SAC GFCM
Sub-Committee on Stock Assessment

Date*	**20**	**October**	**2011**	**Code***	**DPS9911S.**

Authors*	S. Ben Meriem, F.Fiorentino, A.Arneri, L. Ceriola, M. Dimech, V. Gancitano, O. Jarboui, L. Knittweis
Affiliation*	Institut National des Sciences et Technologies de la Mer (INSTM), Tunisia; IAMC-CNR Mazara del Vallo, Italy; Ministry for Resources and Rural Affairs (MRRA), Malta
Species Scientific name*	**1** *Parapenaeus longirostris* - *DPS* Source: GFCM Priority Species
	2 Source: -
	3 Source: -
Geographical area*	GSA 12, 13, 14, 15 and 16
Geographical Sub-Area (GSA)*	99 - Combination of GSAs
Combination of GSAs **1**	16 - South of Sicily
2	15 - Malta Island
3	12 - Northern Tunisia

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet #0

Basic data on the assessment

Code: DPS9911S.

Date*	20	Oct	2011	Authors*	S. Ben Meriem, F.Fiorentino, A.Arneri, L. Ceriola, M. Dimech, V. Gancitano, O. Jarboui, L. Knittweis

Species Scientific name*	Parapenaeus longirostris - DPS	Species common name*	Deepwater rose shrimp

Data Source

GSA*	16 - South of Sicily, 15 - Malta Island, 12 - Northern Tunisia	Period of time*	2007-2010

Description of the analysis

Type of data*	LFD from commercial catches, landings data	Data source*	Tunisian national data collection programme, EU Data Collection Framework
Method of assessment*	LCA, Y/R analysis	Software used*	Analen, VIT4win, Yield

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	Other	D	Z	C
1	1	4	1	---	2	1	2	1	---	1	1	1

Comments, bibliography, etc.

Chevailler P., Laurec A., 1990. Logiciels pour l'evaluation des stocks de poisson. ANALEN: Logiciel d'analyse des donnees de capture par classes de taille et de simulation des pecheries multi-engins avec analyse the sensibilite. FAO Doc. Tech. Peches, 101, Suppl. 4: 124p.

Fiorentino, F., Meriem, S., Bahri, T., Camilleri, M., Dimech, M., Ezzedine-Naja, S., Massa, F., Jarboui, O., Zgozi, S., 2008. Synthesis of information on some target species in the MedSudMed Project area (central Mediterranean). GCP/RER/010/ITA/MSM-TD-15. MedSudMed Tech. Docs, 15: 67 pp.

Fortibuoni, T., Bahri, T., Camilleri, M., Garofalo, G., Gristina, M., Fiorentino, F., 2010. Nursery and spawning areas of deep-water rose shrimp, Parapenaeus longirostris (Decapoda:Penaeidae), in the strait of Sicily (Central Mediterranean Sea). Journal of Crustacean Biology, 30(2):167-174.

Guijarro B., Massuti E., 2006. Selectivity of diamond- and square-mesh codends in the deepwater crustacean trawl fishery off the Balearic Islands (western Mediterranean). ICES J. of Mar. Sci. 63: 52-67.

Lleonart J., Salat J., 2000. Vit4winVersion 1.1.www.faocopemed.org/es/activ/infodif.htm.

MEDSUDMED, 2007. Spatial distribution of demersal fishery resources, environmental factors and fishing activities in GSA 15 (Malta Island). GCP/RER/010/ITA/MSM-TD-13. MedSudMed Technical Documents, 13: 103pp.

Comments, bibliography, etc.

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	**Sheet B** **Biology of the species**

Code: DPS9911S.

Biology

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

Parameters used (state units and information sources)

			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		1.05	1.2	1.115	

sex ratio (mal/fem)	0.57-0.67

Comments

Reproduction

According to Levi et al., (1995) mature females are found in GSA 15 and 16 throughout the year, with a maturity peak extended from November to February, and another maturity peak in April. Ben Mariem et al. (2001) reported that P. longirostris off the Tunisian coasts (GSA 12) reproduces all year along, with a peak in June-July and a minimum in winter.

The stock structure of deep water pink shrimp (Parapenaeus longirostris) in the Strait of Sicily has yet to be defined. 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) were reported by Fortibuoni et al. (2010). This idea is based on the occurrence of local spawning and nursery areas, which are connected by the Atlantic Ionian Stream flow (0-150 m depth). It is hypothesised that the development of larval and juveniles phases occurs in this Atlantic Ionian Stream. These local sub-populations, one on the Adventure Bank and one on the Malta Bank, are separated by a wide area, where the species abundance is scanty

The sex ratio was calculated as F/(F+M) both in terms of population at sea (0.57) and catch (0.67)

Comments

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet P1

General information about the fishery

Code: DPS9911S.

Data source*	Tunisian National Data Collection Programme, EU Data Collection Framework	Year (s)*	2007-2010

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

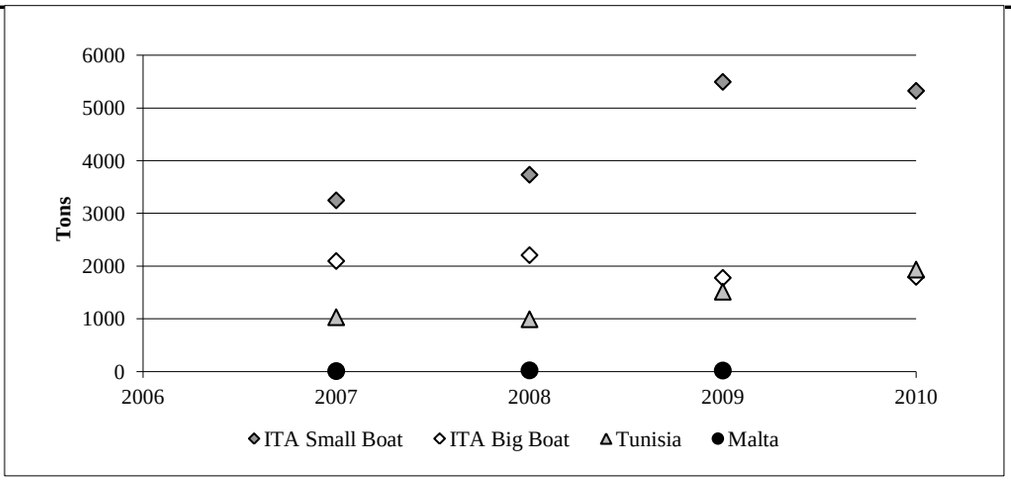
Fleet and catches (please state units)

	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						

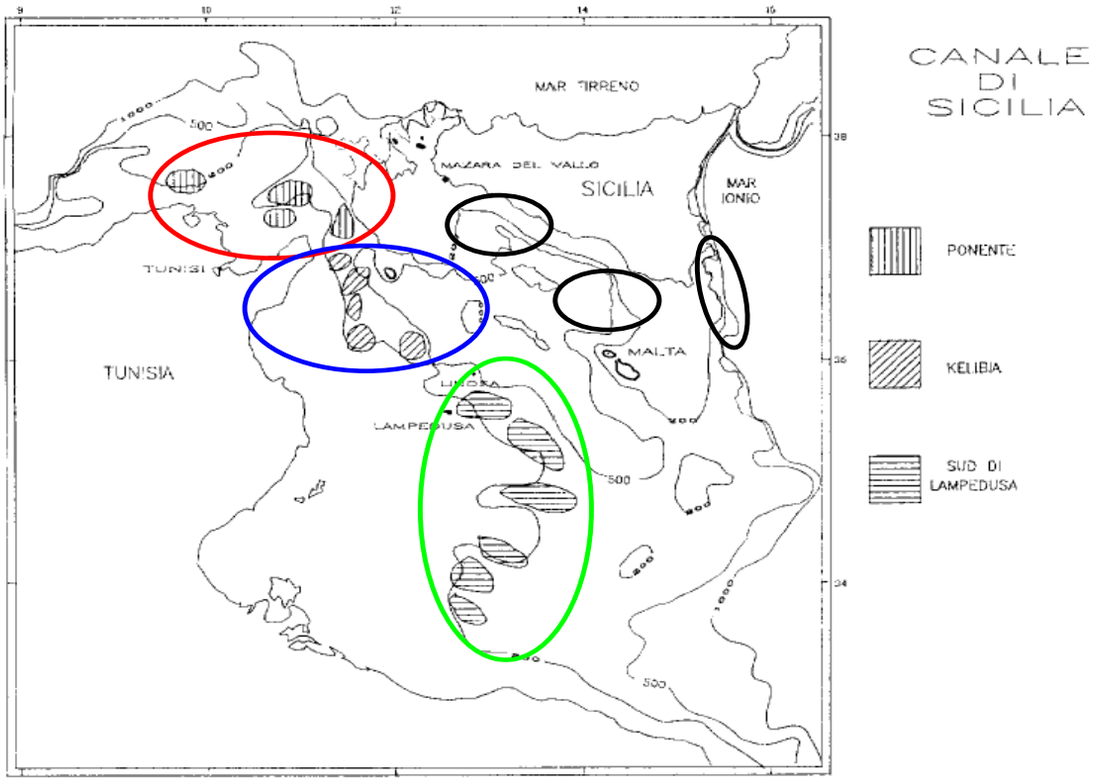
Operational Units*	Fleet (n° of boats)*	Kilos or Tons	Catch (species assessed)	Other species caught	Discards (species assessed)	Discards (other species caught)	Effort units
MLT 99 E 03 34 - DPS	16	Tons	18.2				
ITA 99 E 03 34 - DPS	250	Tons	5326				
ITA 99 F 03 34 - DPS	140	Tons	1796				
TUN 99 F 03 34 - DPS	70	Tons	1934				
Total	476		9074.2				

Legal minimum size	EU: 20mm CL (EC 1967/2006)

Comments



Comments



The main fishing areas of *P. longirostris* for distant (coloured) and coastal (black) Sicilian trawlers in the Strait of Sicily (modified from Levi et al. 1995).

Data source*	EU Data Collection Framework	OpUnit 1*	MLT 99 E 03 34 - DPS

Time series

Year*	2007	2008	2009			
Catch	8	22	18.239			
Minimum size						
Average size Lc			22.86			
Maximum size			35			
Fleet			E-Trawl			

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

L25	19.1
L50	20.2
L75	21.4
Selection factor	

Remarks

Selectivity parameters for 40mm square mesh net, taken from Guijarro and Massuti (2006; Balearic Islands).

Structure by size or age

LC (mm)	Female_2009	Male_2009
5	0	0
6	0	0
7	0	0
8	138	414
9	71	213
10	702	2105
11	1786	5359
12	3615	10846
13	4495	13485
14	6880	20640
15	7186	25152
16	19869	24836
17	14150	46695
18	26338	68039
19	28577	120024
20	64785	225589
21	71146	190541

Structure by size or age

22	139098	211012
23	198863	170454
24	198647	81473
25	216657	38752
26	226603	17566
27	135460	2419
28	175075	5404
29	96105	2529
30	41251	0
31	12256	0
32	1830	0
33	6423	0
34	879	0
35	927	0
36	0	0
37	0	0
38	0	0
39	0	0
40	0	0
41	0	0
42	0	0

Data source*	EU Data Collection Framework	OpUnit 2*	ITA 99 E 03 34 - DPS

Time series

Year*	2007	2008	2009	2010		
Catch	3248	3734	5496	5326		
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

L25	15.5
L50	17
L75	18.5
Selection factor	0.42

Remarks

Structure by size or age

LC (mm)	2009_F	2009_M	2008_F	2008_M	2007_F	2007_M
11		134844	108020		11134	174932
12	196036	0	197475		915067	491389
13	689325	772598	793744	723444	8478919	5321790
14	4228111	5152947	3405838	3176333	14942327	14864909
15	15264807	9850795	6637083	8521668	22708064	32229241
16	30301436	17150102	10350692	20813723	39137772	42515472
17	52872716	18782243	14428260	30691359	36275604	46208607
18	63745500	28802119	16915257	37293873	30322650	44161422
19	45268580	33428213	18558406	30974464	42371451	41542071
20	45696504	44526242	21325921	26427205	42720314	47106079
21	32124357	47051764	22109408	20878315	46912626	32546273
22	19674494	48864893	22068288	13946160	31415123	17283146
23	9480845	51238256	22468774	7316439	17921125	17135189
24	3892223	50009258	20873452	3392939	13053034	13771849
25	1630169	45517385	16126276	1442202	9035917	3865262
26	1587025	38920430	9969758	935824	6147974	1419521
27	107387	31967001	4900844	286536	5762245	180109

28	179647	23659571	1936488	175267	4060601	20012
29	59188	14794257	836303	281962	3186788	20012
30	59188	10657027	449341	105430	1973553	
31		4798261	262230		371581	
32		2506732	110738		287639	
33		887977	77402		123860	
34		654335	44689		123860	
35		51961			0	
36					136606	

2010_F		**2010_M**	
12	102871	13	144779
13	297156	14	2594514
14	1218249	15	12661315
15	5574677	16	40594656
16	15588703	17	61147839
17	27675896	18	61872405
18	44978748	19	52306058
19	48997570	20	58774622
20	63032245	21	46514788
21	60379314	22	25733547
22	56634322	23	15106470
23	46956954	24	6410293
24	35047345	25	3708601
25	26926379	26	419215
26	16407299	27	64478
27	10567727		
28	7457893		
29	4476732		
30	3038961		
31	1343365		
32	682378		
33	381689		
34	256105		
35	60166		

Data source*	EU Data Collection Framework	OpUnit 3*	ITA 99 F 03 34 - DPS

Time series

Year*	2007	2008	2009	2010		
Catch	2097	2207	1777	1796		
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

L25	15.5
L50	17
L75	18.5
Selection factor	0.42

Remarks

Structure by size or age

LC (mm)	2009_F	2009_M	2008_F	2008_M	2007_F	2007_M
11						
12			88112			
13			110140			
14	172448	100553	198253	279321	30030	
15	612228	347481	628340	1007374	47930	
16	1411602	1071013	1165425	2117070	189548	
17	1316796	1224907	1364220	1905376	848603	3101046
18	2419064	2143497	2138656	3327612	806923	2949290
19	2805642	2240142	3098108	4128937	2535763	6558908
20	4503450	4687522	6697499	9901077	3708557	10917774
21	7019773	6104840	11123662	11445010	4900987	18914374
22	7253768	9153675	13084955	11434830	5480091	21394399
23	8493146	12459466	17320761	8335216	6895414	27788357
24	6485632	15458039	18913195	5642141	4428865	29195397
25	2920133	18396795	17801469	4241551	4729978	34454833
26	1574239	1566341	15694226	2610788	3366790	26496574
27	773450	13060865	13533979	1373466	2828533	15846019

28	339655	11320011	11848576	1185004	4726328	6797040
29	191887	8074446	10389603	1172324	7270096	1849539
30	120561	6483043	10991883	1156997	10079262	839485
31	134442	4179552	8915794	412816	11344156	248943
32	115021	2912215	6326830	95019	7105018	89044
33	53716	2179104	3344830	17443	4969229	
34		562845	2049782		2303741	
35		564185	938260		1623312	
36		309515	317319		391248	
37		68406	367448			
38		55986	174725			
39		3278	91996			
40			47429			
41						

2010_F

12	22028
13	28127
14	85750
15	261648
16	617725
17	906065
18	1354310
19	2079079
20	4049747
21	6322342
22	8166359
23	10841317
24	11161242
25	12132181
26	10438731
27	9355670
28	9444863
29	8665718
30	9557982
31	8102432
32	5734874
33	3099827
34	1517187
35	888561
36	286660
37	172862
38	86516
39	40195
40	11857

2010_M

13	973
14	3652
15	20929
16	247106
17	466402
18	894493
19	744538
20	2231315
21	3810072
22	5496887
23	6066099
24	3878571
25	3452616
26	1551576
27	769106
28	283873
29	113429
30	18908
31	6833
32	2198

Data source*	Tunisian National Data Collection Programme	OpUnit 4*	TUN 99 F 03 34 - DPS

Time series

Year*	2007	2008	2009	2010		
Catch	1030	992	1515	1934		
Minimum size	13	13	13			
Average size Lc	24.89	26.8	25.56			
Maximum size	42	42	42			
Fleet	F-trawl	F-trawl	F-trawl			

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

L25	
L50	
L75	
Selection factor	0.4

Remarks

Structure by size or age

LC (mm)	2009_F	2009_M	2008_F	2008_M	2007_F	2007_M
13	315181	0		32229		209937
14	242810	28976	13539	59080	71782	316024
15	895185	579011	102104	158292	467970	723282
16	922257	657247	165279	206753	643901	808234
17	1214829	1679044	576372	392183	1935826	1316956
18	1608853	1702674	743755	670329	2171524	1951594
19	2082198	2209146	851756	732128	2194416	1876868
20	2533561	2489102	1201689	934897	2731006	2096669
21	5247474	3532375	1938704	2450185	3902133	4870681
22	7611339	3777551	2174724	3834471	3891020	6781613
23	9684318	4744672	2310672	4811789	3692403	7662421
24	8631458	6414211	3345677	5049991	4739873	7264852
25	6064241	10498072	5261212	3353001	6738531	4389338
26	4914788	13397034	7046935	1836768	8198575	2176294
27	4103427	18502461	9286607	1455446	9943781	1564246
28	1657172	14906879	9292125	980260	9142788	967025
29	607951	9965501	6065119	588049	5477265	536046

30	250486	8125125	5772593	483425	4829296	407947
31	229055	5993883	4841750	459546	3770060	359436
32	31242	4286823	4119508	107035	2983106	77375
33	23805	2930329	2384787	91824	1591602	61491
34	85125	2168105	2708749	152502	1674692	94461
35	43300	1289194	1917187	150546	1104991	87561
36	0	968687	653147	0	348614	0
37	10462	502771	1367247	50859	692826	25911
38	462	324867	911835	54235	434480	25911
39		123815	222464		98828	
40		79747	319216		136393	
41		60190	0		0	
42		5843	14425		5126	

2010_F		**2010_M**	
13	226268	13	80811
14	222165	14	121217
15	300323	15	640590
16	997474	16	484869
17	1071529	17	3144259
18	444329	18	2359282
19	997474	19	4841610
20	474987	20	8264069
21	1261514	21	10117484
22	832522	22	17549277
23	3344844	23	11754333
24	5971096	24	8309121
25	8754674	25	7115368
26	9378613	26	10795695
27	9636231	27	5945855
28	6779856	28	374960
29	2564406	29	374960
30	3472606		
31	1447031		
32	1682092		
33	1308306		
34	407491		
35	231725		
36	104326		

Data source*	EC 1967 / 2006	OpUnit 1*	MLT 99 E 03 34 - DPS

Regulations in force and degree of observance of regulations

At present there are no regulations in force specifically targeting giant deepwater rose shrimp. However, 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.

Moreover, 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. Moreover, the overall capacity of the trawlers allowed to fish in the 25nm zone can not exceed 4 800 kW, and the total fishing effort of all vessels is not allowed to exceed an overall engine power and tonnage of 83 000 kW and 4 035 GT respectively.

Accompanying species

The fishing capacity of any single vessel with a license to operate at less than 200m depth can not exceed 185 kW. In addition, the use of all trawl nets within 1.5nm of the coast is prohibited according to EC regulation 1967 / 2006, although again a transitional derogation is at present in place until 2010.

In terms of technical measures, the new regulation EC 1967 of 21 December 2006 fixed a minimum harvest size of 20mm and a minimum mesh size of 40 mm for bottom trawling of EU fishing vessels (i.e. Italian and Maltese trawlers in the Central Mediterranean). Mesh size had to be modified to square 40 mm or diamond 50 mm in July 2008, and derogations are no longer possible since June 2010.

Deepwater rose shrimp are frequently caught together with Norway lobster (*Nephrops norvegicus*), large sized giant red shrimp (*Aristaeomorpha foliacea*), the more rare violet shrimp (*Aristeus antennatus*), the scorpionfish *Helicolenus dactylopterus*, grater forkbeard (*Phicys blennioides*) , the flat fish *Lepidorombus boscii*, the squid *Todarodes sagittaus*, as well as small hake (*Merluccius merluccius*).

Data source*		OpUnit 2*	ITA 99 E 03 34 - DPS

Regulations in force and degree of observance of regulations

At present there are no formal management objectives for giant red shrimp fisheries in the Strait of Sicily.
In terms of technical measures, the new regulation EC 1967 of 21 December 2006 fixed a minimum mesh size of 40 mm for bottom trawling of EU fishing vessels (Italian and Maltese trawlers). Mesh size had to be modified to square 40 mm or diamond 50 mm in July 2008, however derogations are possible up to 2010. No minimum landing sizes have been established for this species (EC 1967/06).
A medium term management plan for 2008-2013 has been agreed for Italian trawlers operating in the GSA 15 and 16. This 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 (targeted to deep water pink shrimp fishery which is the main commercial species in the GSA 15 and 16);
- changing the mesh opening in the cod-end from the 40 mm to 50 mm (diamond) from 2010;

Accompanying species

Although designed mainly for deep water pink shrimps, the adoption of the management measures of the IFMP are also expected to improve the stock status of giant red shrimp in the area.

Deepwater rose shrimp are frequently caught together with Norway lobster (*Nephrops norvegicus*), large sized giant red shrimp (*Aristaeomorpha foliacea*), the more rare violet shrimp (*Aristeus antennatus*), the scorpionfish *Helicolenus dactylopterus*, grater forkbeard (*Phicys blennioides*) , the flat fish *Lepidorombus boscii*, the squid *Todarodes sagittaus*, as well as small hake (*Merluccius merluccius*).

Data source*		OpUnit 3*	ITA 99 F 03 34 - DPS

Regulations in force and degree of observance of regulations

At present there are no formal management objectives for giant red shrimp fisheries in the Strait of Sicily.
In terms of technical measures, the new regulation EC 1967 of 21 December 2006 fixed a minimum mesh size of 40 mm for bottom trawling of EU fishing vessels (Italian and Maltese trawlers). Mesh size had to be modified to square 40 mm or diamond 50 mm in July 2008, however derogations are possible up to 2010. No minimum landing sizes have been established for this species (EC 1967/06).
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Accompanying species

Although designed mainly for deep water pink shrimps, the adoption of the management measures of the IFMP are also expected to improve the stock status of giant red shrimp in the area.

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Data source*		OpUnit 4*	TUN 99 F 03 34 - DPS

Regulations in force and degree of observance of regulations

Actually there are no specific regulations for pink shrimp fisheries in the Tunisian waters. However, there is a trawling ban in areas comprised under 3 miles from the coast and/or less 50m depth.
In terms of technical measures, the minimum mesh size in cod end of trawler should not less than 40 mm for bottom trawling in Tunisian waters.

Accompanying species

Deepwater rose shrimp in Tunisia are frequently caught together with hake (*Merluccius merluccius*), red Pandora (*Pagellus bogaraveo*), common Pandora (*Pagellus erythriuns*), monkfish (*Lophius piscatorius*), mackerel (*Trachurus* spp.), Norway lobster (Nephrops norvegicus) and more rarely giant red shrimp (*Aristaeomorpha foliacea*) and violet shrimp (*Aristeus antennatus*).

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet G

Indirect methods. Global model

Code: DPS9911S.

Analysis #*	

Data source*	EU data Collections Framework	Gear*	trawl

Model characteristic

Type of model*		Fitting criterion	
Software		Bibliographical source	

Data

Year							
Catch							
Effort							
CPUE							

Year							
Catch							
Effort							
CPUE							

Adjustment

RMS	

Results

Carryng capacity		a	
Growth rate		b	
Catchability			
MSY			
EMSY		TACMSY	
E0.1		TAC0.1	
Ecurrent			

Comments

Comments

SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: DPS9911S.

Sex*	F&M '07-10

Analysis # *	LCA

Time series

Data	Size	Age
(mark with X)	x	

Model	Cohorts	Pseudocohorts
(mark with X)		x

Equation used	VPA	Tunig method	None
# of gears	4	Software	VIT 4 win
$F_{terminal}$	Fterm 1.8 Fem; 2 Male		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum	11	0.237	Recruitment	3065	
Average	21.8	1.14	Average population	1766	7723
Maximum	40	3.91	Virgin population		
Critical	18.29	0.79	Turnover		
	mm	year		millions	t

Average mortality

		Gear					
	Total	Italian 12-24	Italian >24	Tunisian	Malta		
F_1	1.16	0.42	0.41	0.34	0.002		
F_2							
Z							

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

Comments

Fishing mortality obtained as (Catch F + Catch M)/ VPA mean number F + VPA mean number M) by size.

F1 is expressed as arithmetic values of F on overall size of catch up to 38 mm CL.

Sex*	F+M mean 3 yr

Analysis # *	LCA

Time series

Data	Size	Age
(mark with X)	x	

Model	Cohorts	Pseudocohorts
(mark with X)		x

Equation used	LCA	Tunig method	no
# of gears	4	Software	ANALEN
$F_{terminal}$	1.8		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum	8		Recruitment	3326	
Average	14.35		Average population	34100	90000
Maximum	36		Virgin population		
Critical	18.5		Turnover		
	mm			million	t

Average mortality

		Gear					
	Total	Italian 12-24	Italian > 24	Tunisian	Maltese		
F_1	1.25	0.421	0.42	0.405	0.003		
F_2							
Z	2.365						

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

Comments

Fishing mortality by size obtained as average of F females weighed by sex ratio in catch.

F1 is expressed as arithmetic.

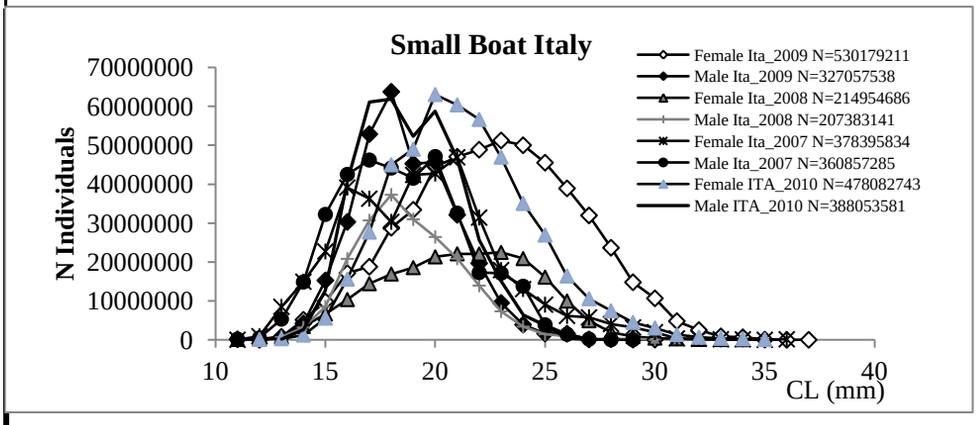
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	**Sheet A2** **Indirect methods: data**

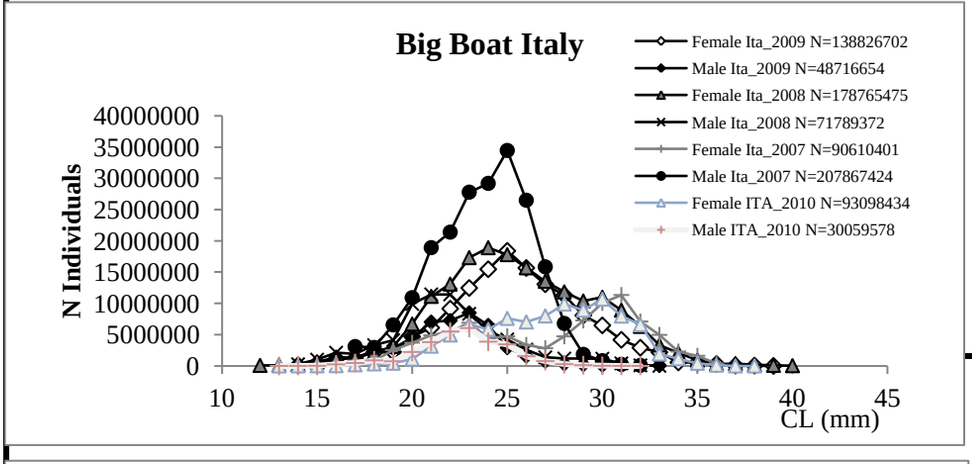
Code: DPS9911S.

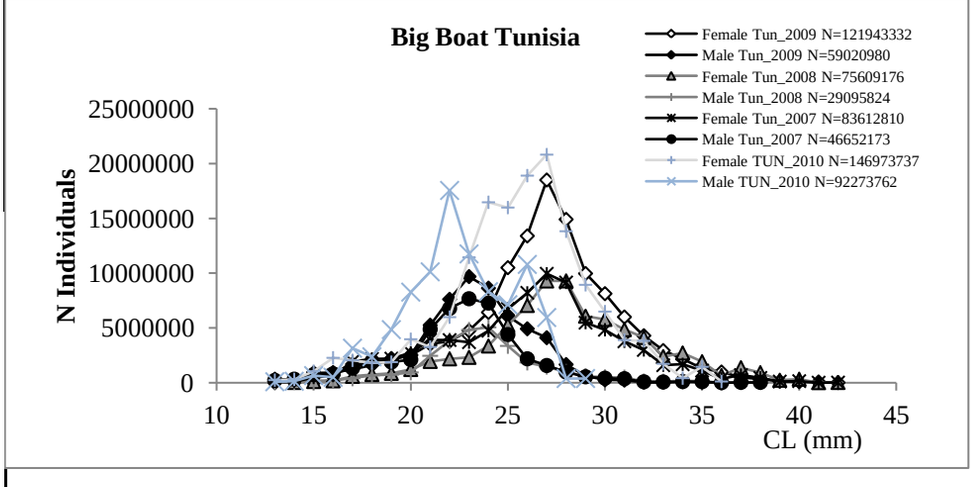
Sex*	F & M sep.	Gear*	Trawl	Analysis # *	**VPA**

Data source	LFD

Data





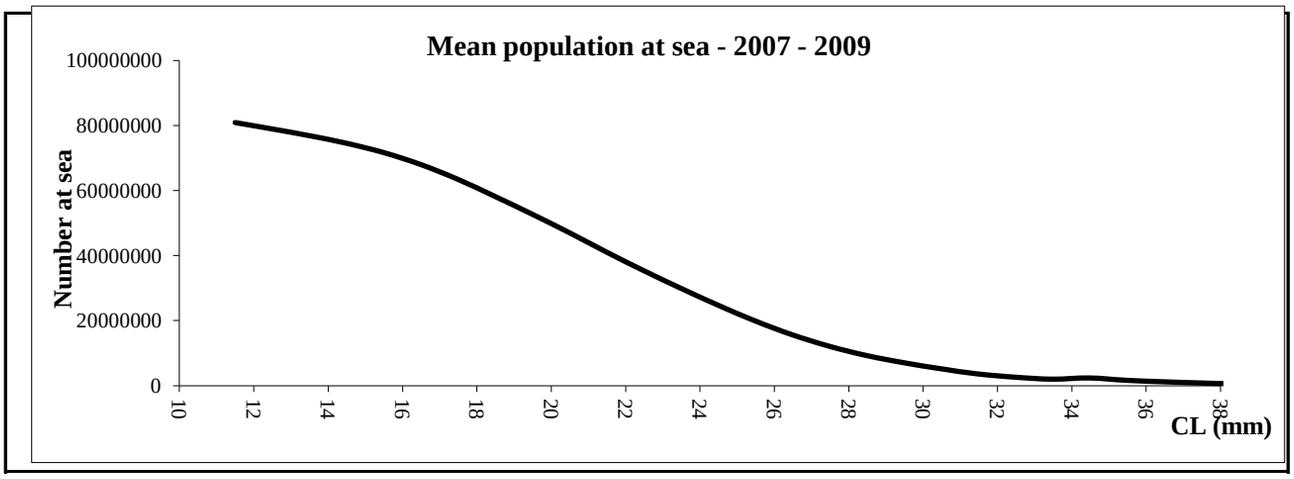


SAC GFCM - Sub-Committee on Stock Assessment (SCSA)	
Assessment form	Sheet A3 Indirect methods: VPA results

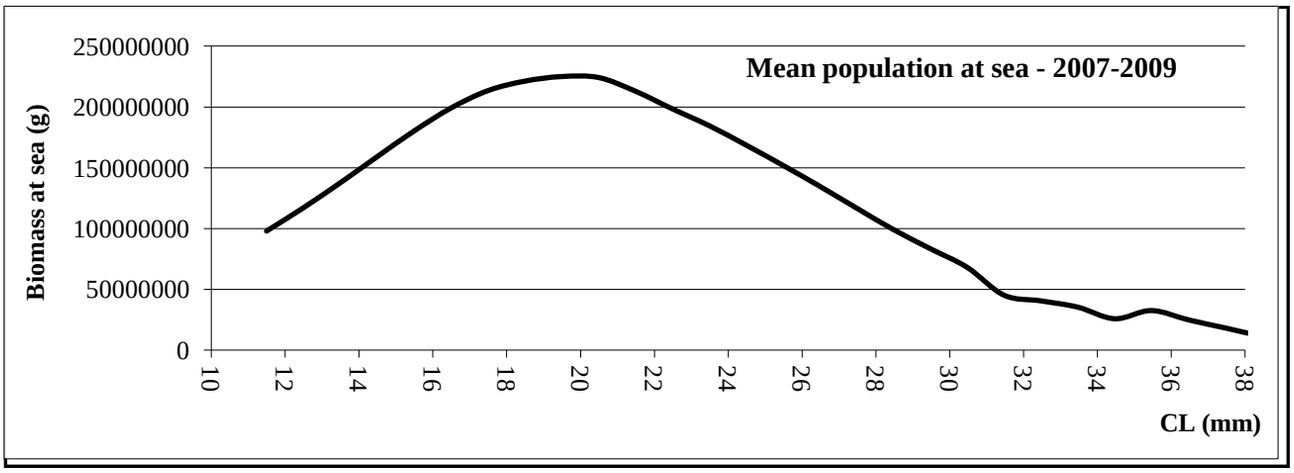
Code: DPS9911S.

Sex*	F&M	Gear*	Trawl 2007-2009	Analysis #*	LCA VIT

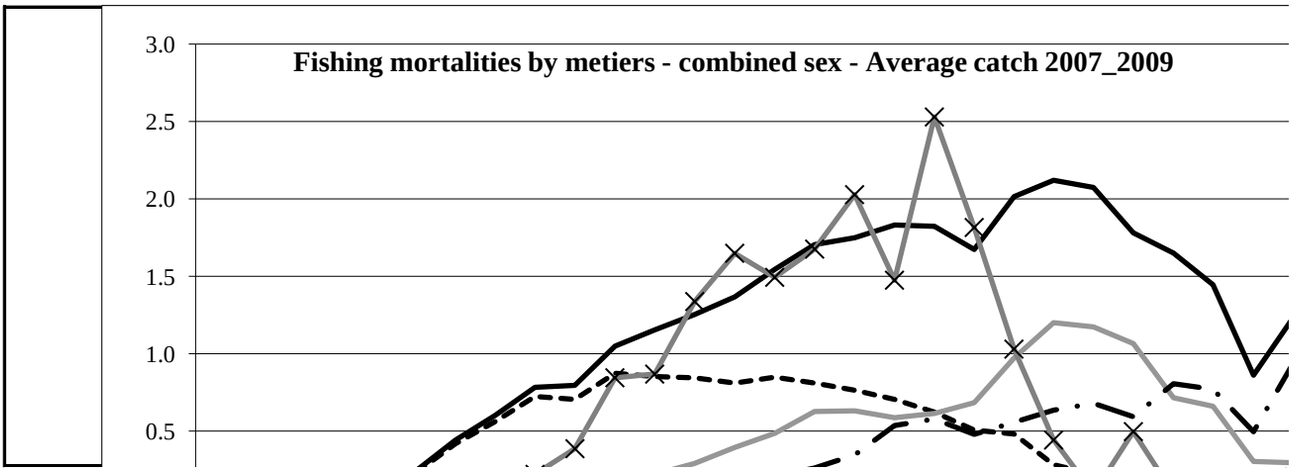
Population in figures



Population in biomass

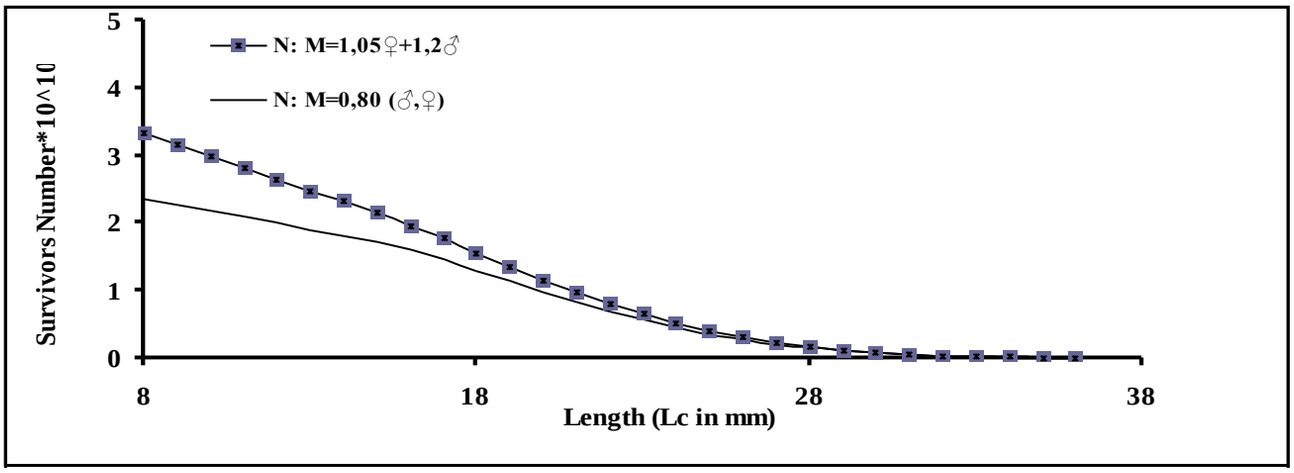


Fishing mortality rates

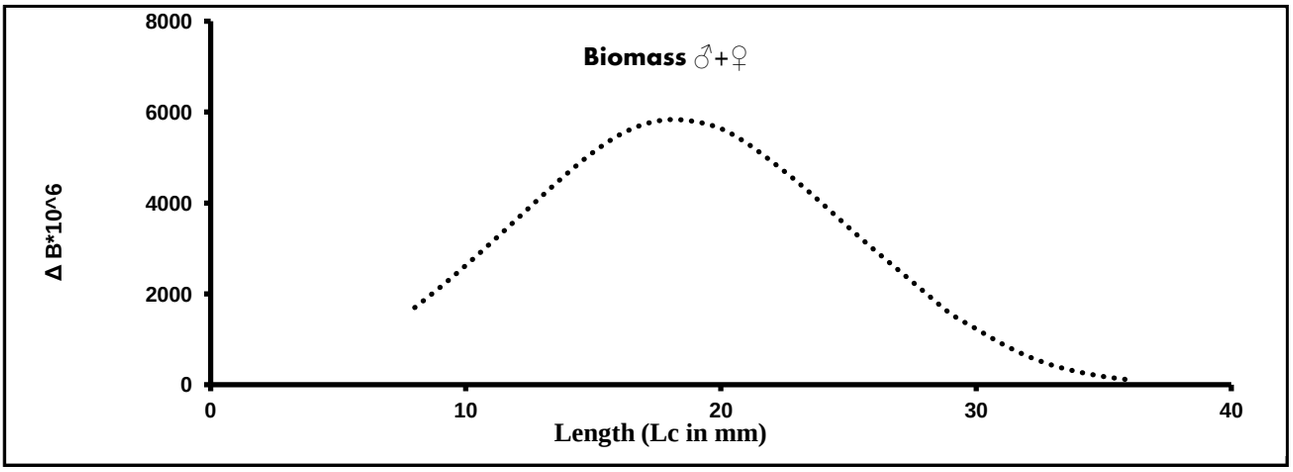


Sex*	F&M	Gear*	Trawl 2007-2009	Analysis #*	LCA ANALEN

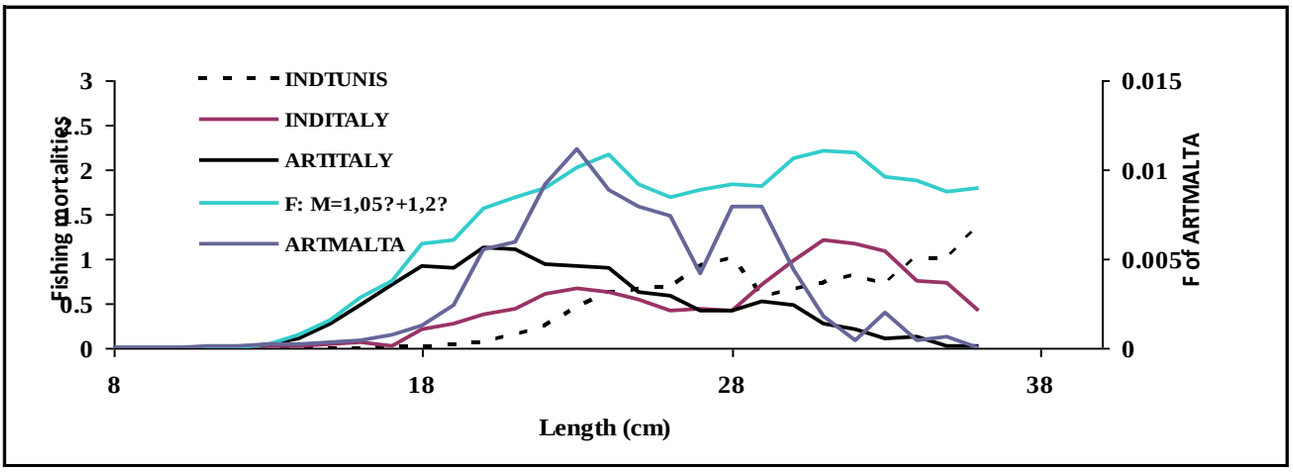
Population in figures



Population in biomass



Fishing mortality rates



SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

Assessment form

Sheet Y

Indirect methods: Y/R

Code: DPS9911S.

Sex	F+M

Analysis #	LCA

# of gears	trawl	Software	VIT4win

Parameters used

Vector F	
Vector M	
Vector N	

Model characteristics

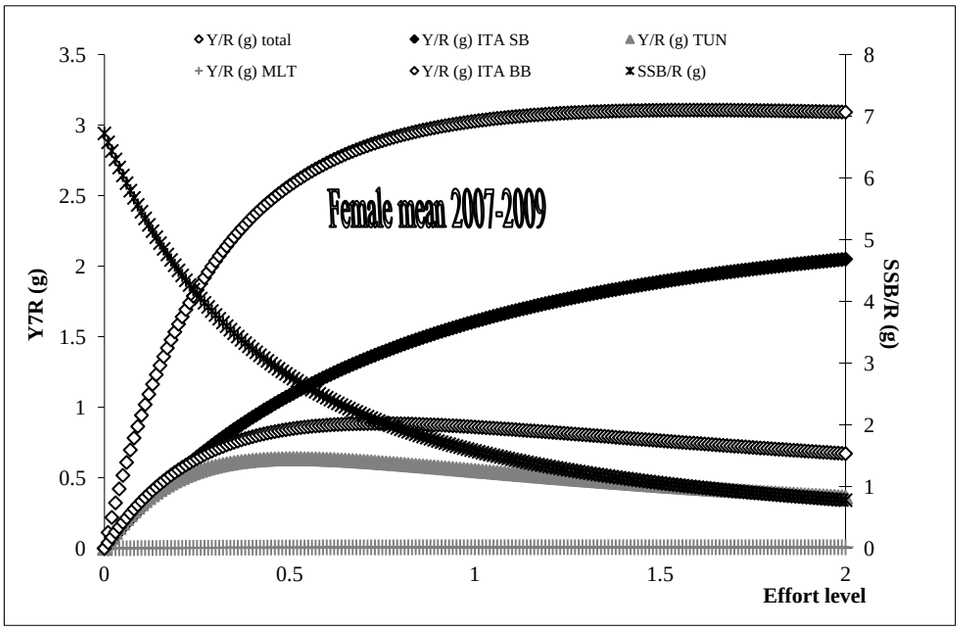
Values of VPA and Y/R analyses were estimated by sex and years. For each year, results were averaged by a sex ratio (0.57 females and o0.43 males) weighed mean.

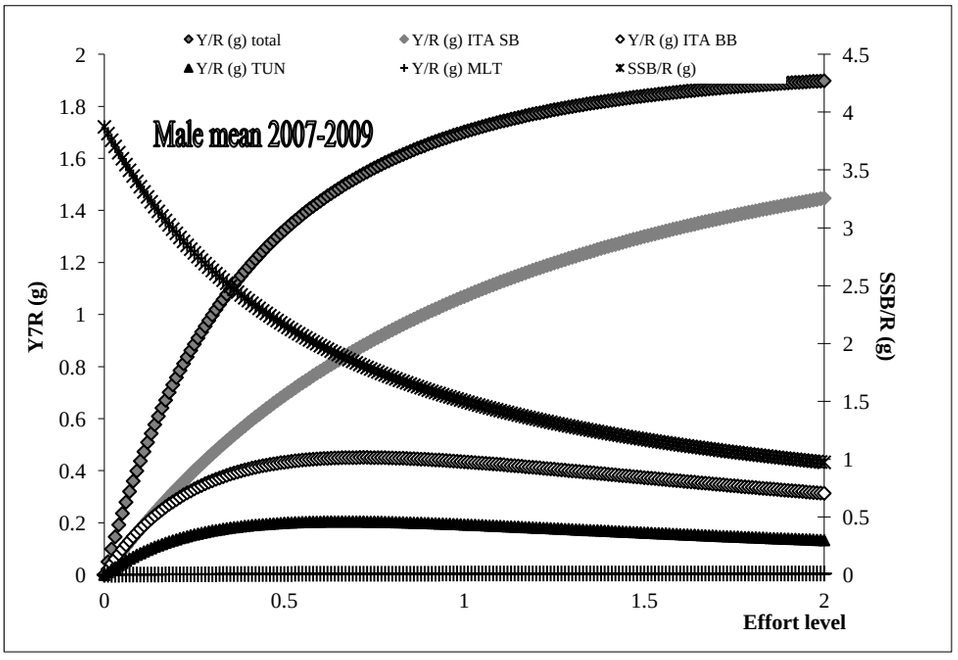
Results

	Total	Gear			
		Trawl MAL	Trawl ITA 12_24	Trawl ITA>24	Trawl TUN
Current YR	2.46-3.13	0.006 - 0.006	1.38-1.88	0.68-0.68	0.40-0.57
Maximum Y/R	NC - 3.18	NC	NC	NC - 0.63	NC - 0.45
Y/R 0.1	2.31-3.06	0.005 - 0.006	1.18-1.74	0.69-0.68	0.44-0.63
F_{max}	NC - 1.52				
$F_{0.1}$	1.07-0.82				
Current B/R	2.41-2.74				
Maximum B/R	NC - 2.24				
B/R 0.1	2.86 - NC				
Current SSB/R	1.55 NC	on left VIT			
SSB/R 0.1	1.97 - NC	on right ANALEN			
SSB/R virgin	5.50 -NC				

Comments

Comments


Y/R (g) total
Y/R (g) ITA SB
Y/R (g) TUN
Y/R (g) MLT
Y/R (g) ITA BB
SSB/R (g)
Female mean 2007-2009
Y7R (g)
SSB/R (g)
Effort level


Y/R (g) total
Y/R (g) ITA SB
Y/R (g) ITA BB
Y/R (g) TUN
Y/R (g) MLT
SSB/R (g)
Male mean 2007-2009
Y7R (g)
SSB/R (g)
Effort level

Other assessment methods

Y and B per recruit of females estimated by Yield package (Branch, T. A. et, al., 2000). All the linear parameters were converted in TL (cm).
Conversions were made by using the relationship reported by Crosnier et al.,(1970): TL(mm)= 3,646+4,436 CL(mm).Y and B per recruit estimated only Female.

Probability distribution of Fmax, F0.1 and FSPR0.3 were estimated by 2000 simulations.

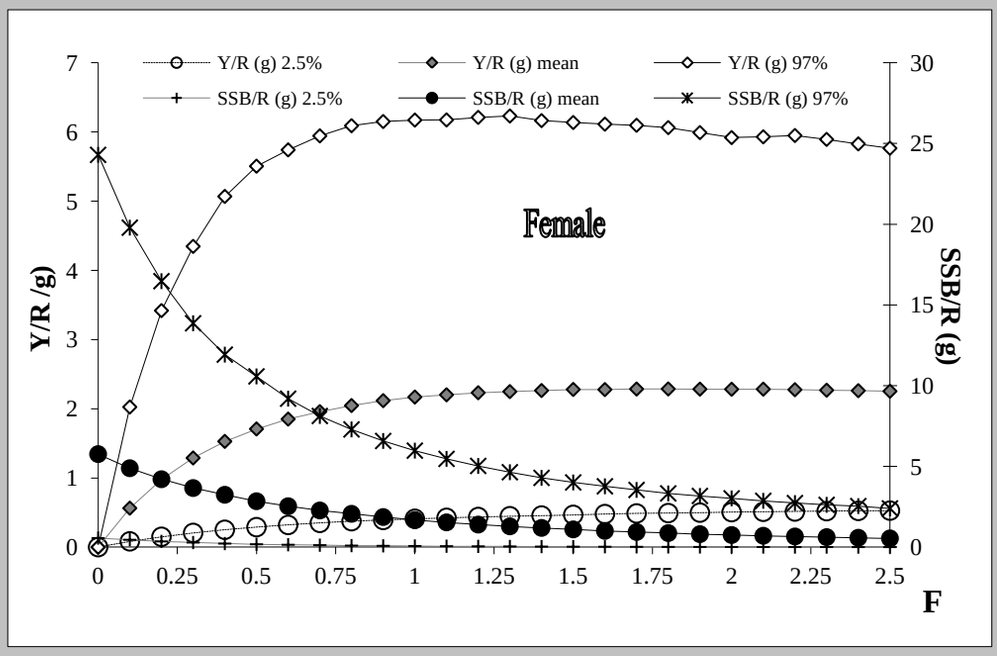
Incertidute was added to all parameters as a CV of 20%

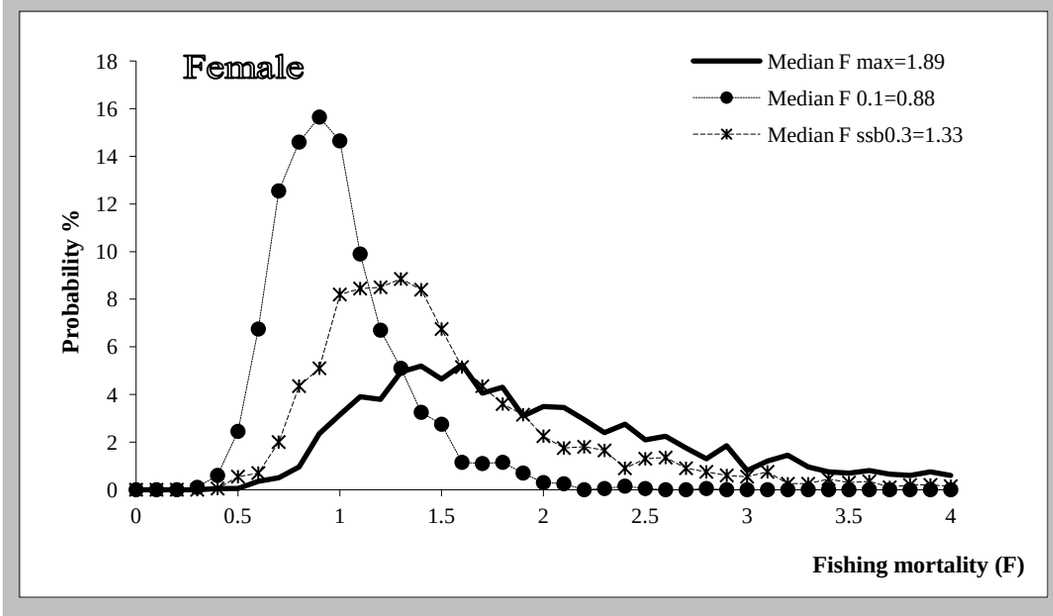
	0.10			0.20			0.40		
Parameters	Y/R	Biomass	SSB	Y/R	Biomass	SSB	Y/R	Biomass	SSB
'ooooooooo'	2.36	2.44	1.66	2.36	2.44	1.66	2.36	2.44	1.66
'o-ooo-oooo'	2.37	2.71	1.84	2.37	3.04	2.06	2.38	4.04	2.73
'o-ooo+oooo'	1.77	2.48	1.67	1.17	2.48	1.63	0.23	2.19	1.29
'o+ooo-oooo'	2.94	2.39	1.64	3.47	2.33	1.61	4.44	2.20	1.54
'o+ooo+oooo'	2.36	2.23	1.52	2.36	2.05	1.40	2.35	1.76	1.21

Changing M and k has a pronounced effect on Y/R when the variation is in the opposite direction; while B/R and SSB/R are strongly affected when the change is in the same direction

This sheet will be activated once the previous page will be successfully completed

Code: DPS9911S.





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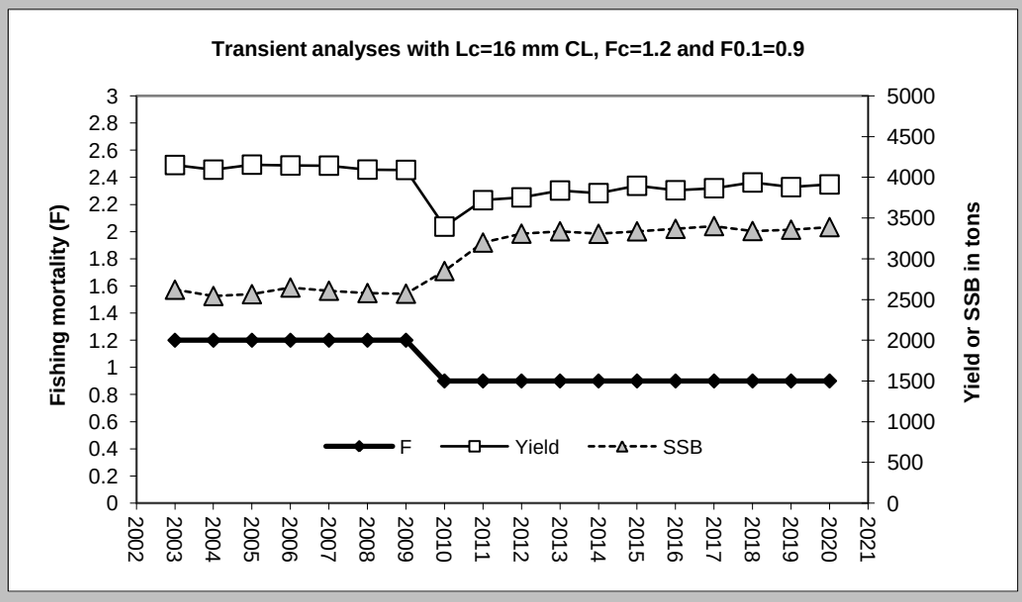
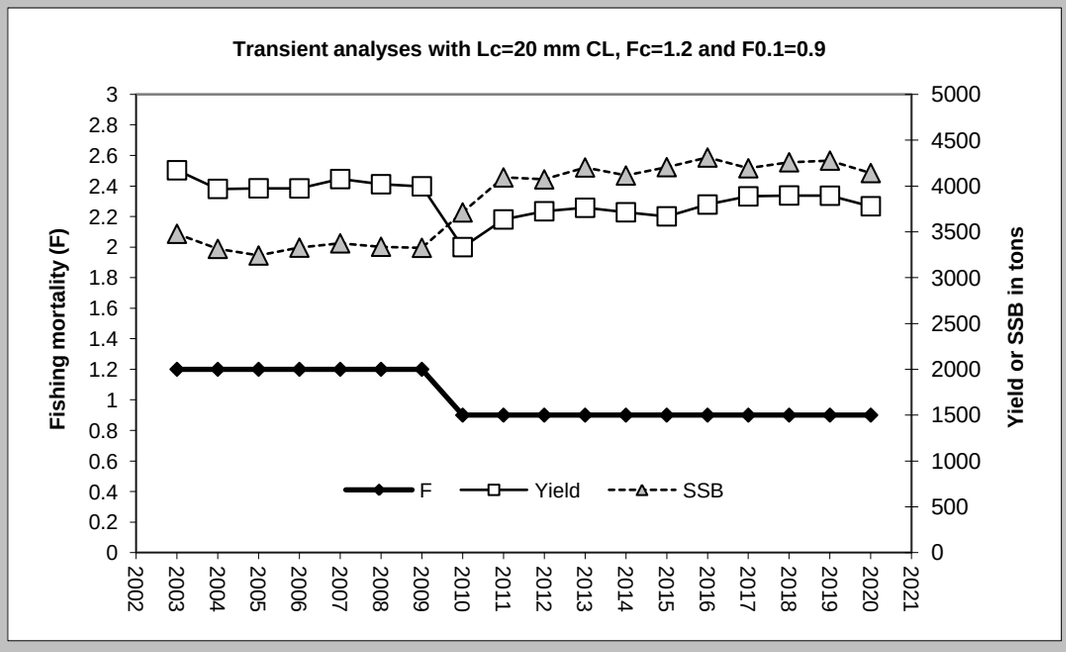
Code: DPS9911S.





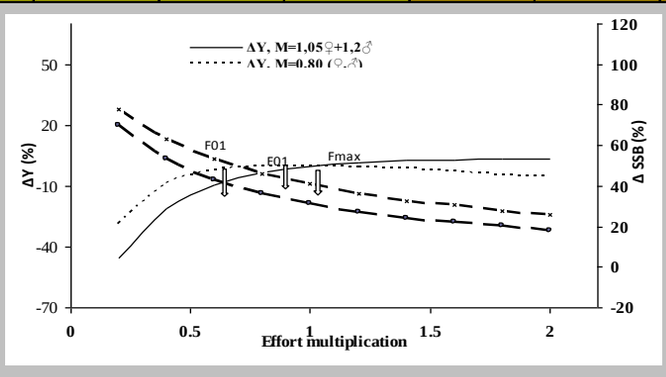
SAC GFCM - Sub-Committee on Stock Assessment (SCSA)

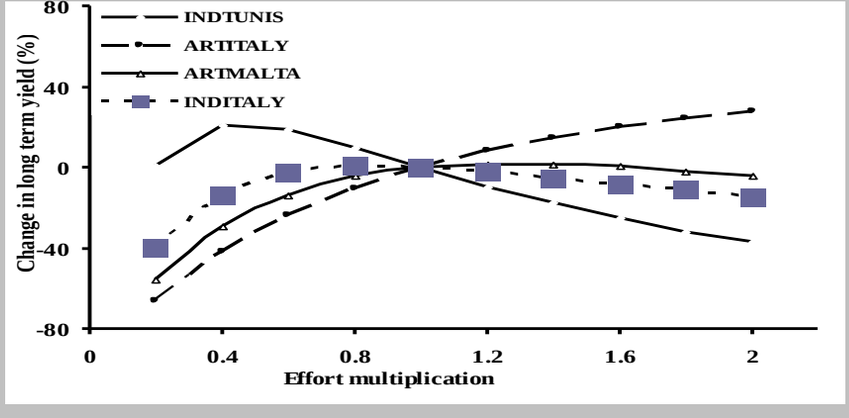
Assessment form — **Sheet other**

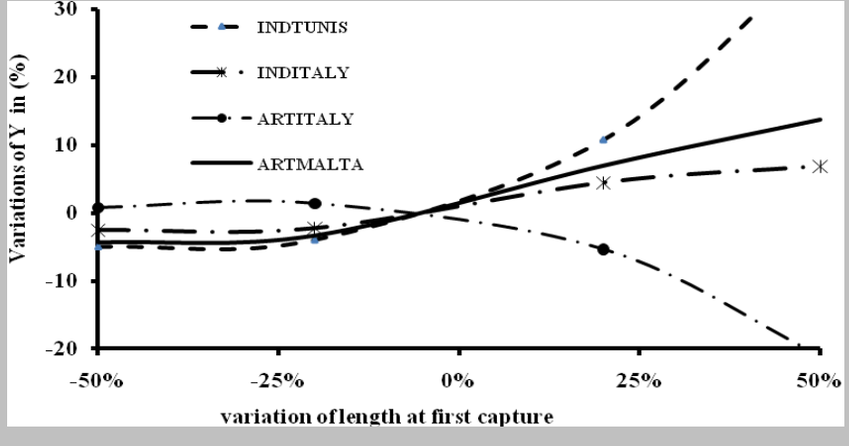
This sheet will be activated once the previous page will be successfully completed

Code: DPS9911S.

	Y%: M=0,8				Y%: M=1,05			
Effort	**ARTMALTA**	**ARTITALY**	**INDITALY**	**INDTUNIS**	**ARTMALTA**	**ARTITALY**	**INDITALY**	**INDTUNIS**
0.2	-47	-61	-23	46	-56	-66	-40	1
0.4	-21	-37	1	53	-30	-42	-14	21
0.6	-7	-20	6	35	-14	-24	-3	19
0.8	-2	-8	5	16	-4	-11	1	10
1	0	0	0	0	0	0	0	0
1.2	-1	6	-5	-13	2	8	-2	-9
1.4	-3	11	-11	-24	1	15	-5	-18
1.6	-7	15	-15	-32	0	20	-8	-25
1.8	-11	17	-20	-39	-2	24	-11	-32
2	-14	20	-24	-45	-4	28	-14	-37







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

Code: DPS9911S.

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B	2,57	g	2.86		All biomass and yield values are per recruit
SSB	1.55	g	1.97		
F	1.21		0.95		A reduction of 20% is adviced to reach the F0.1 target reference point
Y	2.79	g	2.68		(VIT analyses)
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

NB. Although the stock is considered ‘overfished’ taking into account F0.1 as a reference point, no risk of depletion was recognised by the working group.

Code: DPS9911S.

Management advice and recommendations*

Current fishing mortality should be reduced by around 20% for deepwater rose shrimp in the Central Mediterranean.

A reduction in fishing capacity should primarily target small trawl vessels (12-24m length), which target juvenile shrimp. In addition the selection pattern of the fishery should be improved. An increase in 20% of minimum catch length would lead to a significant increase in spawning stock biomass, as well as a gain of 6% in sustainable yield for large trawl fleet. However, the fleet of small trawlers would suffer long-term losses around 7%.

A protection of key nursery areas in the Strait of Sicily is also recommended in order to improve the status of this fishery. Stable nurseries of this species have been identified on the Adventure and Malta Banks in the Strait of Sicily (Fortibuoni et al. 2010).

Advice for scientific research*

In order to make the assessment more robust, a trawl survey covering the whole area (GSA 12; 13; 14; 15 and 16) should be planned. This source of information should allow an investigation of the spatial structure of species in the area, including the position of main nursery and spawning areas of deepwater rose shrimp.

Furthermore data on spatial distribution of trawling effort should be collected and made available for stock assessment and management purposes.

Finally the assessment should be updated regularly in order to assess the effects of the implementation of the 40mm square / 50mm diamond mesh size on trawlers in EU member states (i.e. Italy and Malta).

Comments*

Several problems were encountered when completing the GFCM stock assessment form:

- On the contacts sheet the old SCSA coordinator is listed (Constantina Karlou-Riga), this needs to be updated

- A maximum of 3 GSAs can be added to the cover sheet, this number needs to be increased. For instance in the present assessment 5 GSAs were covered

- On form P1, general information for the fishery can only be provided for one year.

- On sheet Y, additional space should be added to report the results of indirect methods. For instance in this assessment two indirect methods were used (VIT and ANALEN) but there was no space to report the results of the two separate analyses.

- The definition of an 'overexploited stock' needs to be rewritten in sheet D, since it is possible to have for instance an economically overexploited stock where there is however no imminent risk of depletion or collapse

- A form suitable for use with Apple-MAC computers should be made available since participants using MAC computers were unable to fill in the forms.

An improvement of the forms would improve future presentation of stock assessment results.

Abstract for SCSA reporting

Authors S. Ben Meriem, F.Fiorentino, A.Arneri, L. Ceriola, M. Dimech, V. Gancitano, O. Jarboui, L. Knittweis

Year 2011

Species Scientific name Parapenaeus longirostris - DPS

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 16 - South of Sicily, 15 - Malta Island, 12 - Northern Tunisia

Fisheries (brief description of the fishery)*

Sicilian trawlers between 12-24m LOA which target deep water pink shrimp are based in seven harbours along the southern coasts of Sicily. These trawlers (about 150 boats in 2009) operate mainly on a short-distance trawl fishery basis, with trips from 1 to 2 days at sea, fishing on outer shelf and upper slope. The distant trawlers of Mazara del Vallo (about 140 boats in 2009) represent the main commercial fleet of trawlers in the area, and are one of the most important fleets in the Mediterranean. In contrast to the other Sicilian fleets, the large trawlers of the Mazara fleet (LOA>24m) are employed on long fishing trips (3 – 4 weeks) in offshore waters. These vessels thus operate in both national and international waters in the Strait of Sicily.

In the Maltese Islands small vessels measuring 12- 24m in length target pink shrimp at depths of about 600m, with fishing grounds located to the north / north-west of Gozo, as well as to the west / south-west of Malta. Catches are primarily destined for the local market.

Tunisian vessels target pink shrimp primarily in Northern Tunisia, with 90% of the country's total P. longirostris catches originating here. The great majority of these catches are landed in the town of Bizerte.

Source of management advice*

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

Data was derived both from indirect (fisheries monitoring) sources. Stock status was assessed by using a Yield and Spawning Stock Biomass per Recruit analysis with the VIT, ANALEN Yield packages. Analyses were based length frequency distributions by sexes. Current F was assessed using a steady state VPA with VIT by length on LFD of 2007, 2008 and 2009 raised to the total landings. VPA and Y/R values by sex and year were combined to obtain a single values for both the sexes.

Stock Status*

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;

Exploitation rate

High fishing mortality

Stock abundance

Intermediate abundance

Comments

Management advice and recommendations*

Current fishing mortality should be reduced by around 20% for deepwater rose shrimp in the Central Mediterranean.

A reduction in fishing capacity should primarily target small trawl vessels (12-24m length), which target juvenile shrimp. In addition the selection pattern of the fishery should be improved. An increase in 20% of minimum catch length would lead to a significant increase in spawning stock biomass, as well as a gain of 6% in sustainable yield for large trawl fleet. However, the fleet of small trawlers would suffer long-term losses around 7%.

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Advice for scientific research*

In order to make the assessment more robust, a trawl survey covering the whole area (GSA 12, 13, 14, 15 and 16) should be planned. This source of information should allow an investigation of the spatial structure of species in the area, including the position of main nursery and spawning areas of deepwater rose shrimp.

Furthermore data on spatial distribution of trawling effort should be collected and made available for stock assessment and management purposes.

Finally the assessment should be updated regularly in order to assess the effects of the implementation of the 40mm square / 50mm diamond mesh size on trawlers in EU member states (i.e. Italy and Malta).