Stock Assessment Form version 0.1

Assessment form content for each stock

1 Basic Identification Data

Scientific name: Parapenaeus longirostris	Common name: deep water rose shrimp	ISCAAP Group:
Geographical sub-area: 12,13,14,15, and 16		
Stock assessment method: Indirect method (VPA, XSA)		
Authors: S. Ben Meriem[1], F. Fiorentino[2], F. Colloca[2], A. Arneri[4], L. Ceriola[4], V. Gancitano[2], O. Jarboui[1], L. Knittweis[3]		
Affiliations: [1]Institute National des Sciences et Technologies de la Mer (INSTM), Tunisia; [2]National Research Council (CNR) – Institute for Coastal Marine Environment (IAMC) of Mazara del Vallo, Via L. Vaccara 61, 91026, Mazara del Vallo (TP), Italy ; [3]Fisheries Control Directorate (FCD), Ministry for Resources and Rural Affairs (MRRA), Barriera Wharf, Valletta VLT 1970, Malta; [4]Food and Agriculture Organization of the United Nations (FAO), MedSudMed Project, Viale delle Terme di Caracalla, 00153 Rome, Italy.		

2 Stock identification and biological information.

2.1 Stock unit

The deep water rose shrimp *Parapenaeus longirostris* (Lucas 1846) is distributed throughout the eastern Atlantic Ocean and the Mediterranean basin. Information on the species' ecology however mainly comes from the eastern and central Mediterranean basins, where the species is more abundant than in the western Mediterranean.

The stock structure of the species in the Strait of Sicily is not well known. Although the study area is one of the most important areas for the deepwater rose shrimp (*Parapenaeus longirostris*) fishery in the Mediterranean, only few studies looked at the spatial distribution of critical habitats and stock structure in the Central Mediterranean. Levi et al. (1995) hypothesised that there is a flux of eggs, larvae and juvenile *P. longirostris* from east to west due to an intermediate water current present in the region. More recently, the existence of at least two sub-populations in the northern side of the area (GSA 15 and 16) connected by the Atlantic Ionian Stream (AIS) were reported by Fortibuoni et al. (2010). The authors however conclude that further studies on critical habitats and their correlation with oceanographic features are needed in order to clearly define the stock structure of *P. longirostris* in the Central Mediterranean.

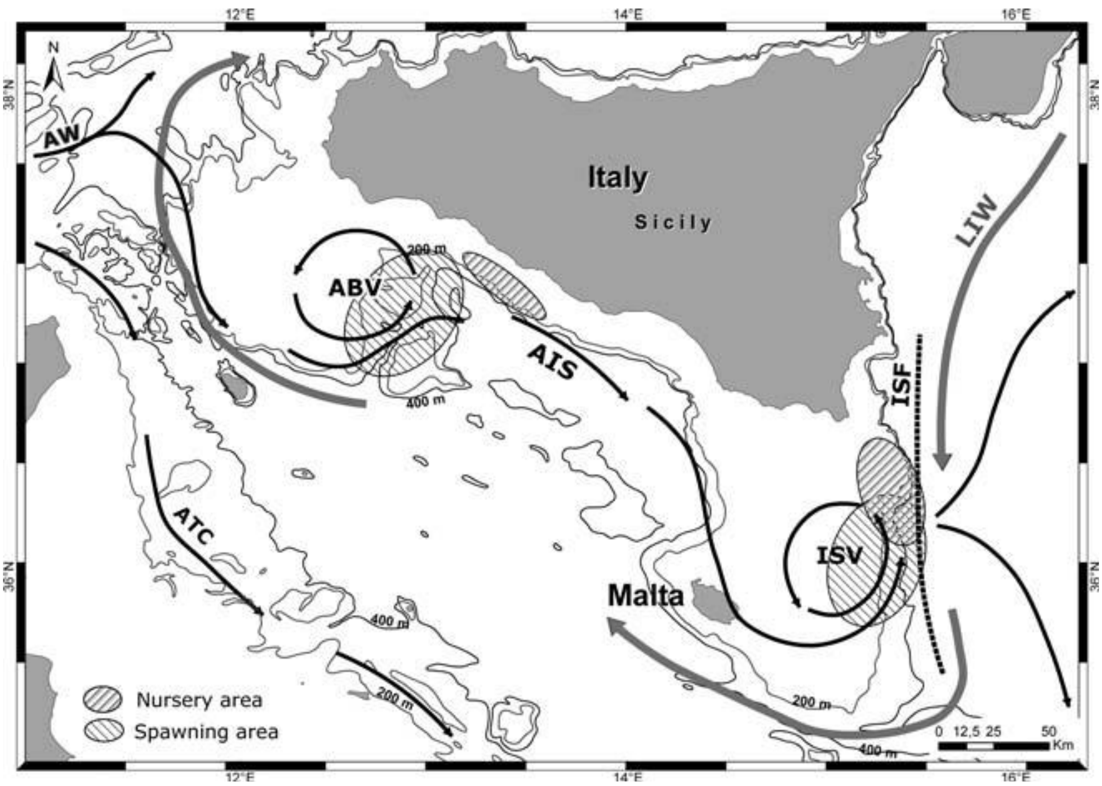


Fig. 2-1: Schematic model of the spawning strategy of *Parapenaeus longirostris* in the northern sector of the Strait of Sicily. The location of stable nursery and spawning areas is shown, as well as the main hydrological characteristics of the area. ABV: Adventure Bank Vortex; ATC: Atlantic Tunisian Current; AIS: Atlantic Ionian Stream; ISV: Ionian Shelf-break Vortex; ISF: Ionian Slope Front; LIW: Levantine Intermediate Water; AW: Atlantic Water (from Fortibuoni et al., 2010).

2.2 Growth and maturity

P. longirostris is a short-lived species characterized by high growth and mortality rates (Abellò *et al.*, 2002) which reproduces throughout the year (Levi et al. 1995, Ben Mariem *et al.,* 2001). Individuals are mainly found in epibenthic habitats characterized by sandy to muddy bottoms between 100 and 400m, although the species has a bathymetric distribution range of 20 – 750 m. Deep water rose shrimp have a size-dependent depth distribution, with the highest concentration of small individuals found at the edge of the continental shelf (Lembo *et al.*, 1999). This size related depth segregation is reflected in commercial catches, where smallest specimens are caught mainly on the outer continental shelf (50–200 m), and larger specimens along the slope (>200 m) (Tursi *et al.*, 1999).

Table 2-1: Maximum size, size at first maturity and size at recruitment.

Somatic magnitude measured (LH, LC, etc)*			CL		Units*	mm
Sex	Fem	Mal	Both	Unsexed		
Maximum size observed	42-46	38-41			Reproduction season	Peak summer/fall
Size at first maturity	20,85	13,65	15		Reproduction areas	yes
Recruitment size			5 to 8		Nursery areas	yes

Table 2-2: Growth and length weight model parameters

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	mm	42,705	33,56	44,59	
	K		0,67	0,73	0,6	
	t0	year	-0,208	-0,13	-0,118	
	Data source	Average SAMED (2002) / Ben Meriem (unpubl.)				
Length weight relationship	a		0,0029	0,00345	0,0033	
	b		2,48185	2,4096	2,4572	

M (scalar)		1,05	1,2	1,115	

sex ratio (% females/total)	0.57-0.67

3 Fisheries information

3.1 Description of the fleet

Trawlers targeting *P. longirostris* operate on the continental shelf of the Central Mediterranean throughout the year, and catches often include Norway lobster (*Nephrops norvegicus*), giant red shrimp (*Aristaeomorpha foliacea*), hake (*Merluccius merluccius*), violet shrimp (*Aristeus antennatus*), scorpionfish (*Helicolenus dactylopterus*), greater forkbeard (*Phicys blennioides*), red Pandora (*Pagellus bogaraveo),* common Pandora (*Pagellus erythrinus*) and monkfish (*Lophius* spp.). Scientific data available indicates that exploitation by the fishing fleets of Tunisia, Malta, Libya and Italy is targeting a single shared stock of deep water rose shrimp (Camilleri *et al.*, 2007).

Sicilian coastal trawlers (LOA between 12 and 24 m) targeting deep water rose shrimp are based in seven harbours along the southern coasts of Sicily. These trawlers operate mainly on short-distance fishing trips, which range from 1 to 2 days at sea, and fishing taking place on the outer shelf and upper slope. With 250 registered vessels, this is the largest component of the fleet targeting rose shrimp in 2009. Sicilian trawlers over 24 m in length have longer fishing trips, which may have a duration of up to 4 weeks. These vessels operate offshore, in both Italian and international waters of the Central Mediterranean. In 2009, 140 such vessels were active. In the Maltese Islands small vessels measuring 12 to 24 m in length target rose shrimp at depths of about 600 m. Fishing grounds are located to the north and north-west of Gozo, as well as to the west and south-west of Malta. Catches are primarily destined for the local market. The number of trawlers targeting rose shrimp increased from 7 in 2005 to 12 in 2009, with some vessels fishing in international waters. Tunisian trawl vessels which target rose shrimp measure around 24 m in length, and operate primarily in Northern Tunisia where 90% of the country's total *P. longirostris* catches originate. The great majority of these catches are landed in the town of Bizerte and Kelibia. The number of Tunisian trawlers targeting rose shrimp has increased from 40 in 1996 to around 70 in 2009.

Table 3-1: Description of operational units in the stock

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	MLT	99	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	DPS
Operational Unit 2	ITA	99	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	DPS
Operational Unit 3	ITA	99	F - Trawl (>24 metres)	03 - Trawls	34 - Demersal slope species	DPS
Operational Unit 4	TUN	99	F - Trawl (>24 metres)	03 - Trawls	34 - Demersal slope species	DPS
Operational Unit 5						

Table 3-2: Catch and effort by operational unit for 2011.

Operational Units*	Fleet (n° of boats)*	Kilos or Tons	Catch (species assessed)	Other species caught	Discards (species assessed)	Discards (other species caught)	Effort units
MLT 99 E 03 34 - DPS	22	Tons	21				
ITA 99 E 03 34 - DPS	250	Tons	5886				
ITA 99 F 03 34 - DPS	140	Tons	732				
TUN 99 F 03 34 - DPS	70	Tons	1595				
Total	482		8234				

Table 3-3: Catches as used in the assessment

Classification (age, length, re-cruit/spawner)	Catch(t) 2007	Catch(t) 2008	Catch(t) 2009	Catch(t) 2010	Catch(t) 2011	Average catch (t) 2007-2011
length	6375	6933	8806	7156	8234	7501
Total	6375	6933	8806	7156	8234	7501

3.2 Historical trends

In terms of biomass the deep water rose shrimp was the most important crustacean species landed by Mediterranean trawl fisheries in 2000-2008, constituting 23% of total crustacean landings (FAO FishStat; GFCM capture production dataset).

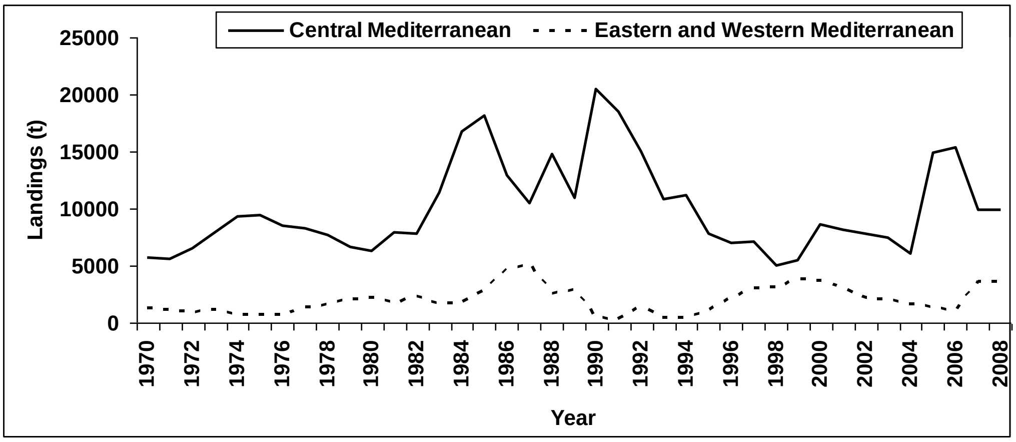


Figure 3-1 Capture production of *Parapenaeus longirostris* in the Mediterranean Sea from 1970 to 2008 (source: FAO/GFCM).

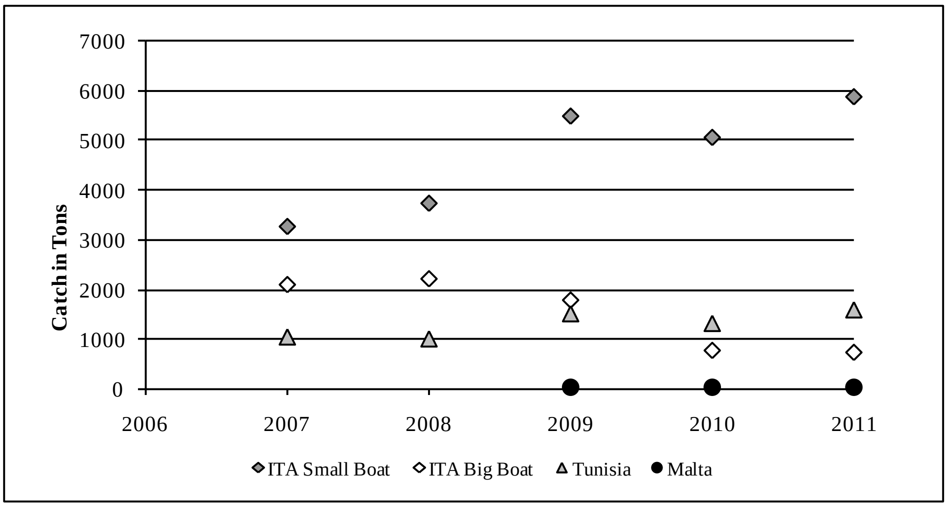


Figure 3-2 Catch of DPS from 2007 to 2011 in the Strait of Sicily, Central Mediterranean (GSA 12,13,14,15 and 16)

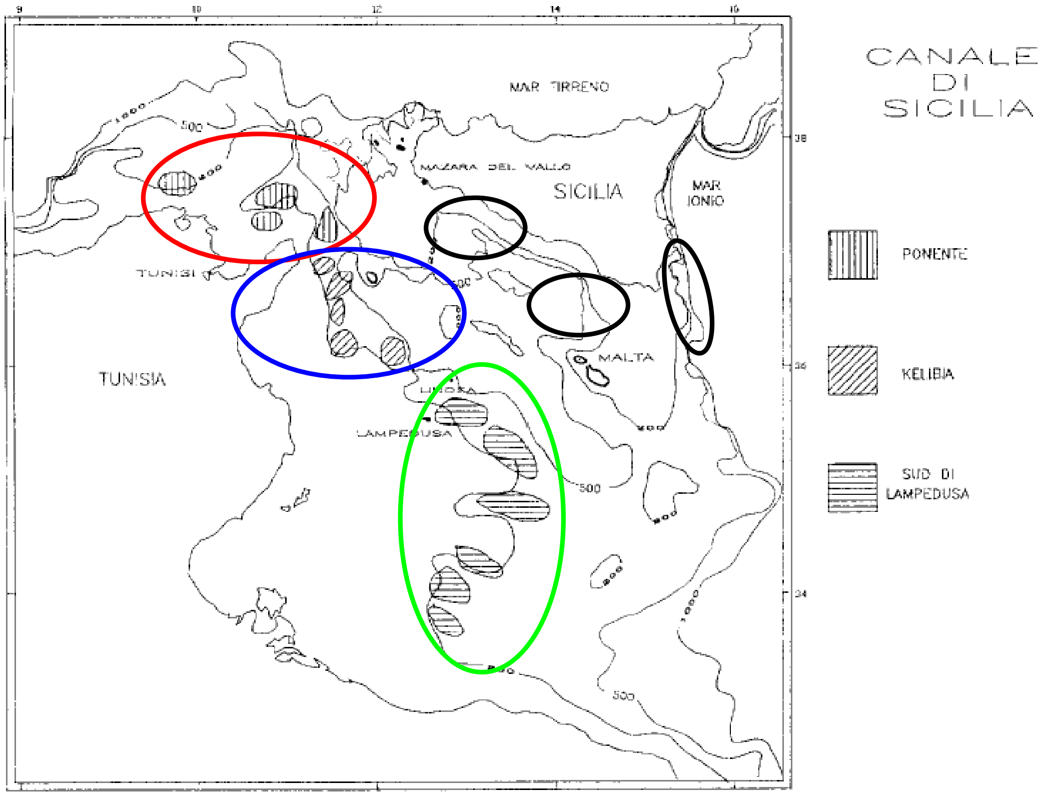


Figure 3-3 The main fishing areas of *Parapenaeus longirostris* for distant (colored) and coastal (black) Sicilian trawlers in the Central Mediterranean (modified from Levi *et al.*, 1995).

3.3 Management regulations

A medium term management plan for 2008-2013 has been agreed for Italian trawlers targeting rose shrimp in the Strait of Sicily. Italian Management Fishery Plans (IFMP) is based on :

- a fleet reduction of 25% of the current capacity obtained in two steps. The first (12.5%) from 2008 to 2010, and the second (12.5%) from 2011 to 2013.
- a trawling ban of 45 days per year between January and March

In addition, the Mediterranean Regulation EC 1967 of 21 December 2006 fixed a minimum harvest size of 20 mm CL and a minimum mesh size of 40 mm square or 50 mm diamond for EU bottom trawling vessels (i.e. Italian and Maltese trawlers).

In order to limit the over-capacity of fishing fleet, Maltese fishing licenses had been fixed at a total of 16 trawlers since 2000. Eight new licences were however issued in 2008, a move made possible under EU law by the reduction of the capacities of other Maltese fishing fleets. However, the Maltese Islands are surrounded by a 25 nautical miles (nm) fisheries management zone, where fishing effort and capacity are being managed by limiting vessel sizes, as well as total vessel engine powers (EC 813/04; EC 1967/06). Trawling is allowed within this designated conservation area, however only by vessels not exceeding an overall length of 24m and only within designated areas. Such vessels fishing in the management zone hold a special fishing permit in accordance with Article 7 of Regulation (EC) No 1627/94, and are included in a list containing their external marking and vessel's Community fleet register number (CFR) to be provided to the Commission annually by the Member States concerned.

In Tunisia, no regulations targeted specifically at the rose shrimp fishery are currently in place. However, trawling is not permitted within 3 nautical miles of the coast and at less than 50m depth in GSAs 12-14. Moreover, in GSA 14 a closed season where trawling is prohibited extending from July-September is in place in order to protect recruits of a large number of species. Although minimum landing sizes exist for a number of crustacean species harvested by the Tunisian fleets, there is no minimum landing size for *P. longirostris*. The minimum legal mesh size used by demersal trawlers in Tunisian waters is 20mm.

3.4 Reference points

Table 3-4: List of reference points

2007					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.31	g			All biomass and yield values are per recruit
SSB	1.54	g			
F	0.814		**1.10**		Sustainable stock status
Y	2.18	g			(VIT analyses)
CPUE					

2008					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.31	g			All biomass and yield values are per recruit
SSB	1.42	g			
F	1.097		**1.21**		Sustainable stock status
Y	2.43	g			(VIT analyses)
CPUE					

2009					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.49	g			All biomass and yield values are per recruit
SSB	1.58	g			
F	1.409		**1.36**		Overfishing. A reduction of 3.5% is advised to reach the $F_{0.1}$ target reference point
Y	2.42	g			(VIT analyses)
CPUE					

2010					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.48	g			All biomass and yield values are per recruit
SSB	1.45	g			
F	1.493		**1.20**		Overfishing. A reduction of 20% is advised to reach the $F_{0.1}$ target reference point
Y	2.56	g			(VIT analyses)
CPUE					

2011					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.41	g			All biomass and yield values are per recruit
SSB	1.53	g			
F	1.651		**1.18**		Overfishing. A reduction of 28% is advised to reach the $F_{0.1}$ target reference point
Y	2.38	g			(VIT analyses)
CPUE					

Average 2007-2011					
Criterion	Current value	Units	Reference Point	Trend	Comments
B	2.36	g			All biomass and yield values are per recruit
SSB	1.51	g			
F	1.243		**1.22**		Overfishing. A reduction about of 22% is advised to reach the $F_{0.1}$ target reference point
Y	2.33	g			(VIT analyses)
CPUE					

4 Fisheries independent information

4.1 {NAME OF THE DIRECT METHOD}

4.1.1 Brief description of the chosen method and assumptions used

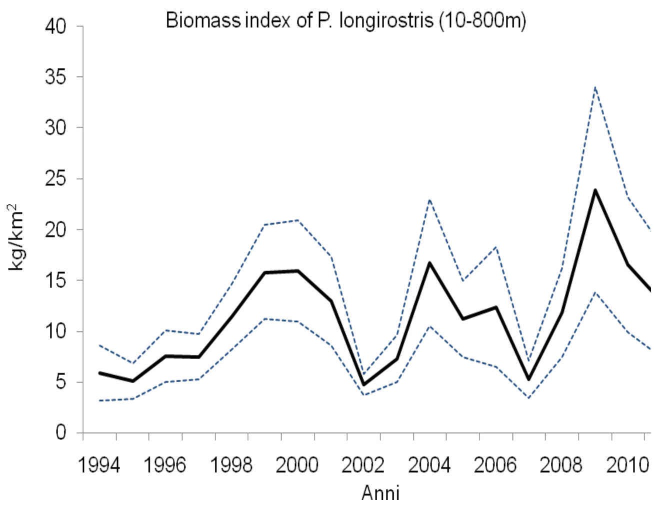
In order to collect fisheries independent data, which is a requirement of the EU DCF (Council Regulation 199/2008, Commission Regulation 665/2008, Commission Decision EC 949/2008 and Commission Decision 93/2010), the MEDITS international trawl survey is carried out in GSAs 15 & 16 on an annual basis. In July of 2011 an intercalibration experiment was carried out to standardize catch rate from trawl surveys collected by Italian and Maltese vessels with those obtained by Tunisian vessels and allow joint analyses integrating fishery dependent and independent information.

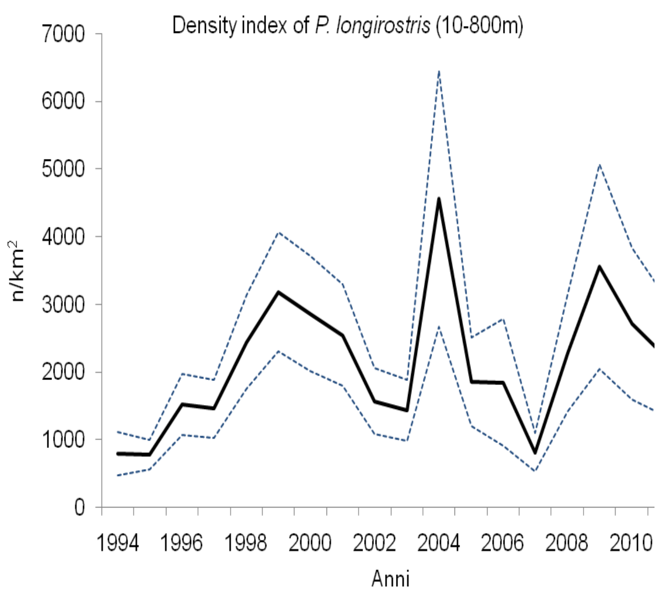
4.1.2 Spatial distribution of the resources

Spatial distribution of estimated abundances by vital phases are available for GSA 15 and 16 (Fig. 2-1).

4.1.3 Historical trends

Figure 4-1: Observed trends in abundance from Medits trawl survey in GSA 15 & 16.





5. Ecological information

5.1 Protected species potentially affected by the fisheries

No information is available to the WG..

5.2 Environmental indexes

No information is available to the WG..

6. Stock Assessment

Data used in this assessment were derived from catch sampling. In Italy and Malta, data is collected based on the provisions of the EU Data Collection Regime (DCR) and the subsequent Data Collection Framework (DCF; EC 93/2010). Length frequency distributions of landings from Tunisia and Sicily were raised to total landings recorded by fleet segment in the respective countries for the years 2007, 2008, 2009, 2010 and 2011 and used in the assessment, but length frequency distributions of catches made by Maltese vessels were only available since the start of the EU DCF in 2009.

6.1 LCA analysis

6.1.1 Model assumptions

The VIT model (Lleonart and Salat, 1992) was developed to for data-poor stocks where a sufficient time series of age-structured catch data is lacking. The main assumption the model makes is that of steady state: the analysis is based on annual data and interprets catch length / age structures as belonging to pseudo-cohorts. Raetz et al. (2010) showed that the equilibrium assumption made by the model forces strong inter-annual variations in the estimated fishing mortality, especially in years when the age composition shows strong year class effects. The authors recommended running the model separately for each year in order to evaluate stock status considering the variability of parameters over the available data time series.

An assessment was performed using length cohort analysis (LCA) as implemented in VIT4Win (Maynou, 1999; Lleonart and Salat, 2000). Current mean F and exploitation pattern were assessed using the steady state LCA on length frequency distributions (LFD) from 2007 to 2011 as well as the average 2007-2011 catches, raised to the total landings. Analyses were performed separately on length frequency distributions of females and males and by keeping fleet segments separate. The F values by size and year for combined sex were obtained as ratio of the sum of the catch of females and males to the sum of mean number at sea of females and males respectively. The VIT was also used to estimate biomass and to conduct yield per recruit analysis. The latter was done in order to analyze the stock production with increasing exploitation under equilibrium conditions. The biomass and yield per recruit values by sex were combined to obtain a single value for both the sexes by using an average, weighed by sex ratios (0.55 females and 0.45 males).

6.1.2 Results

Figures of Fishing mortality, Recruitment and SSB of *P. longirostris* by LCA.

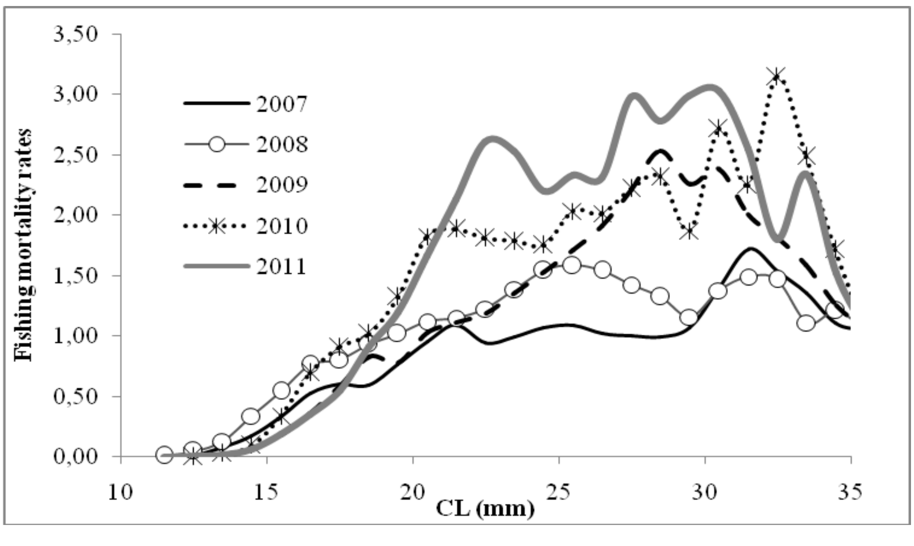


Fig. 6-1: Fishing mortality rates (F) by size and bottom otter trawling fleet segments in GSAs 12, 13, 14, 15 6 16 of *P. longirostris* (from 2007 to 2011)

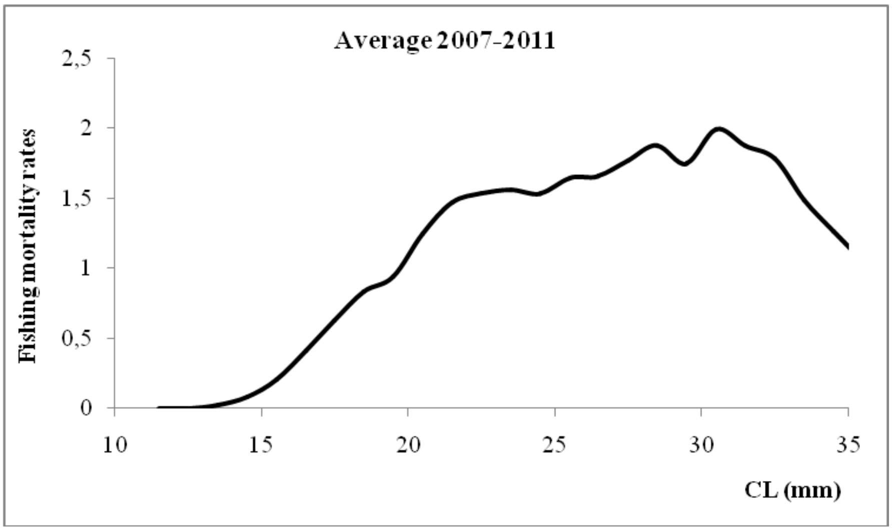


Fig. 6-2: Fishing mortality rates (F) by size and bottom otter trawling fleet segments in GSAs 12, 13, 14, 15 6 16 of *P. longirostris* (average 2007 - 2011).

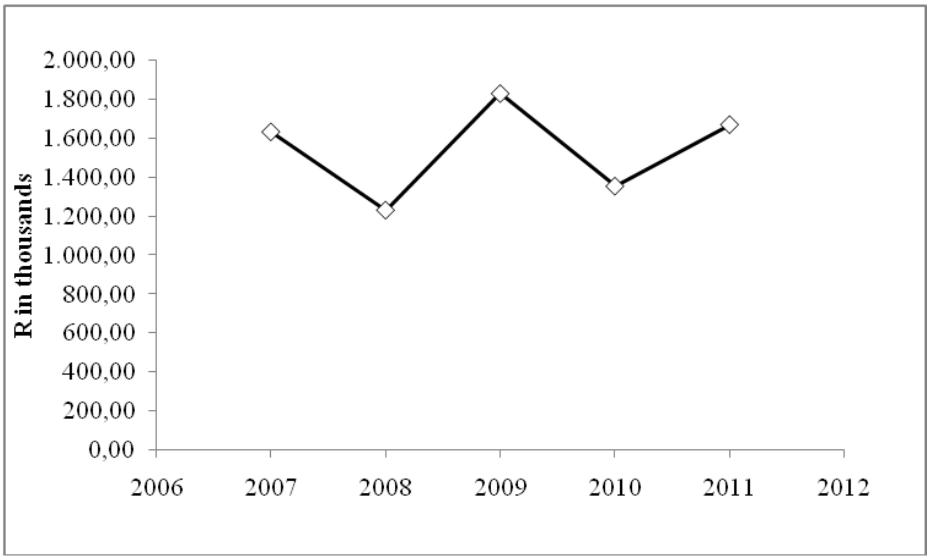
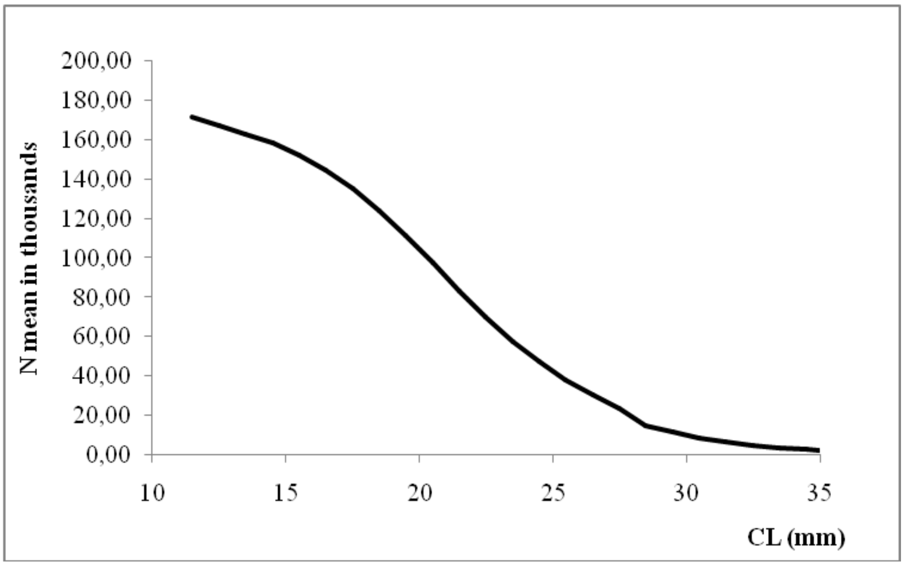


Fig. 6-3: Recruitment from LCA by years in GSAs 12, 13, 14, 15 6 16 of *P. longirostris*.



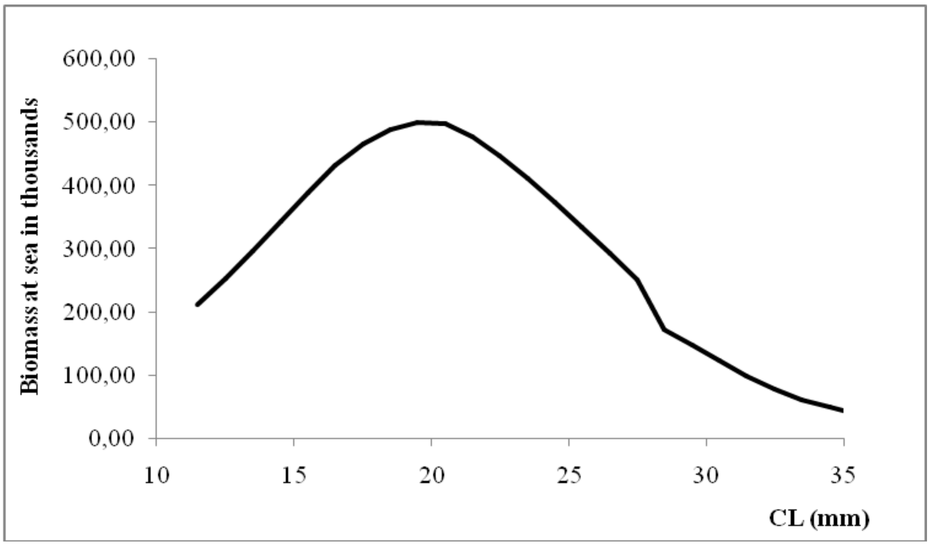


Fig. 6-4: Average population at sea in 2007-2011 in terms of numbers and biomass for combined sexes as reconstructed with the VIT length cohort analysis.

In order to investigate the robustness of the LCA, a sensitivity analysis for was carried out as implemented in the VIT4 Win programme. This routine allows for the estimation of the effects of errors in the precisions of parameters and their potential effects on the results of the yield per recruit analysis. The von Bertalanffy's growth equation parameters K and natural morality (M) were tested for females. Results of the sensitivity analysis (Table 6-1) showed that changing M and k has a pronounced effect on yield per recruit estimates when the variation is in the opposite direction. Biomass per recruit and spawning stock biomass per recruit in contrast are strongly affected when the change is in the same direction. Results are only shown for females since the yield per recruit for rose shrimp females is more important than that for males (3g and 1.8g respectively) and the contribution of females to the total SSB by far exceeds that of males.

Table 6-1: Results of the sensitivity analysis performed for the parameters used in the VIT analysis. Variations of 10%, 20% and 40% were tested on yield per recruit (Y/R), biomass per recruit (B/R) and spawning stock biomass per recruit (SSB/R) estimates. Parameter marks correspond to: L∞, K, t0, a, b, M, F_{term}, and the two fleet segments. Dark shading represents changes in Y/R when M and k are changed; light shading represents changes in B/R and SSB/R. Only results of females are presented.

	Variations tested								
	10%			**20%**			**40%**		
Parameters altered	**Y/R**	**B/R**	**SSB/R**	**Y/R**	**B/R**	**SSB/R**	**Y/R**	**B/R**	**SSB/R**
OOOOOOOOO	2.36	2.44	1.66	2.36	2.44	1.66	2.36	2.44	1.66
O-OOO-OOO	2.37	2.71	1.84	2.37	3.04	2.06	2.38	4.04	2.73
O-OOO+OOO	1.77	2.48	1.67	1.17	2.48	1.63	0.23	2.19	1.29
O+OOO-OOO	2.94	2.39	1.64	3.47	2.33	1.61	4.44	2.20	1.54
O+OOO+OOO	2.36	2.23	1.52	2.36	2.05	1.40	2.35	1.76	1.21

6.2 XSA

6.2.1 Model assumptions

Darby and Flatman (1994) outline the XSA algorithm as performing the following steps: (1) a cohort analysis of the total catch-at-age data to produce estimates of population abundance-at-age, and total fishing mortalities; (2) adjustment of the CPUE values for the period of fishing defined using the alpha and beta parameters in the fleet tuning file, into CPUE values that would have been recorded if the fleet had fished only at the beginning of the year. The adjusted values are directly comparable with the population abundances at the beginning of the year; (3) calculation of fleet-based estimates of population abundance-at-age from the adjusted CPUE values and fleet catchabilities; (4) calculation of a least squares estimate (weighted mean) of the terminal population (survivors at the end of the final assessment year) for each cohort in the tuning range using the fleet-derived estimates of population abundance-at-age. These terminal populations are used to initiate the Cohort analysis in the next iteration. The process iterates until the convergence criteria described for *ad hoc* tuning are achieved. Various options are available for catchability analysis, time series weighting and shrinkage of the weighted estimates.

An XSA assessment was carried out using the 2007-2011 landings data from Malta, Tunisia and Sicily, and calibrated with 2007-2011 trawl survey data from GSA 15 and GSA 16 (partial tuning). No discards data was available. The annual size distributions of the landings as well as of the MEDITS survey in GSA 15 and 16 were converted into numbers at age using the LFDA5 program. Natural mortality at age was calculated using the Gislason method (Gislason et al. 2008a, 2008b). The full set of input parameters are listed in Tables 6-2 to 6-7 below.

Table 6-2. Catch at Age (in thousands)

	Age			
	0	1	2	3+
2007	562640	542950	59185	2875
2008	318869	426986	26855	4887
2009	771369	801853	26958	1991
2010	641964	576221	18835	10
2011	633298	644652	8599	58

Table 6-3. Catch and stock weight at age (kg)

Age	0	1	2	3+
Weight	0.00227	0.01023	0.01701	0.02122

Table 6-4. Maturity at Age

Age	0	1	2	3+
Maturity	0	1	1	1

Table 6-5. Mortality at Age

Age	0	1	2	3+
Mortality	3.114	1.102	0.78	0.672

Table 6-6. MEDITS Tuning Data (GSA 15 and 16)

	Age			
	0	1	2	3+
2007	23017	35071	3322	60
2008	98094	77283	1928	98
2009	89544	188926	2505	35
2010	79326	131513	4990	30
2011	75237	97590	3282	55

Table 6-7. Settings used for the XSA runs to be discussed at WG

Settings		
fse	Shrinkage	0.5, 1.0, 2.0
rage	The oldest age for which the two parameter model is used for determining catchability at age	1
qage	The age after which catchability is no longer estimated. Catchability at older ages will be set to the value of catcha-bility at this age.	2
shk.yrs	The number of years to be used for shrinkage to the mean F.	5
shk.ages	The ages over which shrinkage to the mean F should be ap-plied.	3

6.1.2 Results

XSA was run setting shrinkage at 0.5, 1.0, and 2.0.

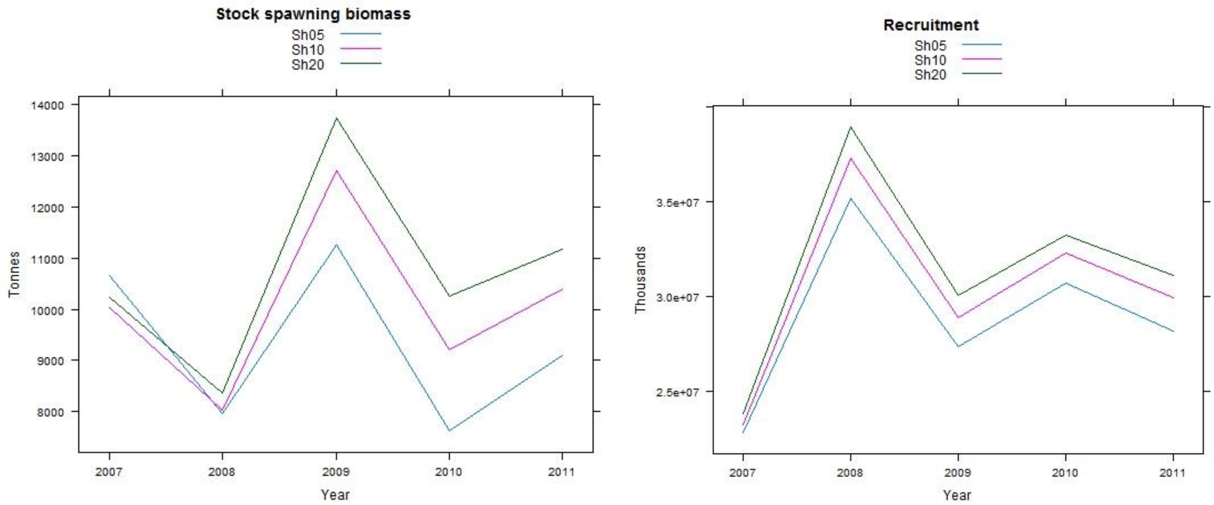


Fig. 6_5. Estimates of recruitment and SSB under different shrinkage settings.

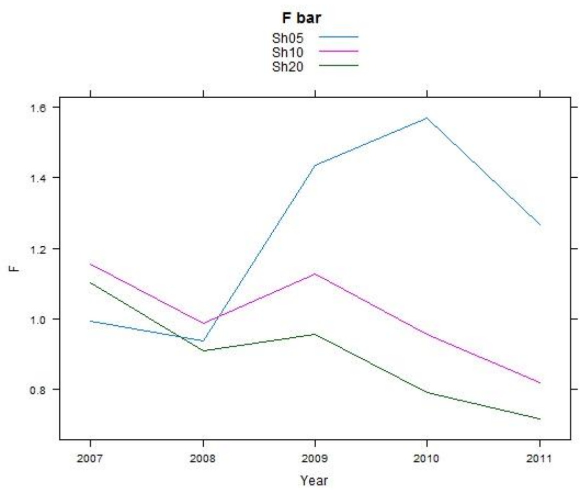


Fig. 6-6. Estimates of F_{bar} (ages 0-2) under different shrinkage settings.

0.5 **1.0**

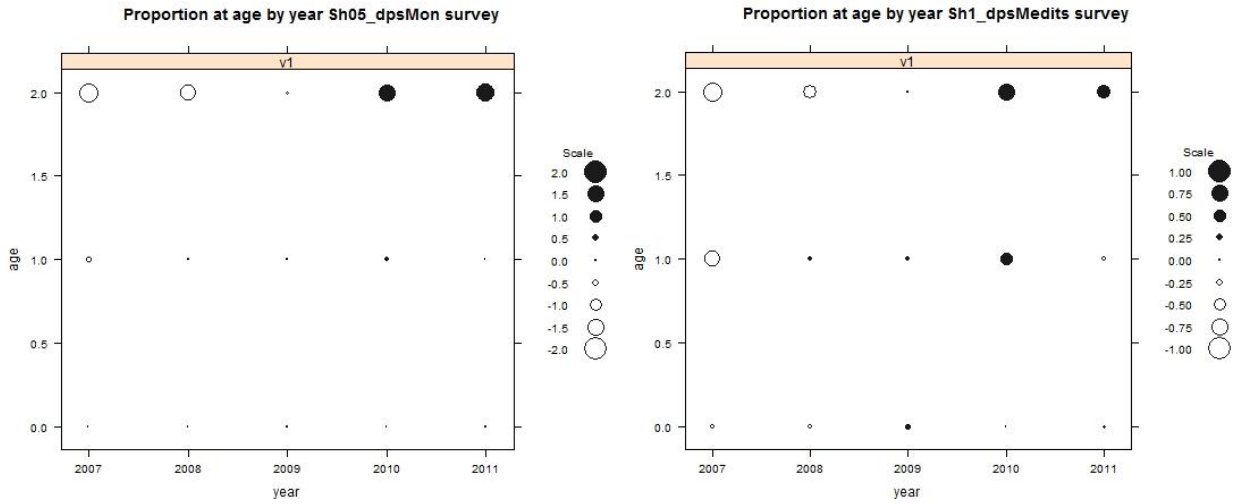
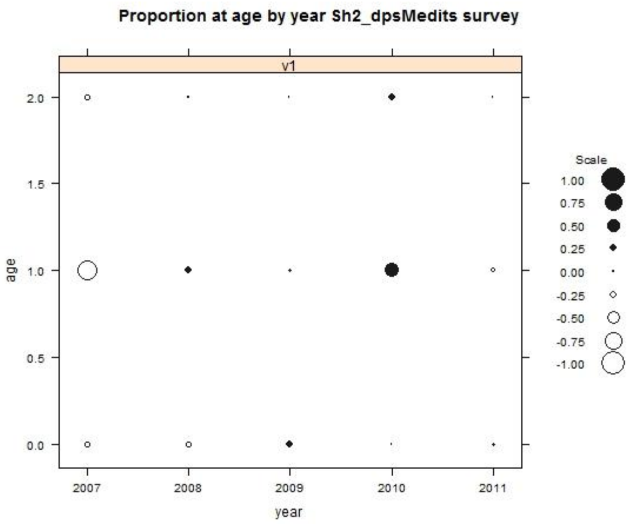


Fig. 6-7. Residuals at age obtained with shrinkage settings 0.5 and 1.0.



2.0

Fig.6-8. Residuals at age obtained with the shrinkage setting 2.0.

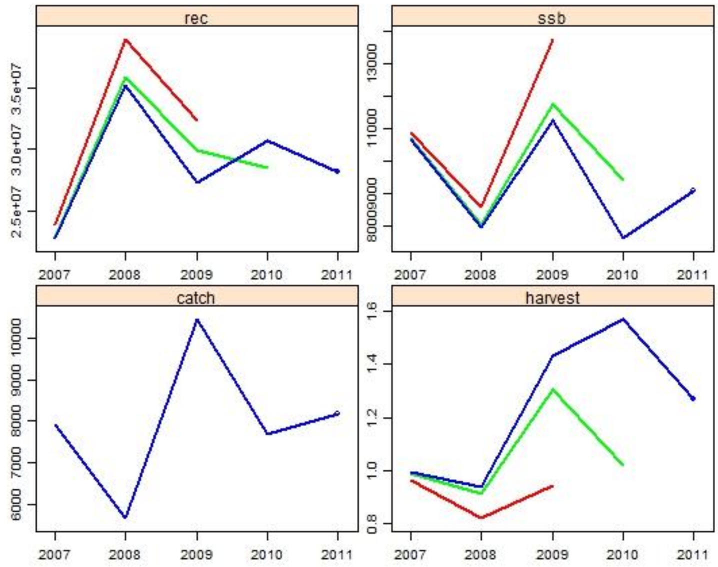


Fig. 6-9. Retrospective analysis for model with shrinkage set at 0.5

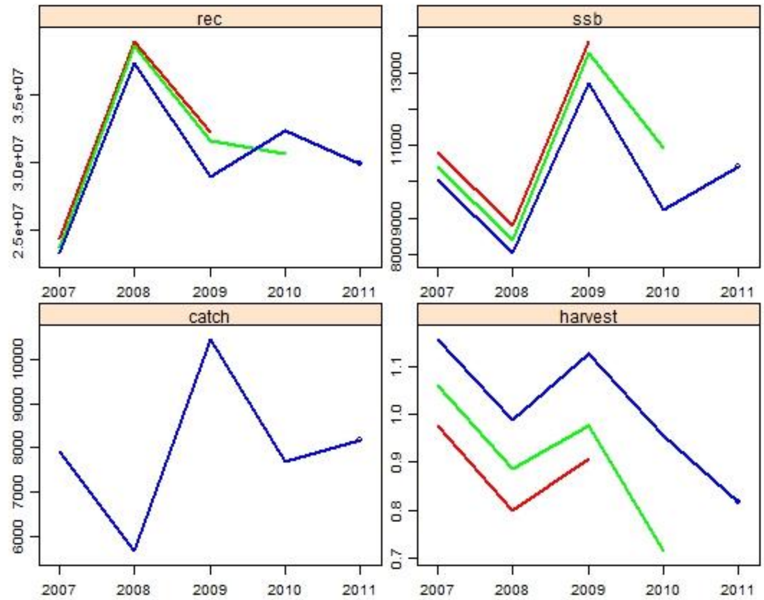


Fig. 6-10. Retrospective analysis for model with shrinkage set at 1.0

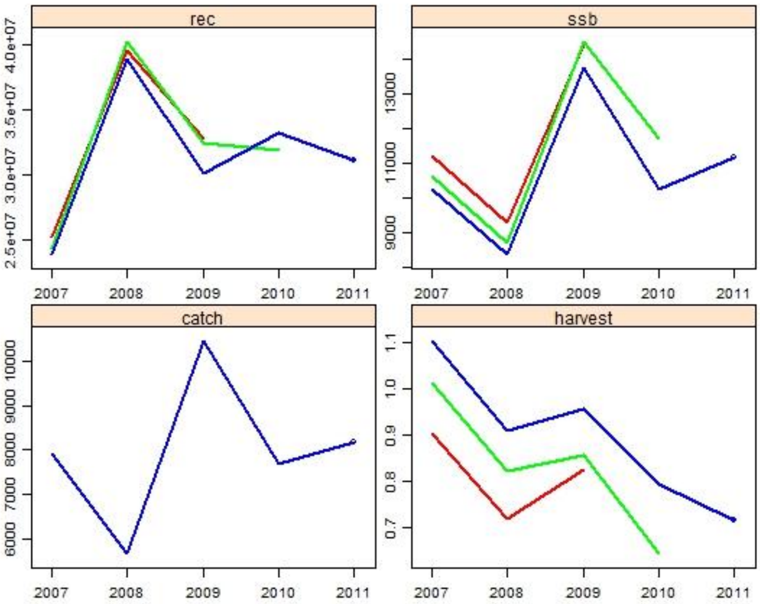


Fig. 6-11. Retrospective analysis for model with shrinkage set at 2.0

The following table lists F (age 0-2), SSB and recruitment XSA estimates by from 2007 to 2011 with the three different shrinkage settings. XSA estimates of F_{0-2} in 2011 varied between 0.72 (shrinkage level 2) and 1.27 (shrinkage level 0.5). During 2007-2011 spawning stock biomass (SSB) fluctuated with no clear trend with all three shrinkage levels used in the analysis. Recruitment estimates were similar regardless of the shrinkage used in the model, with a peak in 2008 before fluctuating at a level of around 30 million since 2009.

Table 6-8. F, SSB and recruitment estimates by XSA for *P. longirostris* in 2007 to 2011 with shrinkage set at 0.5, 1 and 2

		F0-2				
Shrinkage		2007	2008	2009	2010	2011
	0.5	**0.99**	**0.94**	**1.43**	**1.57**	**1.27**
	1	1.16	0.99	1.13	0.96	0.82
	2	1.10	0.91	0.95	0.79	0.72
		SSB (tons)				
		2007	2008	2009	2010	2011
	0.5	**10656**	**7957**	**11261**	**7620**	**9102**
	1	10046	8035	12714	9215	10395
	2	10236	8373	13730	10253	11171
		Recruitment (millions)				
		2007	2008	2009	2010	2011
	0.5	**22825**	**35192**	**27359**	**30721**	**28166**
	1	23279	37303	28910	32298	29931
	2	23846	38915	30094	33246	31105

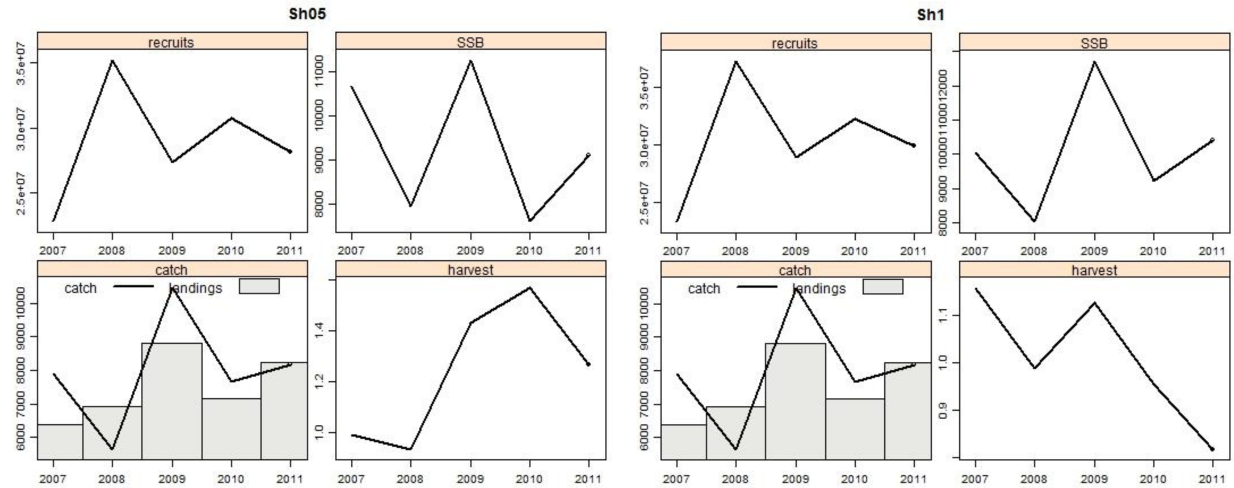


Fig. 6-12. Summary of stock parameters (recruitment, SSB, catch and landings, F mean for ages 0-2) as estimated by XSA for *P. longirostris* with model with shrinkage set at 0.5 and 1

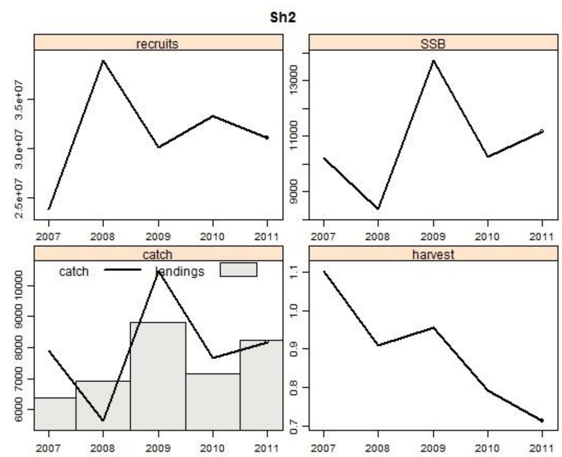


Fig. 6-13. Summary of stock parameters (recruitment, SSB, catch and landings, F mean for ages 0-2) as estimated by XSA for *P. longirostris* with model with shrinkage set at 2

7. Stock predictions

7.1 Long term predictions

Y/R and SSB/R using pseudocohort analysis with the VIT and Yield packages.

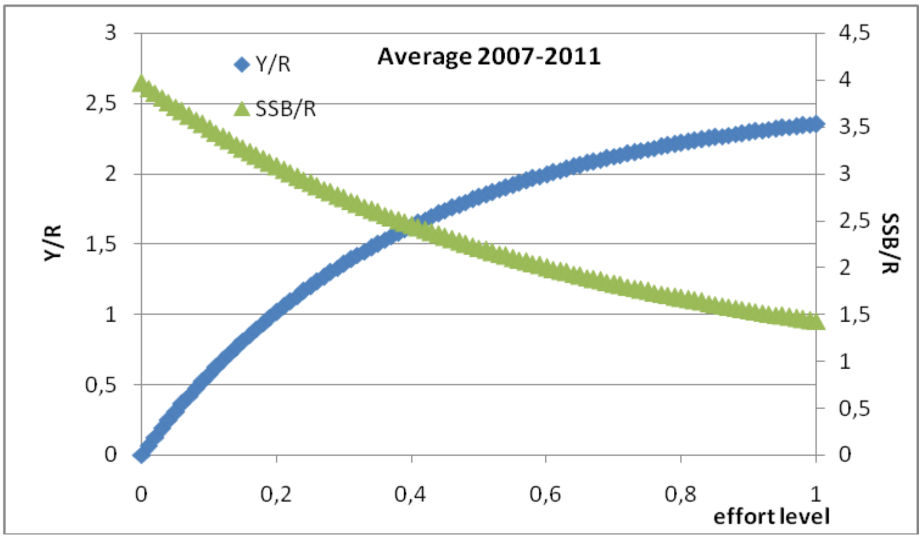


Figure 7.1 Spawning Stock Biomass (SSB) Yield per recruit (Y/R) varying current fishing mortality (F_c) for rose shrimp by a multiplicative factor.

Table 7.1 Estimation of yield (Y in g), biomass (B in g) and spawning stock biomass (SSB in g) per recruit (R), varying current fishing mortality by a multiplicative factor in VIT analysis. The factor corresponding to the target reference point $F_{0.1}$ is marked in bold.

Year	Factor	F	Y/R	B/R	SSB/R
	0	0	0	4,78	3,88
	1,35	**1,1**	**2,18**	**2,31**	**1,54**
2007	1	0,81	2,04	2,51	1,74
	0	0	0	4,94	3,95
	1,10	**1,21**	**2,43**	**2,31**	**1,42**
2008	1	1,10	2,37	2,40	1,50
	0	0	0	5,04	3,88
	0,97	**1,36**	**2.41**	**2,50**	**1,58**
2009	1	1,41	2,35	2,36	1,45
	0	0	0	5,20	4,04
	0,80	**1,2**	**2,56**	**2,48**	**1,45**
2010	1	1,49	2,68	2,11	1,12
	0	0	0	4,97	4,01
	0,71	**1,18**	2,38	**2,41**	**1,53**
2011	1	1,65	2,54	1,95	1,12

Average catch	0	0	0	4,91	3,97
2007-2011	**0,98**	**1,22**	**2,32**	**2,35**	**1,51**
	1	1,24	2,35	2,26	1,43

8. Draft scientific advice

This section should provide with required text to explain the draft scientific advice, as well as tick a mark on the values in Table 8.1 and/or 8.2 that best represent the status of the stock.

Table 7-1: Unidimensional stock status

Unidimnsional		? - (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;
	x	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;
		N – **None** of the above.

Table 7-2: Bidimensional stock status

Bidimensional	Exploitation rate		Stock Abundance			
		No or low fishing mortality		Virgin or high abundance		Depleted
		Moderate fishing mortality	x	Intermediate abundance		Uncertain / Not assessed
	x	High fishing mortality		Low abundance		
		None of the above		None of the above		

Please note the two new definitions provided by the SAC:

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)*