



Stock Assessment Form of *Sardinella aurita* (Small Pelagics sp.) in GSA 27 (Palestine).

Reference Year: 2016 and 2017

Reporting Year: 2018

The round *Sardinella aurita* is one of the exploited species in GSA 27 (Palestine). Landings of *Sardinella aurita* were 512 and 217 tonnes in 2016 and 2017, respectively. The landed catch of *Sardinella aurita* mainly came from Purse seiners and it constituted about 70 % of all the sardine-like species in GSA 27 (Palestine).

The size of the samples ranged between 6 to 20 cm and the information used for the assessment of the stock consisted of catch length structure, length weight relationship, Von Bertalanffy growth parameters, Sex ratio, the values of total (Z) and fishing (F) mortalities, length at first sexual maturity, yield per recruit, biomass per recruit and biological reference points. Gislason method was applied to estimate natural mortality. Length cohort analysis and Beverton & Holt Yield per recruit analysis were performed in order to estimate the limit and target reference points.

According to the results obtained, the current fishing level of *Sardinella aurita* is higher than the biological reference point ($F_{0.1}$) in the understudied years which shows that *Sardinella aurita* resources in GSA 27 (Palestine) is in state of moderate overfishing (according to GFCM recommendations 2012)

Stock Assessment Form version 1.0 (January 2014)

Uploader: *Reda M. Fahim*

Stock assessment form

1	Basic Identification Data	2
1.1	Data and parameters:.....	3
1.2	Assessment method:	3
2	Stock unit	4
2.1	Growth and maturity	4
3	Fisheries information	7
3.1	Management regulations	7
3.2	Biological reference point:.....	7
3.3	Reference points.....	8
4	Draft scientific advice	9
4.1	Explanation of codes	10

1 Basic Identification Data

Scientific name:	Common name:	ISCAAP Group:
<i>Sardinella aurita</i>	[Round Sardinella]	
1st Geographical sub-area:	2nd Geographical sub-area:	3rd Geographical sub-area:
[GSA_27]		
1st Country	2nd Country	3rd Country
[Palestine]	[Country_2]	[Country_3]
Stock assessment method: (direct, indirect, combined, none)		
Indirect Methods (VPA with Vit and yield per recruit model)		
Authors:		
Hatem H. Mahmoud ¹ , Reda M. Fahim ² , Abdelnasser Madi ³ , Mohamed Abu Tair ³ and Marcelo Vasconcellos ⁴		
Affiliation:		
¹ College of Fisheries Technology and Aquaculture, Arab Academy for Science, Technology and Maritime transport – Alex., Egypt. ² National Institute of Oceanography and Fisheries, Egypt. ³ Ministry of Agriculture, Palestine. ⁴ FAO-EastMed Project. Rome, Italy.		

1.1 Data and parameters:

Samples were collected from landings during 2016 and 2017 within a fisheries data collection system supported by the FAO EastMed project. The monthly length frequency distributions were raised to the monthly landings and analyzed by ELEFAN program incorporated in LFDA software for the estimation of growth parameters for the sexes combined. The length-weight relationship, the length at first maturity (L_{m50}) and the sex ratio were also studied. Gislason method was applied to estimate natural mortality.

1.2 Assessment method:

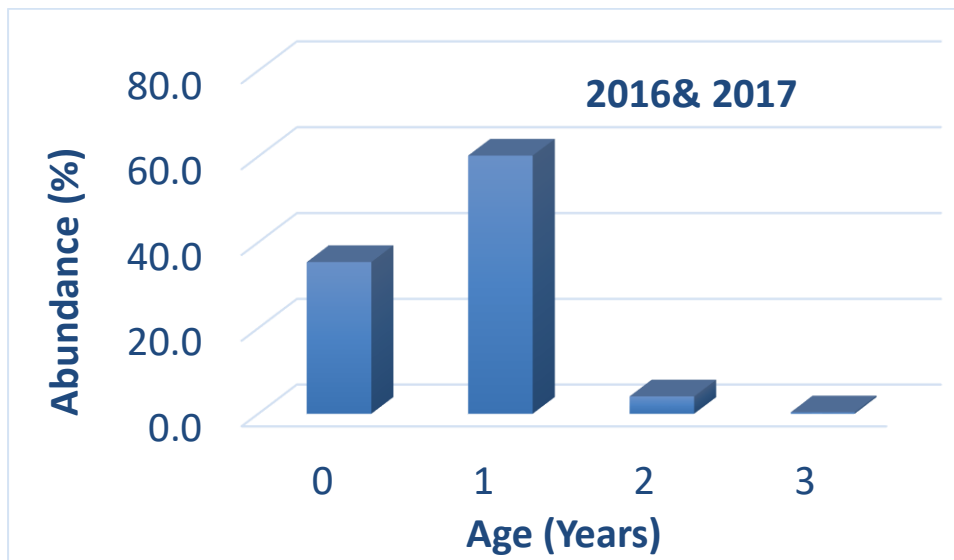
VIT software was used for pseudo cohort analysis (Leonart and Salat, 1992). In addition, The Y/R analysis which implemented in VIT was applied for the calculation of the reference point $F_{0.1}$.

2 Stock unit

2.1 Growth and maturity

Table 2.2-1: Maximum size, size at first maturity and size at recruitment, 2017.

Somatic magnitude measured (LT, LC, etc)				Units	
Sex	Fem	Mal	Combined	Reproduction season	from June to September
Maximum size observed			20 cm	Recruitment season	
Size at first maturity			14.61 cm	Spawning area	
Recruitment size to the fishery			5.59 cm	Nursery area	



Age composition of *Sardinella aurita* in GSA 27 (Palestine).

Table 2-2.2: *M* vector and proportion of matures by age of *Sardinella aurita* in GSA 27, 2017.

L. class (cm)	Maturity ratio	M (Gislason)
6	0	3.86
7	0	3.01
8	0	2.43
9	0	2.01
10	0.11	1.69
11	0.12	1.45
12	0.19	1.26
13	0.23	1.11
14	0.31	0.99
15	0.55	0.88
16	0.65	0.8
17	0.81	0.72
18	0.93	0.66
19	1	0.6
20	1	0.56

Table 2-3: Growth and length weight model parameters, 2017

		Sex				
		Units	female	male	Combined	Years
Growth model	L_{∞}				24	
	K				0.41	
	t_0				-0.64	
	Data source	Length frequency				
Length weight relationship	a				0.0063	
	b				3.0741	
	M (scalar)					
	sex ratio (% females/total)	0.52				

3 Fisheries information

Table 3.1-1: Catch, bycatch, discards and effort by operational unit in the reference year

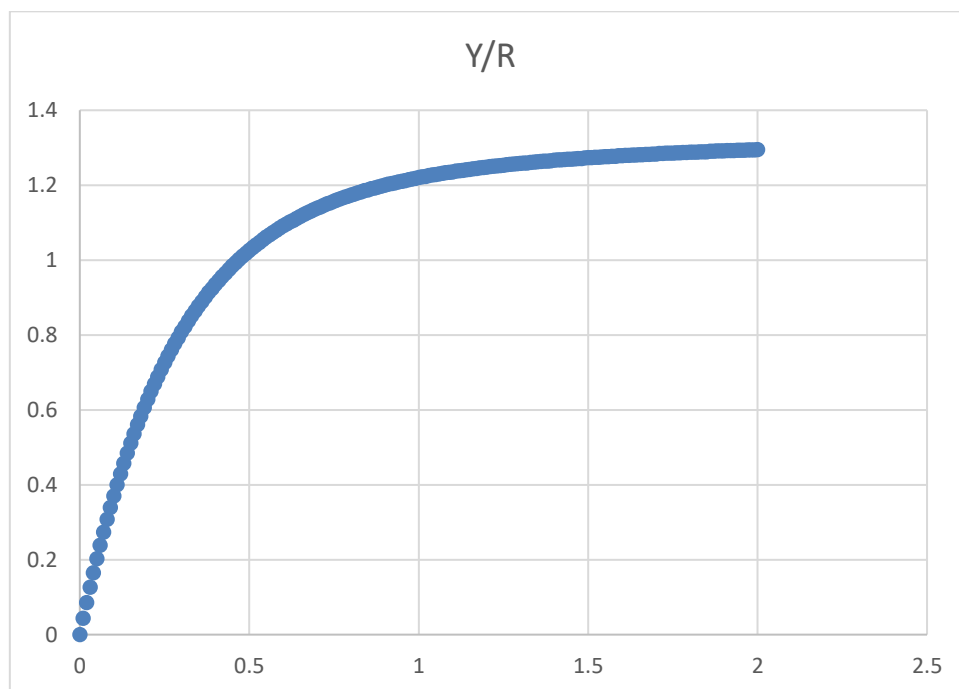
specification	Number
Purse seine 6 - 12	138
Minor gear with engine < 6	55
Minor gear with engine 6 - 12	344
Purse Seine 12 - 24	42
TOT	579

3.1 Management regulations

The available area of fishing usually varies from 3-9 miles from the coast with an average of 6 miles at most cases.

3.2 Biological reference point:

Gislason:



Yield per recruit of *Sardinella aurita* in GSA 27.

3.3 *Reference points*

	F_{curr}	$F_{0.1}$	$F_{curr} / F_{0.1}$
2016	1.051	0.630	1.66
2017	0.803	0.66	1.2
ALL	0.949	0.645	1.47

4 Draft scientific advice

Based on	Indicator	Analytic al reference point (name and value)	Current value from the analysis (name and value)	Empirical reference value (name and value)	Trend (time period)	Status
Fishing mortality	Fishing mortality	($F_{0.1}$, = 0.645)	$F_{current}=0.949$		N	IO_L
	Fishing effort				D	
	Catch					
Stock abundance	Biomass			33 th percentile		O_L
	SSB					
Recruitment					D	
Final Diagnosis		In moderate level of overfishing.				

State the rationale behind that diagnoses, explaining if it is based on analytical or on empirical references

4.1 *Explanation of codes*

Trend categories

- 1) N - No trend
- 2) I - Increasing
- 3) D – Decreasing
- 4) C - Cyclic

Stock Status

Based on Fishing mortality related indicators

- 1) **N - Not known or uncertain** – Not much information is available to make a judgment;
- 2) **U - undeveloped or new fishery** - Believed to have a significant potential for expansion in total production;
- 3) **S - Sustainable exploitation**- fishing mortality or effort below an agreed fishing mortality or effort based Reference Point;
- 4) **IO –In Overfishing status**– fishing mortality or effort above the value of the agreed fishing mortality or effort based Reference Point. An agreed range of overfishing levels is provided;

Range of Overfishing levels based on fishery reference points

In order to assess the level of overfishing status when $F_{0.1}$ from a Y/R model is used as LRP, the following operational approach is proposed:

- If $F_c/F_{0.1}$ is below or equal to 1.33 the stock is in (**O_L**): **Low overfishing**
- If the $F_c/F_{0.1}$ is between 1.33 and 1.66 the stock is in (**O_I**): **Intermediate overfishing**
- If the $F_c/F_{0.1}$ is equal or above to 1.66 the stock is in (**O_H**): **High overfishing**

* F_c is current level of F

- 5) **C- Collapsed**- no or very few catches;

Based on Stock related indicators

- 1) **N - Not known or uncertain**: Not much information is available to make a judgment
- 2) **S - Sustainably exploited**: Standing stock above an agreed biomass based Reference Point;
- 3) **O - Overexploited**: Standing stock below the value of the agreed biomass based Reference Point. An agreed range of overexploited status is provided;

Empirical Reference framework for the relative level of stock biomass index

- **Relative low biomass**: Values lower than or equal to 33rd percentile of biomass index in the time series (**O_L**)

- **Relative intermediate biomass:** Values falling within this limit and 66th percentile (O_i)
 - **Relative high biomass:** Values higher than the 66th percentile (O_H)
- 4) **D – Depleted:** Standing stock is at lowest historical levels, irrespective of the amount of fishing effort exerted;
- 5) **R –Recovering:** Biomass are increasing after having been depleted from a previous period;

Agreed definitions as per SAC Glossary

Overfished (or overexploited) - A stock is considered to be overfished when its abundance is below an agreed biomass based reference target point, like $B_{0.1}$ or B_{MSY} . To apply this denomination, it should be assumed that the current state of the stock (in biomass) arises from the application of excessive fishing pressure in previous years. This classification is independent of the current level of fishing mortality.

Stock subjected to overfishing (or overexploitation) - A stock is subjected to overfishing if the fishing mortality applied to it exceeds the one it can sustainably stand, for a longer period. In other words, the current fishing mortality exceeds the fishing mortality that, if applied during a long period, under stable conditions, would lead the stock abundance to the reference point of the target abundance (either in terms of biomass or numbers)