

SAC GFCM Sub-Committee on Stock Assessment

Date* 24 November 2010

Code* PAC0910Abe

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Species Scientific name*

1
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area* Western Mediterranean (FAO Subarea 37.1.)

Geographical Sub-Area (GSA)* 09 - Ligurian and North Tirrenian Sea

Combination of GSAs 1
2
3

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

Assessment form	Sheet #0
	Basic data on the assessment

Code: PAC0910Abe

Date*	24	Nov	2010	Authors*	Abella A.(4), Colloca F.(1), Sartor P. (2); Mannini A.(3),
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Species Scientific name*	Pagellus erythrinus - PAC	Species common name*	Deep-sea pink shrimp
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Data Source

GSA*	09 - Ligurian and North Tirrenian Sea	Period of time*	1994-2008
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Description of the analysis

Type of data*	Catch, trawl survey indices	Data source*	Official Statistics
Method of assessment*	Length cohort analysis, Surba, Y/R	Software used*	VIT, SURBA, YIELD

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

Comments, bibliography, etc.

Deep-Sea pink shrimp has been assessed using both trawl survey data (MEDITS 1994-2008; GRUND 1994-2007) and catch data (DCR 2006-08). The survey-based stock assessment model SURBA (Needle, 2003) was used to reconstruct trend in population structure and fishing mortality. Equilibrium YPR reference points (F01) for the stock were estimated through the Yield software (Hoggarth et al., 2006) assuming recruitment fluctuating randomly around a constant value and 20% uncertainty in input parameters. SURBA analysis was performed using an M vector obtained using ProdBiom. Average fishing mortality (F1-3) estimated from MEDITS ranged between 0.78 and 1.8 (1.16 in 2007). A different picture was obtained using LCA on 2006-08 landing data. F1-3 was between 0.5 and 0.6, little below the estimated reference value of F0.1=0.7. Relative indices derived from scientific MEDITS survey for the period 1994-2008 indicated an increasing trend of the spawning stock biomass with three peaks in 1999 and 2006 and 2008. In 2008 the SSB was the highest observed since 1994. GRUND data shows a very similar temporal trend in SSB. Given the current uncertainty in F estimates, the relevant fleet effort should not be increased, in order to avoid future low stock productivity and landings.

Comments, bibliography, etc.

Bibliography (Published papers and books):

Abella A., Caddy J.F., Serena F. (1997) Declining natural mortality with age and fisheries on juveniles: a Mediterranean demersal fishery yield paradigm illustrated for *Merluccius merluccius*. *Aquatic Living Resources* 10: 257–269.

Ardizzone G. D., Corsi F., 1997. Atlas of Italian Demersal Fishery Resources. *Biol. Mar. Medit.*, 4: 568 pp.

Ardizzone G.D., Gravina M.F., Belluscio A., Schintu P., 1990. Depth-size distribution pattern of *Parapenaeus longirostris* (Lucas, 1846) (Decapoda) in the central Mediterranean Sea. *Journal of Crustacean Biology*, 10(1): 139-147.

Biagi F., Sartor P., Ardizzone G.D., Belcari P., Belluscio A., Serena F., 2002. Analysis of demersal fish assemblages of the Tuscany and Latium coasts (north-western Mediterranean). *Scientia Marina*, 66 (Supp. 2): 233-242.

Caddy, J.F. (1991). Death rates and time intervals: Is there an alternative to the constant natural mortality axiom? *Rev. Fish Bio./ Fisheries*, 1: 109-138.

Colloca F., Cardinale M., Belluscio A., Ardizzone G., 2003. Pattern of distribution and diversity of demersal assemblages in the Central Mediterranean Sea. *Estuarine, Coastal and Shelf Science*, 56: 469-480.

Colloca F., Carpentieri P., Balestri E., Ardizzone G.D., 2004. A critical habitat for Mediterranean fish resources: shelf-break areas with *Leptometra phalangium* (Echinodermata: Crinoidea). *Marine Biology*, 145: 1129-1142.

De Ranieri S., Belcari P., Bertolini D., Biagi F., Chiericoni V., Cognetti A.G., Mori M., Nannini N., Reale B., Rocca V., Sartor P., Sbrana M., 1997. Reclutamento di alcune specie ittiche demersali nel Mar Tirreno Settentrionale. *Biol. Mar. Medit.*, 4(1): 237-243.

Hoggarth D. D., Abeyasekera S., Arthur R. I., Beddington J. R., Burn R. W., Halls A. S., Kirkwood G. P., McAllister M., Medley P., Mees C. C., Parkes G. B., Pilling G. M., Wakeford R. C., Welcomme R. L., 2006. Stock assessment for fishery management- A framework guide to the stock assessment tools of the fisheries management sciences Programme (FMSP). *Fao Fish. Tech. Pap.* No 487, 261p.

Needle C. L., 2003. Survey-based assessments with SURBA. Working Document to the ICES Working Group on Methods of Fish Stock Assessment, Copenhagen, 29 January to 5 February 2003.

Reale C, Sartor P, Ligas A, Viva C, Bertolini D, De Ranieri S, Belcari P., 2005. Demersal resources assemblages on the *Leptometra phalangium* (J. Müller, 1841) (Echinodermata; Crinoidea) bottoms in the Northern Tyrrhenian Sea. *Biol Mar Medit* 12 (1): 571-574.

Sartor P., Reale B., Sbrana M., Biagi F. (1998) - Analisi dello sbarcato commerciale con reti a strascico presso un porto del Mar Tirreno Settentrionale negli anni 1990-95. *Biol. Mar. Medit.*, 5 (2): 81-91.

Sartor P., Sbrana M., Reale B., Belcari P., 2003b. Impact of the deep sea trawl fishery on demersal communities of the northern Tyrrhenian Sea- (Western Mediterranean). *J. Northw. Atl. Fish. Sci.*, 31: 1-10.

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Assessment form

Sheet B
Biology of the species

Code: PAC0910Abe

Biology

	Somatic magnitude measured (LH, LC, etc)*			Carapace Length	Units*	1 millimeter
	Sex	Fem	Mal	Both	Unsexed	
Maximum size observed			50		Reproduction season	spring
Size at first maturity			18		Reproduction areas	at about 80-100m
Recruitment size			8		Nursery areas	coastal

Parameters used (state units and information sources)

		Units	Sex			
			female	male	both	unsexed
Growth model	L _∞	cm			54.3	
	K	year-1			0.118	
	t0	year			-1.12	
	Data source	Length frequency distributions				
Length weight relationship	a				0.00274	
	b				2.9556	
	M	0.27		M vector (see comments)		
	sex ratio (mal/fem)	1				

Comments

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Assessment form

Sheet P1

General information about the fishery

Code: PAC0910Abe

Data source*	Official Statistics+ MEDITS trawl surveys	Year (s)*	1990-2009
Data aggregation (by year, average figures between years, etc.)*	By year 1994-2009		

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	ITA	09	E - Trawl (12-24 metres)	03 - Trawls	33 - Demersal shelf species	PAC
Operational Unit 2	ITA	09	C - Minor gear with engine (6-12 metres)	07 - Gillnets and Entangling Nets	33 - Demersal shelf species	PAC
Operational Unit 3						
Operational Unit 4						
Operational Unit 5						

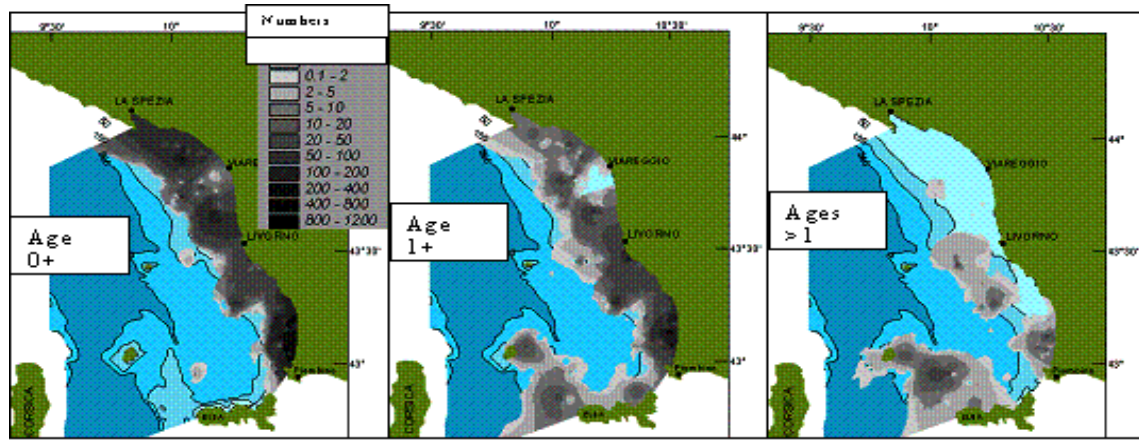
Operational Units*	Fleet (n° of boats)*	Kilos or Tons	Catch (species assessed)	Other species caught	Discards (species assessed)	Discards (other species caught)	Effort units
ITA 09 E 03 33 - PAC	413	Tons		alis, Octopus vulg			
ITA 09 C 07 33 - PAC		Tons					
Total	413						

Legal minimum size	15 cm
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Comments

The fishing grounds are located close to the coast. It is not a target species, and is caught as part of the coastal groundfish assemblage.

Comments



Distribution of *Pagellus erythrinus* by size in the Northern part of the GSA9

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Assessment form

Sheet P2a
Fishery by Operational Unit

Code: PAC0910Abe

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Data source*	Official Statistics	OpUnit 1*	ITA 09 E 03 33 - PAC
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Time series

Year*	2004	2005	2006	2007	2008	2009
Catch	413				216	
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						0.225

Selectivity

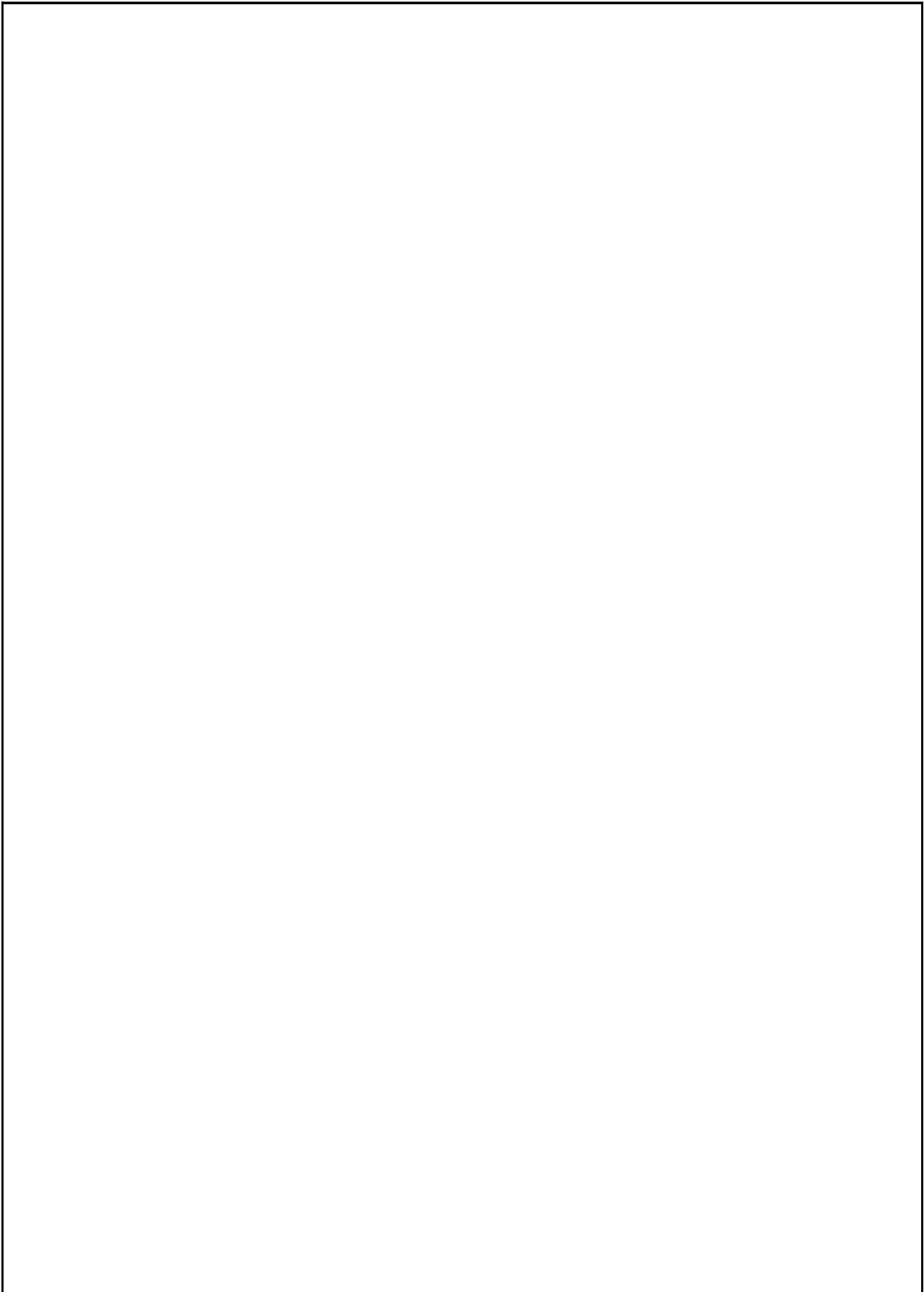
Remarks

L25		This L50 value was obtained with a 40 mm stretched mesh size in the cod end (estimated during GRUND survey 1998).
L50	9	
L75		
Selection factor	0.225	

Structure by size or age

T

Structure by size or age

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Assessment form

Sheet P2a
Fishery by Operational Unit

Code: PAC0910Abe

Page 2 / 2

Data source*		OpUnit 2*	ITA 09 C 07 33 - PAC
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Time series

Year*						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		

Structure by size or age

Structure by size of age

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Assessment form

Sheet P2b
Fishery by Operational Unit

Code: PAC0910Abe

Page 1 / 1

Data source* Official Statistics

OpUnit 1*

ITA 09 E 03 33 - PAC

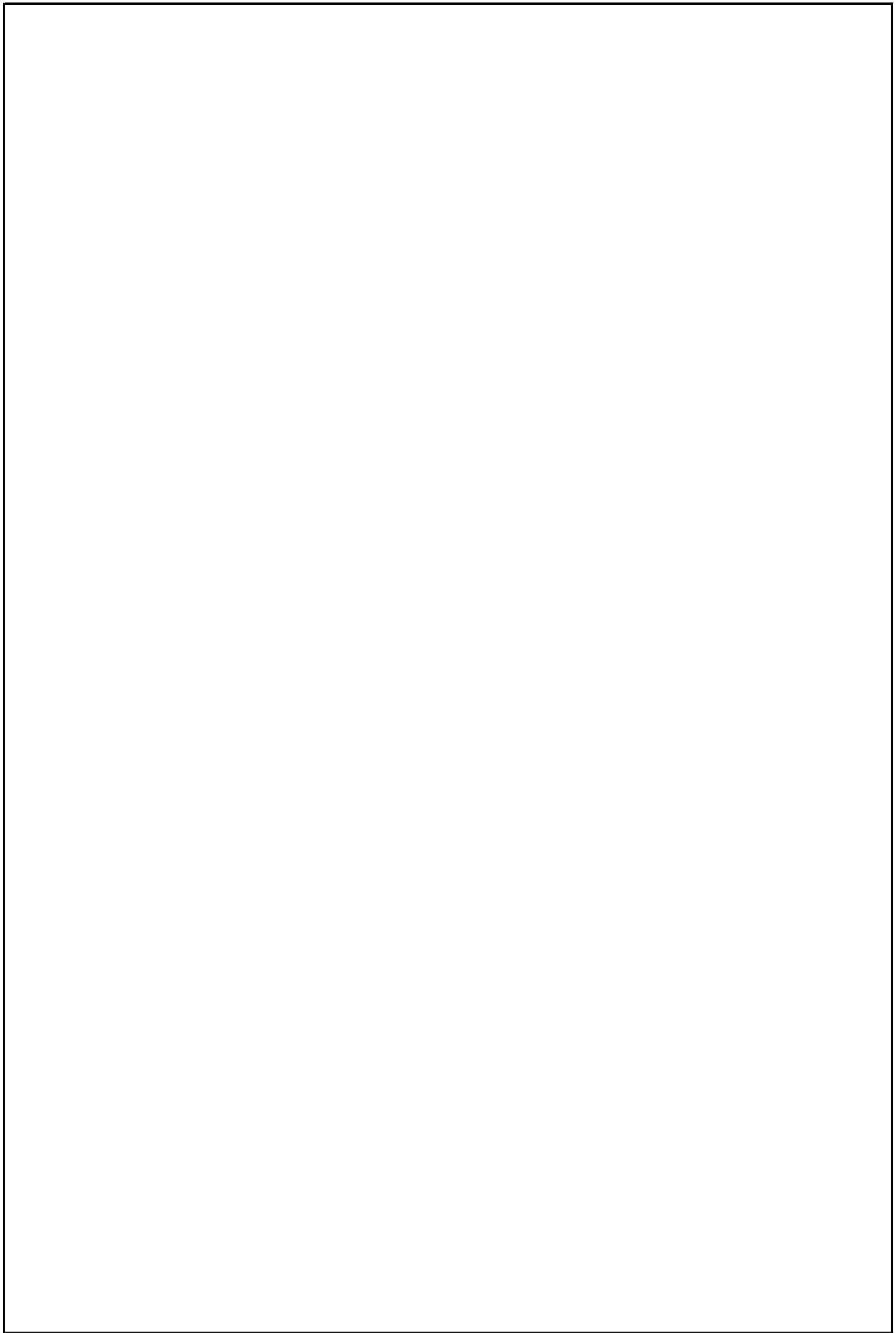
Regulations in force and degree of observance of regulations

Fishing license: fully observed
Minimum landing size 15 mm: almost observed
Fishing allowed for 5 days a week: fully observed
Technical measures regulations fully observed

Accompanying species

The most important are:

Horse mackerel (*Trachurus trachurus*)
Hake (*Merluccius merluccius*)
Norway lobster (*Nephrops norvegicus*)
Horned octopus (*Eledone cirrhosa*)
Southern shortfin squid (*Illex coindetii*)
Blue whiting (*Micromesistius poutassou*)



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Assessment form

Sheet P2b
Fishery by Operational Unit

Code: PAC0910Abe

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Data source*

OpUnit 2*

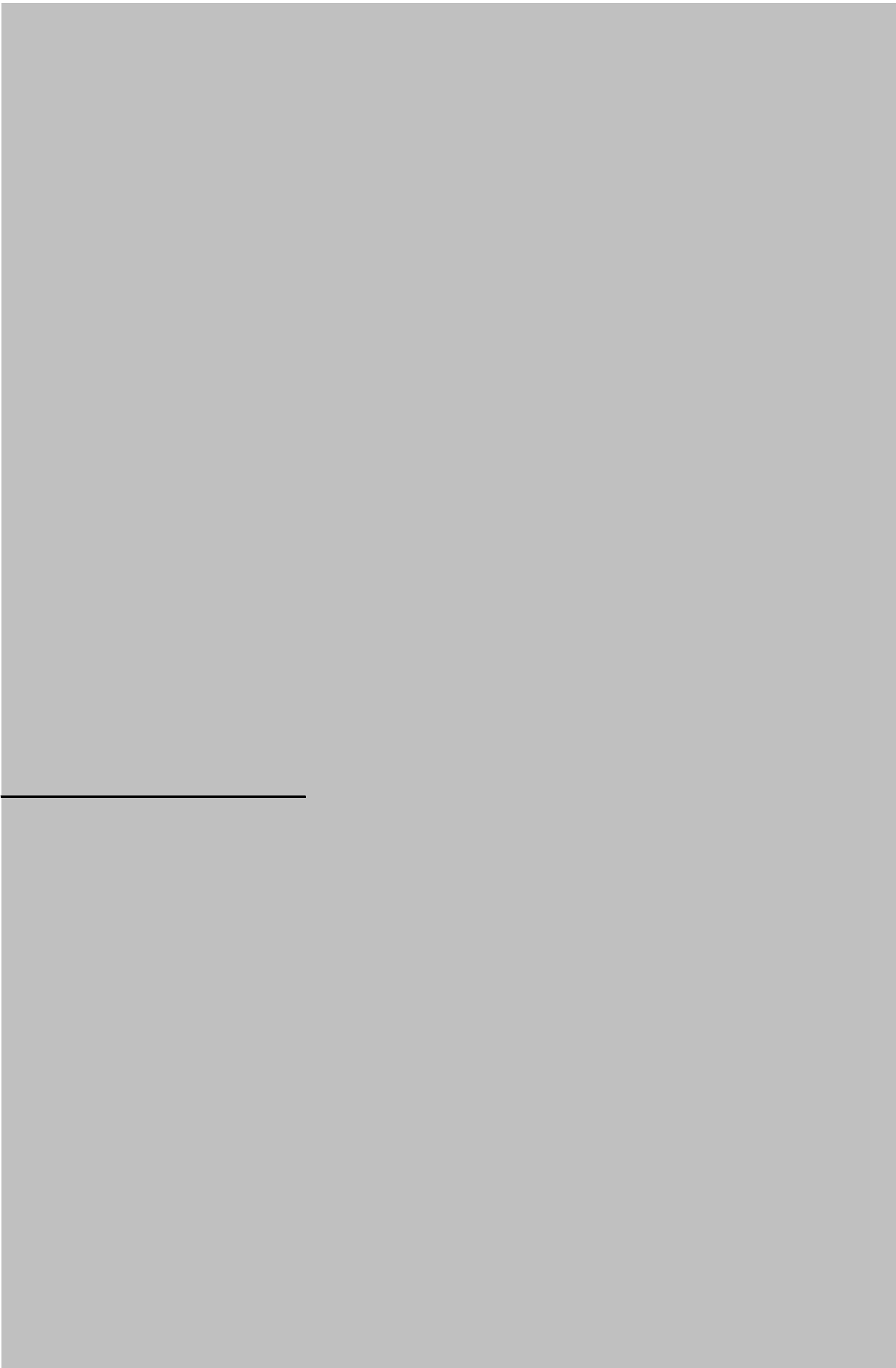
ITA 09 C 07 33 - PAC

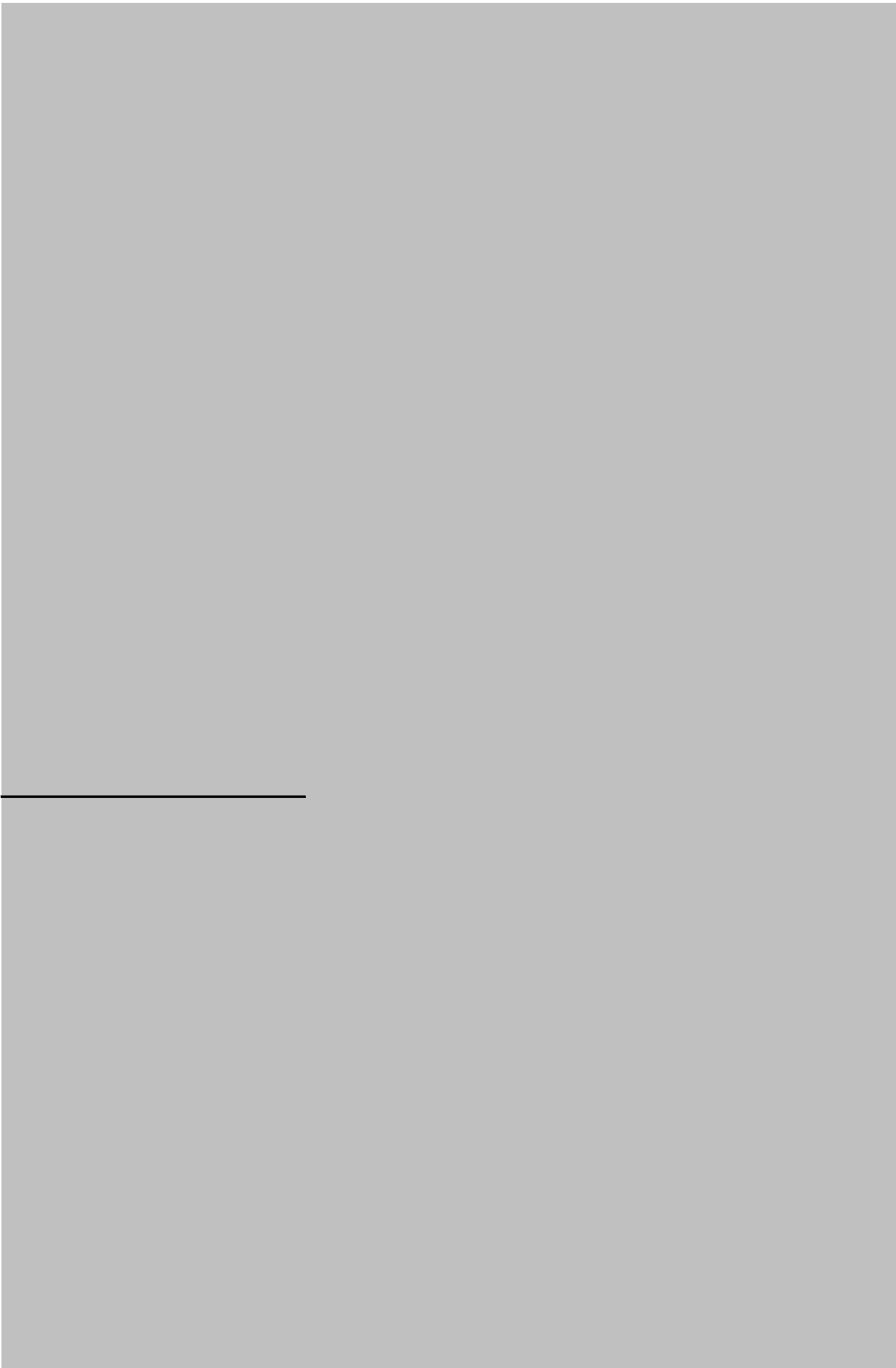
Regulations in force and degree of observance of regulations

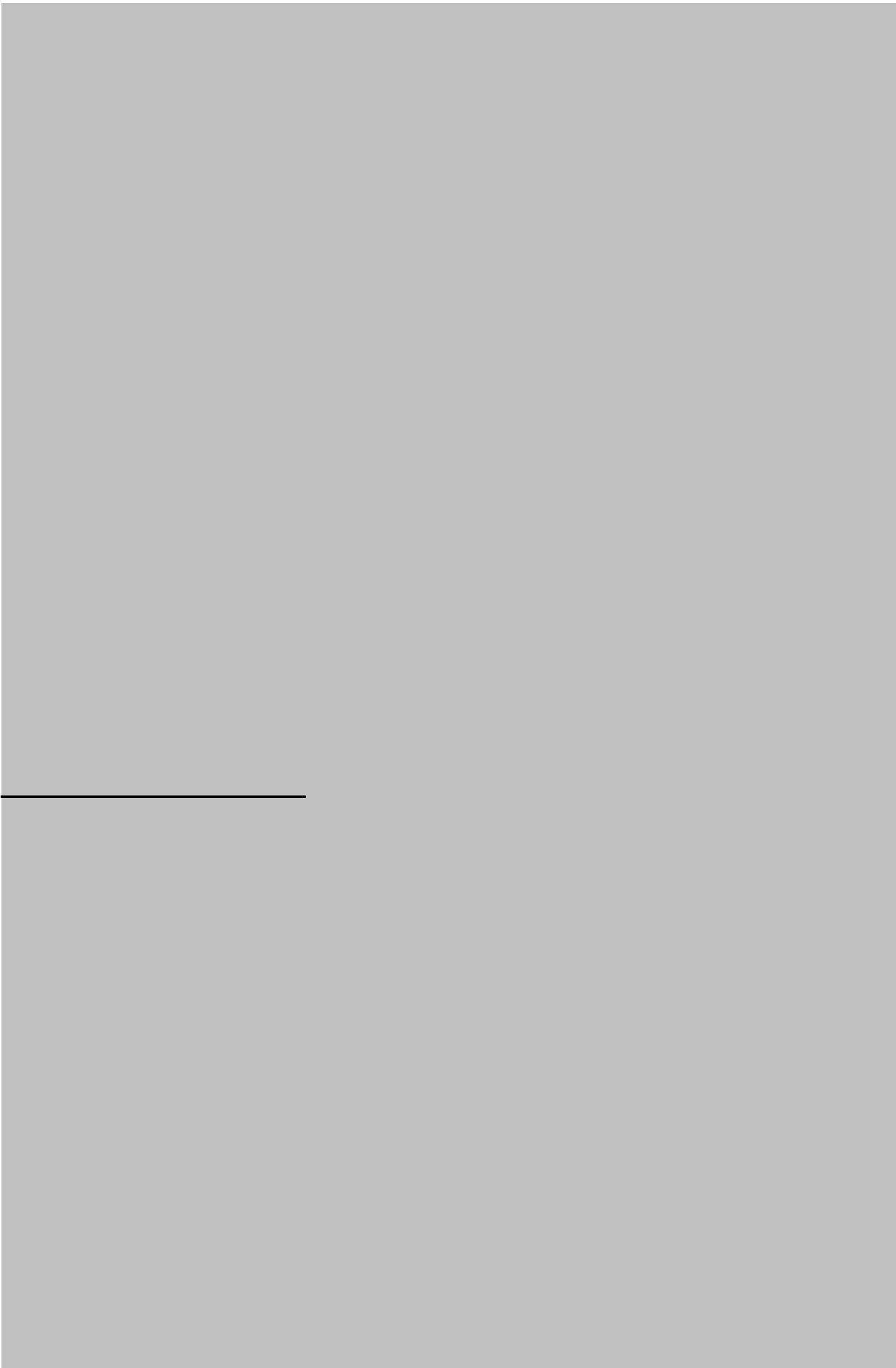
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Accompanying species

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

Sex both	Code: PAC0910Abe
	Analysis # Y/R

# of gears		Software	YIELD
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Parameters used

Vector F	0-3
Vector M	0.28
Vector N	recruitment = 10.000

Model characteristics

The Yield software uses a standard analytical model to estimate yield and biomass-based indicators and reference points, allowing for uncertainty in parameter inputs. Yield predicts both the yield to the fishery and the biomass of the fish stock that might occur at different levels of F, and with different closed seasons and size limits. Both the indicators and reference points can be expressed per recruit, or as absolute values. In the first case, constant numbers of new recruits are assumed each

Results

	Total	Gear			
		Trawl			
Current YR	0.363				
Maximum Y/R					
Y/R 0.1					
F _{max}	0.17				
F _{0.1}	0.13				
Current B/R					
Maximum B/R					
B/R 0.1					
F30%SSB	0.14				

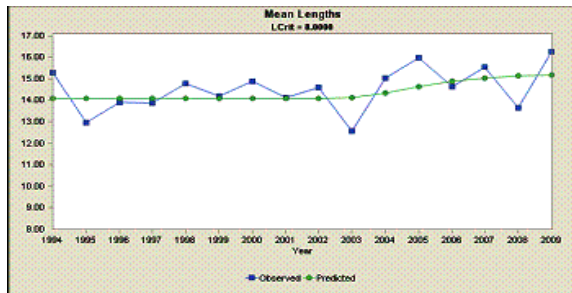
Comments

Equilibrium YPR reference points (F01)for the stock were estimated through the Yield software (Hoggarth et al., 2006) assuming recruitment fluctuating randomly around a constant value and 20% uncertainty in input parameters.
 The current fishing mortality estimated from Gedamke and Hoenig method of 0.363 is higher than the estimated reference value of F0.1=0.13
 The status of the stock can be therefore considered of overexploitation.

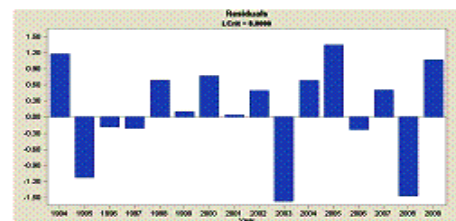
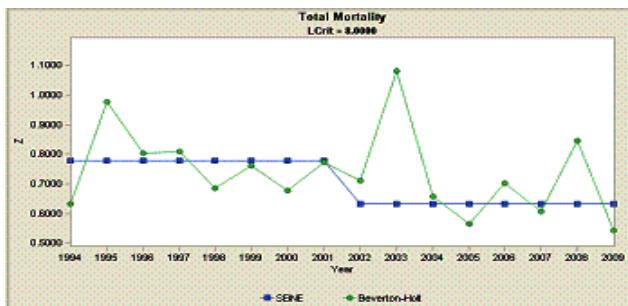
Comments

Other assessment methods

SEINE software (Survival Estimation in non-equilibrium situations) (Gedamke and Hoenig, 2006) was used for the estimation of Z, using weighted information of mean size of catch, size of full capture and growth parameters. The transitional behavior of the mean length statistic is derived for use in nonequilibrium conditions. The use of a nonequilibrium estimator allows a change in mortality to be characterized reliably several years faster than would occur with the use of the Beverton–Holt estimator



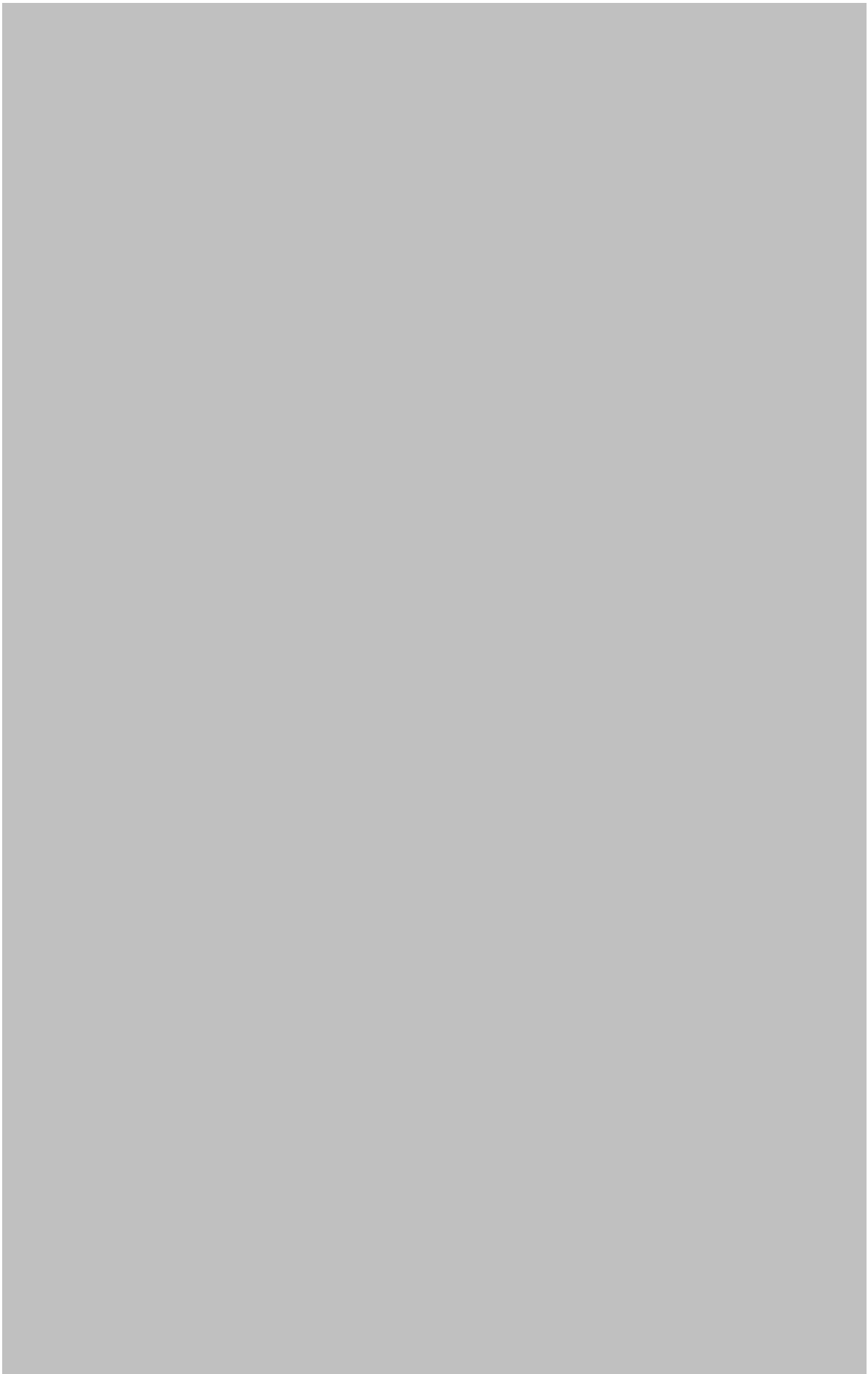
AIC	131.2488	
Likelihood	61.6244	
Parameter	Value	STD Deviation
Z 1	0.77772271	0.039267
Z 2	0.63343090	0.055421
Change Year 1	2002.813	0.855640
Sigma	11.38829052	2.013200

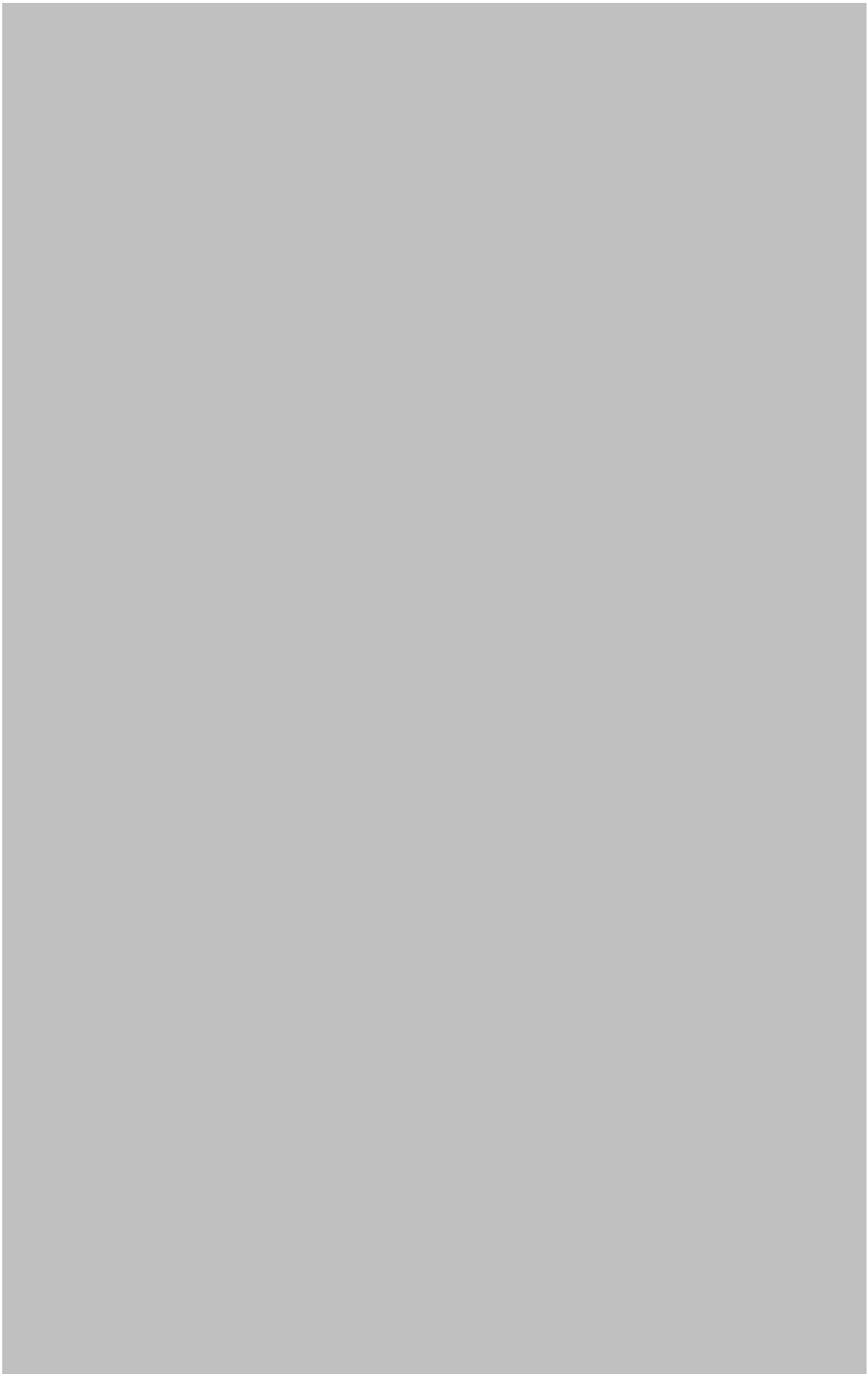


Other assessment methods

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Assessment form

Sheet D
Diagnosis

Code: PAC0910Abe

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B					
SSB					
F					
Y					
CPUE					
F0.1	0.12				
Fmsy					
F30%SSB	0.14				

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

Comments

The stock can be considered in an overexploitation status.

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Assessment form

Sheet Z

Objectives and recommendations

Code: PAC0910Abe

Management advice and recommendations*

The stock need of a reduction of fishing mortality. The exploitation pattern of the species is not adequate and an important fraction of the potential production of the stock is lost.

Advice for scientific research*

ADVICE FOR SCIENTIFIC RESEARCH

We recommend to increase the current knowledge on the effect of environmental variability on the spatio-temporal dynamic of the stock in order to disentangle environmental and fishing effects. Also knowledge on catchability need to be improved to better understand the impact of fishery on recruitment. Even though current trawl mesh (40 mm) retains small-sized individuals ($L_{50} = 15$ mm) the proportion of juveniles ($LC < 20$ mm) either in the commercial or experimental trawl catch is always very reduced.

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Assessment form

Sheet C
Comments

Code: PAC0910Abe

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Comments*

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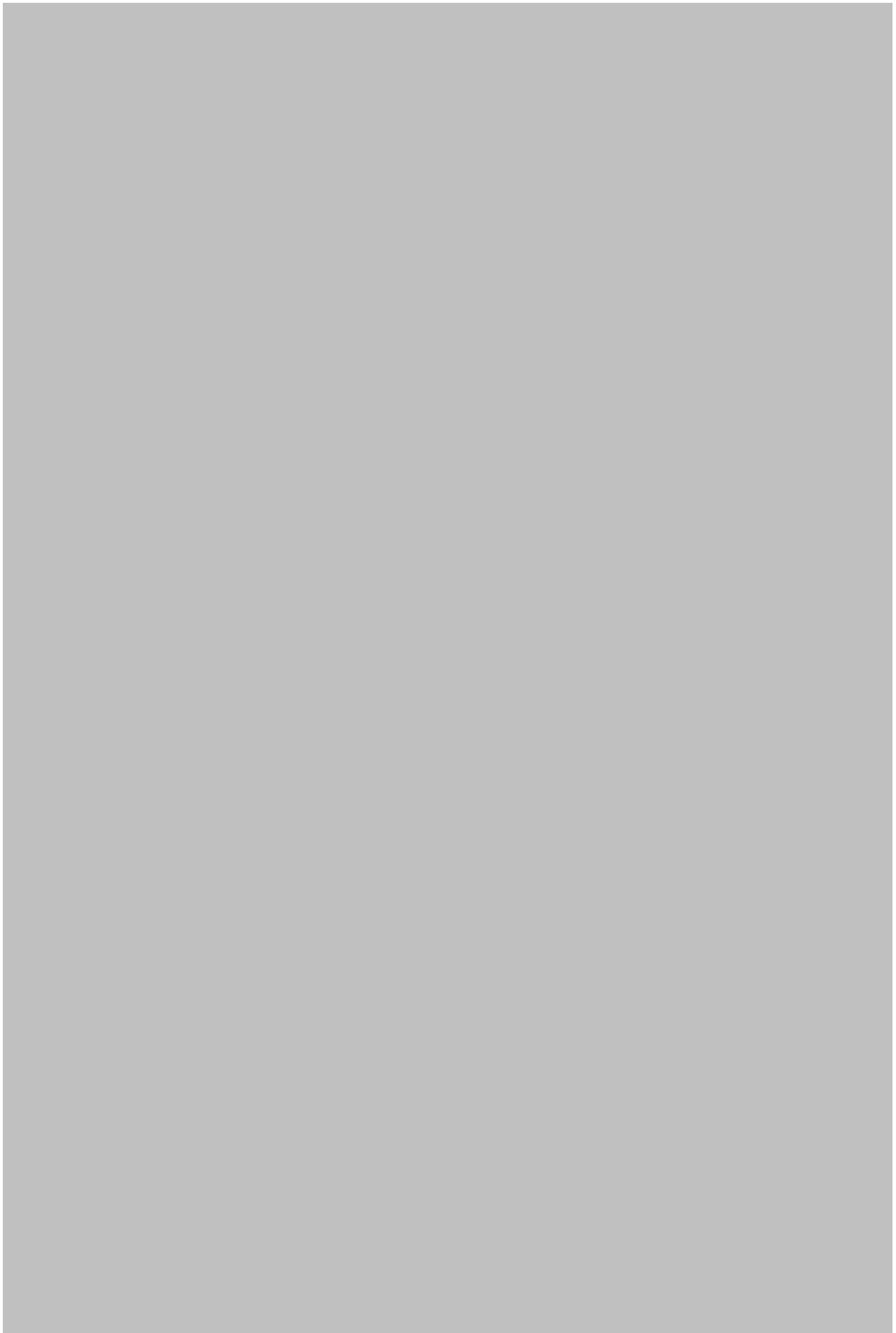
Assessment form

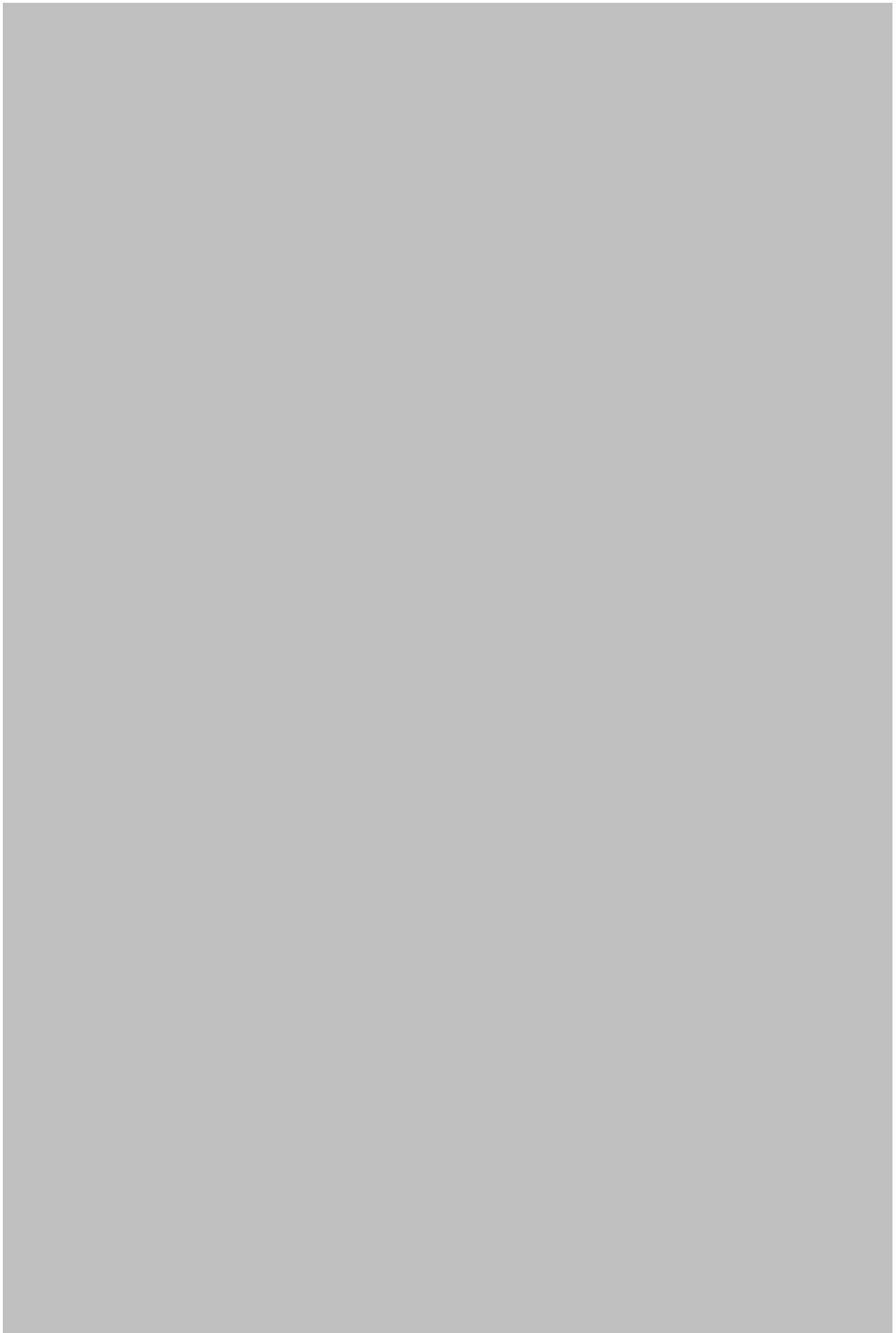
Sheet C
Comments

Code: PAC0910Abe

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Comments*





Abstract for SCSA reporting

Authors Abella A.(4), Colloca F.(1), Sartor P. (2); Mannini A.(3), **Year** 2010

Species Scientific name Pagellus erythrinus - PAC
Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 09 - Ligurian and North Tyrrhenian Sea

Fisheries (brief description of the fishery)*

The deep sea pink shrimp is one of the most important species exploited commercially by the trawl fleet (361 vessels) in the GSA9. The fishing grounds are distributed from 150 to 400 m depth, where the main target species are hake, *Merluccius merluccius*, horned octopus, *Eledone cirrhosa* and Norway lobster, *Nephrops norvegicus*, at greater depths. The stock is more abundant in the southern part (central northern Tyrrhenian Sea) than in the northern part (Ligurian Sea). Landings in 2006 and 2008 were concentrated on adults of age classes 2-4. High landings were observed in 2006. Fishing mortality peaked for specimens of age classes 2 and 3. Recruitment and relative SSB showed an increasing trend in the last ten years. Current fishing mortality estimated from catch data (2006-08) using LCA is currently slight below the estimated F reference point (F01). Trawl surveys data returned higher F values well above F01.

Source of management advice*

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

Data used: catch data collected from 2006-08. Trawl survey data (Grund: 1994-2007; Medits: 1994-2008).

Assessment has been done comparing F_{curr} respect to F_{ref} (F_{01}). Estimates of F_{curr} have been obtained using Length Cohort Analysis (LCA) and Survey Based Assessment (SURBA). Yield software has been used to estimate F_{01} given a set of biological parameters and fisheries data and assuming a given uncertainty level for some parameters ($CV=0.2$).

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

Stock abundance

High fishing mortality

Intermediate abundance

Comments

Management advice and recommendations*

Blank area for management advice and recommendations.

