Stock Assessment Form of *Metapenaeus stebbingi* (Demersal sp.) in GSA 26.

Reference years: 2012-2013-2014-2015

Reporting year: 2016

Seven species (*Metapenaeus monoceros, Metapenaeus stebbingi, Penaeus semisulcatus, Penaeus kerathurus, Penaeus japonicas, Parapeneus longirostris* and *Trachypenaeus curvirostris*) of Penaeidae were recorded in the catch of Egyptian Mediterranean (GSA 26). *Metapenaeus stebbingi* is one of the most important commercial species in the Mediterranean coast of Egypt (GSA 26). Its landings were 1593 tonnes during 2012, 1429 tons during 2013, 1935 tons during 2014 and 1697 tons during 2015 . The landed catch of *Metapenaeus stebbingi* came from the trawl vessels and it constituted about 22.4% of Penaeidae in GSA 26.

The size of the samples ranged between 7 and 42 mm 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. Since the species is characterized by high growth rate and short life span, Pauly (1983) empirical equation 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 using different models such as (FiSAT, LFDA, Vit 4 win & ProdBiom, 2009).

According to the results obtained the current fishing level of *Metapenaeus stebbingi* is higher than the biological reference point ($F_{0.1}$) in the four understudy years which shows that *Metapenaeus stebbingi* resources in GSA 26 is in a state of high overfishing (according to GFCM recommendations 2012).

Stock Assessment Form version 1.0 (January 2014)

Uploader: Hatem Hanafy Mahmoud

Stock assessment form

Contents

1 Basic Identification Data

Scientific name:	Common name:	ISCAAP Group:
Metapenaeus stebbingi	Peregrine shrimp	
1st Geographical sub-area:	2nd Geographical sub-area:	3rd Geographical sub-area:
[GSA_26]		
1st Country	2nd Country	3rd Country
Egypt		
Stock assessment method: (direct, indirect, combined, none)		
Indirect Methods (VPA with Vit and yield per recruit model)		
Authors:		
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The ISSCAAP code is assigned according to the FAO 'International Standard Statistical Classification for Aquatic Animals and Plants' (ISSCAAP) which divides commercial species into 50 groups on the basis of their taxonomic, ecological and economic characteristics. This can be provided by the GFCM secretariat if needed. A list of groups can be found here:

http://www.fao.org/fishery/collection/asfis/en

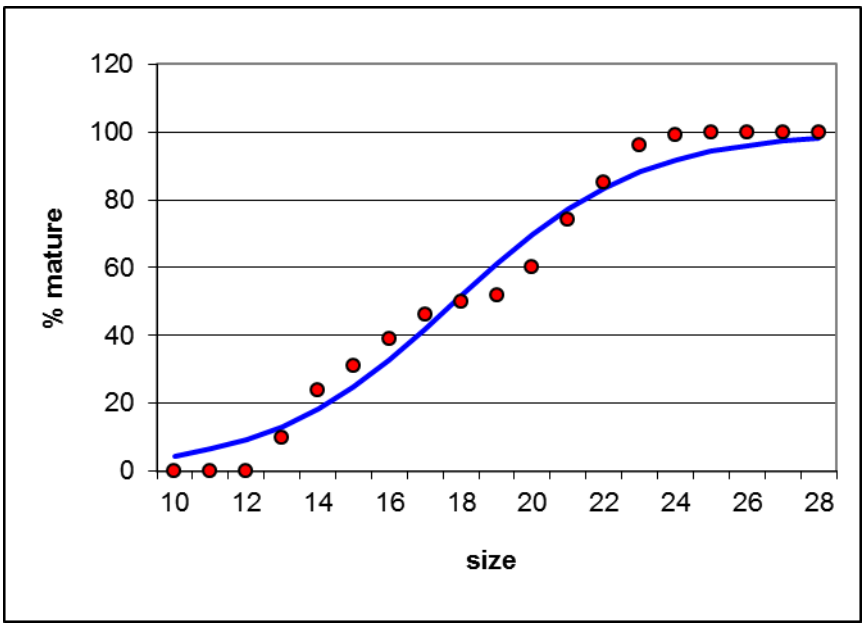
2 Stock identification and biological information

2.1 Stock unit

2.2 Growth and maturity

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

Somatic magnitude measured (LT, LC, etc)				Units	
Sex	**Fem**	**Mal**	**Combined**	**Reproduction season**	**From May to September**
Maximum size observed			**42 mm**	**Recruitment season**	
Size at first maturity			**17.8 mm**	**Spawning area**	
Recruitment size to the fishery			**7.93 mm**	**Nursery area**	



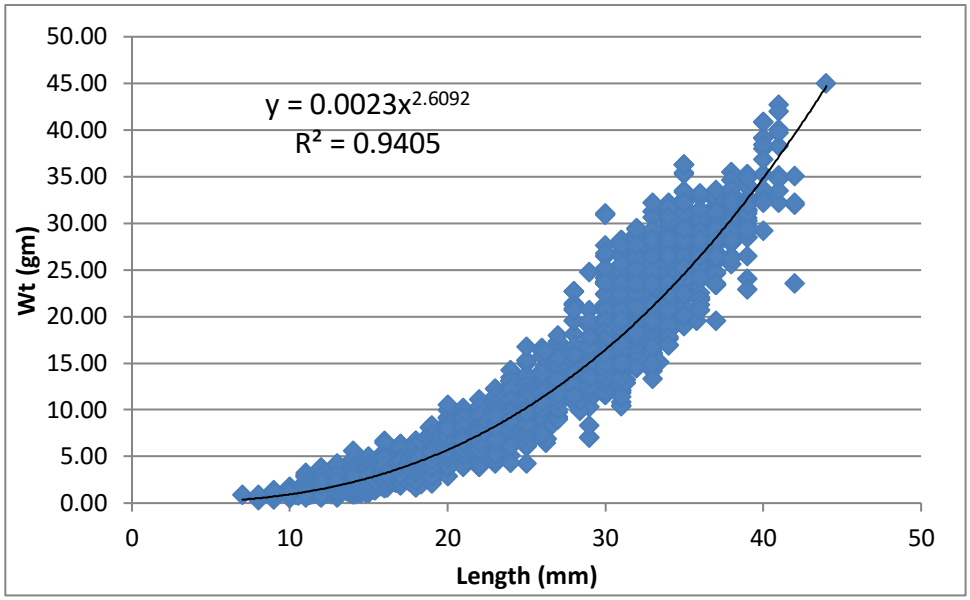
Length at first sexual maturity of *Metapenaeus stebbingi*

Table 2-2.2: M vector and proportion of matures by age

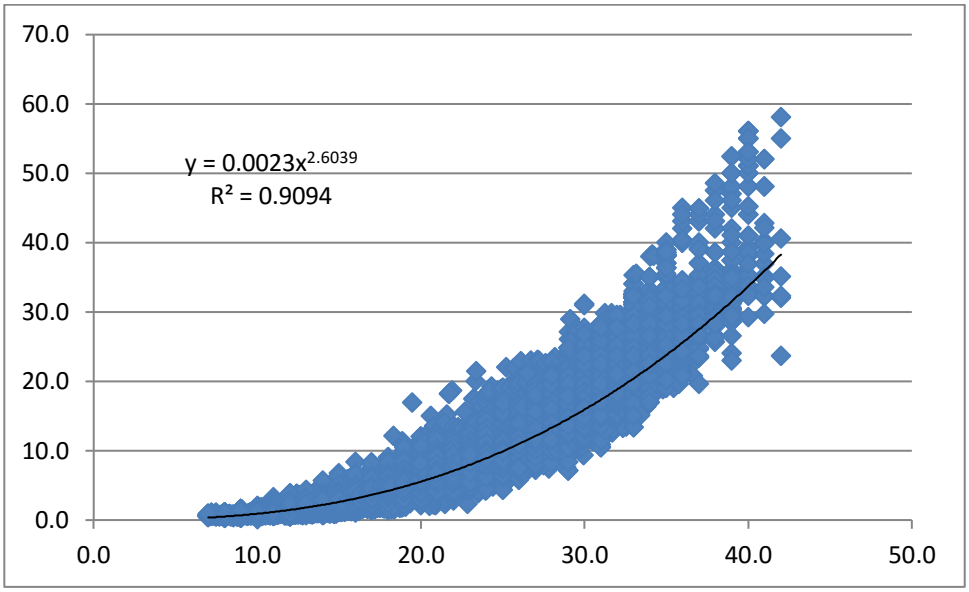
L. class (mm)	Maturity ratio	M	
		Pauly	ProdBiom
7	0	1.414	2.65
8	0	1.414	2.65
9	0	1.414	2.65
10	0	1.414	2.65
11	0	1.414	2.65
12	0.1	1.414	2.65
13	0.24	1.414	2.65
14	0.31	1.414	2.65
15	0.39	1.414	2.65
16	0.46	1.414	2.65
17	0.5	1.414	2.65
18	0.52	1.414	2.65
19	0.6	1.414	2.65
20	0.74	1.414	2.65
21	0.85	1.414	2.65
22	0.97	1.414	2.65
23	0.99	1.414	2.65
24	1	1.414	2.65
25	1	1.414	2.65
26	1	1.414	2.65
27	1	1.414	2.65
28	1	1.414	2.65
29	1	1.414	2.65
30	1	1.414	2.65
31	1	1.414	0.74
32	1	1.414	0.74
33	1	1.414	0.74
34	1	1.414	0.74
35	1	1.414	0.74
36	1	1.414	0.74
37	1	1.414	0.74
38	1	1.414	0.74
39	1	1.414	0.74
40	1	1.414	0.74
41	1	1.414	0.42
42	1	1.414	0.42

Table 2-3: Growth and length weight model parameters

			Sex			
		Units	female	male	Combined	Years
Growth model	L_∞				46.13	2012-2015
	K				1.02	
	t_0				-0.06	
	Data source	Length frequency				
Length weight relationship	A				0.0023	
	B				2.6039	
	sex ratio (% females/total)	0.42				



Length weight relationship of *Metapenaeus stebbingi* in 2015.



Length weight relationship of *Metapenaeus stebbingi* from 2012 to 2015.

3 Fisheries information

3.1 Description of the fleet

The fishing grounds along the Egyptian Mediterranean coast are divided into four regions; Western region (from Alexandria to El-Salloum), Nile Delta region, Damietta region and Eastern

region (From Port Said to Rafah).

The continental shelf is narrow in the western region comparable to the wider delta and Damietta and eastern regions. Fish production in this area is low due to the nature of the bottom (mostly rocky) and the limited fishing grounds for trawling.

The main fishing grounds used by the Egyptian vessels are on the continental shelf off the Nile delta; recently extend to the eastern side off Sinai Peninsula and seasonally to the western side of Alexandria. The seabed along the middle and eastern area is flat, mostly muddy to sandy and is suitable for trawling.

There are nine official main landing centers (Fishing harbors) most of them are located along the Nile River Delta region as shown in the following figure.

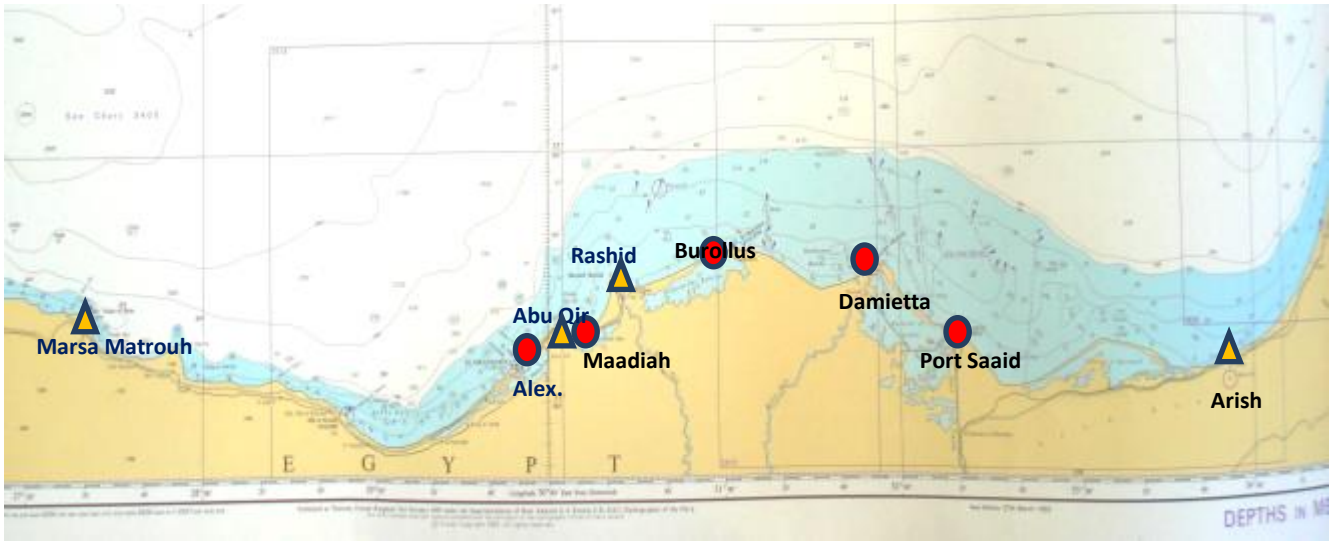


Figure 3.1.1 - Map of the Egyptian Mediterranean coast represents the main fishing ports (GSA 26), the red circles show our sampling locations.

Table 3.1-2: Catch and effort by operational unit in the reference year

Operational Units*	Fleet (n° of boats)*	Catch per ton (species assessed)	Effort units
Trawlers	1056	1697 Tons (2015)	No. of fishing vessels
Purse seiners	250		
Longline	1169		
Trammel Net	525		

3.2 Historical trends

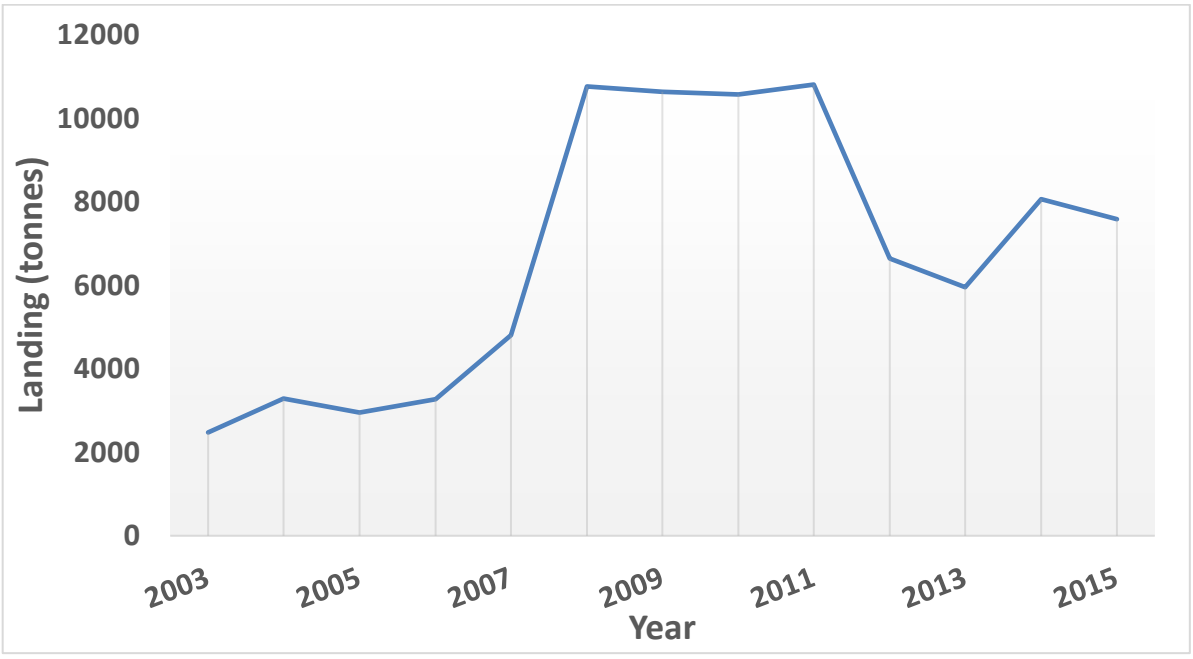


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Figure 3.2.1 - Landings of *Metapenaeus stebbingi* from 2003 to 2015

3.3 Management regulations

The fisheries management tools for the Egyptian Mediterranean coast are limited (for example, there is no minimum landing size); the only effective management tools are to freeze the fishing licenses and to implement a closed fishing season (May to June) for all the fishing gears in the Egyptian Mediterranean coast.

3.4 Reference points

Reference points

Year	F_{curr}	$F_{0.1}$	F_{max}	$F_{curr} / F_{0.1}$
2012	2.288	0.892	1.487	2.564
2013	2.173	0.891	1.369	2.439
2014	2.234	0.894	1.407	2.500
2015	2.524	0.909	1.489	2.778
Results of merged data (2012-2015)	2.618	0.890	1.414	2.941

4 Fisheries independent information

5 Stock Assessment

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

5.1 VIT

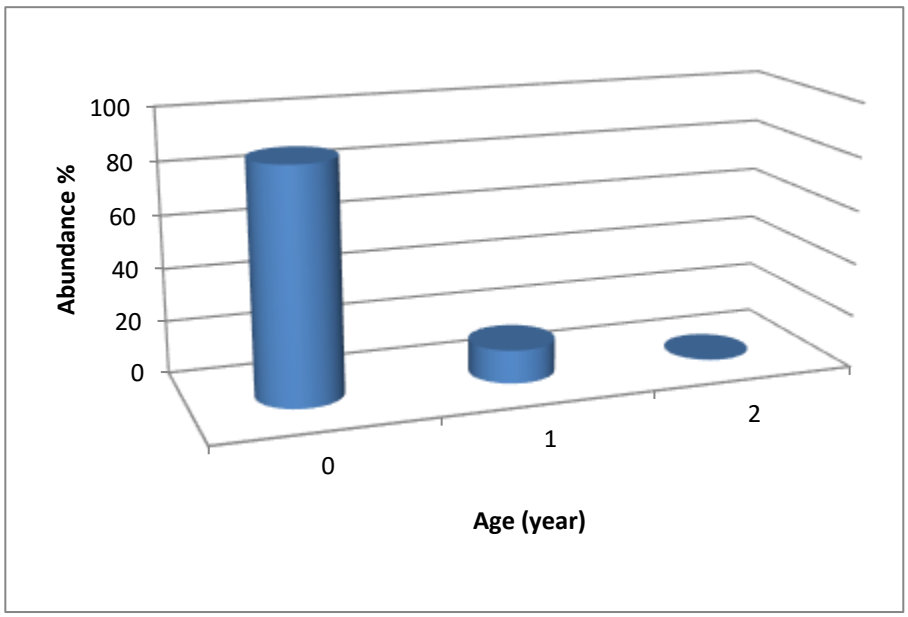
5.1.1 Model assumptions

5.1.2 Scripts

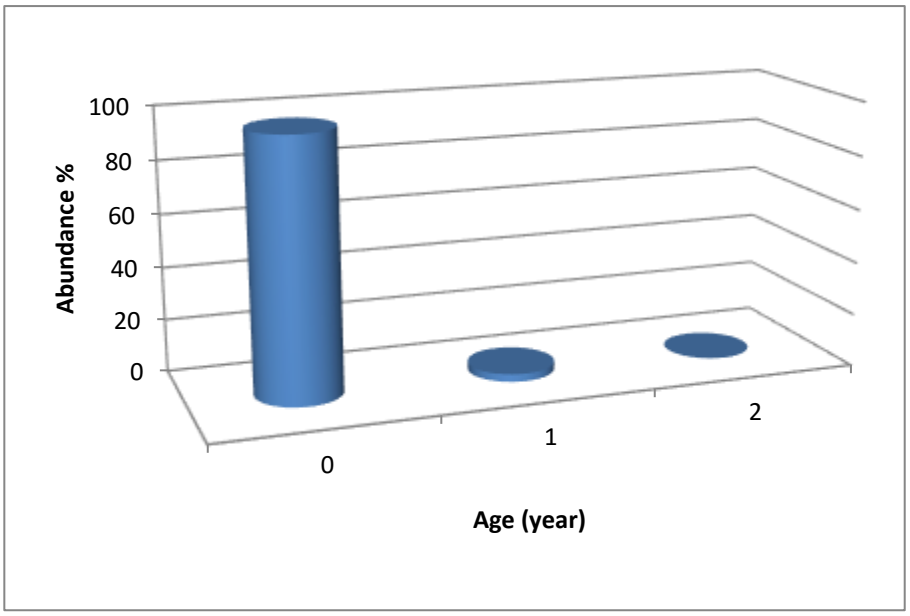
5.1.3 Input data and Parameters

Monthly samples were collected from landings during the period from January till

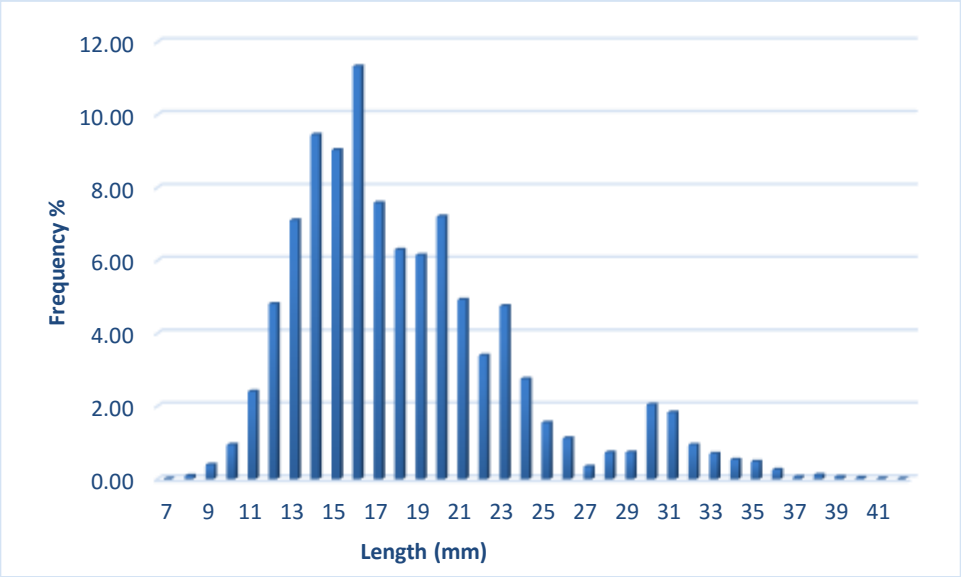
December 2012 and from the beginning of 2013 to the end of 2015 in bimonthly basis within a fisheries data collection system supported by the FAO EastMed project. The monthly length frequency distributions were raised to the monthly landings and analyzed by ELEFAN program incorporated in LFDA software 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. Since the species is characterized by high growth rate and short life span, Pauly (1983) empirical equation was applied to estimate natural mortality.



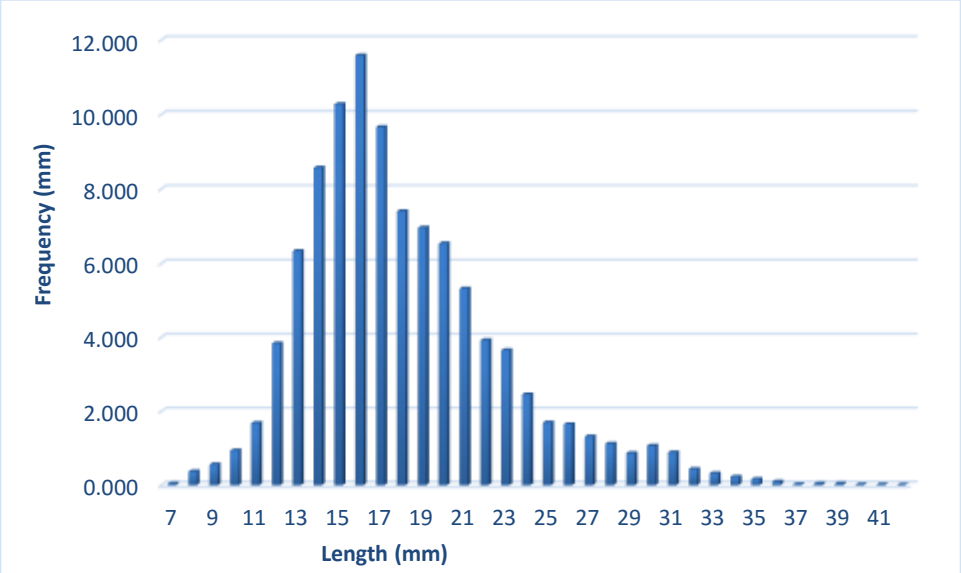
Age composition of *Metapenaeus stebbingi* in 2015.



Age composition of *Metapenaeus stebbingi* from 2012 to 2015.



Length frequency of *Metapenaeus stebbingi* in GSA 26 in 2015.



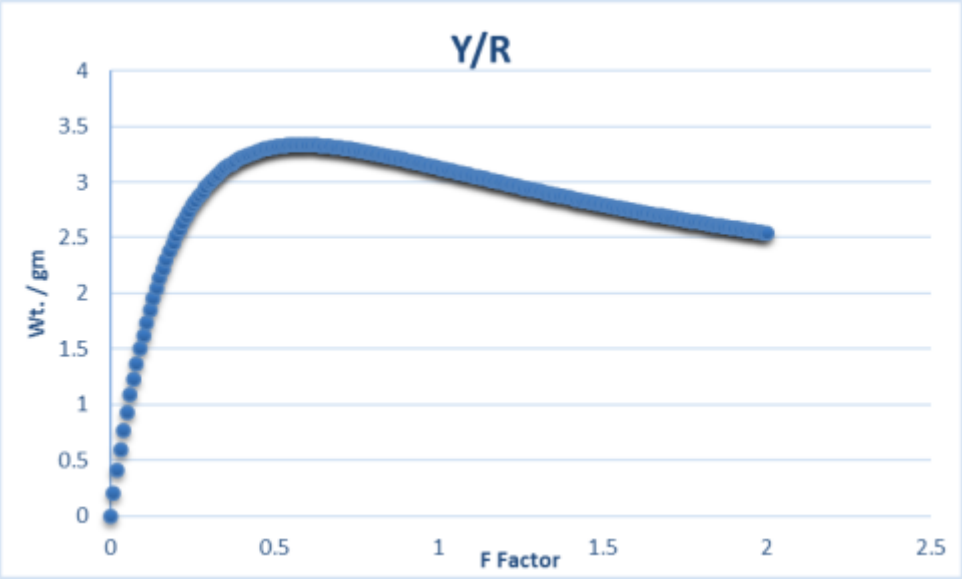
Length frequency of *Metapenaeus stebbingi* in GSA 26 from 2012 to 2015.

5.1.4 Results

Year	F_{curr}
2012	2.288
2013	2.173
2014	2.234
2015	2.524
Results of merged data (2012-2015)	2.618

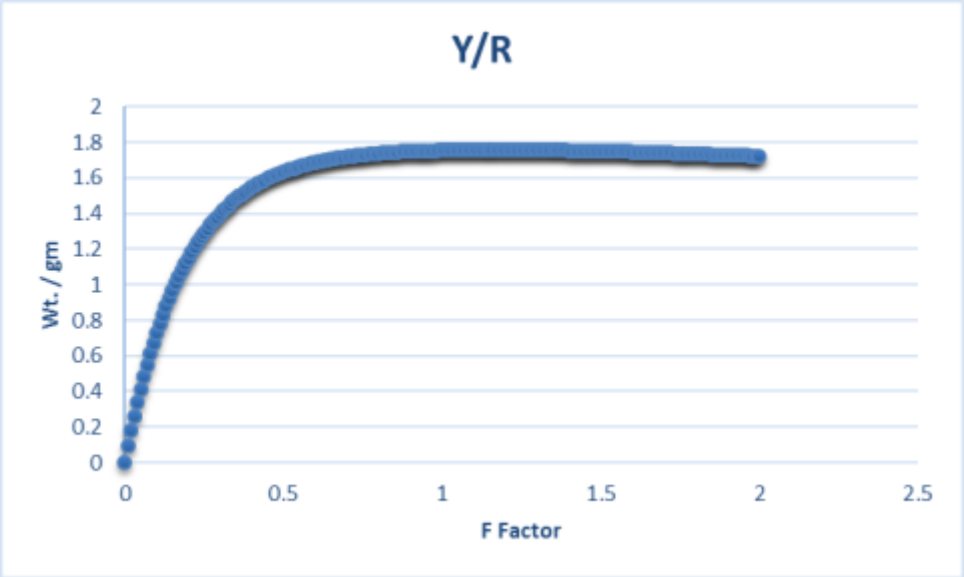
Yield per Recruit

Pauly*:*



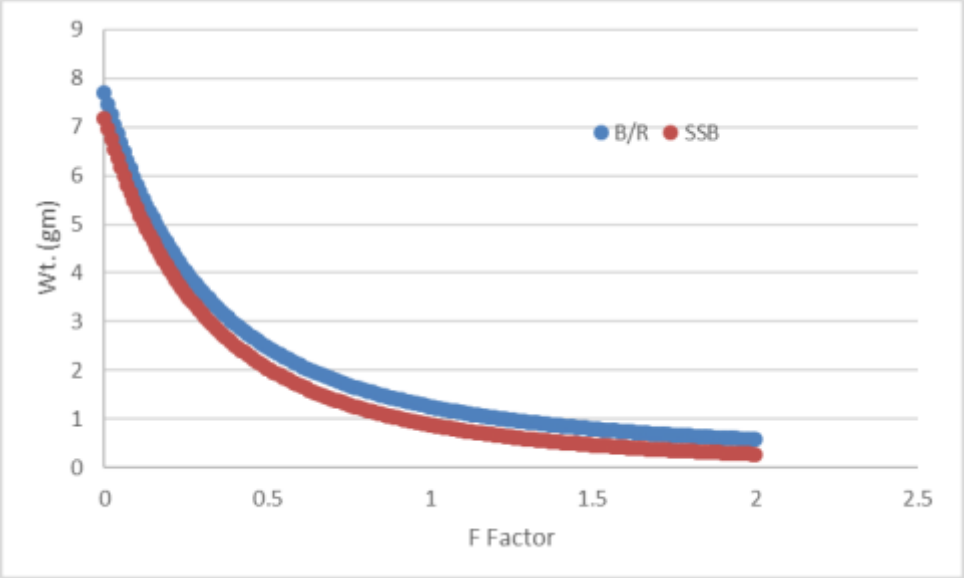
Yield per recruit of *Metapenaeus stebbingi* in GSA 26 in 2015.

ProdBiom*:*



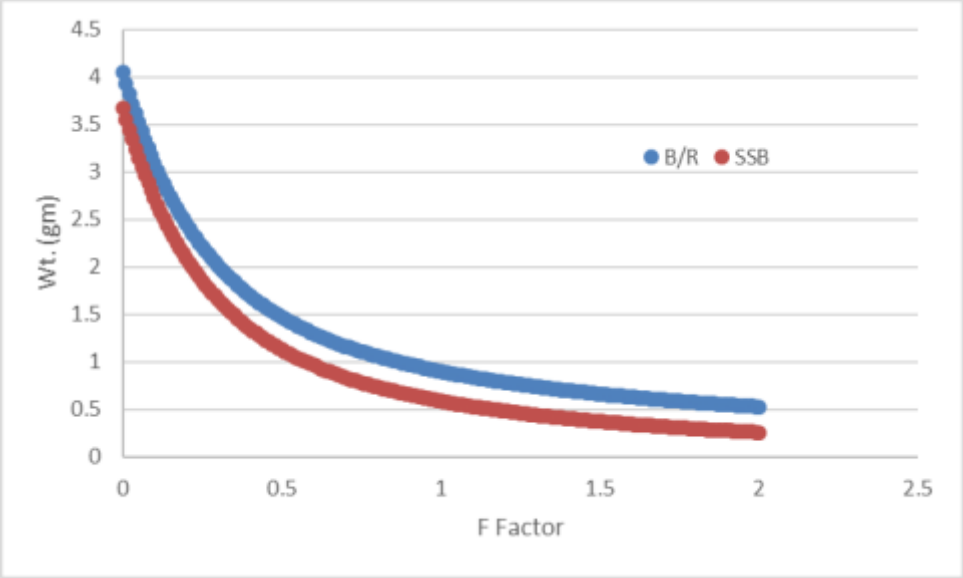
Yield per recruit of *Metapenaeus stebbingi* in GSA 26 in 2015.

Pauly*:*



Biomass per recruit and SSB of *Metapenaeus stebbingi* in GSA 26 in 2015.

ProdBiom*:*



Biomass per recruit and SSB of *Metapenaeus stebbingi* in GSA 26 in 2015.

Criterion	Current value	Units	Reference Point	Trend	Comments
Pauly (2015)					
B/R	1.252		$B/R_{0.1}$ = 3.201		
SSB	0.877		$SSB_{0.1}$ = 2.753		
F_{cur}	2.524	$Year^{-1}$	$F_{0.1}$ = 0.909	$F_{cur}/F_{0.1}$ = 2.778	The stock of *Metapenaeus stebbingi* in GSA (26) is in severe overexploitation
Y/R	3.128		$Y/R_{0.1}$ = 3.147		
ProdBiom (2015)					
B/R	0.899		$B/R_{0.1}$ = 1.6		
SSB	0.586		$SSB_{0.1}$ = 1.254		
F_{cur}	2.204	$Year^{-1}$	$F_{0.1}$ = 0.970	$F_{cur}/F_{0.1}$ = 2.273	The stock of *Metapenaeus stebbingi* in GSA (26) is in severe overexploitation
Y/R	1.755		$Y/R_{0.1}$ = 1.587		

6 Stock predictions

7 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)	Stock Status
Fishing mortality	Fishing mortality	($F_{0.1}$ = 0.890, F_{max}=1.414)	F_c = 2.618		I	IO_H High overfishing
	Fishing effort					
	Catch					
Stock abundance	Biomass	($B/R_{0.1}$=3.201	B/R_{cur} = 1252			
	SSB	$SSB_{0.1}$ = 2.753	SSB_{cur} = 0.877			
Recruitment						
Final Diagnosis	According to the results obtained in (2012, 2013, 2014 & 2015) the current fishing level of the Peregrine shrimp is higher than the biological reference points ($F_{0.1}$) and F_{cur}/ $F_{0.1}$ = 2.564 in (2012), 2.439 in (2013), 2.50 in (2014), 2.778 in (2015) and 2.941 for the merged data of the four years, which show that, *Metapenaeus stebbingi* resources in GSA 26 is in overexploitation (according to GFCM recommendations 2012).					

The stock of Metapenaeus stebbingi in GSA (26) is overexploited as Current fishing mortality (Fcur) exceeds F0.1 levels for the different M scenarios considered and for all the years of study.

It is recommended to maintain the fishing mortality in line (equal or less) with the agreed reference point.

It is recommended to improve the selection pattern of the trawl fishery

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

*Fc 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 B0.1 or BMSY. 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)*