SAC GFCM
Sub-Committee on Stock Assessment

Date*	17	October	2011	Code*	SPC2511Mar

Authors*

Marios Josephides

Affiliation*

DFMR- Department of Fisheries and Marine Research, Ministry of Agriculture, Natural Resources and Environment, 1416 Nicosia, Cyprus

Species Scientific name*

1 *Spicara smaris* - *SPC*

Source: Mediterranean Species

2

Source: -

3

Source: -

Geographical area*

Cyprus Island

Geographical Sub-Area (GSA)*

25 - Cyprus 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: SPC2511Mar

Date*	17	Oct	2011	Authors*	Marios Josephides

Species Scientific name*	Spicara smaris - SPC	Species common name*	Picarel

Data Source

GSA*	25 - Cyprus Island	Period of time*	2005-2010

Description of the analysis

Type of data*	Age composition of landings per gear, official landings data, biological parameters	Data source*	DFMR
Method of assessment*	VPA- pseudocohort and Y/R analysis	Software used*	VIT (Lleonart and Salat, 1997)

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	Other	D	Z	C
1	1	2	2	---	2	---	2	1	---	1	1	---

Comments, bibliography, etc.

Comments:

The biological data used were collected within the framework of the Cyprus National Data Collection Programme, according to the EC Data Collection Regulation.

Comments, bibliography, etc.

Reports:

Annual Reports on the Cyprus Fisheries for the years 2005-2010. Departmental Reports. Department of Fisheries and Marine Research, Ministry of Agriculture, Natural Resources and Environment.

References:

Abella, A., Caddy, J. F. and Serena, F. (1999). Estimation of the parameters of the Caddy reciprocal M-at-age model for the construction of natural mortality vectors. CIHEAM- Options Mediterraneennes, pp:10

Beverton, R.J.H. and Holt, S. (1957). On the Dynamics of Exploited fish populations. UK Minist. Agric. Fish. Food. Fish. Invest. ((Ser.2)19, pp:533.

Gayanilo, F.C., Sparre, P. and Pauly, D. (2005). FAO - ICLARM stock assessment tools II - User's manual. Computerized Information Series. Fisheries No.8, pp:88-90.

Hilborn, R. and Walters, C.J. (1992).Quantitative Fisheries Stock assessment. Choice,Dynamics and Uncertainty. Chapman & Hall, pp:570.

Lleonart, J. and Salat. J. (1997). VIT: Software for fisheries analysis. FAO Computerized Information Series (fisheries). pp: 107.

Lleonart, J. (2002). Overview of Stock Assessment methods and their suitability to Mediterranean fisheries. 5th session of the SAC-GFCM, Rome, 1-4 July, 2002.

Lleonart, J. (2004). Indicators and Reference Points provided by the VIT software. GFCM/SAC/SCSA Workshop on Reference Points. Rome. Italy. 20-21 April, 2004.

Maynou, F. (1999). VIT (windows version): Software for fisheries analysis. FAO Computerized Information Series (fisheries). pp: 21

Ratz, H.J., A. Cheilari and Lleonart, J. (2010). On the perfomance of fish stock parameters derived from VIT pseudo-cohort analysis. SCIENTIA MARINA 74(1), p:155-162.

Vigneau, J. and Mahevas, S. (2005). A new statistic for sampling design investigation: an application to length-structured landings sampling. CM 2005/Z:07, pp:1-15.

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Assessment form

Sheet B
Biology of the species

Code: SPC2511Mar

Biology

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

Sex	Fem	Mal	Both	Unsexed		
Maximum size observed			20		Reproduction season	February-May
Size at first maturity			9.1		Reproduction areas	Shelf
Recruitment size					Nursery areas	Shelf

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	cm			19.62	
	K	years-1			0.27	
	t0	years			-2.01	
	Data source	Otolith readings				
Length weight relationship	a				0.007	
	b	cm ang g			3.1	

	M					

sex ratio (mal/fem)	

Comments

An M vector was used, as estimated by PRODBIOM spreadsheet (Abella et al, 1997)

Age	M
0	0.5
1	0.13
2	0.08
3	0.07
4	0.06
5	0.06
6+	0.06

Comments

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Assessment form

Sheet P1

General information about the fishery

Code: SPC2511Mar

Data source*	DFMR official landings data.	Year (s)*	2005-2010

Data aggregation (by year, average figures between years, etc.)*	Annual landings of picarel

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	CYP	25	E - Trawl (12-24 metres)	03 - Trawls	33 - Demersal shelf species	SPC
Operational Unit 2	CYP	25	C - Minor gear with engine (6-12 metres)	07 - Gillnets and Entangling Nets	33 - Demersal shelf species	SPC
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
CYP 25 E 03 33 - SPC	4	Tons	831.65	s, Pagellus acarne	included	us, Serranus hepa	days
CYP 25 C 07 33 - SPC	500	Tons	408.75	picara maena, Sa	nsidered negligib		days
Total	504		1240.4				

Legal minimum size	

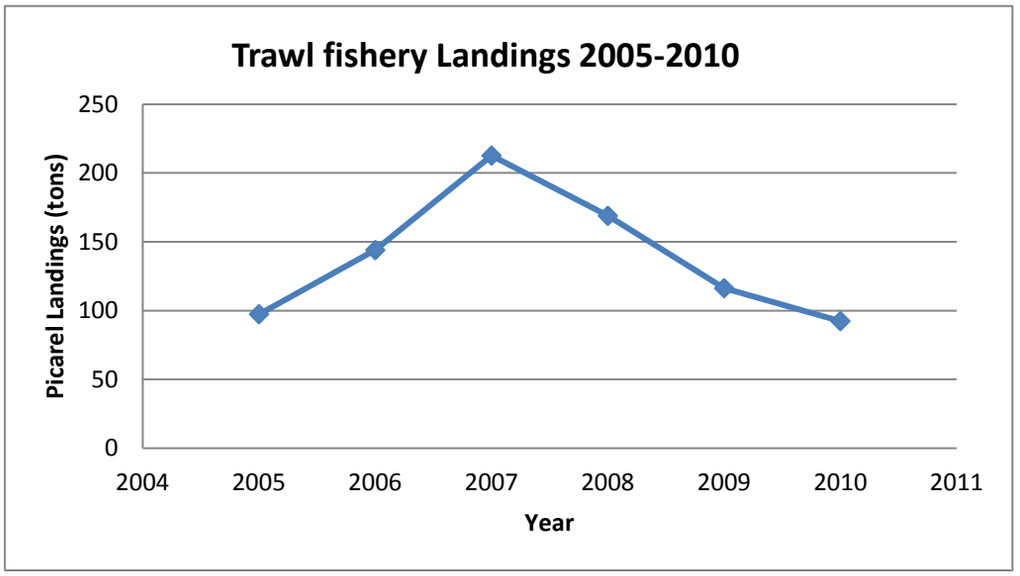
Comments

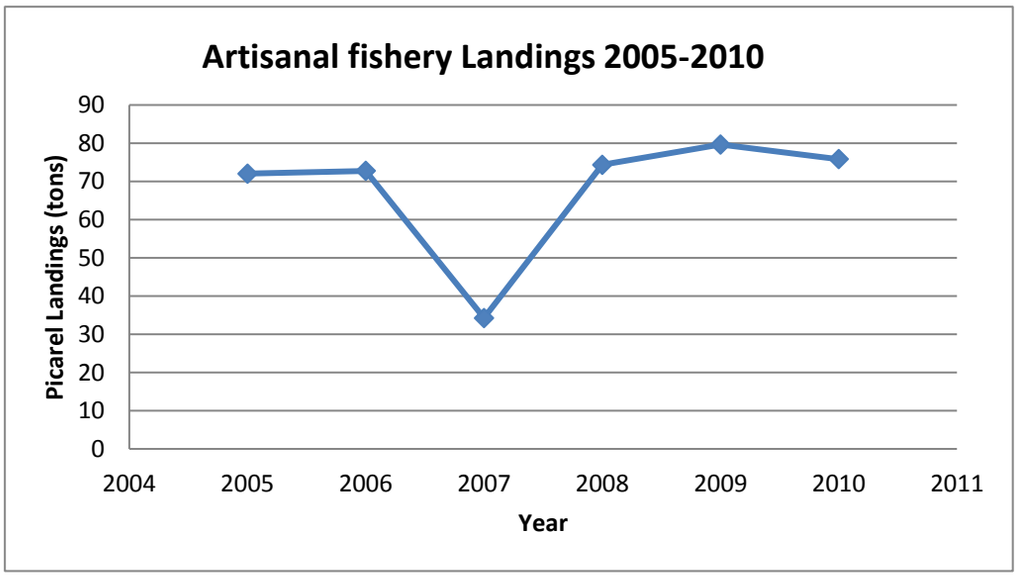
Picarel in GSA 25 is exploited mainly by the bottom trawl fleet and secondly by the artisanal fishery . The percentage from the overall landings of the species is 67% and 33% respectively.

Fleet: Since 2006 the number of licensed bottom trawlers operating in GSA25 has been reduced by 50% (from 8 to 4).
Catch: For both operational units, catch refers to the average values of the years 2005-2007 and 2008-2010.

Discards from the bottom trawl were evaluated for the first time in 2006, through a pilot study under the 2006 Cyprus National Fisheries Data Collection Programme. The discard estimates of *S.smaris* for 2006 had a persentage of 10% to the total catch of the species reaching 15.9 tons. A significant decrease followed at 2008 with a discard percentage of only 2.7% to the total catch of the species reaching 4.6 tons. A further decrease of the amount of discards followed in 2010 with a percentage of 1.8% to the total catch of the species reaching 1.7 tons.
Discards from the artisanal fishery are considered negligible.

Comments


Trawl fishery Landings 2005-2010
Picarel Landings (tons)
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
Year


Artisanal fishery Landings 2005-2010
Picarel Landings (tons)
90
80
70
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
Year

Data source*	DFMR official data	OpUnit 1*	CYP 25 E 03 33 - SPC

Time series

Year*	2005	2006	2007	2008	2009	2010
Catch	97.42	144	212.64	168.89	116.3	92.4
Minimum size						
Average size Lc						
Maximum size						
Fleet	8	4	4	4	4	4

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

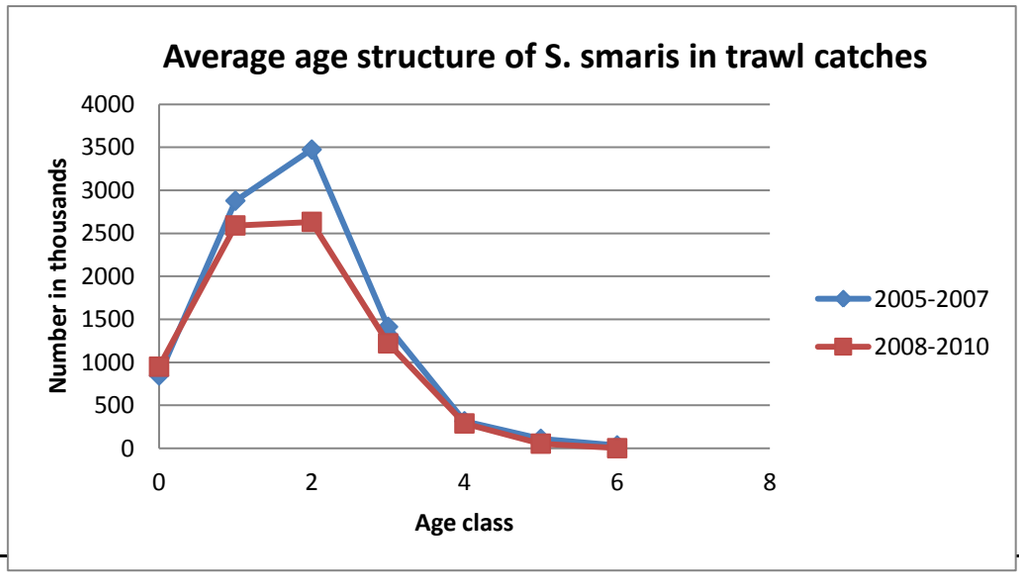
Selectivity

L25	
L50	
L75	
Selection factor	

Remarks

Structure by size or age

The most exploited age classes by the bottom trawl fleet are the age classes 1 and 2 for both periods.



Structure by size or age

Data source*	DFMR official data	OpUnit 2*	CYP 25 C 07 33 - SPC

Time series

Year*	2005	2006	2007	2008	2009	2010
Catch	72	72.75	34.23	74.32	79.63	75.83
Minimum size						
Average size Lc						
Maximum size						
Fleet	500	457	490	498		

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

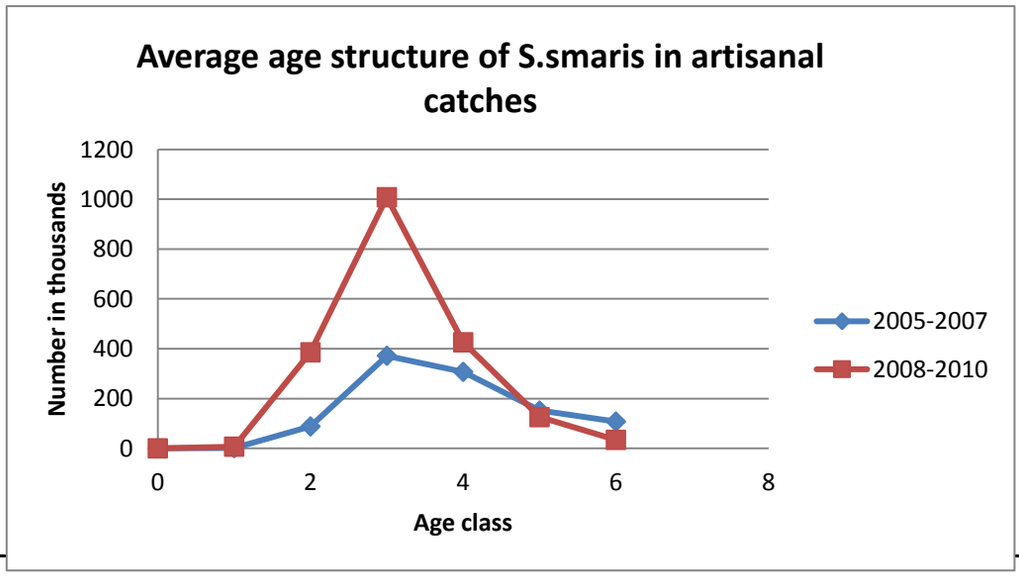
Selectivity

L25	
L50	
L75	
Selection factor	

Remarks

Structure by size or age

The most exploited age class by the artisanal fleet is the age class 3 especially in the second period (2008-2010).



Data source*	National legislation, DFMR data	OpUnit 1*	CYP 25 E 03 33 - SPC

Regulations in force and degree of observance of regulations

Maximum number of licenses restricted to 4 (since 2006): fully observed.

Closed trawling period from 1st of June until the 7th of November (in force since the mid '80s) : fully observed.

Minimum mesh size of trawl net at 40mm (diamond shape) : fully observed. From 1st of June 2010 the 40mm diamond shape trawl net will be replaced by a square meshed net of 40mm or by a diamond meshed net of 50mm at the cod-end.

Prohibition of bottom trawling at depths less than 50m and at distances less than 0.7 nautical miles off the coast. From November 2008 there is a prohibition of bottom trawling at distances between 0.7 and 1.5 nautical miles in certain areas within the territorial waters. Fully observed.

Accompanying species

Spicara smaris
Boops boops
Mullus surmuletus
Pagellus erythrinus
Octopus vulgaris
Loligo vulgaris
Sepia officinalis
Eledone moschata
Octopus macropus
Pagellus acarne
Serranus cabrilla
Synodus saurus
Scorpaena spp.
Trigloporus lastovisa
Uranoscopus scaber
Pagrus pagrus
Merluccius merluccius

Data source*	EC and National Legislation, DFMR data	OpUnit 2*	CYP 25 C 07 33 - SPC

Regulations in force and degree of observance of regulations

Restriction of the maximum number of licenses. Since 2008 assignment of licensed fishermen in 3 categories (A, B, C), based on their fishing activity and certain criteria. Licenses A&B restricted to 500. Th restriction of licenses is fully observed.

Restrictions on the use of fishing gears depending on the fishing license category.
- For licenses A & B:
  Minimum mesh size of nets at 32mm (open mesh size): fully observed. In the near future the minimum mesh size will be set at 36mm.
  Maximum length of nets: For boats with license A is 5000m, for boats with license B is 3000m. Fully observed.
  Restriction on the use of monofilament nets: Maximum length at 2400 m, allowable range of mesh size (open mesh size) 34 - 50 mm. Fully observed.
  Maximum height of nets: 4m. Fully observed.
  Restrictions on the time and duration of fishing, depending on mesh sizes. Fully observed.
- For licenses C (not fully observed):
  Minimum mesh size of nets at 36mm (open mesh size).
  Prohibition of the use of monofilament nets.
  Maximum length of nets: 600 m.
  Restriction of number of fishing days at 70 days annually, during weekends of certain months.

Accompanying species

Sparisoma cretense
Mullus surmuletus
Octopus vulgaris
Sepia officinalis
Serranus cabrilla
Scorpaena spp.
Labridae
Diplodus spp.
Boops boops
Pagellus erythrinus
Siganus spp.

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Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: SPC2511Mar

Sex*	Both

Analysis # *	1-VPA

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Standard catch equation	Tunig method	
# of gears	2	Software	VIT(Lleonart and Salata, 1997)
$F_{terminal}$	0.08		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	22.39 millions	107.36 tons
Average	12.551	2.152	Average population	49.79 millions	1034.62 tons
Maximum			Virgin population		2225.97 tons
Critical	12.975	2	Turnover		33.73

Average mortality

		Gear					
	Total	Bottom trawl	Gill nets				
F_1	0.191	0.131	0.06				
F_2	0.172	0.14	0.032				
Z	0.328						

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

Comments

The above estimations are for the period 2005-2007.

F1 refers to Mean F
F2 refers to Global F

Sex*	Both

Analysis # *	2-VPA

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Standard catch equation	Tunig method	
# of gears	2	Software	VIT (Lleonart and Salat, 1997)
$F_{terminal}$	0.08		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	17.30 millions	82.94 tons
Average	11.819	1.64	Average population	31.68 millions	535.65 tons
Maximum			Virgin population		1719.51 tons
Critical	12.975	2	Turnover		54.45

Average mortality

		Gear					
	Total	Bottom trawl	Gill net				
F_1	0.373	0.131	0.06				
F_2	0.264	0.14	0.032				
Z	0.51						

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

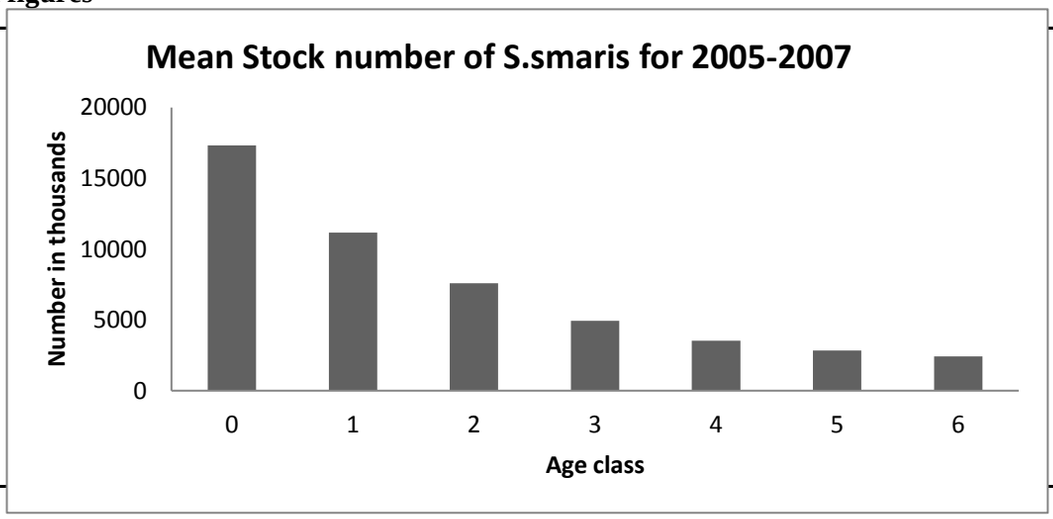
Comments

The above estimations are for the period 2008-2010.

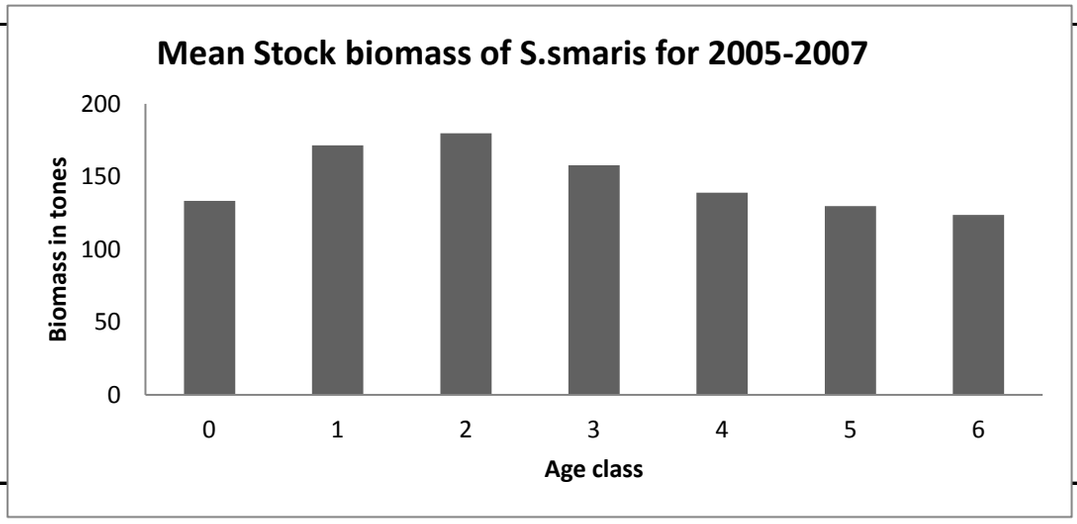
F1 refers to Mean F
F2 refers to Global F

Sex*	Both	Gear*	All	Analysis #*	1

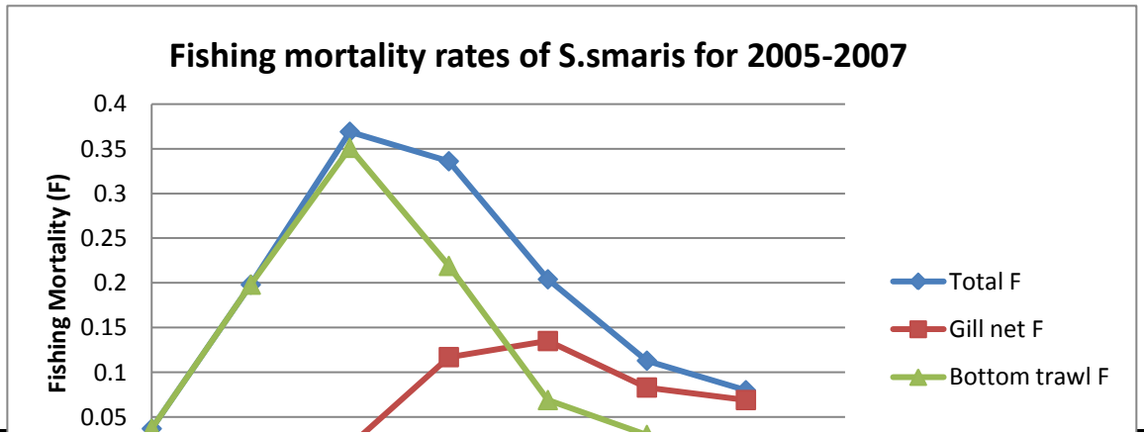
Population in figures



Population in biomass

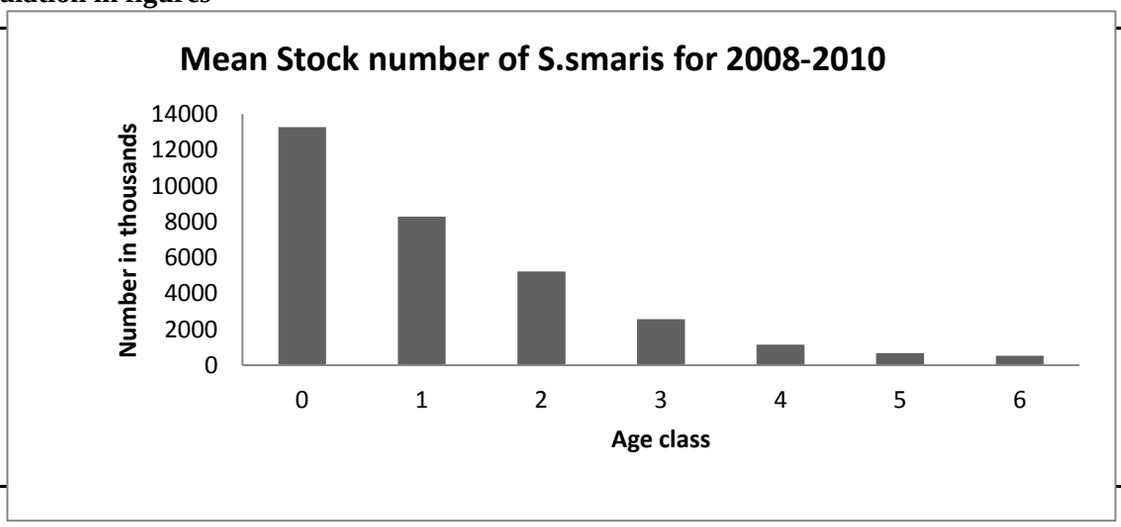


Fishing mortality rates

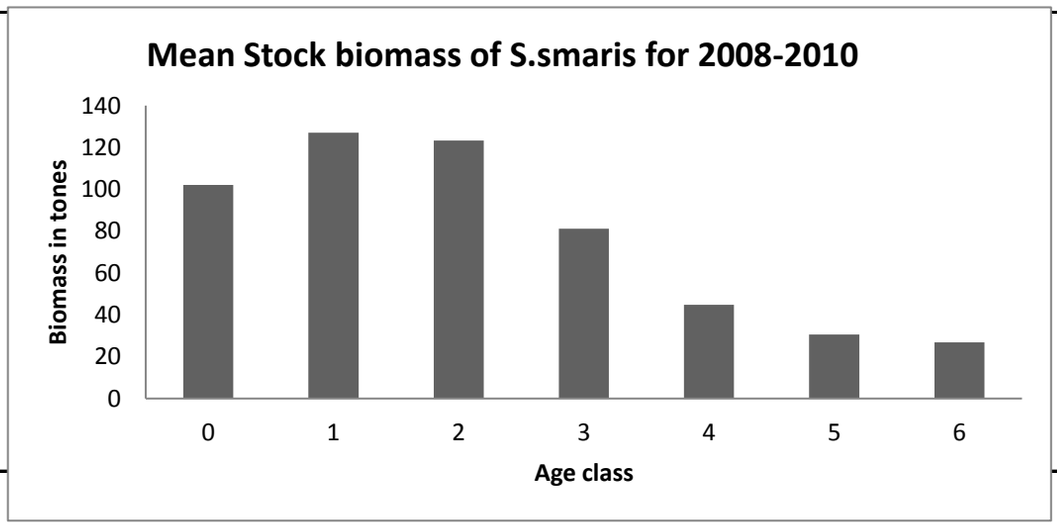


Sex*	Both	Gear*	All	Analysis #*	2

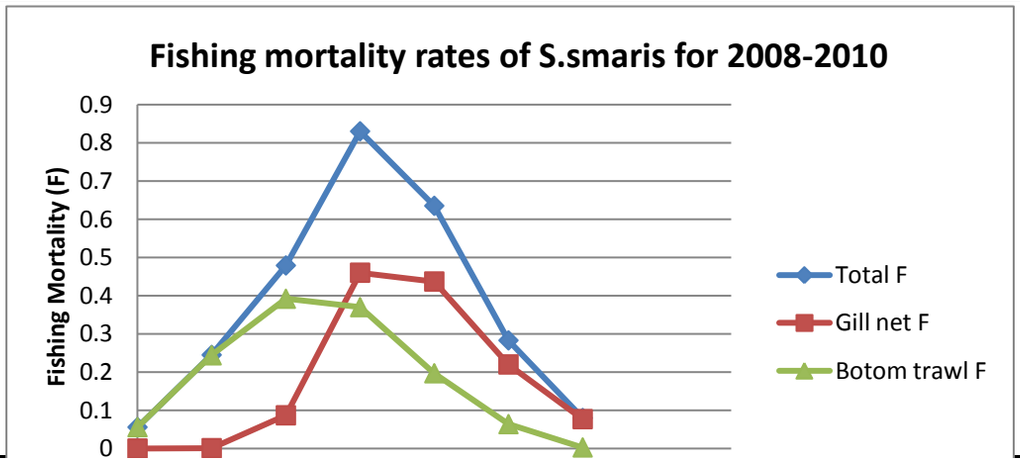
Population in figures



Population in biomass



Fishing mortality rates



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Assessment form

Sheet Y

Indirect methods: Y/R

Code: SPC2511Mar

Sex	Both

Analysis #	**1 and 2**

# of gears	2	Software	VIT (Lleonart and Salat, 1997)

Parameters used

Vector F	
Vector M	
Vector N	
	The data from VPA-pseudocohort were used as inputs

Model characteristics

Results

	Total	Gear			
		Bottom trawl	Gill net		
Current YR	9.423	6.757	2.667		
Maximum Y/R	10.738	8.687	2.667		
Y/R 0.1	9.423	6.757	2.667		
F_{max}	0.38	0.26	0.06		
$F_{0.1}$	0.19	0.13	0.06		
Current B/R	46.204				
Maximum B/R	45.901				
B/R 0.1	46.204				

Comments

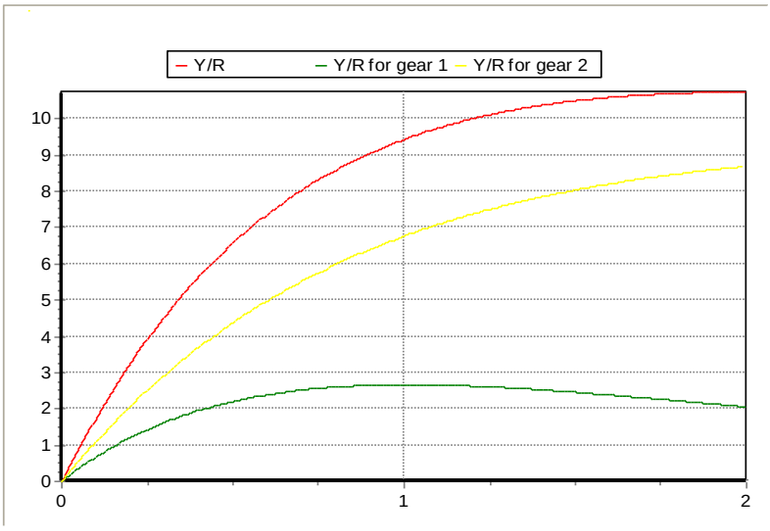
The above estimations are for the period 2005 - 2007

Comments

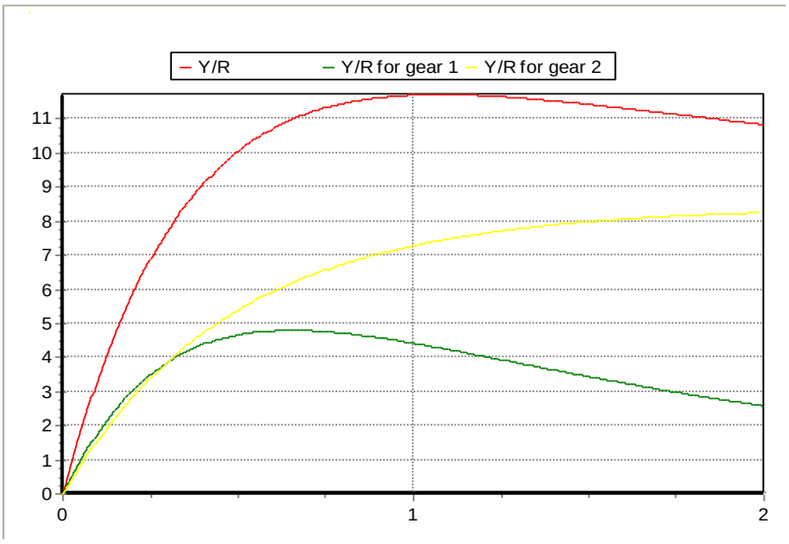
Results

	Total	Gear			
		Bottom trawl	Gill net		
Current YR	11.704	7.28	4.424		
Maximum Y/R	11.72	8.256	4.801		
Y/R 0.1	10.966	6.166	4.801		
F_{max}	0.4	0.38	0.12		
$F_{0.1}$	0.24	0.12	0.12		
Current B/R	30.967				
Maximum B/R	40.665				
B/R 0.1	42.347				

The above estimations are for the period 2008 - 2010



Y/R analysis graph covering the period 2005 - 2007



Y/R analysis graph covering the period 2008 - 2010

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

Code: SPC2511Mar

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 estimated F current (0,19) in relation to the reference points Fmax (0,38) and F0.1 (0,19) for the first period (2005-2007), suggest a fully-exploitation state of the stock as the current Y/R is equal with the Y/R0.1. Also the mean stock biomass (1034.62 tons) in relation to the virgin biomass (2225.97 tons) [46.5%] suggest an intermediate abundance of the stock.

For the second period (2008-2010), the F current (0,37) in relation to the reference points Fmax (0,40) and F0.1 (0,24) showed the stock that is in overfishing state as the current Y/R is very close to the maximun Y/R this time. The mean stock biomass (535.65 tons) in relation to the virgin biomass (1719.51 tons)[31%] indicated that the abundance of the stock remains intermediate with a lower percentage though.

Code: SPC2511Mar

Management advice and recommendations*

Fishing pressure should be reduced in both gears as in the second period (2008-2010) it seems that both gears cause almost the same levels of fishing mortality with the difference that bottom trawl fleet targets mainly age classes 2 and 3 of the population while artisanal fleet targets age classes 3 and 4. According to transition analysis, an approximate reduction of 15% (10-20%) of current F value would lead close to the F0.1 in two years with a constant recruitment. This could be achieved with the reduction of licensed fishing boats (OAL: 6-12 m) and trawlers (OAL: 12-24 m).

Also an important management measure that could lead to this goal is the increase of the minimum mesh size from 32 mm to 38 mm since 10th of March 2011.

It is noteworthy to mention that for the bottom trawl fishery, there was a replacement of the 40mm diamond shape trawl net by a diamond meshed net of 50mm at the cod end from 1st of June 2010, and also that the licensed bottom trawlers have been recently reduced at 50% (from 4 to 2). A further reduction of bottom trawlers operating in territorial waters remains a priority in the fishery policy of the Government within the Operational Program for fisheries 2007-2013.

Advice for scientific research*

Re-evaluation of the growth parameters of the species from the Von-Bertalanffy growth equation. Estimation of SSB using maturity data and development og stock-recruit models. Use of other methods that do not require equilibrium assumption (steady state) made by the VIT model.

Abstract for SCSA reporting

Authors Marios Josephides

Year 2011

Species Scientific name Spicara smaris - SPC

Source: Mediterranean Species

Source: -

Source: -

Geographical Sub-Area 25 - Cyprus Island

Fisheries (brief description of the fishery)*

Picarel (Spicara smaris) in GSA 25 is exploited mainly by the bottom trawl fleet which is comprised by 4 vessels OAL 12-24m since 2006 operating in the territorial waters. The main species caught with picarel in bottom trawl are: Pagellus erythrinus, Mullus barbatus, Serranus cabrilla and cephalopods (Octopus vulgaris, Loligo vulgaris and Sepia officinalis), while in gill nets are: Boops boops, Spicara maena and Sardina pilchardus. The percentage of picarel in the overall landings for bottom trawl fishery, for the period 2005-2010, has a range 44.8-65.9% while for artisanal fishery is 3.2-10%. Bottom trawl fishery exploits mostly age classes 2 and 3 while artisanal fishery exploits 3 and 4 classes..

Source of management advice*

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

Methods used:
The present assessment was performed by means of VPA analysis, using a pseudo-cohort from catch-at-age data for two three-year periods (2005-2007 and 2008-2010). For both periods, Yield per Recruit (Y/R) Analysis was also performed. The VIT software (Lleonart and Salat, 1997) was used for both analyses.

Due to the fact that the VIT model using one yeat recommends a very strong equilibrium state, it has been suggested by the previous Working Group on stock assessment of Demersal species, (Istanbul 18-23 October, 2010), to use the means of values for three years in order to record any changes of the level of the stock by spliting the time series.

Data used:
Catch-at-age data derived from landings for each fishing gear exploiting the stock (gill net and bottom trawl), and discards data from bottom trawl. Acombined ALK for 2006-2008 and annual length distibutions from 2005-2010 were used.

M vector for each age class was used, estimated by PRODBIOM (Abella et al., 1997).

The biological parameters used (growth parameters and L-W relationship) were estimated within the framework of the Cyprus National Data Collection Programme.

Stock Status*

Exploitation rate

High fishing mortality

Stock abundance

Intermediate abundance

Comments

Management advice and recommendations*

Fishing pressure should be reduced in both gears as in the second period (2008-2010) it seems that both gears cause almost the same levels of fishing mortality with the difference that bottom trawl fleet targets mainly age classes 2 and 3 of the population while artisanal fleet targets age classes 3 and 4. According to transition analysis, an approximate reduction of 15% (10-20%) of current F value would lead close to the F0.1 in two years with a constant recruitment. This could be achieved with the reduction of licensed fishing boats (OAL: 6-12 m) and trawlers (OAL: 12-24 m).

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Advice for scientific research*

Re-evaluation of the growth parameters of the species from the Von-Bertalanffy growth equation. Estimation of SSB using maturity data and development og stock-recruit models. Use of other methods that do not require equilibrium assumption (steady state) made by the VIT model.