SAC GFCM
Sub-Committee on Stock Assessment

Date*	17	October	2011	Code*	PIL1811Leo

Authors*

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Affiliation*

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Species Scientific name*

1 *Sardina pilchardus* - *PIL*
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area*

Adriatic Sea

Geographical Sub-Area (GSA)*

18 - Southern Adriatic Sea

Combination of GSAs
1
2
3

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Assessment form

Sheet #0

Basic data on the assessment

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Species Scientific name*	Sardina pilchardus - PIL	Species common name*	Sardine

Data Source

GSA*	18 - Southern Adriatic Sea	Period of time*	1987-2010

Description of the analysis

Type of data*	Biomass estimation by acoustic methodology	Data source*	Acoustic surveys (1987-2010) in west GSA 18 and (2002-2010) in east GSA 18
Method of assessment*	Acoustics	Software used*	Myriax Echoview 4, ESRI Arcview 3.2

Sheets filled out

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

Comments, bibliography, etc.

Direct biomass estimations through acoustic surveys financed by Italian Ministry for Agriculture and Forestry Policies and by EU (1987-2011) in west GSA 18. 2011 data are not yet available.

Direct biomass estimations through acoustic surveys in the framework of AdriaMed Project (2002, 2004, 2005,2008, 2010 and 2011) in east GSA 18

? Cooperative work between ISMAR scientific team, IBMK and University of Tirana:

Data available in east GSA 18

- 2002 – acoustic biomass estimation (MNE)
- 2004 – acoustic biomass estimation (MNE)
- 2005 – acoustic biomass estimations (MNE)
- 2008 – acoustic biomass estimations (MNE - ALB)
- 2010 – acoustic biomass estimations (MNE - ALB)

Comments, bibliography, etc.

Azzali M., De Felice A., Cosimi G., Luna M., Parmiggiani F. (2002): The state of the Adriatic Sea centered on the small pelagic fish populations. P.S.Z.N.: Marine Ecology, 23, Supplement 1, 78-91

Leonori I., Azzali M., De Felice A., Parmiggiani F., Marini M., Grilli F., Gramolini R., (2009): Small pelagic fish biomass in relation to environmental parameters in the Adriatic Sea. Proceedings of Joint AIOL-SItE Meeting 2007, Ancona

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Assessment form

Sheet B
Biology of the species

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Biology

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

Sex	Fem	Mal	Both	Unsexed		
Maximum size observed					Reproduction season	autumn-winter
Size at first maturity					Reproduction areas	continental shelf
Recruitment size					Nursery areas	continental shelf

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞					
	K					
	t0					
	Data source					
Length weight relationship	a				0.01352	
	b				2.74613	
	M					

sex ratio (mal/fem)	1.07527

Comments

Parameters a, b related to length-weight relationship and sex ratio reported here are derived from samples collected during the acoustic survey 2010.

Comments

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Assessment form

Sheet P1

General information about the fishery

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Data source*	ISTAT (1987-2003), IREPA (2004-2010) for Italy	Year (s)*	1987-2010

Data aggregation (by year, average figures between years, etc.)*	

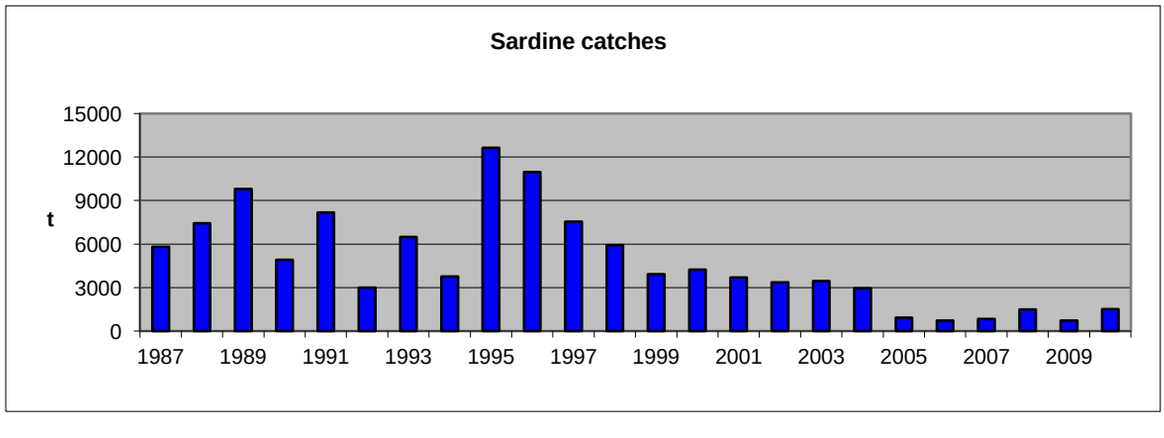
Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	MNE	18	G - Purse Seine (6-12 metres)	02 - Seine Nets	31 - Small gregarious pelagic	PIL
Operational Unit 2	ALB	18	H - Purse Seine (12-24 metres)	02 - Seine Nets	31 - Small gregarious pelagic	PIL
Operational Unit 3	ITA	18	H - Purse Seine (12-24 metres)	02 - Seine Nets	31 - Small gregarious pelagic	PIL
Operational Unit 4	ITA	18	J - Pelagic Trawl (12-24 metres)	03 - Trawls	31 - Small gregarious pelagic	PIL
Operational Unit 5	ITA	18	E - Trawl (12-24 metres)	03 - Trawls	31 - Small gregarious pelagic	PIL

Operational Units*	Fleet (n° of boats)*	Kilos or Tons	Catch (species assessed)	Other species caught	Discards (species assessed)	Discards (other species caught)	Effort units
MNE 18 G 02 31 - PIL							
ALB 18 H 02 31 - PIL							
ITA 18 H 02 31 - PIL							
ITA 18 J 03 31 - PIL							
ITA 18 E 03 31 - PIL							
Total							

Legal minimum size	11 cm

Comments



Comments

Data source*		OpUnit 1*	MNE 18 G 02 31 - PIL

Regulations in force and degree of observance of regulations

Accompanying species

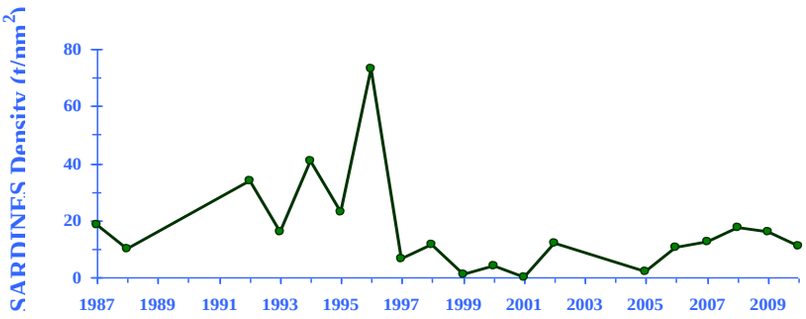
In the eastern side sardine is targeted mostly by small scale fisheries and to a lesser extent by purse seiners because of the small number of that type of vessels in this area. Fishing grounds are located along the coast, while accompanying species are: *Engraulis encrasicolus, Atherina hepsetus, Spicara spp., Boops boops, Trachurus mediterraneus, Scomber japonicus, Scomber scombrus.*
In the western side sardine is mainly targeted by purse seines and pelagic trawls; the main accompanying species are practically the same as in the eastern side.

Other assessment methods

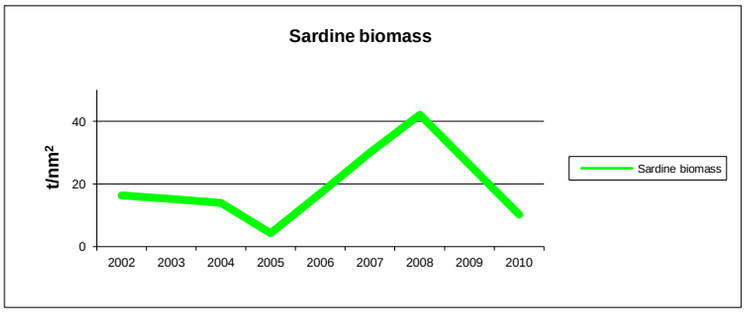
The assessment was made by means of acoustic methodology:

Biomass estimate is derived from the elaboration of acoustic data logged at three frequencies (38, 120 and 200 kHz) to calculate raw density of small pelagic fish in the study area converted into biomass per species on the base of percentage in weight of the different species and their mean size from the outcome of pelagic trawls made during the survey.

Sardine biomass density trend in western GSA 18



Sardine biomass density trend in Montenegro waters (eastern GSA 18)



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Assessment form	**Sheet D Diagnosis**

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Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B	71188	tons		decreasir	results are referred to both eastern and western GSA 18 for 2010
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

Sardine stock biomass in GSA 18 shows similar trends in western and eastern sides (limiting to Montenegro only) in the period 2002-2010 in which both areas were explored. After the oscillations around low levels of the years 2002-2005 there was a recovery that brought to a high biomass level in 2008. After that the stock decreased significantly in 2009 and 2010.

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Management advice and recommendations*

Eastern GSA 18: Due to the fact that there is a lack of consistent fishery effort here the stock could be considered moderately exploited. In any case if an increase in fishing effort is foreseen in eastern GSA 18 for a precautionary approach it has to be introduced slowly and step by step, also because biomass estimations through acoustics indicated a decrease for sardine stock in 2010.
Western GSA 18: sardine is targeted mainly by purse seiners and pelagic trawls; fishing effort is bigger than in the eastern side.
Biomass in the western side is at a rather low level looking at the historical series; anyway the fishery effort is not entirely directed in GSA 18 and fishing pressure is rather low. The stock could be considered moderately exploited.

Advice for scientific research*

There is the need to keep investigation of all GSA 18 by acoustic surveys and also the need to try to improve the quality and availability of landings data.

Abstract for SCSA reporting

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Year 2011

Species Scientific name Sardina pilchardus - PIL

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 18 - Southern Adriatic Sea

Fisheries (brief description of the fishery)*

Italy
Sardine is exploited by pelagic trawl, purse seine and to a lower level by bottom trawl (bycatch of small pelagics). Highest landings in weight are those of pelagic trawling followed by purse seine. Fishing is carried out five days a week. Exploitation is mainly based on age classes 1 and 2. Purse seiners during most of the fishing season operate in GSA 17. Pelagic trawlers mainly fishing small individuals (bianchetto) are no more allowed to operate.
From official data, the pelagic trawl and purse seine fleet of the geographical sub-area 18 (South-Western Adriatic Sea) is made up by 41 boats, but not all of them are operating all over the year.

Montenegro
Sardine is targeted mostly by small scale fisheries. Fishing grounds are located along the coast, and also in the Boka Kotorska Bay. In small scale fishery almost all types of nets are used (gillnet, purse seines, trammel net etc. and long lines). With this type of fishery, a lot of economically important fishes are caught but there are no precise data about their amounts.

Albania
At present there are 4 pelagic vessels in Albania which are active for 3 - 5 months during the year. There are three main exploitation areas: Shengjin, Durres and Valona. The catch goes to market or is used by the local conservation industry. There are three conservation industries in Shengjin; most of the product for these industries is imported.

Source of management advice*

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

Data used for anchovy biomass assessment are from the acoustic surveys made in the western side in the period 1987-2010 and in the eastern side in the period 2002-2010, in both areas some years are missing.

For acoustic methodology the analysis was made through echograms interpretation and standard echointegration procedure. Multifrequency comparison and data thresholding were used in order to separate information of small pelagic fish from other unwanted echoes (i.e. plankton echoes). Information on the composition by species of the pelagic biomass and the relative size distributions were derived from pelagic trawls and used to subdivide total pelagic biomass per species. Conversion of raw density into biomass per species was made using specific Conversion Factors derived from ex situ and in situ experiments. IDW interpolator was used in GIS software for mapping.

Stock Status*

M - Moderately exploited, exploited with a low level of fishing effort. Believed to have some limited potential for expansion in total production;

Exploitation rate

Moderate fishing mortality

Stock abundance

Low abundance

Comments

Management advice and recommendations*

Advice for scientific research*