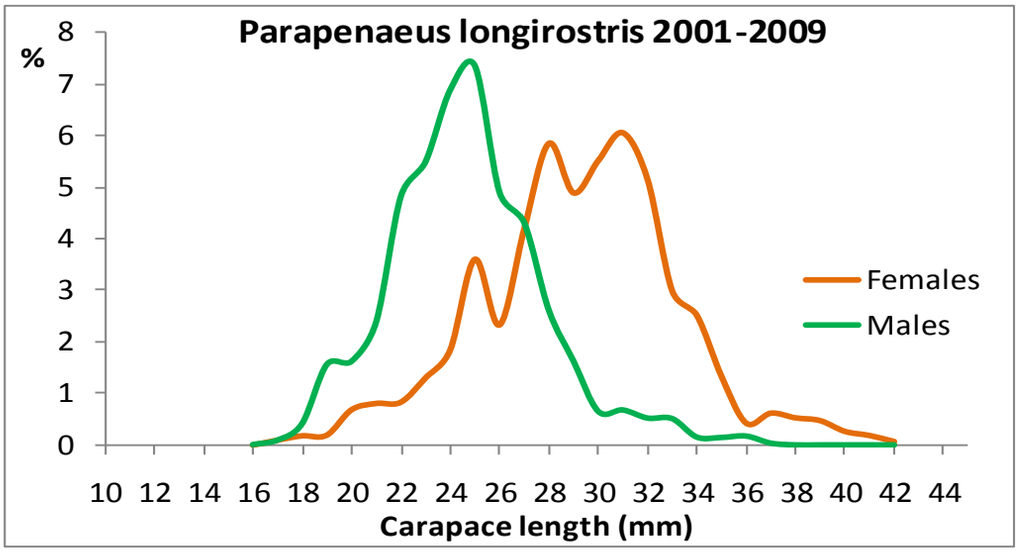
Selectivity

L25	14.7
L50	16.6
L75	18.5
Selection factor	

Remarks

Guijarro B. & E. Massutí (2006) Selectivity of diamond- and square-mesh codends in the deepwater crustacean trawl fishery off the Balearic Islands (W Mediterranean). ICES J Mar Sci 62: 52-67

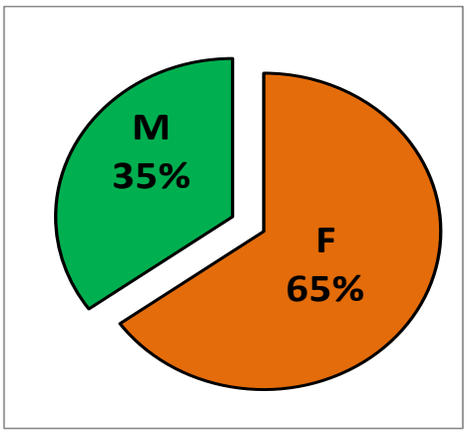
Structure by size or age



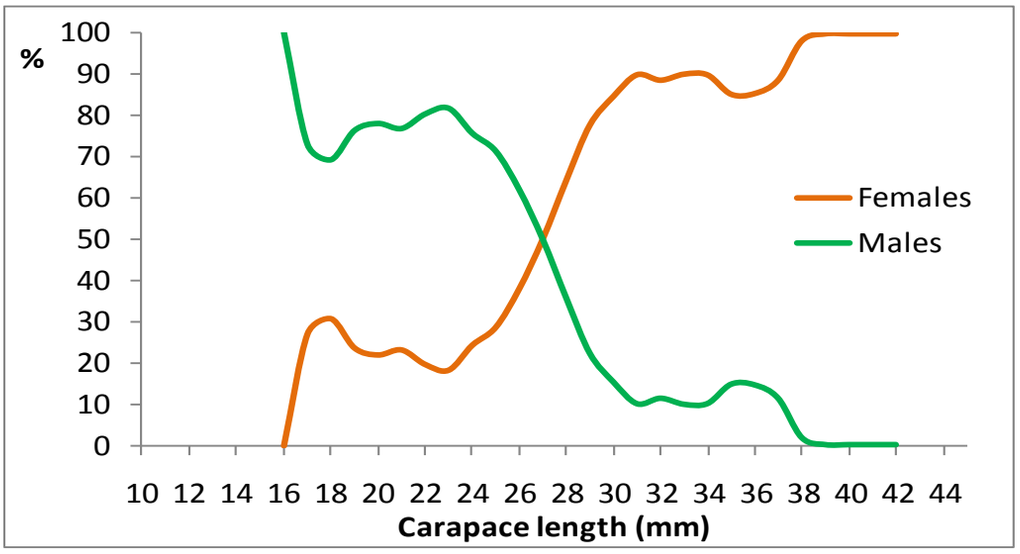
Structure by size or age

CATCHES

	Females (tons)	Males (tons)
2001	35.4	14.8
2002	20.3	15.9
2003	13.4	8.8
2004	4.0	2.4
2005	1.3	0.4
2006	0.7	0.2
2007	0.4	0.3
2008	1.8	0.9
2009	3.3	2.4



SEX-RATIO



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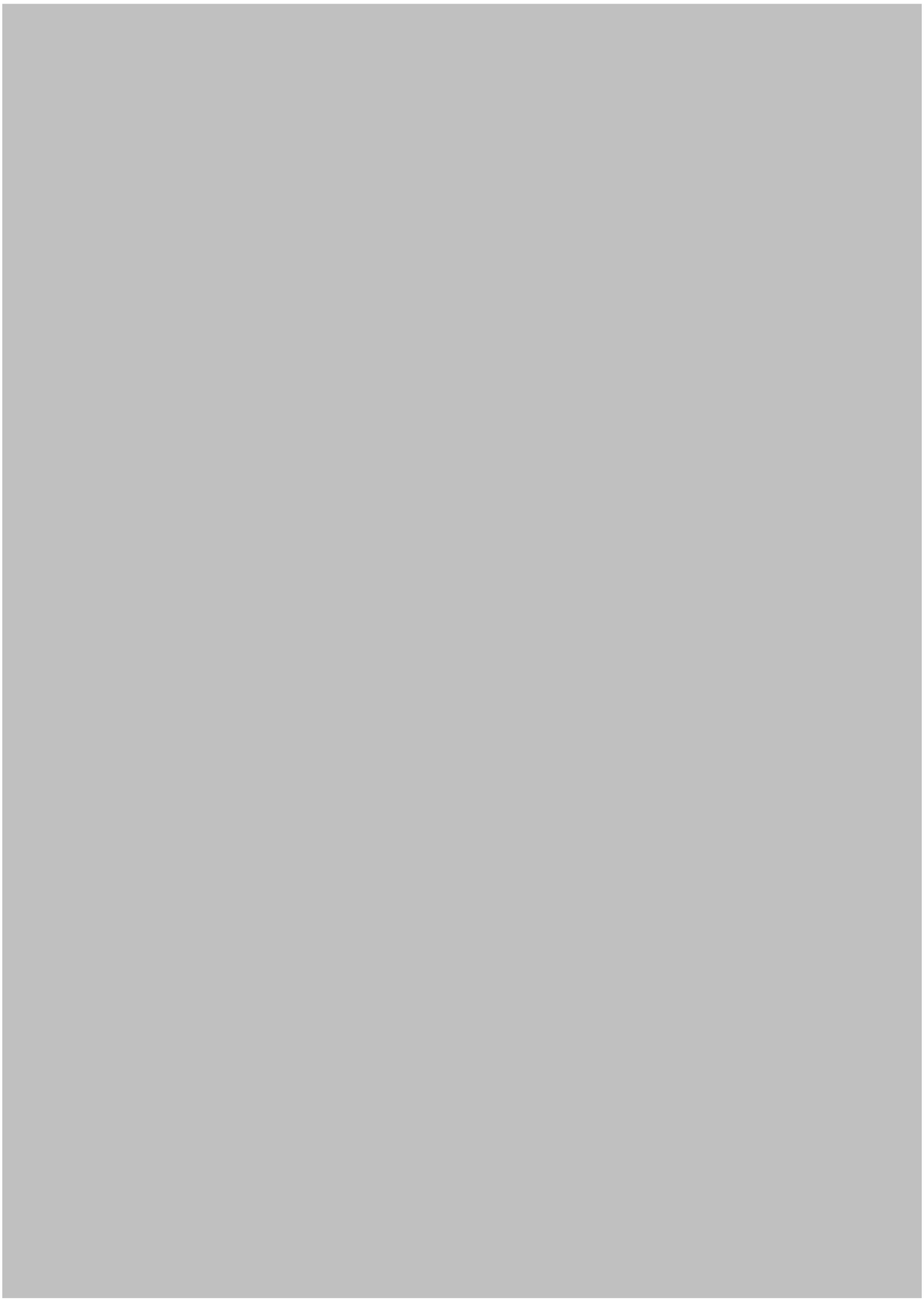
Assessment form

Sheet P2a
Fishery by Operational Unit

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

Code: DPS0510Gui



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Assessment form

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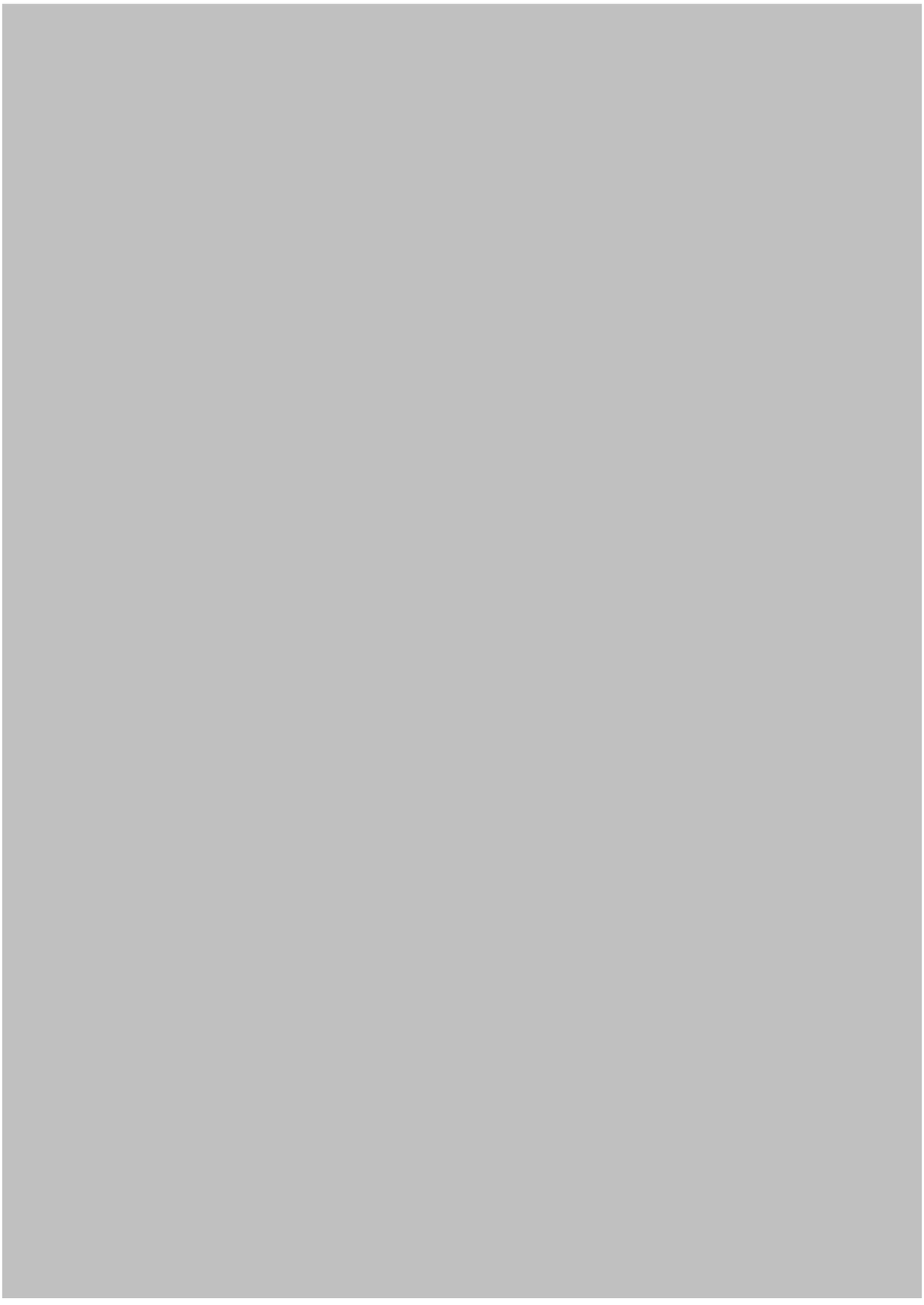

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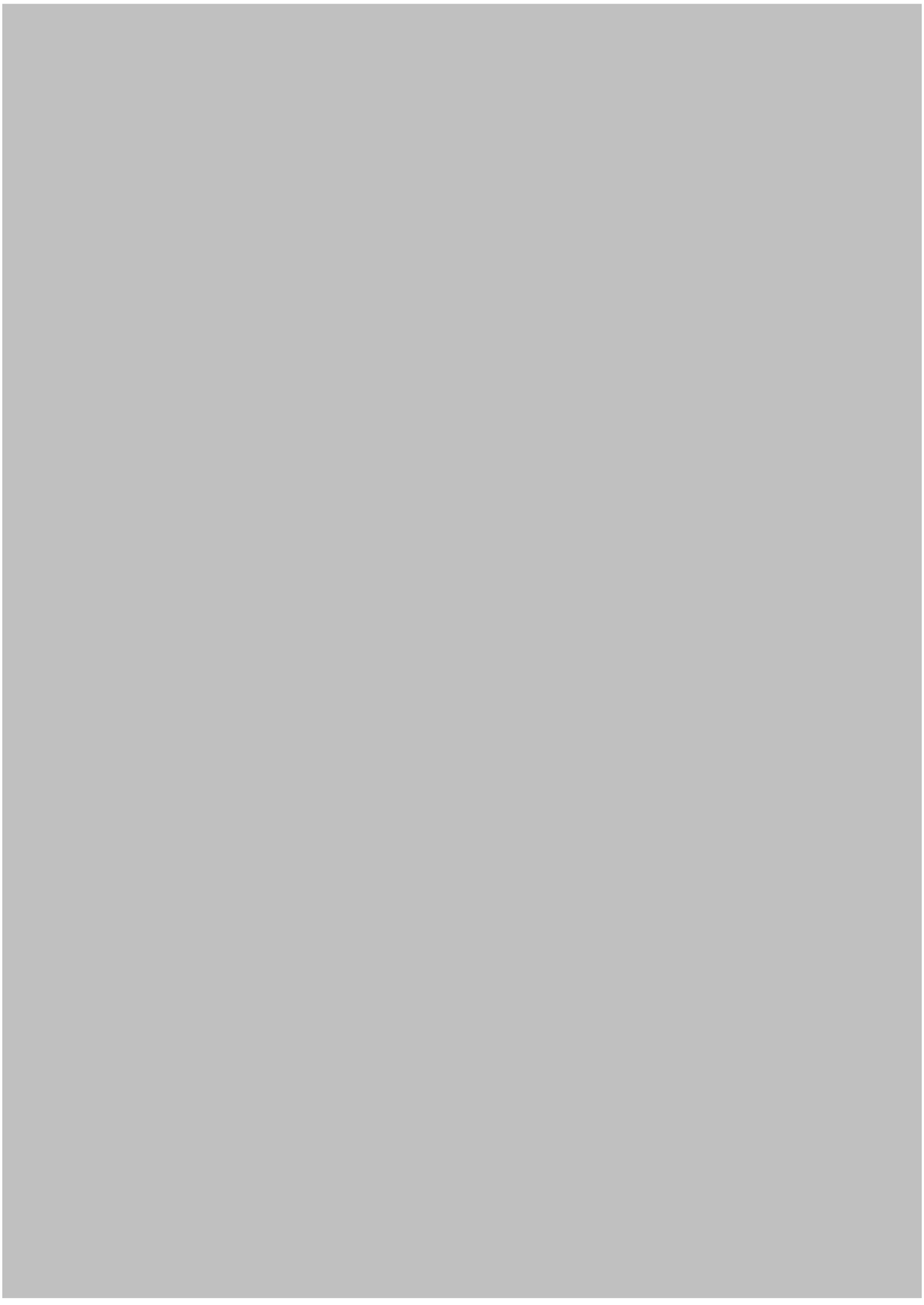

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Assessment form

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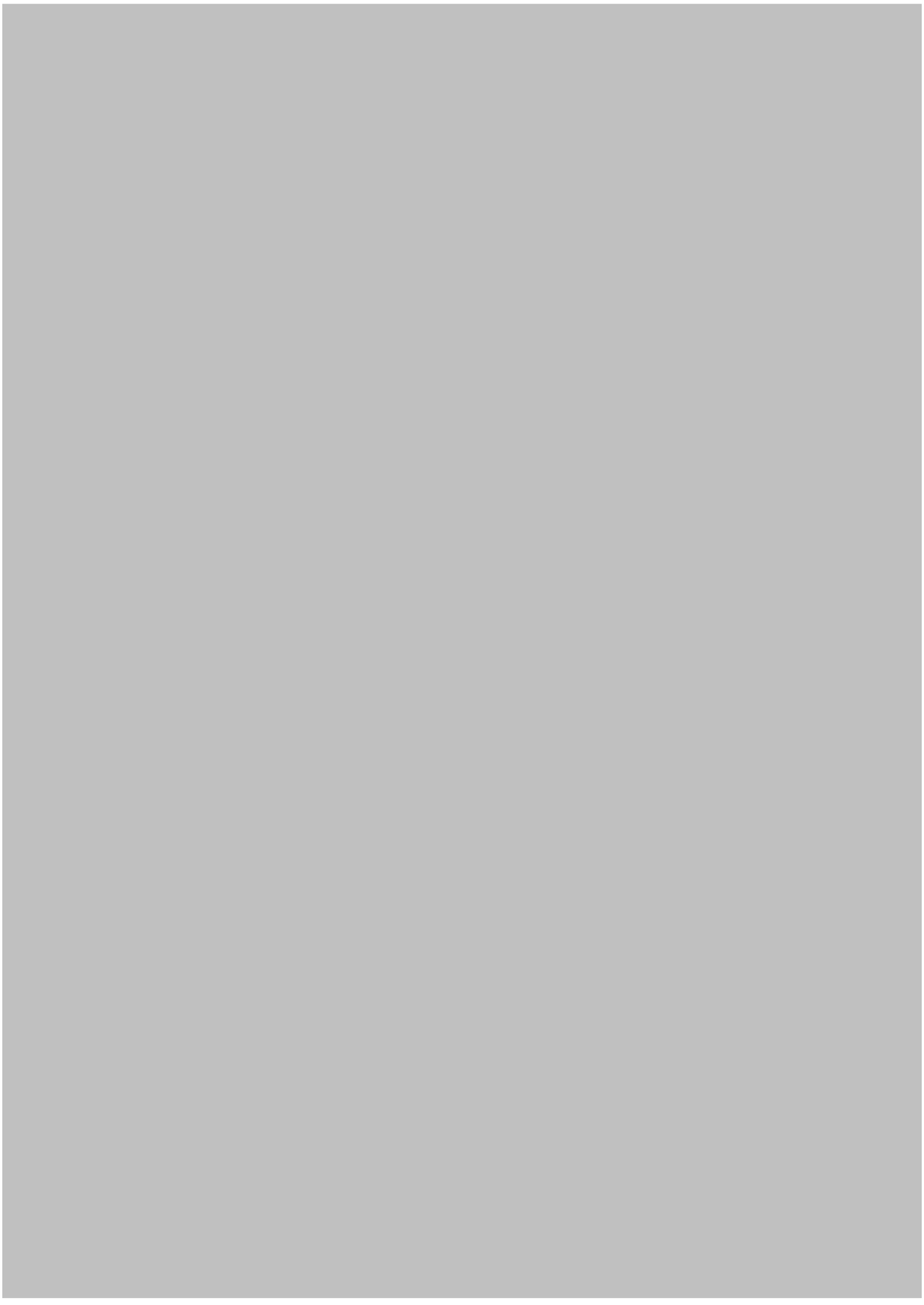


Data source*	IEO, Fishermen Association, Ministry of Fisheries and	OpUnit 1*	ESP 05 E 03 34 - DPS

Regulations in force and degree of observance of regulations

- Fishing license: fully observed

- Engine power limited to 316 KW or 500 HP: not observed (at least, doubled)

- Mesh size in the codend (diamond 40 mm stretched): fully observed

- Fishing forbidden shallower than 50 m depth: not fully observed

- Time at sea (12 hours per day and 5 days per week): fully observed

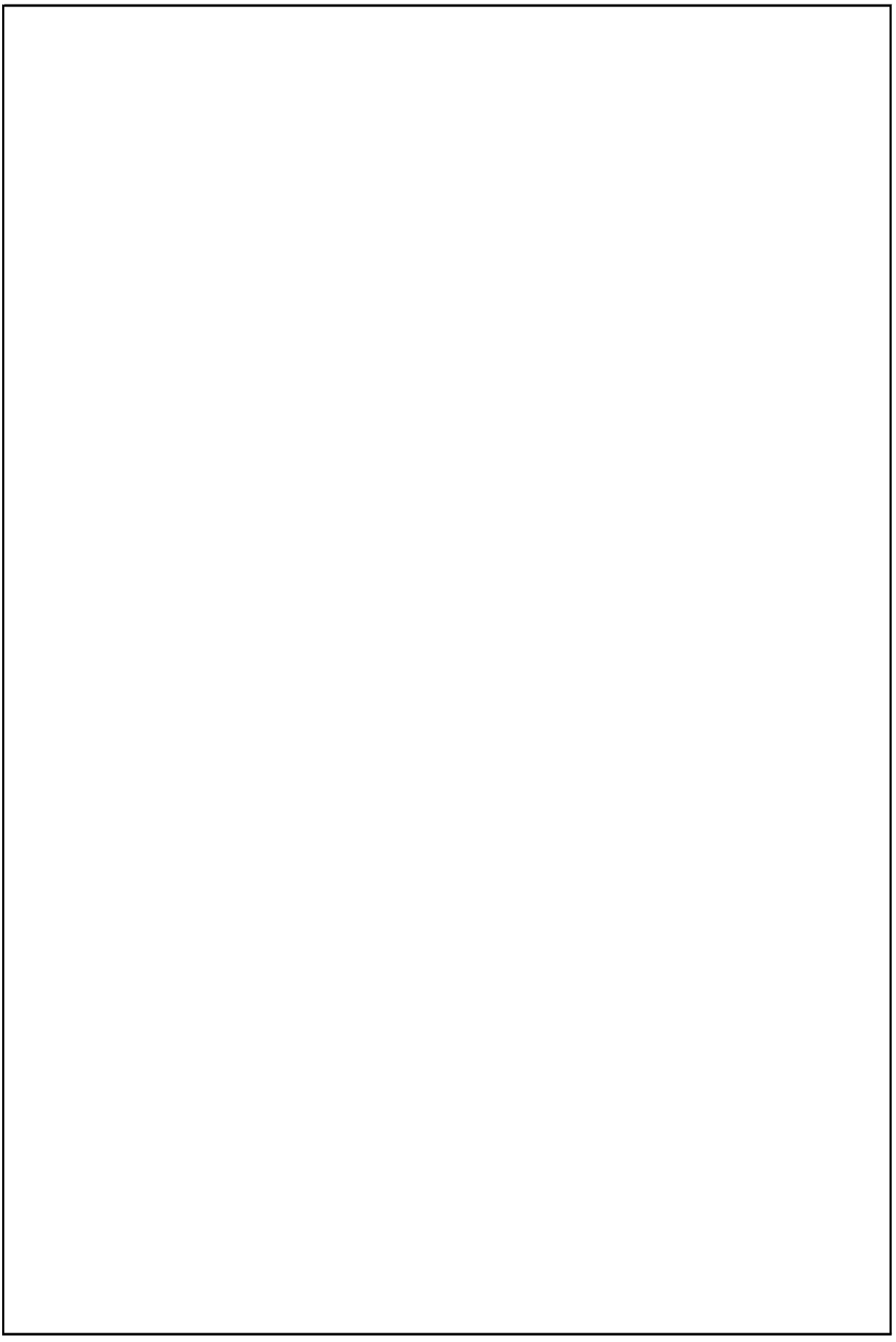
Accompanying species

- Teleosts: Merluccius merluccius, Micromesistius poutassou, Lepidorhombus boscii, Lepidorhombus whiffiagonis, Lophius budegassa, Lophius piscatorius, Argentina sphyraena, Chelidonichthys cuculus, Chlorophthalmus agassizi, Citharus linguatula, Mullus surmuletus, Pagellus acarne, Pagellus bogaraveo, Peristedion cataphractum, Scorpaena elongata, Trachurus trachurus and Trigla lyra.

Elasmobranchs: Raja clavata and Squalus acanthias.

Crustaceans: Nephrops norvegicus, Palinurus mauritanicus, Paromola cuvieri, Plesionika giglioli and Plesionika heterocarpus.
Cephalopods: Eledone cirrhosa, Scaergus unicirrhus, Illex coindetti, Sepia orbignyana and Todarodes sagitattus.

Guijarro B. and E. Massutí (2006) Selectivity of diamond- and square-mesh codends in the deepwater crustacean trawl fishery off the Balearic Islands (W Mediterranean). ICES Journal of Marine Science, 62: 52-67.



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: DPS0510Gui

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: DPS0510Gui

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: DPS0510Gui

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: DPS0510Gui

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

Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: DPS0510Gui

Sex*	Both

Analysis # *	1

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)	X	

Equation used	Catch equation	Tunig method	Extended Survivor Analysis (XSA)
# of gears	1	Software	Lowestoft VPA V3.2 (Darby and Flatman, 1994)
$F_{terminal}$	1.2		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	1.99	17.6
Average			Average population	2.57	27.2
Maximum			Virgin population		
Critical			Turnover	SSN	SSB
				0.93	12.4
				millions	tons

Average mortality

		Gear					
	Total						
F_1	1.27						
F_2							
Z	1.64						

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

Comments

Population results are mean values 2001-2009 at the start of the year (amount in millions and biomass in tons).

F1 was calculated averaging FBAR 0-3 from 2001-2009

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

Assessment form

Sheet A1

Indirect methods: VPA, LCA

Code: DPS0510Gui

Sex*	

Analysis # *	

Time series

Data	Size	Age
(mark with X)		

Model	Cohorts	Pseudocohorts
(mark with X)		

Equation used		Tunig method	
# of gears		Software	
$F_{terminal}$			

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment		
Average			Average population		
Maximum			Virgin population		
Critical			Turnover		

Average mortality

		Gear					
	Total						
F_1							
F_2							
Z							

(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: DPS0510Gui

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: DPS0510Gui

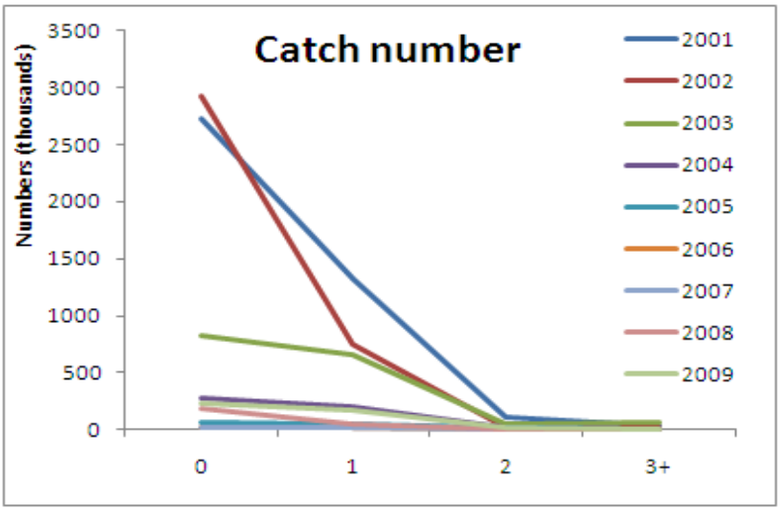
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	**Sheet A2** **Indirect methods: data**

Code: DPS0510Gui

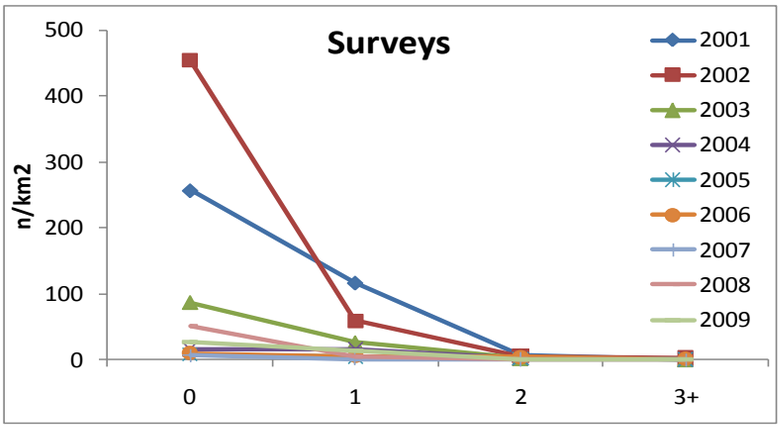
Sex*	Both	Gear*	Trawl	Analysis # *	1

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

Data

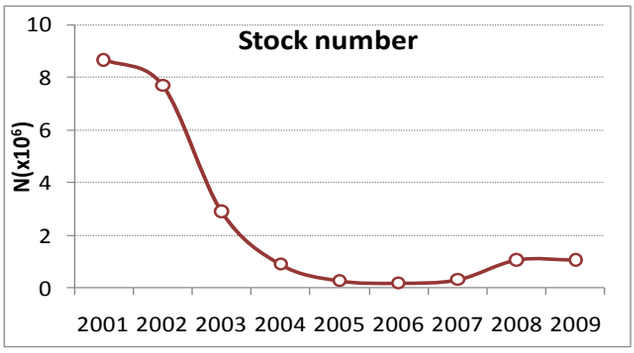


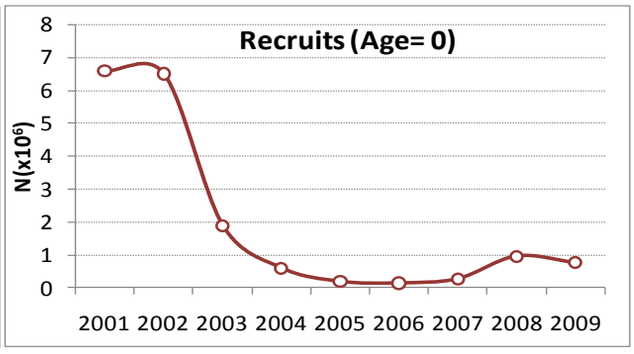
VPA tuning was performed using CPUE data from BALAR-MEDITS surveys (Massutí and Reñones, 2005)



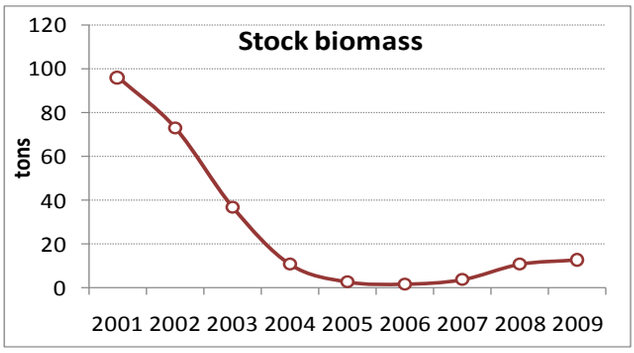
Sex*	Both	Gear*	Trawl	Analysis #*	1

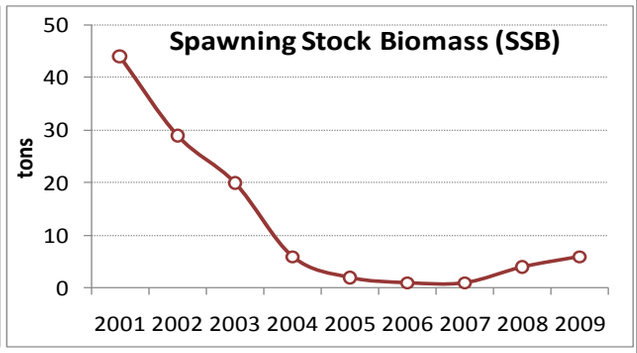
Population in figures



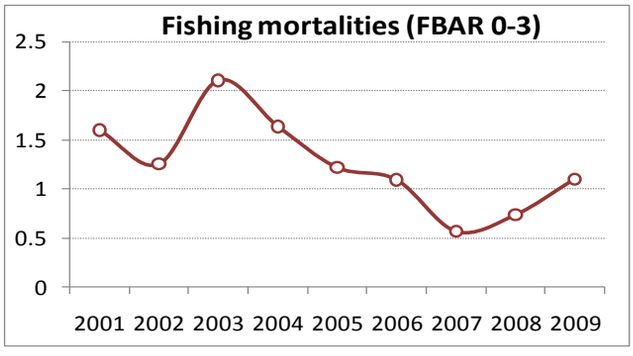


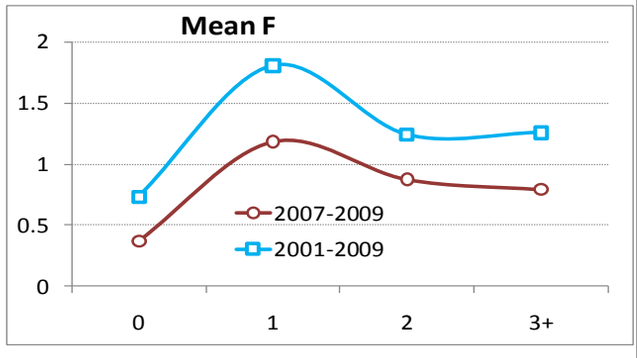
Population in biomass





Fishing mortality rates





Sex*		Gear*		Analysis #*	

Population in figures

Population in biomass

Fishing mortality rates

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

Code: DPS0510Gui

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

Code: DPS0510Gui

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

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

Code: DPS0510Gui

Sex	Both	Analysis #	2

# of gears	1	Software	EXCEL

Parameters used

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

Model characteristics

From calculated mean weights (2001-2009)

Results

	Total	Gear			
Current YR	6.43				
Maximum Y/R	7				
Y/R 0.1	5				
F_{max}					
$F_{0.1}$					
Current B/R	15				
Maximum B/R	12.33				
B/R 0.1	24.92				

Comments

Comments

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	**Sheet D Diagnosis**

Code: DPS0510Gui

Indicators and reference points

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

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

Unidimensional

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

Bidimensional

Exploitation rate

○	No or low fishing
○	Moderate fishing
○	High fishing mortality
◉	Uncertain / Not assessed

Stock abundance

○	Virgin or high abundance
○	Intermediate abundance
○	Low abundance

○	Depleted
◉	Uncertain / Not assessed

Comments

The trends from surveys and CPUEs from commercial fleet are clear, showing the stock as overexploited. However, the problems found with the residuals and the retrospective analysis makes not possible to provide a full management advice.

Code: DPS0510Gui

Management advice and recommendations*

The trends from surveys and CPUEs from commercial fleet are clear, showing the stock as overexploited. However, the problems found with the residuals and the retrospective analysis makes not possible to provide a full management advice.

Advice for scientific research*

Advice for Scientific Research

Comments*

It should be considered the possibility to apply different assessment models, like production models.
It would be necessary to further explore the parameterisation of the model (the contribution of each tuning fleet in the model).
Although the stock is overexploited, it is important to remark than the CPUEs (both from surveys and commercial fleet) oscillations found for this species are in agreement with other areas in the Mediterranean and probably caused not only by the fishing effort but also by environmental changes. For this reason, it is important to follow the evolution of this stock, especially because it seems it has started to recover during the last two years. It is also important to consider that pink shrimp in GSA 5 is only caught as a by-catch in the trawl fishery and a management of this species should be undertaken in the framework of a multispecific approach.

Comments*

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	**Sheet C** **Comments**

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Abstract for SCSA reporting

Authors Guijarro, Beatriz; González, Natalia and Massutí, Enric

Year 2010

Species Scientific name Parapenaeus longirostris - DPS

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 05 - Balearic Island

Fisheries (brief description of the fishery)*

In the Balearic Islands (GSA 5), commercial trawlers employ up to four different fishing tactics (Palmer et al. 2009), which are associated with the shallow and deep continental shelf, and the upper and middle continental slope (Guijarro & Massutí 2006; Ordines et al. 2006). Vessels mainly target striped red mullet (Mullus sumuletus) and European hake (Merluccius merluccius) on the shallow and deep shelf respectively. However, these two target species are caught along with a large variety of fish and cephalopod species. The Norway lobster (Nephrops norvegicus) and the red shrimp (Aristeus antennatus) are the main target species on the upper and middle slope respectively. The Norway lobster is caught at the same time as a large number of other fish and crustacean species, but the red shrimp fishery is the only Mediterranean fishery that could be considered monospecific. The pink shrimp is caught as a by-catch in the upper slope.

Source of management advice*

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

The information used for the assessment of the stock consisted in annual size composition of catches (estimated from monthly sampling) and official landings for the period 2001-2009. Biological parameters used were obtained in previous studies in this area (Guijarro et al., 2009). The vector of natural mortality by age was calculated from Caddy´s formula, using the PROBIOM Excel spreadsheet. The methodology applied was: (i) a tuned virtual population analysis (VPA), applying the Extended Survivor Analysis (XSA) method on the period 2001-2009 and considering bottom trawl surveys (2001-2009) as tuning fleet; and, (ii) a yield per recruit (Y/R) analysis based on the exploitation pattern resulting from the XSA model and population parameters for the entire period. The software used was the Lowestoft VPA program and Excel.

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

Uncertain / Not assessed

Stock abundance

Uncertain / Not assessed

Comments

Management advice and recommendations*

The trends from surveys and CPUEs from commercial fleet are clear, showing the stock as overexplored. However, the problems found with the residuals and the retrospective analysis makes not possible to provide a full management advice.

Advice for scientific research*