SAC GFCM
Sub-Committee on Stock Assessment

Date*	**17**	**October**	**2011**	**Code***	**NEP0911Lig**

Authors*

Ligas A. (3), Abella A(1)., Colloca F.(2),

Affiliation*

1- ARPAT-Livorno 2- Univ.La Sapienza, Roma 3- CIBM Livorno

Species Scientific name*

1

Source: GFCM Priority Species

2

Source: -

3

Source: -

Geographical area*

Western Mediterranean (FAO Subarea 37.1.)

Geographical Sub-Area (GSA)*

09 - Ligurian and North Tirrenian Sea

Combination of GSAs 1

2

3

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Assessment form — **Sheet #0** — **Basic data on the assessment**

Code: NEP0911Lig

Date*	17	Oct	2011	Authors*	Ligas A. (3), Abella A(1)., Colloca F.(2),

Species Scientific name*	Nephrops norvegicus - NEP	Species common name*	Norway lobster

Data Source

GSA*	09 - Ligurian and North Tirrenian Sea	Period of time*	1994-2010

Description of the analysis

Type of data*	Landings, Length and biological samplings.	Data source*	Official Statistics + trawl surveys
Method of assessment*	survival rates from trawl surveys + LCA	Software used*	SURBA + VIT

Sheets filled out

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

Comments, bibliography, etc.

An assessment of NORWAY LOBSTER is reported. Estimation of mortality rates was performed using size structure of the stock derived from trawl surveys. The proxy of Fmsy F0.1 was estimated using yield-per-recruit analysis. The current fishing mortality rate was compared with the reference value F0.1 for assessing the current status of the stock. The species is considered overfished, with a current rate Fcurr/F0.1 of about 1.4. It is difficult to perform yield forecasting simulating changes in the exploitation rate of the stock due to the not well understood (but apparently important) influence in recruitment success and stock size of other causes than fishing pressure.

Comments, bibliography, etc.

Bibliography (Published papers and books):

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Assessment form — **Sheet B** — **Biology of the species**

Code: NEP0911Lig

Biology

Somatic magnitude measured (LH, LC, etc)*				Total Length	Units*	mm
Sex	Fem	Mal	Both	Unsexed		
Maximum size observed	56	73			Reproduction season	spring-summer
Size at first maturity	30	40			Reproduction areas	
Recruitment size	29	29			Nursery areas	

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	mm	56	72.1	74	74
	K	year-1	0.21	0.17	0.17	0.17
	t0	year	0	0	0	0
	Data source	Length frequency				
Length weight relationship	a		0.00027	0.00026	0.00029	0.00029
	b		3.255	3.254	3.229	3.229

M	0.4	>=2yrs	M vector (see comments)

sex ratio (mal/fem)	01:00

Comments

Males reach maturity at 40 mm CL and females at 30.3 mm CL. Sex ratio is about 1:1 until 26 mm CL; in favour of females from 26 to 35 mm CL; in favour of males from 38 mm CL (De Ranieri et al., 1996). Reproduction peak is between spring and summer, and females with external eggs are observed in autumn-winter.

Comments

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Assessment form

Sheet P1

General information about the fishery

Code: NEP0911Lig

Data source*	Official Statistics+ MEDITS trawl surveys	Year (s)*	1994-2010
Data aggregation (by year, average figures between years, etc.)*	By year 1994-2010		

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	ITA	09	E - Trawl (12-24 metres)	03 - Trawls	34 - Demersal slope species	NEP
Operational Unit 2						
Operational Unit 3						
Operational Unit 4						
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
ITA 09 E 03 34 - NEP	60	Tons	162				
Total	60		162				

Legal minimum size	7 cm TL

Comments

The catch is not split by Operational Units.

Comments

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Assessment form

Sheet P2a
Fishery by Operational Unit

Code: NEP0911Lig

Data source*	DCF, Data Call 2011	OpUnit 1*	ITA 09 E 03 34 - NEP

Time series

Year*	2004	2005	2006	2007	2008	2009
Catch	274	289	248	260	228	250
Minimum size			20	18	18	18
Average size Lc			33.5	35.1	34	33.2
Maximum size			60	64	64	64
Fleet						

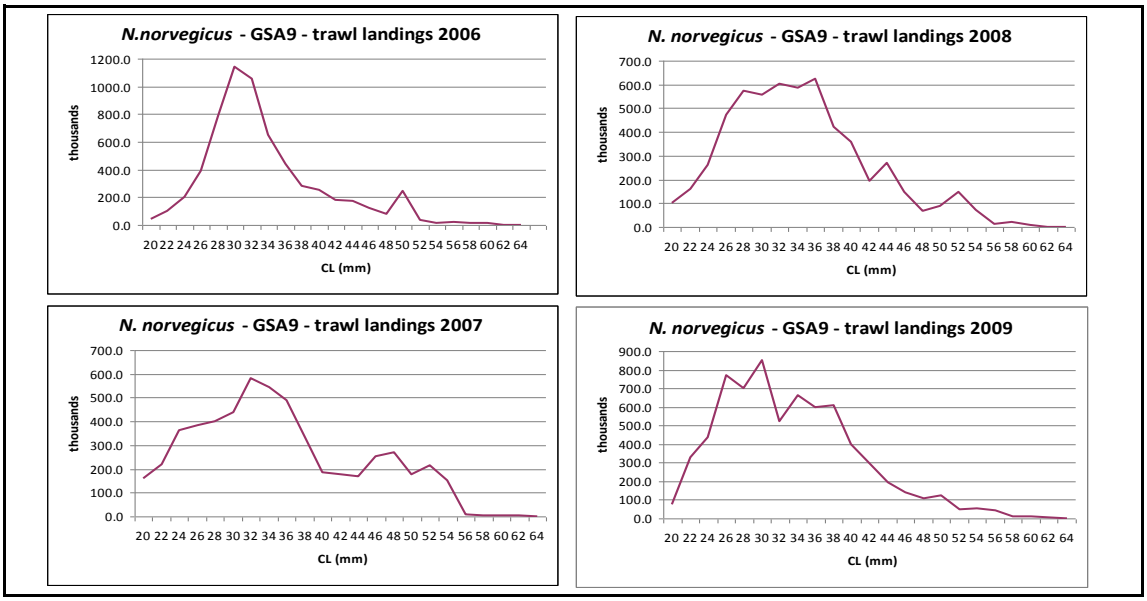
Year	2010					
Catch	162					
Minimum size	14					
Average size Lc	33.2					
Maximum size	60					
Fleet						

Selectivity

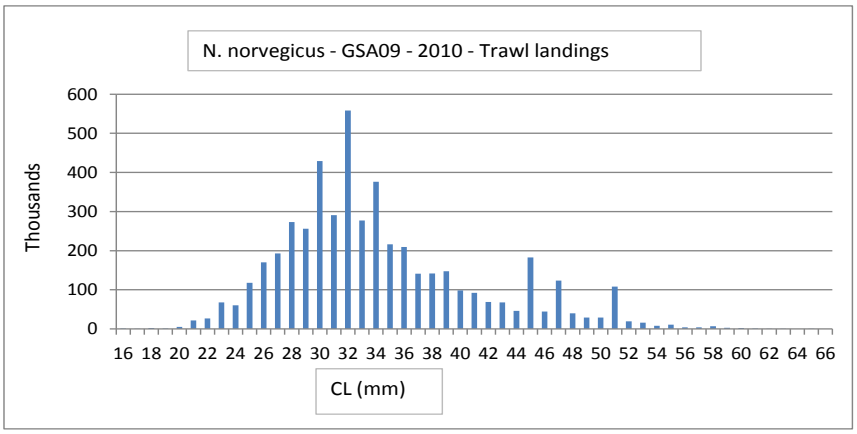
L25	
L50	29
L75	
Selection factor	

Remarks

Structure by size or age



Structure by size or age



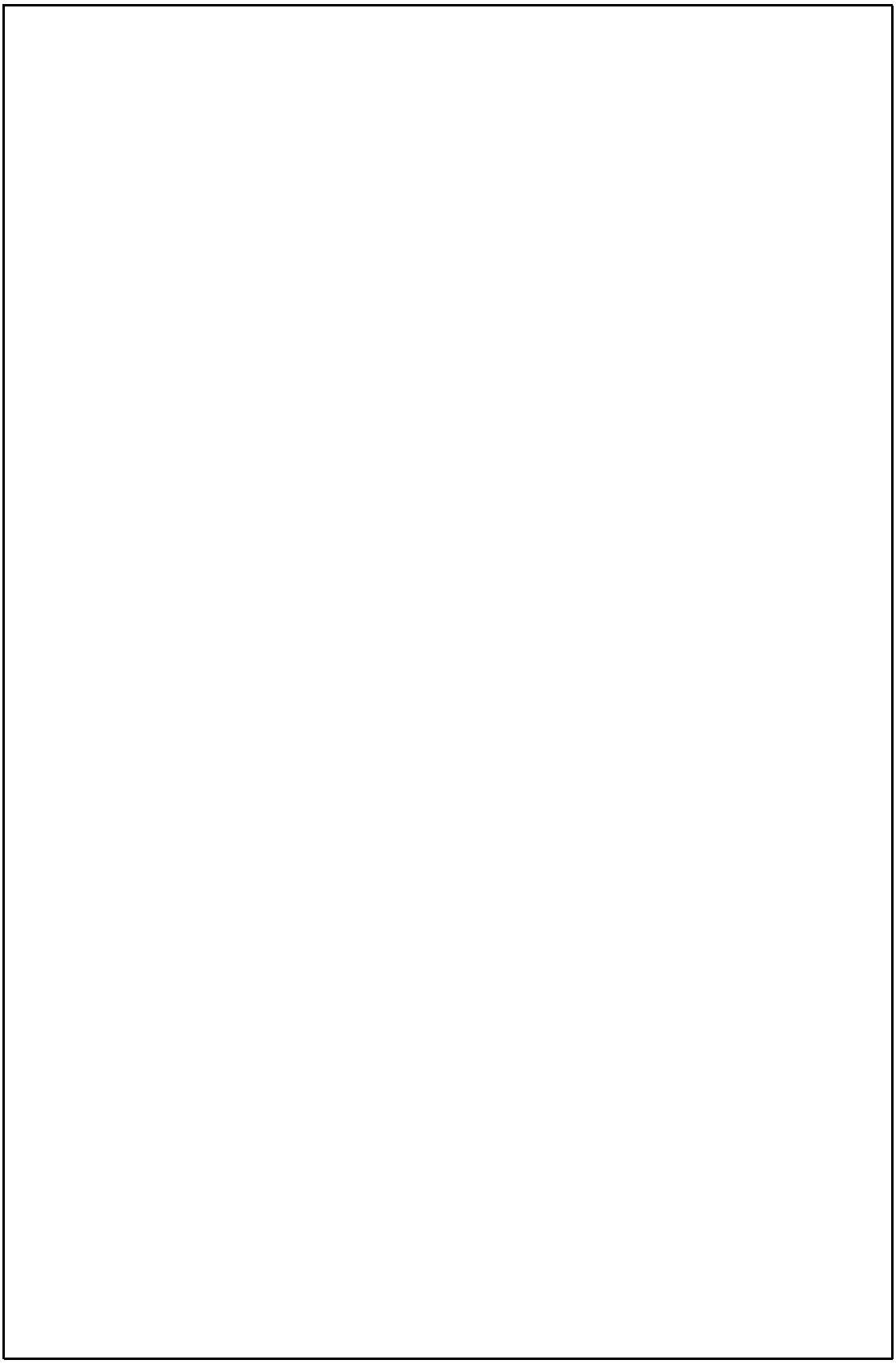
Data source*	Official Statistics	OpUnit 1*	ITA 09 E 03 34 - NEP

Regulations in force and degree of observance of regulations

Fishing license: fully observed
Minimum landing size 7 cm: mostly observed
Fishing allowed for 5 days a week: fully observed
Technical measures regulations: mostly observed

Accompanying species

The most important are:
Micromesistius poutassou
Parapenaus longirostris
Merluccius merluccius
Phycis blennoides
Todarospsis eblanei
Illex coindetti
Lepidopus caudatus
Eledone cirrhosa
Aristaeomorpha foliacea
Aristeus antennatus



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

Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: NEP0911Lig

Sex*	M+F

Analysis # *	1

Time series

Data	Size	Age
(mark with X)	x	

Model	Cohorts	Pseudocohorts
(mark with X)		x

Equation used		Tunig method	
# of gears	1	Software	VIT
$F_{terminal}$	0.5		

Population results (please state units)

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

Average mortality

		Gear					
	Total	recent years					
F_1	0.35	average value					
F_2							
Z							

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

Comments

fishing mortality values very fluctuating, about 0.35 for the period 2006-2010

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Assessment form

Sheet A2

Indirect methods: data

Code: NEP0911Lig

Sex*	M+F	Gear*	bottom trawl	Analysis # *	1

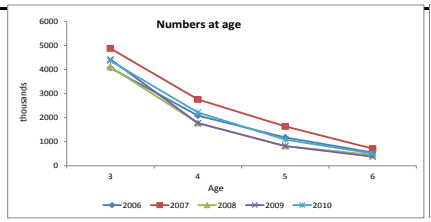
Data	2006-2010

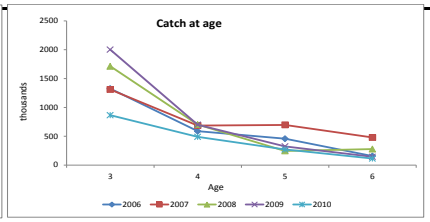
Data

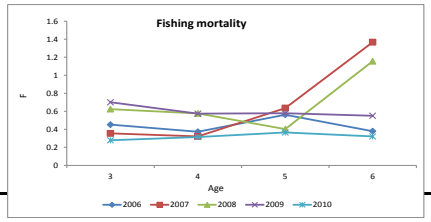
Carapace length (mm)	2006	2007	2008	2009	2010
14		2.5	3.7		8.2
16	0.0	2.5	11.7		33.2
18	0.0	16.0	63.9	16.9	27.2
20	45.3	160.7	103.2	75.5	118.9
22	99.3	221.2	159.9	330.9	125.6
24	203.2	363.4	260.8	438.2	197.7
26	388.2	384.0	473.2	772.3	375.1
28	790.4	401.4	572.2	703.0	534.9
30	1139.5	439.4	558.0	853.2	724.2
32	1055.9	581.5	603.3	521.7	837.8
34	650.3	543.6	587.2	663.2	593.7
36	444.0	490.6	622.7	597.4	350.9
38	279.5	331.6	423.3	608.3	289.2
40	252.8	187.5	357.8	400.7	190.8
42	177.3	178.5	192.3	294.1	136.9
44	173.5	167.7	217.7	195.5	228.7
46	120.5	253.8	147.1	140.7	168.0
48	82.3	269.7	66.2	105.5	68.6
50	249.3	175.9	89.5	122.3	137.1
52	34.4	213.8	148.8	50.3	34.9
54	14.8	151.6	70.5	52.8	18.7
56	18.5	10.1	14.3	41.2	7.9
58	16.4	4.2	19.7	10.9	9.7
60	12.2	5.0	8.8	11.4	4.1
62	0.0	2.9	1.9	3.7	
64	0.0	0.4	0.5	0.9	

Sex*	M+F	Gear*	trawlers	Analysis #*	LCA with VIT

Population in figures







Population in biomass

the analysis has been performed gathering the catches of all the fleets operating in GSA9. At a smaller scale, the local situations might be different for different grounds due to their geo-morphological characteristics, productivity and size of fleets operating in each one of them

Fishing mortality rates

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Assessment form

Sheet Y
Indirect methods: Y/R

Code: NEP0911Lig

Sex	M+F

Analysis #	

# of gears	1	Software	Yield (Hoggarth et al., 2006)

Parameters used

Vector F	F multiplied by probability of selection by size
Vector M	0.4
Vector N	

Model characteristics

Yield per recruit of Beverton & Holt

Results

	Total	Gear			
Current YR					
Maximum Y/R	4.5				
Y/R 0.1	4.2				
F_{max}	0.36				
$F_{0.1}$	0.21				
Current B/R					
Maximum B/R					
B/R 0.1					

Comments

Males

Yield software quantified uncertainty by repeatedly selecting a set of biological and fishery parameter

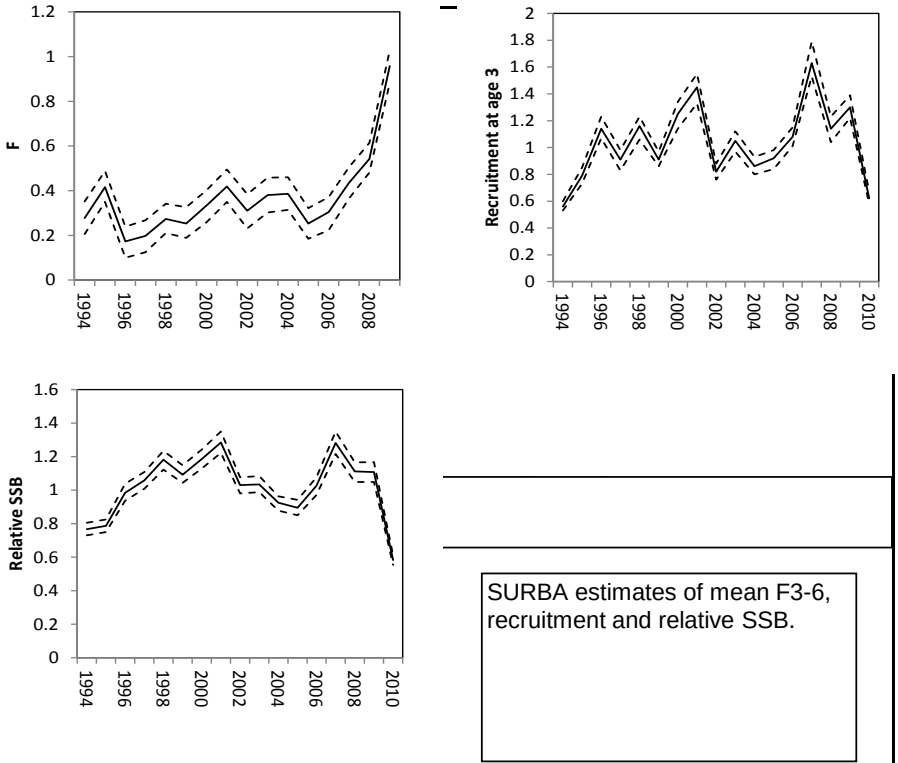
Yield software quantified uncertainty by repeatedly selecting a set of biological and fishery parameter by sampling from the probability distributions for uncertain parameters set by the user, and then calcu the quantities of interest. In this sampling, it is assumed that each of the uncertain parameters are

Comments

certainly incorrect (Hoggarth *et al.* , 2006). F_{max} and $F_{0.1}$ were assumed respectively as limit and target reference points. Their probability distributions showed a considerable variation. The following median values were obtained: F_{max} = 0.36; $F_{0.1}$= 0.21. The maximum predicted values were respectively 0.59 (F_{max}) and 0.30 (F_{01}).

Other assessment methods

SURBA (Needle, 2003) was used for an alternative estimation of F and for the analysis of evolution of biomass. The time series of size distribution proceeding from the MEDITS trawl surveys 1994-2010 were used.



SURBA estimates of mean F3-6, recruitment and relative SSB.

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Assessment form	**Sheet D Diagnosis**

Code: NEP0911Lig

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B					
SSB					
F					
Y					
CPUE					
F0.1	0.35		0.21		
Fmsy					

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

The stock is considered overexploited. At the current level of fishing pressure, even though production is not optimized a danger of stock collapse is not likely. Biomass has shown a clear increasing trend in almost all the sub-areas of the GSA that is not possible to explain by changes in fishing pressure.

Code: NEP0911Lig

Management advice and recommendations*

The stock is on average for the whole GSA9 overexploited. A reduction in fishing effort should be enforced in order to drive the stock to levels close to the FMSY. (the F0.1 considered as a proxy of Fmsy has been used as a reference value).
Differences in the evolution of abundance in time occur on the different grounds of the GSA. They can hardly be explained by changes in fishing pressure. This fact suggest the need of a more detailed analysis including environmental factors or others. A better definition of stock (or sub-stock) units and a detailed assessment of the impact of the different fleets targeting the species in the different grounds within the GSA would be helpful for a more sound management of the stocks in the future.

Advice for scientific research*

Comments*

.
Recent values of F3-6 obtained on commercial data with LCA (VIT) and using SURBA indicate that the stock is currently overexploited. A reduction of fishing effort is recommended. It can be achieved by means of a multiannual management plan towards the proposed management reference point in order to avoid long term losses in yield. Such management plan should consider the mixed fisheries implications for the Nephrops fisheries.

Abstract for SCSA reporting

Authors Ligas A. (3), Abella A(1)., Colloca F.(2),

Year 2011

Species Scientific name Nephrops norvegicus - NEP

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 09 - Ligurian and North Tirrenian Sea

Fisheries (brief description of the fishery)*

Nephrops norvegicus is among the most important species exploited commercially in the area. It is an important component of the species assemblage that constitutes the target of the shelf break-slope fisheries using trawl nets.
N. norvegicus is a mud-burrowing species that prefers sediments with mud mixed with silt and clay in variable proportions. The emergence from burrows of individuals may vary depending on biological features or environmental factors (moult or reproduction cycles, light intensity, etc).
The species lives on muddy substrates at depths between 150 and 800 m, but in the area is more commonly found between 250 and 800 m depth.
Recruits peak in abundance between 400 and 500 m depth over the upper slope and appear to move slightly deeper when they reach 30 mm carapace length
Norway lobster fishing grounds include soft bottoms of upper slope, generally between 350 and 600 m depth. Fishing pressure shows some geographical differences inside the GSA 09 according to the consistency of the fleets, the availability of the resources and the morphology of the continental shelf and upper slope. The species by-catch is mainly represented by Micromesistius poutassou, Phycis blennoides, Lepidorhombus bosci, Galeus melastomus, Parapenaeus longirostris, Eledone cirrhosa, Todaropsis eblane, Trachurus spp. The species has a very high price, which varies depending on size, availability and market request. It is consumed fresh,.

Source of management advice*

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

The relatively long time series of data available from the MEDITS survey provided the most important data sets for analysis. The survey-based stock assessment approach SURBA (Needle, 2003) was used on MEDITS (1994-2010) data of the Norway lobster from GSA 09.
The analyses were performed excluding the first age groups, because these are not efficiently sampled by trawl net.

Assessment was performed using an LCA (VIT software, Lleonart and Salat 1997) on an annual pseudo-cohort (2006-2010).

Data coming from DCF contained information on landings and the respective size/age structure for 2006-2010. The short data time series did not allow the application of VPA.

LCA was performed using VIT software on data of the years 2006, 2007, 2008, 2009 and 2010.

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*

The stock is on average for the whole GSA9 overexploited. A reduction in fishing effort should be enforced in order to drive the stock to levels close to the FMSY. (the F0.1 considered as a proxy of Fmsy has been used as a reference value).
Differences in the evolution of abundance in time occur on the different grounds of the GSA. They can hardly be explained by changes in fishing pressure. This fact suggest the need of a more detailed analysis including environmental factors or others. A better definition of stock (or sub-stock) units and a detailed assessment of the impact of the different fleets targeting the species in the different grounds within the GSA would be helpful for a more sound management of the stocks in the future.

Advice for scientific research*