SAC GFCM
Sub-Committee on Stock Assessment

Date*	17	October	2011	Code*	BOG2511Mar

Authors*

Marios Josephides

Affiliation*

DFMR- Department of Fisheries and Marine Research, Ministry of Agriculture, Natural Resources and Environment, 1416 Nicosia, Cyprus

Species Scientific name*

1 *Boops boops* - *BOG*

Source: GFCM Priority Species

2

Source: -

3

Source: -

Geographical area*

Cyprus Island

Geographical Sub-Area (GSA)*

25 - Cyprus Island

Combination of GSAs

1

2

3

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

Assessment form

Sheet #0

Basic data on the assessment

Code: BOG2511Mar

Date*	17	Oct	2011	Authors*	Marios Josephides

Species Scientific name*	Boops boops - BOG	Species common name*	Bogue

Data Source

GSA*	25 - Cyprus Island	Period of time*	2005-2010

Description of the analysis

Type of data*	Age composition of landings per gear, official landings data, biological parameters	Data source*	DFMR
Method of assessment*	VPA- pseudocohort and Y/R analysis	Software used*	VIT (Lleonart and Salat, 1997)

Sheets filled out

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

Comments, bibliography, etc.

Comments:

The biological data used were collected within the framework of the Cyprus National Data Collection Programme, according to the EC Data Collection Regulation.

Comments, bibliography, etc.

Reports:

Annual Reports on the Cyprus Fisheries for the years 2005-2010. Departmental Reports. Department of Fisheries and Marine Research, Ministry of Agriculture, Natural Resources and Environment.

References:

Abella, A., Caddy, J. F. and Serena, F. (1999). Estimation of the parameters of the Caddy reciprocal M-at-age model for the construction of natural mortality vectors. CIHEAM- Options Mediterraneennes, pp:10

Beverton, R.J.H. and Holt, S. (1957). On the Dynamics of Exploited fish populations. UK Minist. Agric. Fish. Food. Fish. Invest. ((Ser.2)19, pp:533.

Gayanilo, F.C., Sparre, P. and Pauly, D. (2005). FAO - ICLARM stock assessment tools II - User's manual. Computerized Information Series. Fisheries No.8, pp:88-90.

Hilborn, R. and Walters, C.J. (1992).Quantitative Fisheries Stock assessment. Choice,Dynamics and Uncertainty. Chapman & Hall, pp:570.

Lleonart, J. and Salat. J. (1997). VIT: Software for fisheries analysis. FAO Computerized Information Series (fisheries). pp: 107.

Lleonart, J. (2002). Overview of Stock Assessment methods and their suitability to Mediterranean fisheries. 5th session of the SAC-GFCM, Rome, 1-4 July, 2002.

Lleonart, J. (2004). Indicators and Reference Points provided by the VIT software. GFCM/SAC/SCSA Workshop on Reference Points. Rome. Italy. 20-21 April, 2004.

Maynou, F. (1999). VIT (windows version): Software for fisheries analysis. FAO Computerized Information Series (fisheries). pp: 21

Ratz, H.J., A. Cheilari and Lleonart, J. (2010). On the perfomance of fish stock parameters derived from VIT pseudo-cohort analysis. SCIENTIA MARINA 74(1), p:155-162.

Vigneau, J. and Mahevas, S. (2005). A new statistic for sampling design investigation: an application to length-structured landings sampling. CM 2005/Z:07, pp:1-15.

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

Code: BOG2511Mar

Biology

Somatic magnitude measured (LH, LC, etc)*	Total length	Units*	cm

Sex	Fem	Mal	Both	Unsexed		
Maximum size observed			36		Reproduction season	February-May
Size at first maturity			13		Reproduction areas	Shelf
Recruitment size					Nursery areas	Shelf

Parameters used (state units and information sources)

			Sex			
		Units	female	male	both	unsexed
Growth model	L∞	cm			26.09	
	K	years-1			0.26	
	t0	years			-1.59	
	Data source	Otolith readings				
Length weight relationship	a				0.004	
	b	cm ang g			3.32	

	M					

sex ratio (mal/fem)	

Comments

An M vector was used, as estimated by PROBIOM spreadsheet (Abella et al, 1997)

Age	M
0	0.45
1	0.17
2	0.13
3	0.12
4	0.12
5+	0.11

Comments

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Assessment form

Sheet P1

General information about the fishery

Code: BOG2511Mar

Data source*	DFMR official landings data.	Year (s)*	2005-2010

Data aggregation (by year, average figures between years, etc.)*	Annual landings of bogue by operational unit.

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	CYP	25	C - Minor gear with engine (6-12 metres)	07 - Gillnets and Entangling Nets	33 - Demersal shelf species	BOG
Operational Unit 2	CYP	25	E - Trawl (12-24 metres)	03 - Trawls	33 - Demersal shelf species	BOG
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
CYP 25 C 07 33 - BOG	500	Tons	1346.74	e, Spicara maena,	nsidered negligib	lodus annularis,	days
CYP 25 E 03 33 - BOG	4	Tons	108.61	Spicara smaris	included		days
Total	504		1455.35				

Legal minimum size	

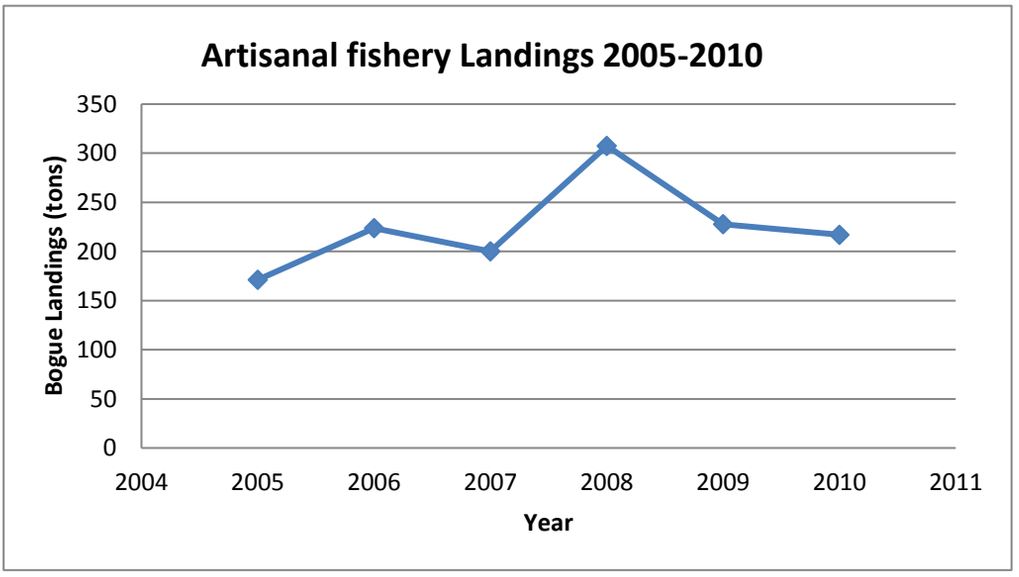
Comments

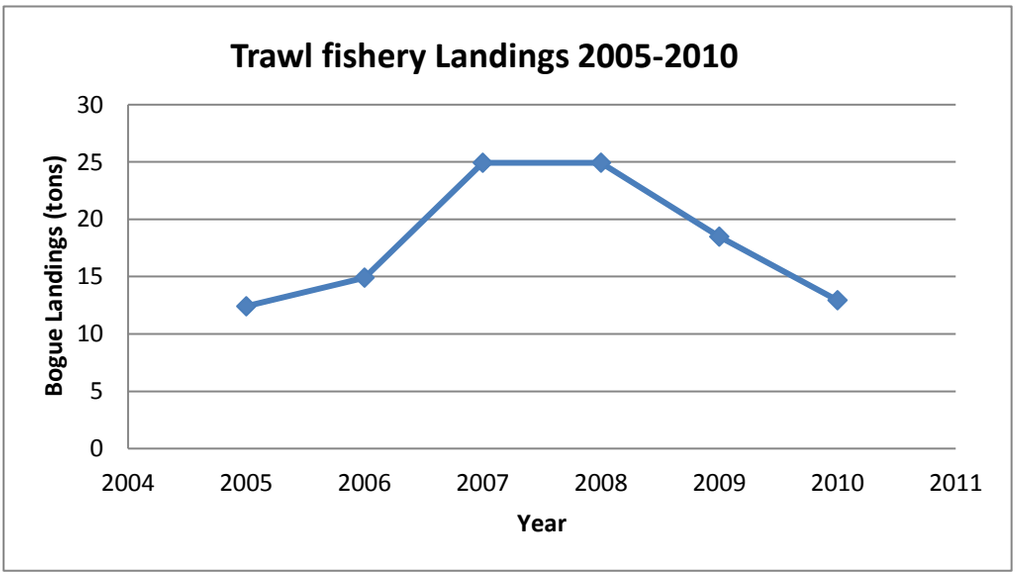
Bogue in GSA 25 is exploited mainly by the artisanal fleet using set nets (basically gill nets), with other semi demersal species such us Spicara smaris and Spicara maena. The percentagefrom the overall landings of the species is 92.5% and 7.5% for each gear respectively. It is obvious that is mainly exploited by the artisanal fishery.

Fleet: Since 2006 the number of licensed bottom trawlers operating in GSA25 has been reduced by 50% (from 8 to 4).
Catch: For both operational units, catch refers to the average values of the years 2005-2007 and 2008-2010.

Discards from the bottom trawl were evaluated for the first time in 2006, through a pilot study under the 2006 Cyprus National Fisheries Data Collection Programme. The discard estimates of *B.boops* for 2006 and 2007 were less than 200kg, accounting for about 0.4% of the total catch of the species. The percentage showed a significant increase for 2008 with 3%, while until 2010 has decreased to 1.2%.
Discards from the artisanal fishery are considered negligible.

Comments


Artisanal fishery Landings 2005-2010
Bogue Landings (tons)
350
300
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
Year


Trawl fishery Landings 2005-2010
Bogue Landings (tons)
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
Year

Data source*	DFMR official data	OpUnit 1*	CYP 25 C 07 33 - BOG

Time series

Year*	2005	2006	2007	2008	2009	2010
Catch	171.12	223.68	200.08	307.3	227.7	216.85
Minimum size						
Average size Lc						
Maximum size						
Fleet	500	457	490	498		

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

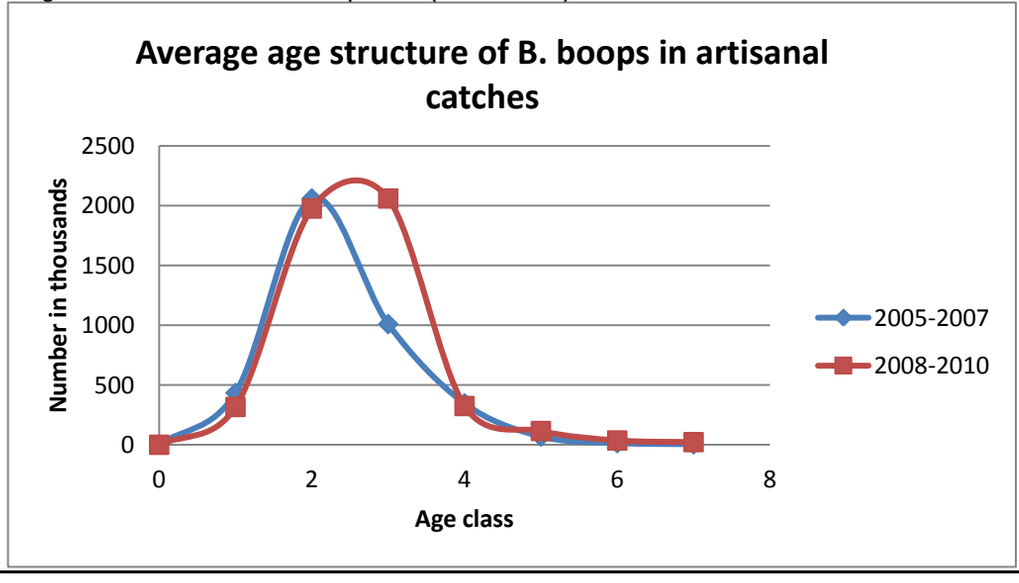
Selectivity

L25	
L50	
L75	
Selection factor	

Remarks

Structure by size or age

The most exploited age classes by the artisanal fleet (gill net) are the age classes 2 for the first period (2005-2007), 2 and 3 age classes for the second period (2008-2010).



Structure by size or age

Data source*	DFMR official data	OpUnit 2*	CYP 25 E 03 33 - BOG

Time series

Year*	2005	2006	2007	2008	2009	2010
Catch	12.41	14.91	24.93	24.93	18.49	12.94
Minimum size						
Average size Lc						
Maximum size						
Fleet	8	4	4	4	4	4

Year						
Catch						
Minimum size						
Average size Lc						
Maximum size						
Fleet						

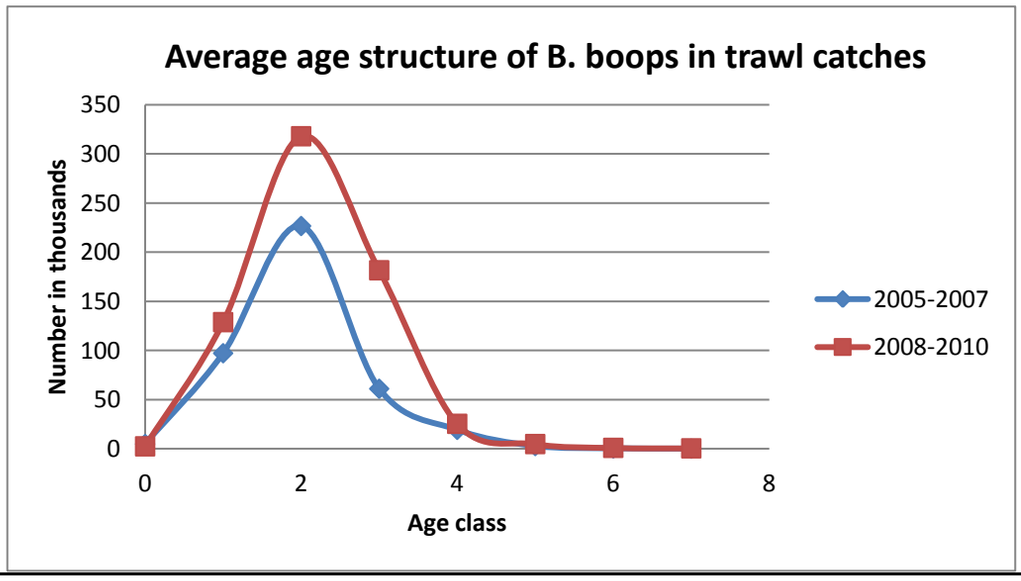
Selectivity

L25	
L50	
L75	
Selection factor	

Remarks

Structure by size or age

The most exploited age class by the bottom trawl is the age class 2 for both periods.



Data source*	National legislation, DFMR data	OpUnit 1*	CYP 25 C 07 33 - BOG

Regulations in force and degree of observance of regulations

Restriction of the maximum number of licenses. Since 2008 assignment of licensed fishermen in 3 categories (A, B, C), based on their fishing activity and certain criteria. Licenses A&B restricted to 500. Th restriction of licenses is fully observed.

Restrictions on the use of fishing gears depending on the fishing license category.
- For licenses A & B:
  Minimum mesh size of nets at 32mm (open mesh size): fully observed. In the near future the minimum mesh size will be set at 36mm.
  Maximum length of nets: For boats with license A is 5000m, for boats with license B is 3000m. Fully observed.
  Restriction on the use of monofilament nets: Maximum length at 2400 m, allowable range of mesh size (open mesh size) 34 - 50 mm. Fully observed.
  Maximum height of nets: 4m. Fully observed.
  Restrictions on the time and duration of fishing, depending on mesh sizes. Fully observed.
- For licenses C (not fully observed):
  Minimum mesh size of nets at 36mm (open mesh size).
  Prohibition of the use of monofilament nets.
  Maximum length of nets: 600 m.
  Restriction of number of fishing days at 70 days annually, during weekends of certain months.

Accompanying species

Sparisoma cretense
Mullus surmuletus
Octopus vulgaris
Sepia officinalis
Serranus cabrilla
Scorpaena spp.
Labridae
Diplodus spp.
Boops boops
Pagellus erythrinus
Siganus spp.

Data source*	EC and National Legislation, DFMR data	OpUnit 2*	CYP 25 E 03 33 - BOG

Regulations in force and degree of observance of regulations

Maximum number of licenses restricted to 4 (since 2006): fully observed.

Closed trawling period from 1st of June until the 7th of November (in force since the mid '80s) : fully observed.

Minimum mesh size of trawl net at 40mm (diamond shape) : fully observed. From 1st of June 2010 the 40mm diamond shape trawl net will be replaced by a square meshed net of 40mm or by a diamond meshed net of 50mm at the cod-end.

Prohibition of bottom trawling at depths less than 50m and at distances less than 0.7 nautical miles off the coast. From November 2008 there is a prohibition of bottom trawling at distances between 0.7 and 1.5 nautical miles in certain areas within the territorial waters. Fully observed.

Accompanying species

Spicara smaris
Boops boops
Mullus surmuletus
Pagellus erythrinus
Octopus vulgaris
Loligo vulgaris
Sepia officinalis
Eledone moschata
Octopus macropus
Pagellus acarne
Serranus cabrilla
Synodus saurus
Scorpaena spp.
Trigloporus lastovisa
Uranoscopus scaber
Pagrus pagrus
Merluccius merluccius

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Assessment form

Sheet A1
Indirect methods: VPA, LCA

Code: BOG2511Mar

Sex*	Both

Analysis # *	1-VPA

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Standard catch equation	Tunig method	
# of gears	2	Software	VIT(Lleonart and Salata, 1997)
$F_{terminal}$	0.12		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	8.04 millions	44.5 tons
Average	13.653	1.405	Average population	14.78 millions	420.57 tons
Maximum			Virgin population		1941.48 tons
Critical	15.831	2	Turnover		70.65

Average mortality

		Gear					
	Total	Gill nets	Bottom trawl				
F_1	0.567	0.534	0.033				
F_2	0.261	0.237	0.024				
Z	0.732						

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

Comments

The above estimations are for the period 2005-2007.

F1 refers to Mean F
F2 refers to Global F

Sex*	Both

Analysis # *	2-VPA

Time series

Data	Size	Age
(mark with X)		X

Model	Cohorts	Pseudocohorts
(mark with X)		X

Equation used	Standard catch equation	Tunig method	
# of gears	2	Software	VIT (Lleonart and Salat, 1997)
$F_{terminal}$	0.12		

Population results (please state units)

	Sizes	Ages		Amount	Biomass
Minimum			Recruitment	9.91 millions	54.90 tons
Average	14.154	1.627	Average population	20.02 million	659.3 tons
Maximum			Virgin population		2392.38 tons
Critical	15.831	2	Turnover		58.63

Average mortality

		Gear					
	Total	Gill net	Bottom trawl				
F_1	0.369	0.348	0.021				
F_2	0.221	0.203	0.018				
Z	0.534						

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

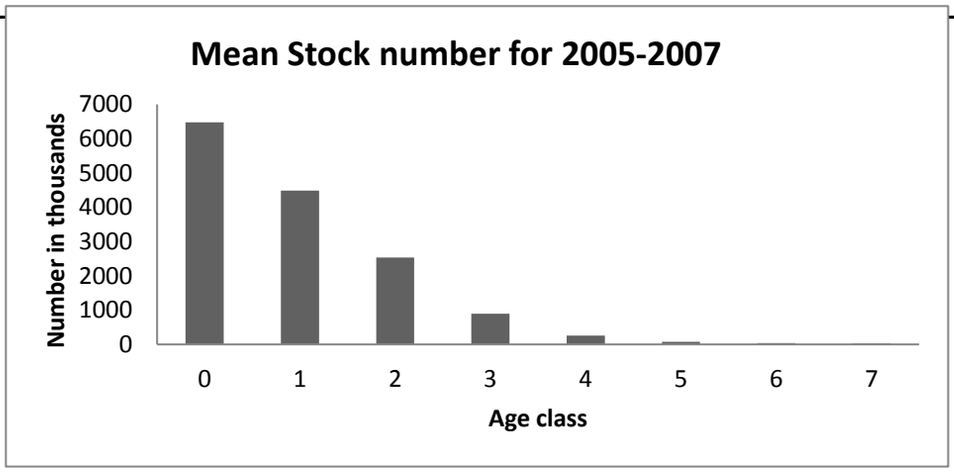
Comments

The above estimations are for the period 2008-2010.

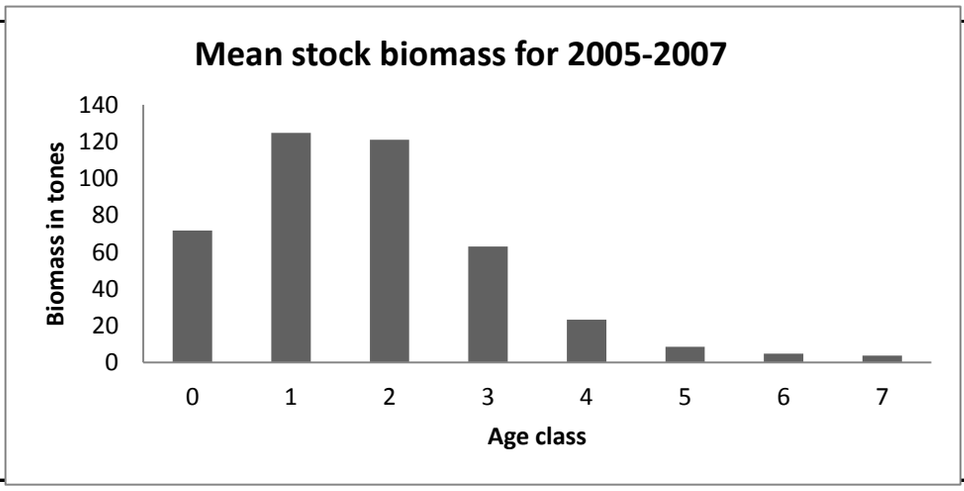
F1 refers to Mean F
F2 refers to Global F

Sex*	Both	Gear*	All	Analysis #*	1

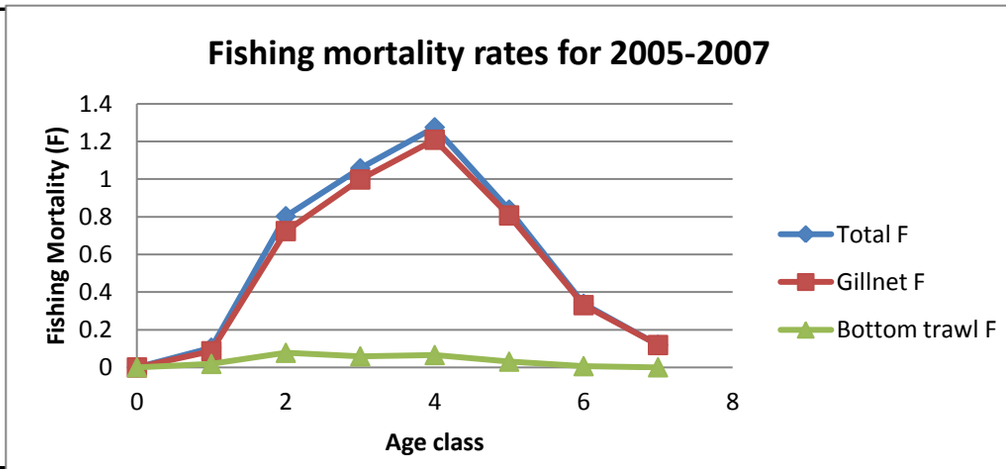
Population in figures



Population in biomass

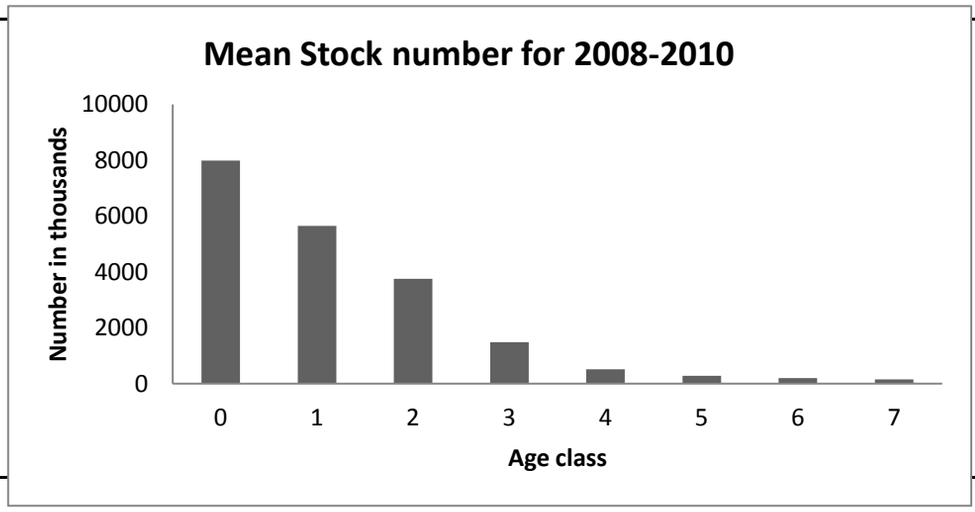


Fishing mortality rates

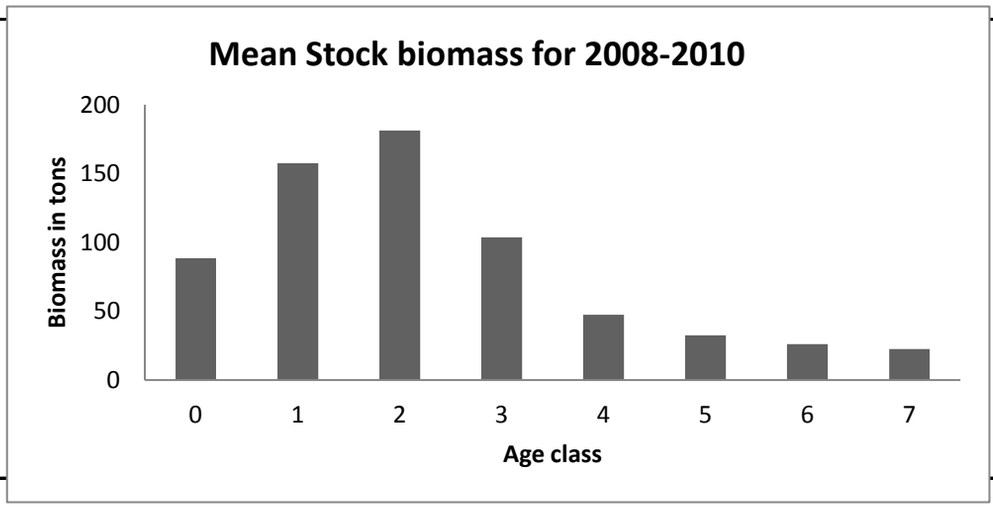


Sex*	Both	Gear*	All	Analysis #*	2

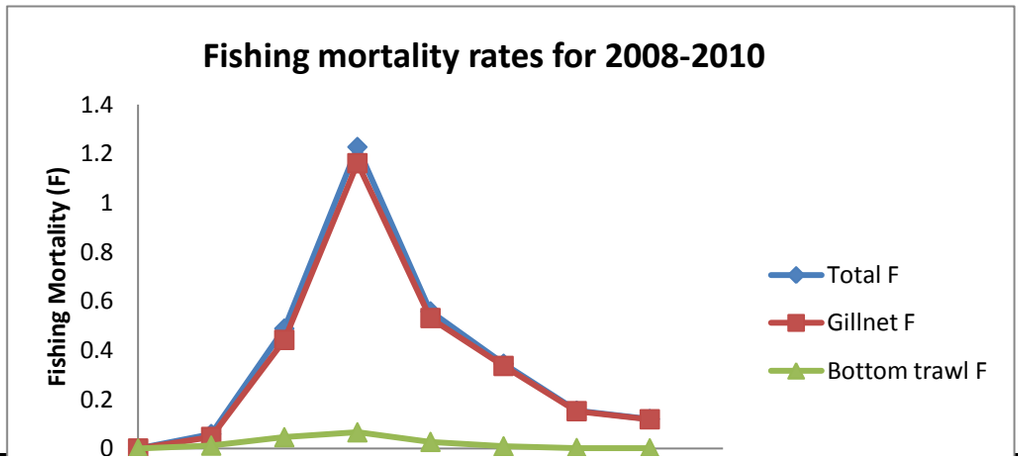
Population in figures



Population in biomass



Fishing mortality rates



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

Assessment form

Sheet Y

Indirect methods: Y/R

Code: BOG2511Mar

Sex	Both

Analysis #	**1 and 2**

# of gears	2	Software	VIT (Lleonart and Salat, 1997)

Parameters used

Vector F	
Vector M	
Vector N	
	The data from VPA-pseudocohort were used as inputs

Model characteristics

Results

	Total	Gear			
		Gill net	Bottom trawl		
Current YR	26.814	24.642	2.172		
Maximum Y/R	27.655	25.666	2.354		
Y/R 0.1	26.253	24.543	1.71		
F_{max}	0.38	0.34	0.07		
$F_{0.1}$	0.24	0.22	0.01		
Current B/R	52.279				
Maximum B/R	71.57				
B/R 0.1	96.733				

Comments

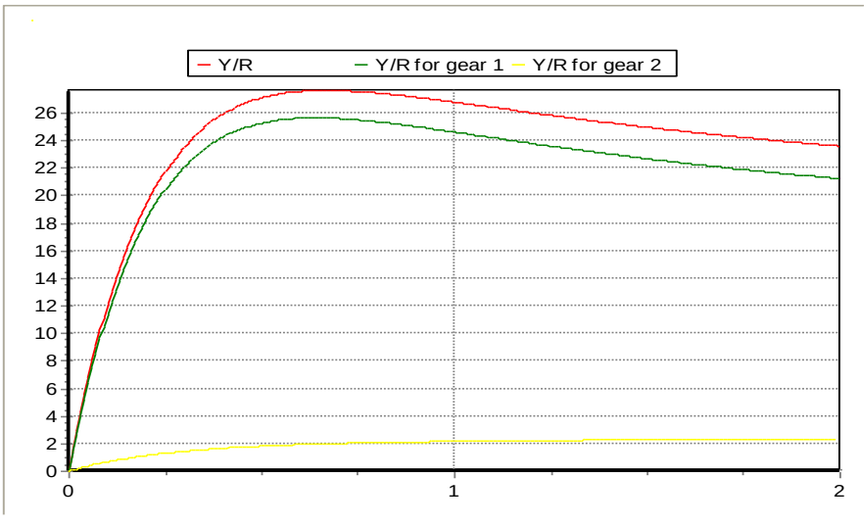
The above estimations are for the period 2005 - 2007

Comments

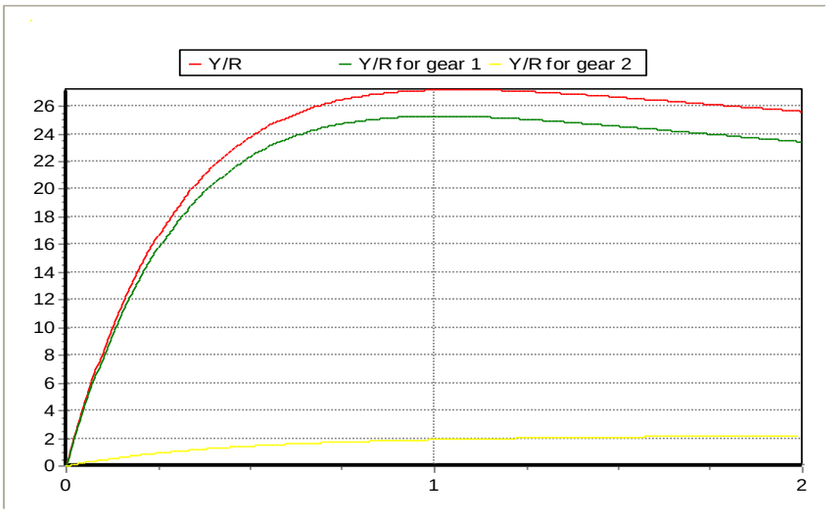
Results

	Total	Gear			
		Gill net	Bottom trawl		
Current YR	27.176	25.274	1.902		
Maximum Y/R	27.202	25.276	2.199		
Y/R 0.1	25.709	24.08	1.629		
F_{max}	0.39	0.36	0.04		
$F_{0.1}$	0.24	0.23	0.01		
Current B/R	66.509				
Maximum B/R	66.509				
B/R 0.1	91.302				

The above estimations are for the period 2008 - 2010



Y/R analysis graph covering the period 2005 - 2007



Y/R analysis graph covering the period 2008 - 2010

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

Code: BOG2511Mar

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

○	? - (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 estimated F current (0,57) in relation to the reference points Fmax (0.38) and F0.1 (0.24) for the first period (2005-2007), suggest an overfishing state of the stock. The mean stock biomass (420.57 tons) in relation to the virgin biomass (1941.48 tons) [21.7%] suggest an intermediate abundance of the stock.

For the second period (2008-2010), the F current (0,37) in relation to the reference points Fmax (0,39) and F0.1 (0.24) showed the stock is in overfishing state once more but in better situation as the current Y/R is very close to the maximum Y/R. The mean stock biomass (659.3 tons) in relation to the virgin biomass (2392.38 tons)[27.5%] indicated that the abundance of the stock remains intermediate with a higher percentage though.

It is obvious that artisanal fishery using gillnets, puts the most pressure on the stock of bogue.

Code: BOG2511Mar

Management advice and recommendations*

Fishing pressure should be reduced in the case of small scale fisheries. According to transition analysis, a reduction of approximate 15% (10-20%) of current F value would lead to the F0.1 in two years assuming a constant recruitment. This could be achieved with the reduction of licensed fishing boats (OAL: 6-12 m).

Also an important management measure that could lead to this goal is the increase of the minimum mesh size from 32 mm to 38 mm since 10th of March 2011.

It is noteworthy to mention that for the bottom trawl fishery, there was a replacement of the 40mm diamond shape trawl net by a diamond meshed net of 50mm at the cod end from 1st of June 2010, and also that the licensed bottom trawlers have been recently reduced at 50% (from 4 to 2). A further reduction of bottom trawlers operating in territorial waters remains a priority in the fishery policy of the Government within the Operational Program for fisheries 2007-2013.

Advice for scientific research*

Re-evaluation of the growth parameters of the species from the Von-Bertalanffy growth equation. Estimation of SSB using maturity data and development of stock-recruit models. Use of other methods that do not require equilibrium assumption (steady state) made by the VIT model.

Abstract for SCSA reporting

Authors Marios Josephides

Year 2011

Species Scientific name Boops boops - BOG

Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 25 - Cyprus Island

Fisheries (brief description of the fishery)*

Bogue (Boops boops) in GSA 25 is exploited mainly by the artisanal fleet that consists 500 vessels OAL 6-12m using gill nets and secondly by the bottom otter trawlers that consist 4 vessels OAL 12-24m since 2006. The main species caught with bogue in gillnets are: Spicara smaris, Spicara maena and Sardina pilchardus, while in bottom trawl are: Spicara smaris, Mullus surmuletus, Mullus barbatus, Pagellus erythrinus and cephalopods (Octopus vulgaris, Loligo vulgaris and Sepia officinalis). The percentage of bogue in the overall landings for artisanal fishery, for the period 2005-2010, has a range 20-28.7% while for bottom trawl fishery is 5.7-9.4%. Both gears exploit mostly age classes 3 and 4.

Source of management advice*

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

Methods used:
The present assessment was performed by means of VPA analysis, using a pseudo-cohort from catch-at-age data for two three-year periods (2005-2007 and 2008-2010). For both periods, Yield per Recruit (Y/R) Analysis was also performed. The VIT software (Lleonart and Salat, 1997) was used for both analyses.

Due to the fact that the VIT model using one yeat recommends a very strong equilibrium state, it has been suggested by the previous Working Group on stock assessment of Demersal species, (Istanbul 18-23 October, 2010), to use the means of values for three years in order to record any changes of the level of the stock by spliting the time series.

Data used:
Catch-at-age data derived from landings for each fishing gear exploiting the stock (gill net and bottom trawl), and discards data from bottom trawl. Acombined ALK for 2006-2008 and annual length distibutions from 2005-2010 were used.

M vector for each age class was used, estimated by PRODBIOM (Abella et al., 1997).

The biological parameters used (growth parameters and L-W relationship) were estimated within the framework of the Cyprus National Data Collection Programme.

Stock Status*

Exploitation rate	**Stock abundance**
High fishing mortality	Intermediate abundance

Comments

Management advice and recommendations*

Advice for scientific research*