

SAC GFCM

Sub-Committee on Stock Assessment

Date*

20	October	2011
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Code*

HKE9911S.

Authors*

S. Ben Meriem, F.Fiorentino, A.Arneri, L. Ceriola, V. Gancitano, O. Jarboui, L. Knittweis, R. Mifsud
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Affiliation*

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Species Scientific name*

1	<i>Merluccius merluccius</i> - HKE 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
	2
	3

	16 - South of Sicily
	15 - Malta Island
	12 - Northern Tunisia

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Assessment form

Sheet #0

Basic data on the assessment

Code: HKE9911S.

Date*	20	Oct	2011	Authors*	S. Ben Meriem, F. Fiorentino, A. Arneri, L. Ceriola, V. Gancitano, O. Jarboui, L. Knittweis, R. Mifsud
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Species Scientific name*	Merluccius merluccius - HKE	Species common name*	European hake

Data Source

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

Sheets filled out

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

Comments, bibliography, etc.

Abella A., Fiorentino F., Mannini A., Orsi Relini L. 2008. Exploring relationships between recruitment of European hake (*Merluccius merluccius* L. 1758) and environmental factors in the Ligurian Sea and the Strait of Sicily (Central Mediterranean). *Journal of Marine Systems*, 71: 279-293.

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Comments, bibliography, etc.

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Fiorentino F., Garofalo G., Fortibuoni T., Bahri T., Camilleri M., Drago A., Gristina M., Massa F., 2006. Delineating habitats used by different life phases of hake in the Strait of Sicily. Commission staff working paper presented at STECF-SGRMED meeting on sensitive and essential fish habitats in the Mediterranean sea (Rome, March 2006): 203-234.

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Levi, D. Patti, B. Rizzo, P. Lo Brutto, S. Parrinello, N. Arculeo, M., 2004. Genetic and morphometric variations of Mediterranean hake, *Merluccius merluccius*, in the Strait of Sicily (central Mediterranean): implications for stock assessment of shared resources. Italian Journal of Zoology, 71 (2):165-170.

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Sheet B
Biology of the species

Code: HKE9911S

Biology

Somatic magnitude measured (LH, LC, etc)*				TL	Units*	cm
Sex	Fem	Mal	Both	Unsexed		
Maximum size observed	68	44	68		Reproduction season	all year
Size at first maturity	37	28	36		Reproduction areas	yes
Recruitment size					Nursery areas	yes

Parameters used (state units and information sources)

		Units	Sex			
			female	male	both	unsexed
Growth model	L ∞	cm			100-69.5	
	K				0.116-0.176	
	t0	year			-0.5;-0.6	
	Data source					
Length weight relationship	a				0.0048	
	b				3.1252	
	M				0.28-0.2	
	sex ratio (mal/fem)				0.48	

Comments

Stock Identification

The stock structure of hake in the Strait of Sicily has to date not been defined. Levi et al. (1994) compared the growth of *M. merluccius* in Mediterranean and found quite a similar pattern in individuals from the Northern side of the Strait of Sicily (GSAs 15 and 16) and those caught in the Gulf of Gabes (GSA 14). Lo Brutto et al. (1998) have also found no evident of genetic subdivisions or significant differences in allelic frequencies, between samples near Sicily and those from the mid-line. More recently Levi et al. (2004) applied electrophoretic, morphometric and growth analyses to test the hypothesis of the existence of a unique stock of hake in the Sicily channel, which includes part of the North African continental shelf off the Tunisian coast and the shelf off the southern Sicilian coast. Although the level of genetic variation detected at five selected sampling sites was very low, morphometric analyses and otolith readings revealed some significant differences at phenotypic level, mainly in females. On the basis of the spatial distribution of spawning and nursery areas compared with the current patterns in the Strait of Sicily, Camilleri et al. (2008) believed the existence of genetic exchange between hake sub-populations inhabiting GSAs 15 and 16. In the northern sector of the Strait of Sicily (GSA 15 and 16), although some inter-annual variability in the nurseries distribution was evident, Abella et al. (2008) identified two stable nursery areas, which are related with prevailing meso-scale oceanographical processes. These nurseries are located on the eastern side of the Adventure and Malta banks, between 100 and 200 m depth.

Sex Ratio

On the basis of trawl landings (GSA 15 & 16) sex ratio is around 0.5 between 24 and 32 cm TL, while females prevail on males mainly at larger sizes (SR=0.90 after 40 cm TL). In GSA 16 sex ratios from trawl surveys shows a significant decrease (rs=-0.657) with time, showing a reduction of females

Comments

in the population since 1994. In the present analysis combining data from GSA 12, 15 and 16, the sex ratio was calculated as $F/(F+M)$ in terms of population at sea (0.48).

Maturity

Although spawning off Tunisia (GSA 12) occurs all over the year, Bouhlel (1973) reported three maturity peaks, in summer, winter and spring depending to the size of females. The largest females ($LT > 40$ cm) spawn mainly in spring, while the smallest ($29 < TL < 39$ cm) have two main spawning peaks one in summer and another one in winter. The estimated length at first maturity for females is 34.25 cm. Bouaziz et al. (1998), studied samples from Bou-Ismaïl (GSA 4), reported that the spawning season runs throughout the whole year, even if a peak in summer is evident. According to Levi (1991), mature specimens were collected both in autumn (November) and winter (February) in GSA 15 and 16. Information from the northern sector of the Strait of Sicily (GSA 16) revealed that outer shelf on the western side of Adventure Bank might be a relevant spawning area (Fiorentino et al., 2006b). According to literature spawning should occur in the outer shelf-upper slope. For instance, aggregation of mature adults was reported between 100 and 200 m in the Gulf of Tunis (Bouhlel, 1973).

Nutrition

A study by Andaloro et al., (1985) in the Strait of Sicily found that hake's diet varied according to size. Smallest fish of 4.5-12 cm TL feed mainly on Euphausiacea. Decapods are the main preys of hake between 13 and 24 cm TL, while fish is the preferred food of individuals larger than 25 cm TL. Similar feeding behaviour that varied with size has also been observed for other areas in the Mediterranean (see Colloca, 1999).

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Sheet P1

General information about the fishery

Code: HKE9911S

Data source*	Tunisian National Data Collection Programme, EU Data Collection Framework	Year (s)*	2010
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Data aggregation (by year, average figures between years, etc.)*	By year
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Fleet and catches (please state units)

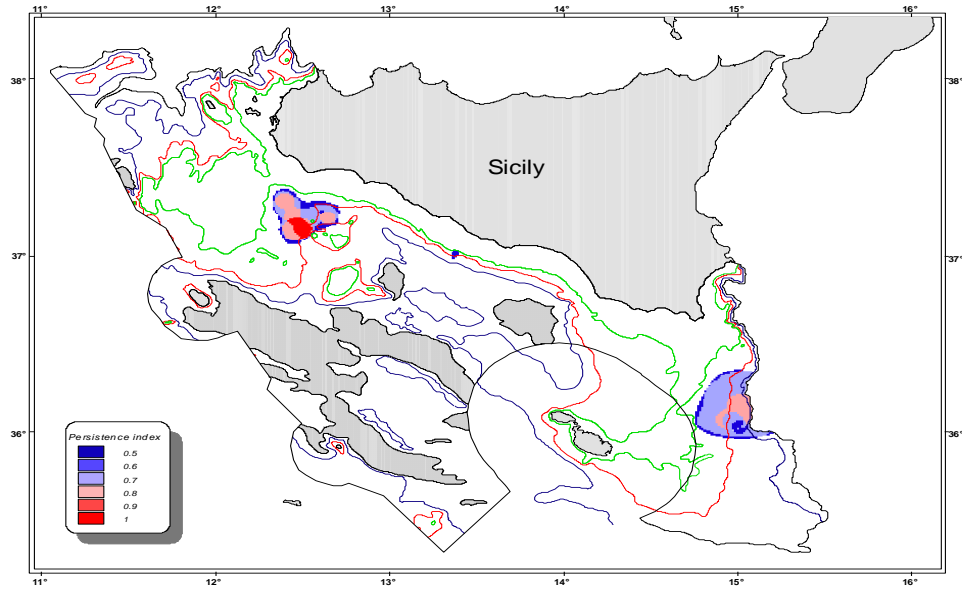
	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	MLT	99	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	HKE
Operational Unit 2	ITA	99	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	HKE
Operational Unit 3	ITA	99	F - Trawl (>24 metres)	03 - Trawls	34 - Demersal slope species	HKE
Operational Unit 4	TUN	99	F - Trawl (>24 metres)	03 - Trawls	34 - Demersal slope species	HKE
Operational Unit 5	TUN	99	C - Minor gear with engine (6-12 metres)	07 - Gillnets and Entangling Nets	33 - Demersal shelf species	HKE

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 - HKE		Tons	6				
ITA 99 E 03 34 - HKE		Tons	1041				
ITA 99 F 03 34 - HKE		Tons	446				
TUN 99 F 03 34 - HKE		Tons	600				
TUN 99 C 07 33 - HKE			80				
Total			2173				

Legal minimum size	Malta / Italy: 20 cm (EC 1967/2006)
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Comments

Comments



Areas showing stable presence of recruits of *M. merluccius* between 1994 and 1999 in GSA 16 and 15, excluding the Maltese Management Fishing Zone (MMFZ). The index of persistence ranges between 0 and 1, where 1 indicates stable nursery and 0 absence of nursery (modified from Fiorentino et al., 2003b).



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Sheet P2a
Fishery by Operational Unit

Code: HKE9911S.

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Data source*	EU Data Collection Framework	OpUnit 1*	MLT 99 E 03 34 - HKE
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Time series

Year*	2010					
Catch	6					
Minimum size						
Average size Lc						
Maximum size	60					
Fleet	E-Trawl					

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		
		

Structure by size or age

Sex_Combined		
18	243	
20	728	
22	1873	
24	1491	
26	798	
28	936	
30	555	
32	798	
34	798	
36	728	
38	624	
40	798	
42	659	
44	451	
46	381	
48	173	
50	243	

Structure by size or age

52	139
54	69
56	69
58	35
60	35

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Sheet P2a
Fishery by Operational Unit

Code: HKE9911S.

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Data source*	EU Data Collection Framework	OpUnit 2*	ITA 99 E 03 34 - HKE
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Time series

Year*	2010					
Catch	1041					
Minimum size	12					
Average size Lc						
Maximum size	68					
Fleet	E-Trawl					

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

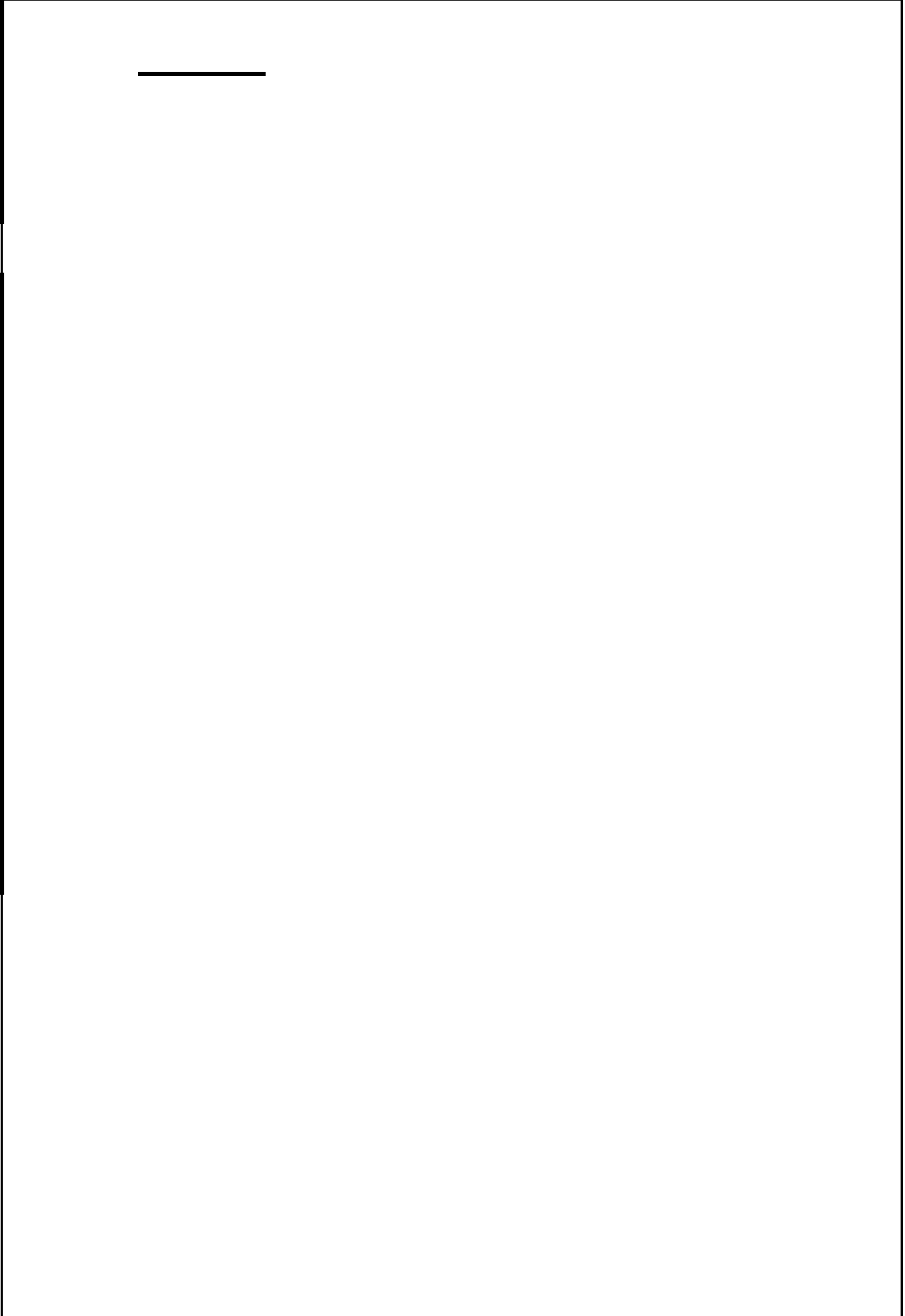
Selectivity

Remarks

L25		
L50		
L75		
Selection factor		
		

Structure by size or age

Sex_Combined			
12	77295	46	12395
14	708328	48	10669
16	1311503	50	9067
18	1461147	52	3079
20	1500140	54	2866
22	1215944	56	6467
24	898697	58	4808
26	528585	60	496
28	327927	62	1646
30	187764	64	1646
32	113618	66	936
34	89069	68	535
36	56316		
38	36074		
40	21724		
42	9892		
44	9935		



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Sheet P2a
Fishery by Operational Unit

Code: HKE9911S.

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Data source*	EU Data Collection Framework	OpUnit 3*	ITA 99 F 03 34 - HKE
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Time series

Year*	2010					
Catch	446					
Minimum size	14					
Average size Lc						
Maximum size	68					
Fleet	F-Trawl					

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

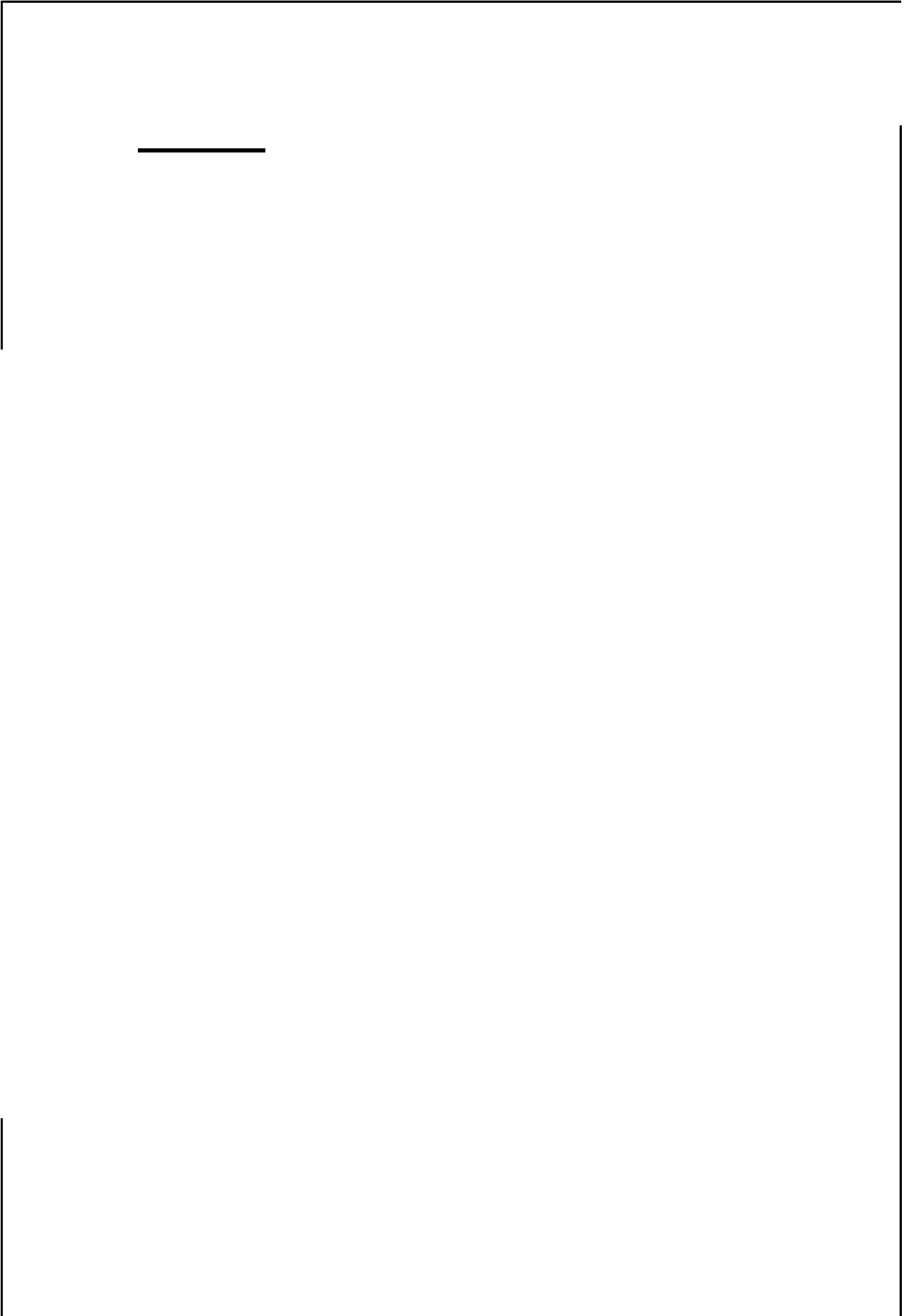
Selectivity

Remarks

L25		
L50		
L75		
Selection factor		

Structure by size or age

Sex_Combined			
14	1199	46	6787
16	59412	48	3522
18	166677	50	1177
20	190073	52	1096
22	212064	54	1488
24	159159	56	1507
26	107567	58	107
28	52500	60	107
30	39337	62	107
32	16888	64	107
34	18905	66	107
36	11650	68	107
38	13988		
40	5725		
42	4844		
44	2656		



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Sheet P2a
Fishery by Operational Unit

Code: HKE9911S.

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Data source*	Tunisian National Data Collection Programme	OpUnit 4*	TUN 99 F 03 34 - HKE
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Time series

Year*	2010					
Catch	600					
Minimum size						
Average size Lc						
Maximum size						
Fleet	F-trawl					

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		
		

Structure by size or age

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		

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Sheet P2a
Fishery by Operational Unit

Code: HKE9911S.

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Data source*		OpUnit 5*	TUN 99 C 07 33 - HKE
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Time series

Year*	2010					
Catch	80					
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		

Structure by size or age



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Assessment form

Sheet P2b
Fishery by Operational Unit

Code: HKE9911S.

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Data source* EC 1967 / 2006

OpUnit 1* MLT 99 E 03 34 - HKE

Regulations in force and degree of observance of regulations

At present there are no regulations in force specifically targeting hake. 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.

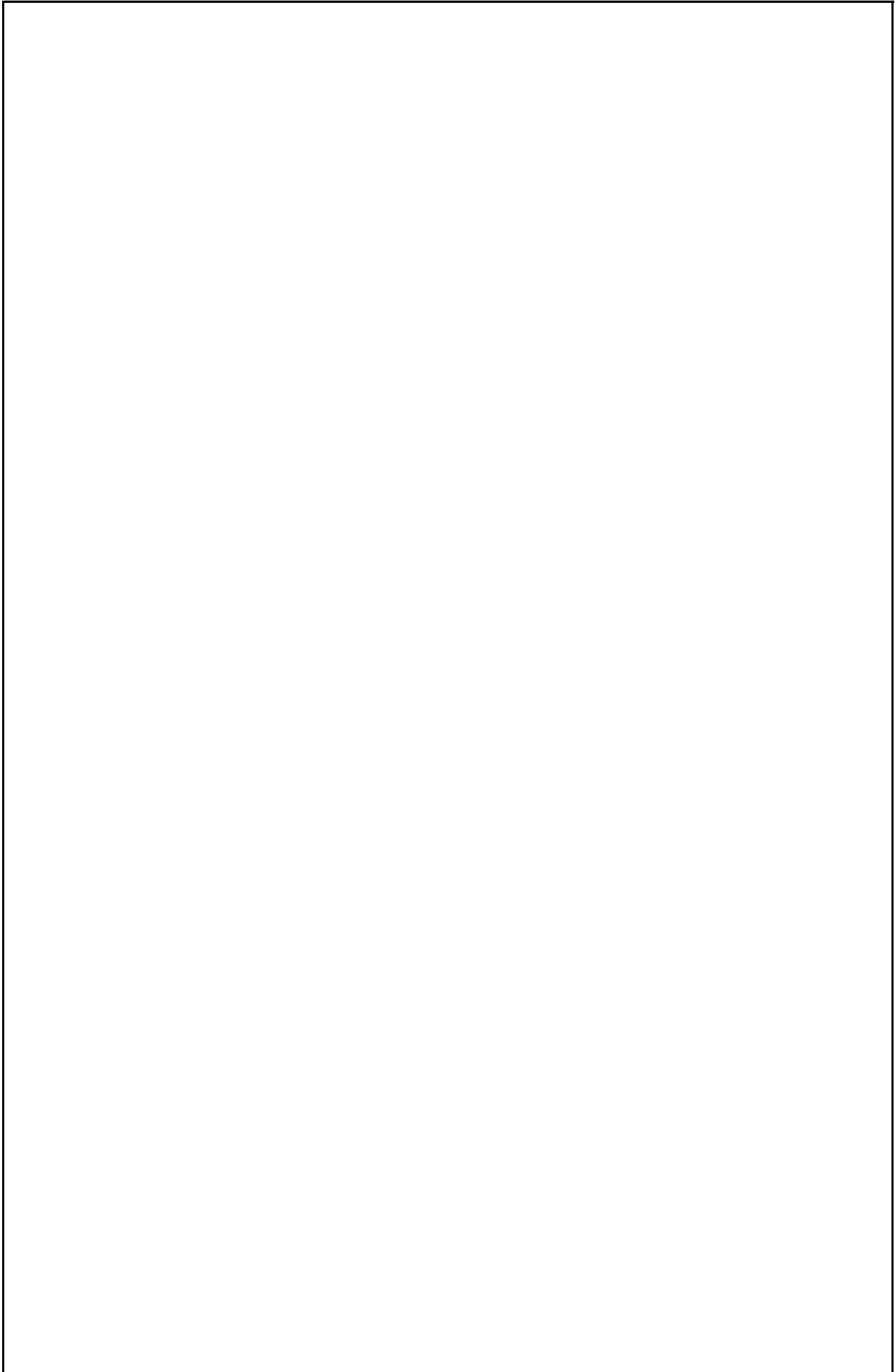
Moreover, the Maltese Islands are surrounded by a 25 nautical miles (nm) fisheries management zone, where fishing effort and capacity are being managed by limiting vessel sizes, as well as total vessel engine powers (EC 813/04; EC 1967/06). Trawling is allowed within this designated conservation area, 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 20 cm 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.

Hake are frequently caught together with Norway lobster (*Nephrops norvegicus*), large sized giant red shrimp (*Aristaeomorpha foliacea*), pink shrimp (*Parapenaeus longirostris*), the more rare violet shrimp (*Aristeus antennatus*), the scorpionfish *Helicolenus dactylopterus*, grater forkbeard (*Phycys blennioides*), the flat fish *Lepidorombus boschii*, and the squid *Todarodes sagittaus*..



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Sheet P2b
Fishery by Operational Unit

Code: HKE9911S

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Data source*

OpUnit 2*

ITA 99 E 03 34 - HKE

Regulations in force and degree of observance of regulations

At present there are no formal management objectives for hake fisheries in the Strait of Sicily. As in other areas of the Mediterranean, the stock management is based on control of fishing capacity (licenses), fishing effort (fishing activity), technical measures (mesh size and area closures), and fish size limits. The new regulation CE 1967 of 21 December 2006 fixed in 40 mm the minimum size for bottom trawling for UE fishing boats (Italian and Maltese trawlers). Concerning the current technical measures is to be outlined the incongruence between the minimum marketable size of hake (20 cm total length) and the adopted minimum mesh size of rhomboidal 40 mm opening, which corresponds to a size at 50% capture around 13 cm TL (Fiorentino et al., 1998). It must be to outline the existence in the Strait of Sicily of the Maltese Management Fishing Zone (MMFZ) extending up to 25 nautical miles from baselines around the Maltese islands, in which fisheries are specifically managed on the basis of the control of the fleet capacity.

Accompanying species

Although hake is not a target of a specific fishery, such as deep water pink shrimp and striped mullet, it is the third species in term of biomass which is landed in GSA 16 (Fiorentino et al., 2005). Hake is caught by trawling in a wide depth range (50-500m) together with other important species such as *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone* sp., *Illex coindetii*, *Todaropsis eblanae*, *Lophius* sp., *Mullus* sp., *Pagellus* sp., *Zeus faber*, *Raja* sp..

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Sheet P2b
Fishery by Operational Unit

Code: HKE9911S

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Data source*

OpUnit 3*

ITA 99 F 03 34 - HKE

Regulations in force and degree of observance of regulations

At present there are no formal management objectives for hake fisheries in the Strait of Sicily. As in other areas of the Mediterranean, the stock management is based on control of fishing capacity (licenses), fishing effort (fishing activity), technical measures (mesh size and area closures), and fish size limits. The new regulation CE 1967 of 21 December 2006 fixed in 40 mm the minimum size for bottom trawling for UE fishing boats (Italian and Maltese trawlers). Concerning the current technical measures is to be outlined the incongruence between the minimum marketable size of hake (20 cm total length) and the adopted minimum mesh size of rhomboidal 40 mm opening, which corresponds to a size at 50% capture around 13 cm TL (Fiorentino et al., 1998). It must be to outline the existence in the Strait of Sicily of the Maltese Management Fishing Zone (MMFZ) extending up to 25 nautical miles from baselines around the Maltese islands, in which fisheries are specifically managed on the basis of the control of the fleet capacity.

Accompanying species

Although hake is not a target of a specific fishery, such as deep water pink shrimp and striped mullet, it is the third species in term of biomass which is landed in GSA 16 (Fiorentino et al., 2005). Hake is caught by trawling in a wide depth range (50-500m) together with other important species such as *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone* sp., *Illex coindetii*, *Todaropsis eblanae*, *Lophius* sp., *Mullus* sp., *Pagellus* sp., *Zeus faber*, *Raja* sp..

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Sheet P2b
Fishery by Operational Unit

Code: HKE9911S

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Data source*

OpUnit 4*

TUN 99 F 03 34 - HKE

Regulations in force and degree of observance of regulations

There are no specific regulations for hake fisheries in Tunisian waters. However there is a trawling ban in areas under 3 miles from the coast and / or less than 50 m depth. In terms of technical measures, the minimum mesh size in the cod end of trawlers should not be less than 40mm 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 erythrius*), monkfish (*Lophius piscatorius*), mackerel (*Trachurus* spp.), Norway lobster (*Nephrops norvegicus*) and more rarely giant red shrimp (*Aristaeomorpha foliacea*) and violet shrimp (*Aristeus antennatus*).

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Sheet A1
Indirect methods: VPA, LCA

Sex* SC_2010

Code: HKE9911S

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Time series

Analysis # * LCA

Data	Size	Age
(mark with X)	x	

Model	Cohorts	Pseudocohorts
(mark with X)		x

Equation used	VPA	Tuning method	None
# of gears	5	Software	ANALEN
F _{terminal}	0.2-0.28		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment		
Average			Average population		
Maximum			Virgin population		
Critical			Turnover		

Average mortality

	Total	Gear					
		Italian 12-24	Italian >24	TUN_TRW	TUN_Gillnet	Malta	
F ₁		0.16	0.11	0.11	0.03	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 arithmetic values of F on overall size of catch from 28 to 56 cm of TL

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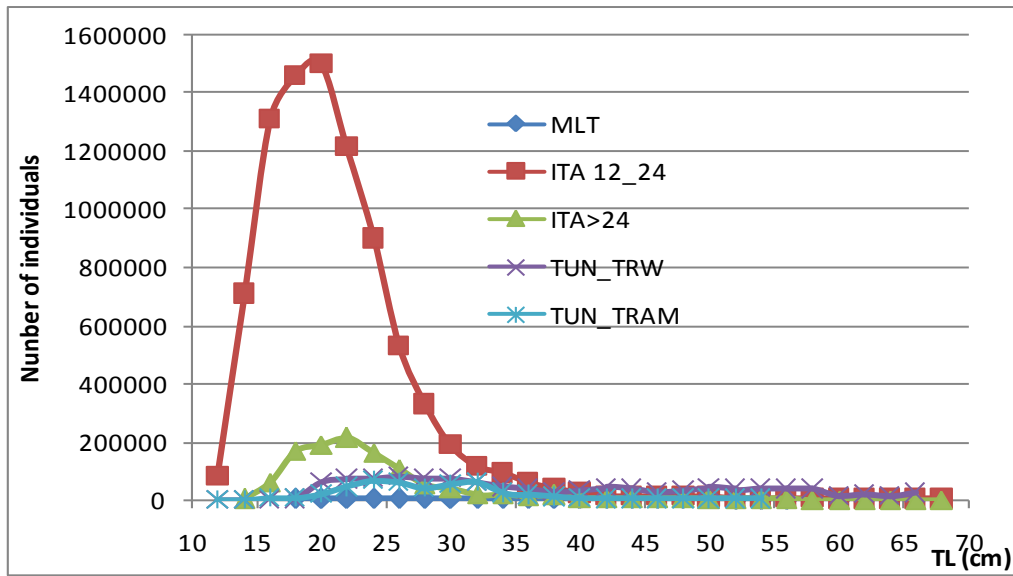
Sheet A2
Indirect methods: data

Code: HKE9911S

Sex*	SC_2010	Gear*	TRW&Gillnet	Analysis # *	VPA
------	---------	-------	-------------	--------------	-----

Data source	LFD
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Data



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Assessment form

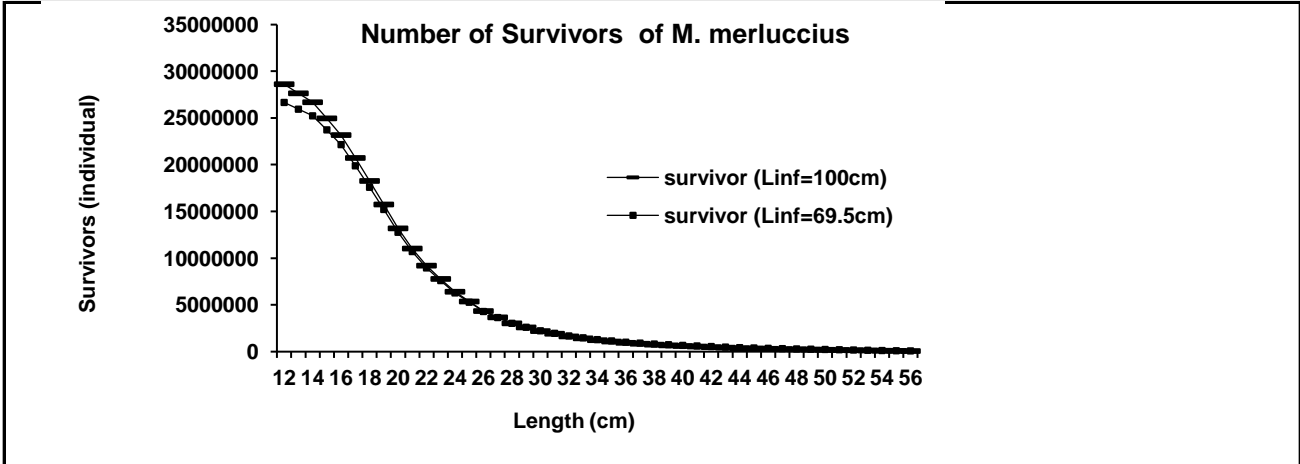
Sheet A3
Indirect methods: VPA results

Code: HKE9911S.

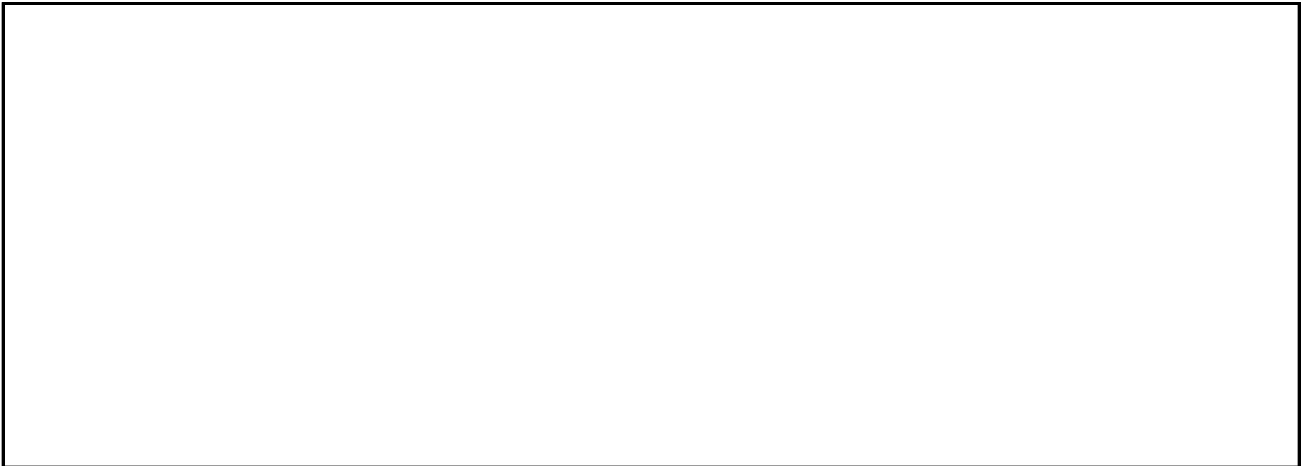
Page 1 / 2

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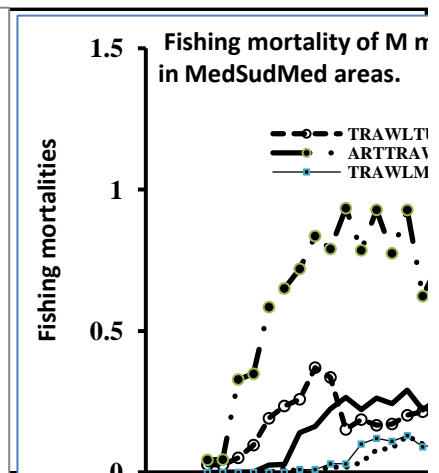
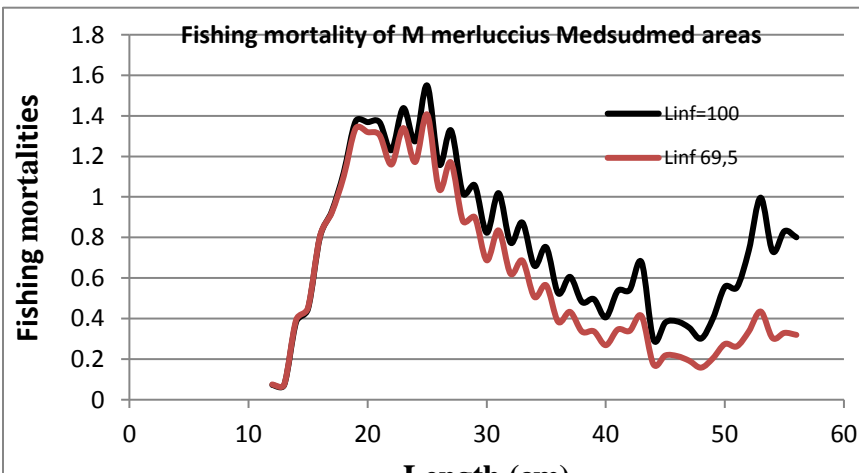
Population in figures



Population in biomass



Fishing mortality rates



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Assessment form Sheet Y
Indirect methods: Y/R

Sex: F+M Code: HKE9911S
Analysis # Y/R

of gears: Trawlers & Gillnets Software Analen

Parameters used

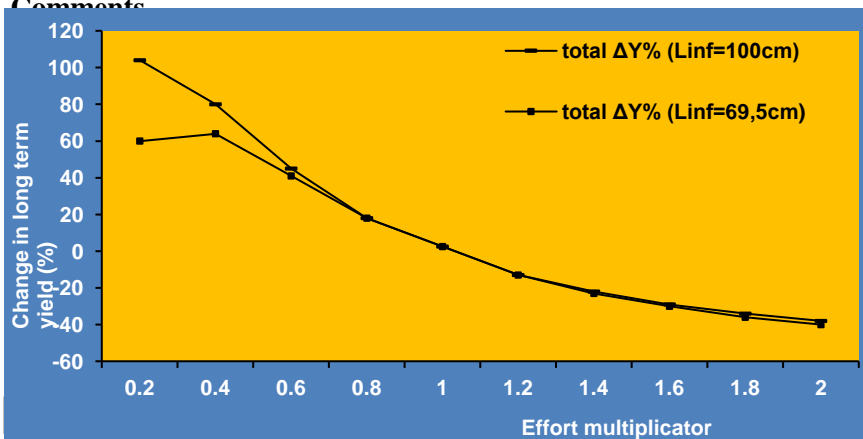
Vector F	
Vector M	
Vector N	

Model characteristics

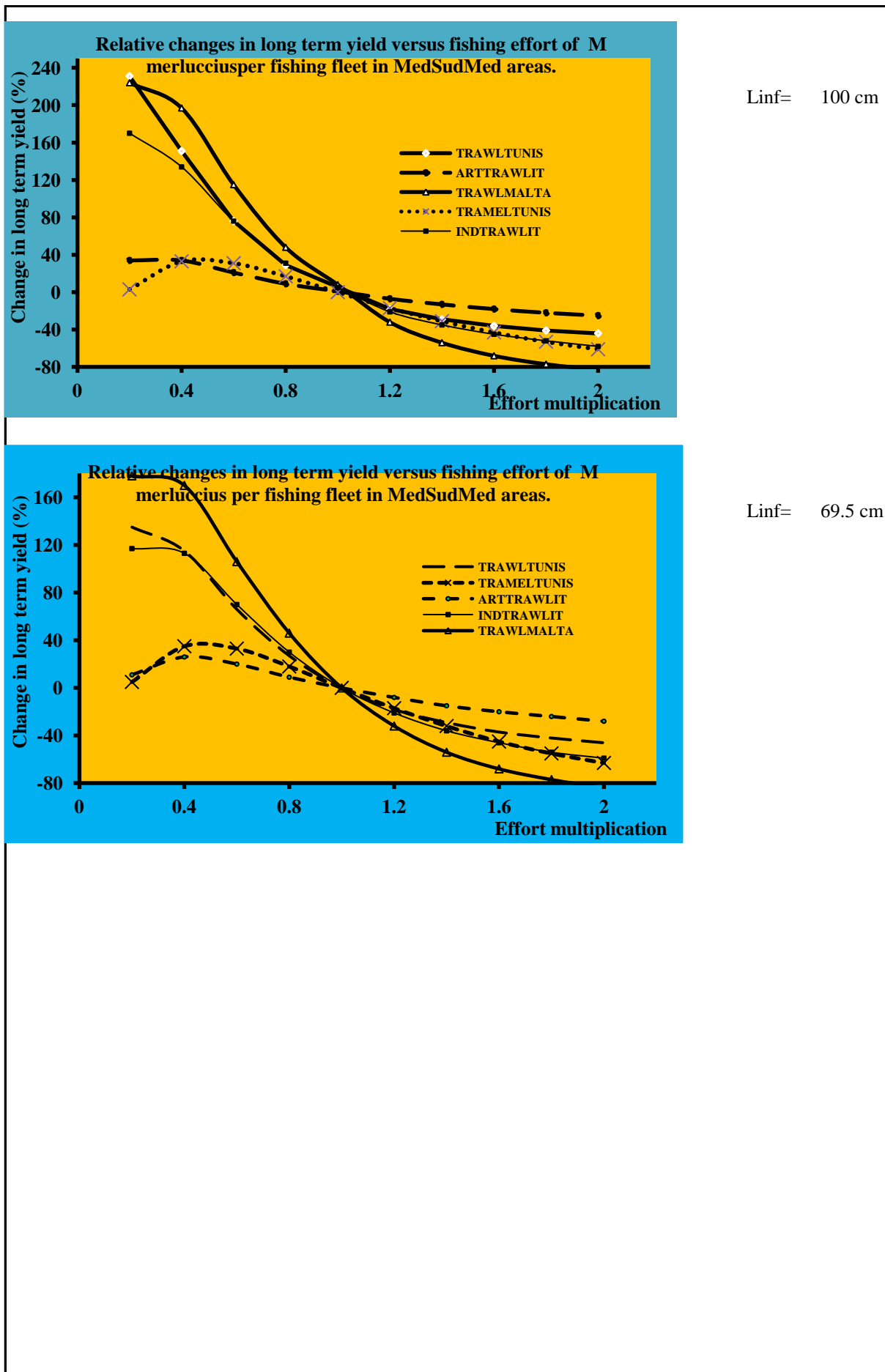
Results

	Total	Gear			
Current YR					
Maximum Y/R					
Y/R 0.1					
F _{max}					
F _{0.1}					
Current B/R					
Maximum B/R					
B/R 0.1					
Current SSB/R					
SSB/R 0.1					
SSB/R virgin					

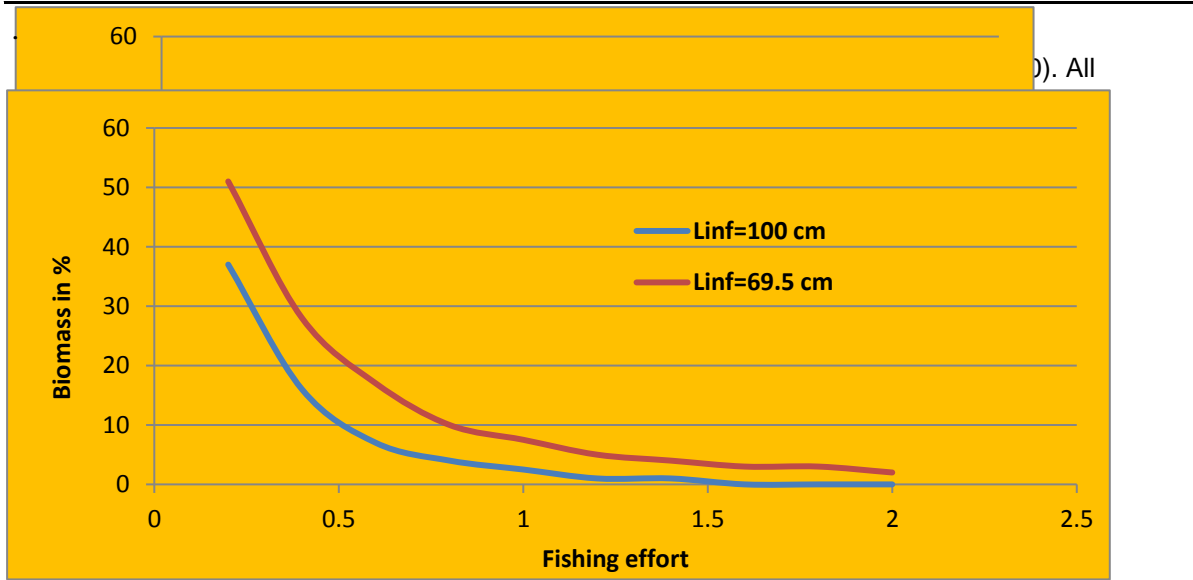
Comments



Comments

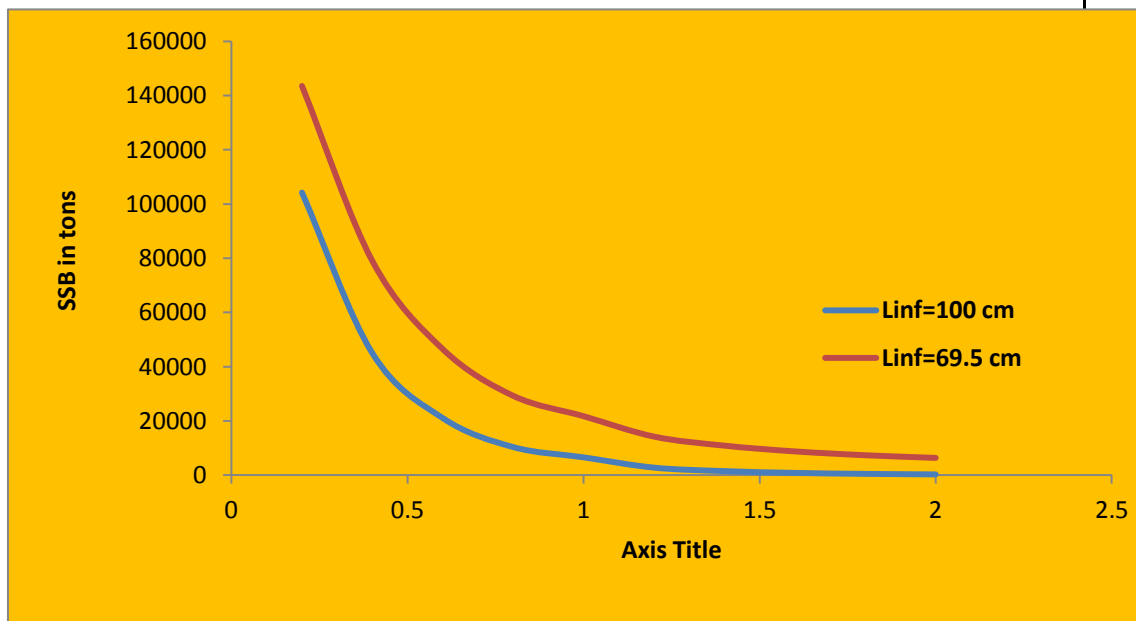


Other assessment methods

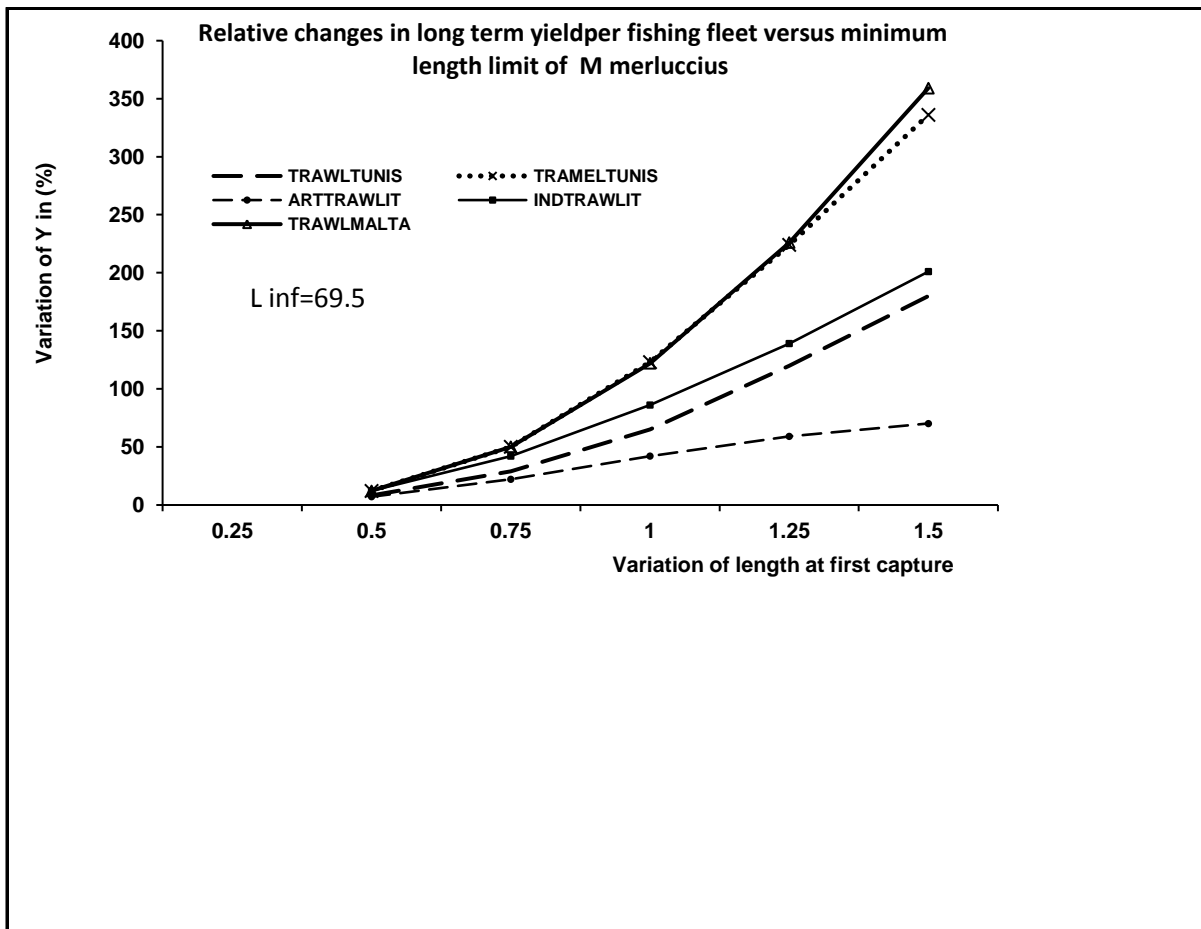
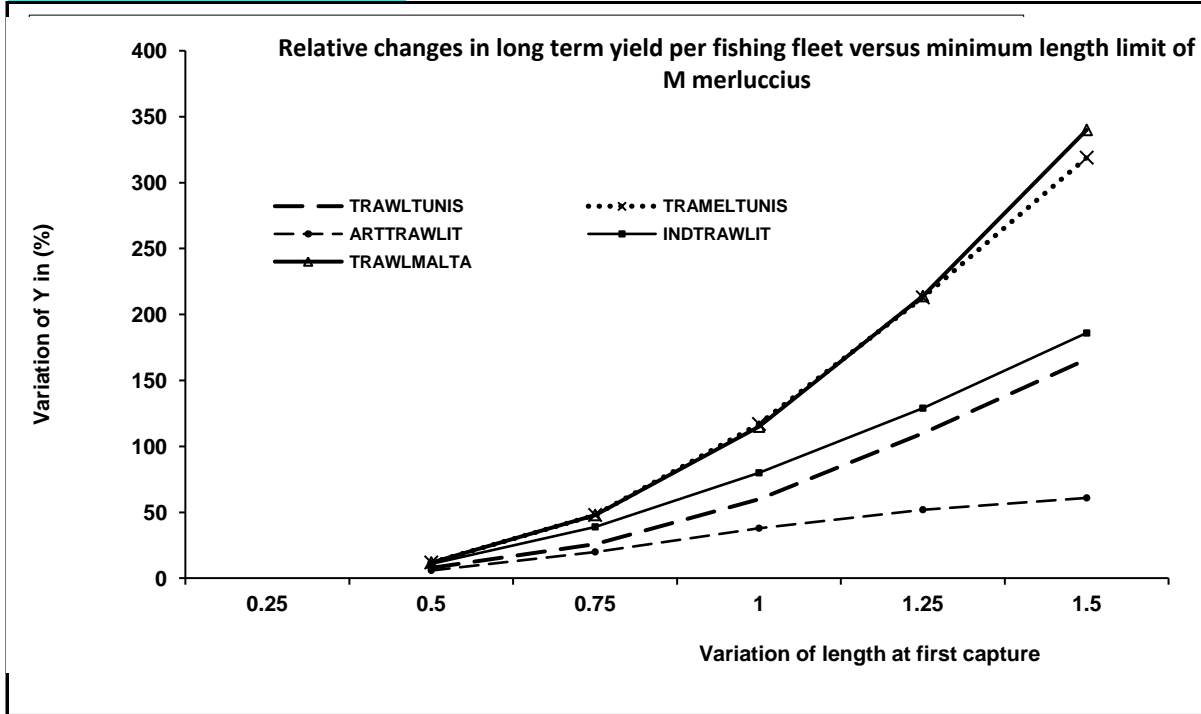


Relative changes in long term of the biomass versus fishing effort of *M. merluccius*

Relative long term change in SSB vs. fishing effort of *Merluccius merluccius*



Other assessment methods



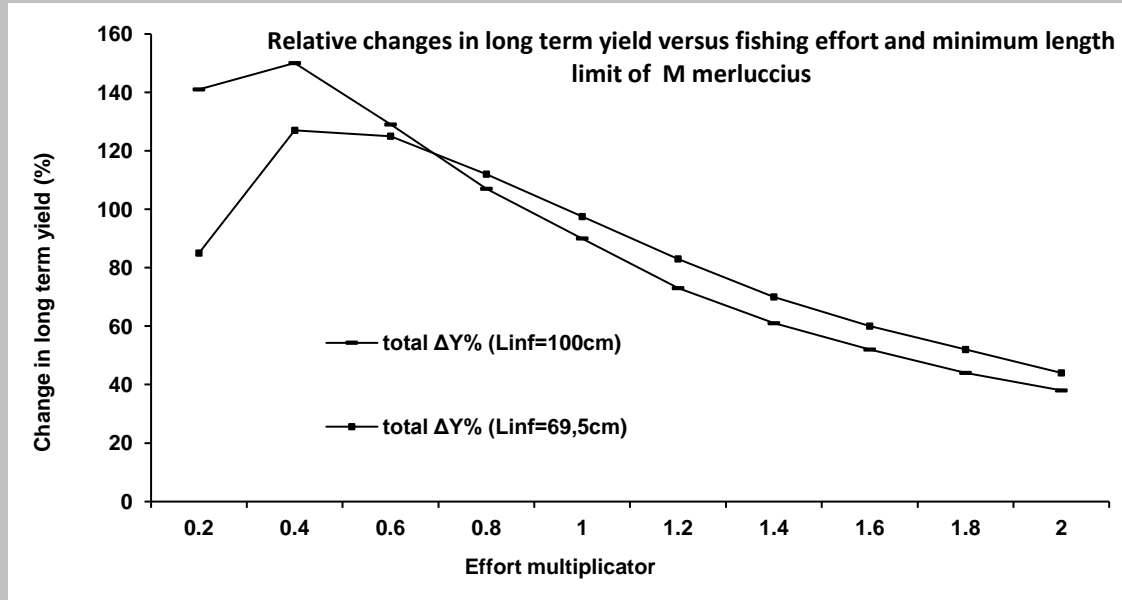
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Assessment form

Sheet other

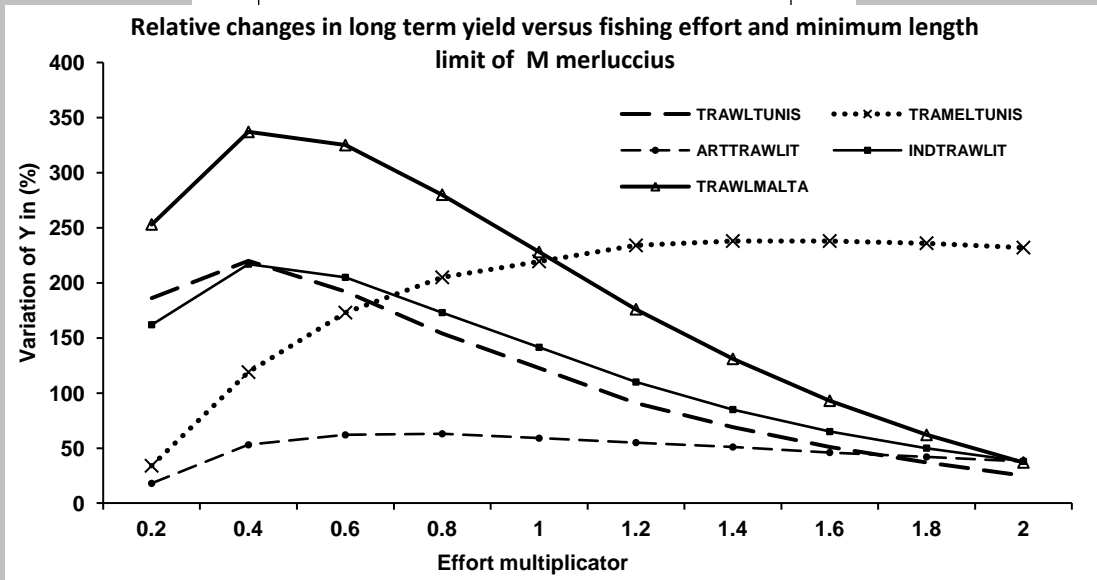
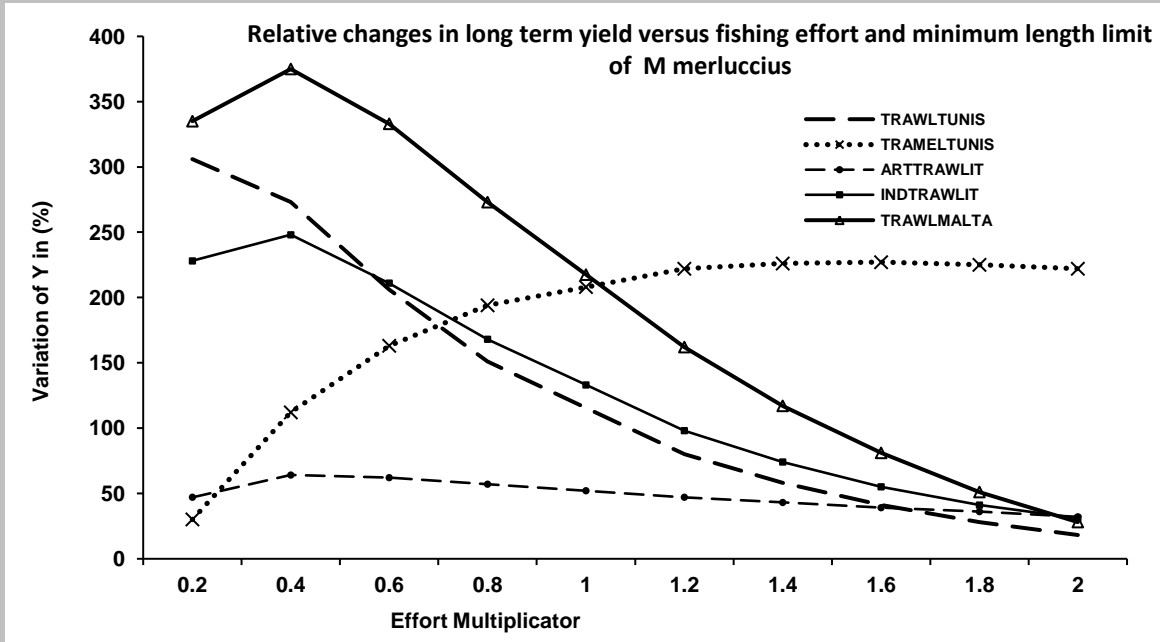
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Code: HKE9911S



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Code: HKE9911S



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Assessment form

Sheet D
Diagnosis

Code: HKE9911S

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B					
SSB					
F					
Y					
CPUE					

Stock Status* Use one (or both) of the following two systems for the stock assessment status description

Unidimensional	<input type="radio"/>	? - (or blank) Not known or uncertain . Not much information is available to make a judgment;
	<input type="radio"/>	U - Underexploited, undeveloped or new fishery . Believed to have a significant potential for expansion in total production;
	<input type="radio"/>	M - Moderately exploited , exploited with a low level of fishing effort. Believed to have some limited potential for expansion in total production;
	<input type="radio"/>	F - Fully exploited . The fishery is operating at or close to an optimal yield level, with no expected room for further expansion;
	<input checked="" type="radio"/>	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;
	<input type="radio"/>	D - Depleted . Catches are well below historical levels, irrespective of the amount of fishing effort exerted;
	<input type="radio"/>	R - Recovering . Catches are again increasing after having been depleted or a collapse from a previous;

Bidimensional	Exploitation rate		Stock abundance	
	<input type="radio"/>	No or low fishing	<input type="radio"/>	Virgin or high abundance
	<input type="radio"/>	Moderate fishing	<input checked="" type="radio"/>	Intermediate abundance
	<input checked="" type="radio"/>	High fishing mortality	<input type="radio"/>	Low abundance
	<input type="radio"/>	Uncertain / Not assessed	<input type="radio"/>	Depleted
			<input type="radio"/>	Uncertain / Not assessed

Comments

The preliminary assessment results show that F is relative high (0.60), and that a high fraction of F is oriented to juveniles. The Y/R analysis showed that the stock is in overfishing status with growth and recruitment overfishing. F_{max} and $F_{0.1}$ would be reached if current F (F_{curr}) is reduced by around 80-90% respectively.

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Assessment form

Sheet Z

Objectives and recommendations

Code: HKE9911S

Management advice and recommendations*

The preliminary assessment carried out indicates that overall F should be reduced following a long term, multiple year strategy. Length at first capture should be increased by both improving selectivity and protecting nursery grounds.

Advice for scientific research*

Due to the wide coverage of the data used, the analysis should be considered a first step toward a complete stock assessment for hake in the Central Mediterranean.

No distinction by sex was considered, and only one year data (2010) was used. In addition, the importance of L+ class used in the analysis should be mentioned as it can cover the effect of the fisheries in the highest size class independently of the growth parameters used as input.

A more accurate analysis by sex and for a longer time series is planned for the future.

Abstract for SCSA reporting

Authors S. Ben Meriem, F.Fiorentino, A.Arneri, L. Ceriola, V. Gancitano, O. Jarboui, L. Knittweis, R. Mifsud **Year** 2011

Species Scientific name Merluccius merluccius - HKE
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 hake 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 hake 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 hake by trawl and gillnet.

Source of management advice*

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

Data was derived from indirect (fishing monitoring) sources. LCA was using to estimated F and abundance vectors by length class and Y/R. The stock status was assessed by using Analen package. The assessed by operational unit or fleet component according to following assumption: each fleet component has its own exploitation pattern. The exploitation pattern was estimated both fleet component and total for the area. The fishing mortality for fleet component was estimated as $F_{i,j}/F_i = C_{i,j}/C_i$

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

Stock abundance

High fishing mortality

Intermediate abundance

Comments

Management advice and recommendations*

The information contained in this report was prepared by the assessor in accordance with the requirements of the relevant standards and is intended to provide a high level of assurance to the client. It is not intended to be used for any other purpose and should not be relied upon for any other purpose. The assessor is not responsible for any loss or damage arising from the use of this report.

Advice for scientific research*

Due to the wide diversity of the data used, the analysis should be considered a first step toward accurate
cross-sectional analysis in the general population.

In addition to the cross-sectional analysis, longitudinal data (LTD) may be used to address the magnitude
of the change in the analysis should be determined as a function of the effect of the exposure in the
analysis. The magnitude of the effect of the exposure may be determined.

For details on the use of LTD, please refer to the following link: