

SAC GFCM

Sub-Committee on Stock Assessment

Date* 28 October 2011

Code* ANE1611Pat

Authors* Patti B., Quinci E.M., Bonanno A., Basilone G., Mazzola S.

Affiliation* CNR-IAMC, Sede di Capo Granitola, via del Mare 3, 91021
Campobello di Mazara (TP), Italy

Species Scientific name* 1 *Engraulis encrasicolus* - ANE
Source: GFCM Priority Species

2
Source: -

3
Source: -

Geographical area* Central Mediterranean - Straits of Sicily

Geographical Sub-Area (GSA)* 16 - South of Sicily

Combination of GSAs 1
2
3

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Assessment form

Sheet #0

Basic data on the assessment

Code: ANE1611Pat

Date*	28	Oct	2011	Authors*	Patti B., Quinci E.M., Bonanno A., Basilone G., Mazzola S.
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Species Scientific name*	Engraulis encrasicolus - ANE	Species common name*	Anchovy
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Data Source

GSA*	16 - South of Sicily	Period of time*	1998-2010
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Description of the analysis

Type of data*	Landings, acoustic and DEPM biomass estimates. Growth parameters. Satellite based Chl-a data.	Data source*	Database of CNR-IAMC. DCF data. FAO MedSud Med regional project. NASA SeaWiFS project.
Method of assessment*	Estimation of exploitation rate. Fitting of a non-equilibrium surplus production model	Software used*	MS Excel spreadsheets distributed by FAO under the BioDyn package (P. Barros)

Sheets filled out

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

Comments, bibliography, etc.

FAO (2004). Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. Saly, Senegal, 17-27 March 2004. FAO Fisheries Report. No762. Rome, FAO. 2004. 135p.

Kallianiotis, A., & Mazzola, S. (2002). Final report of EC-DG XIV study project "Study on purse seine activity in Eastern and Central Mediterranean" (MED 99-035).

MacLennan, D.N., Fernandes, P.G., and Dalen, J. (1996). A consistent approach to definitions and symbols in fisheries acoustics. - ICES Journal of Marine Science, 59:365-369.

Patterson, K. (1992). Fisheries for small pelagic species: an empirical approach to management targets. Review of Fish Biology and Fisheries, 2: 321-338.

Patti B., Bonanno A., Basilone G., Goncharov S., Mazzola S., Buscaino G., Cuttitta A., García Lafuente J., García A., Palombo V., Cosimi G. (2004). Interannual fluctuations in acoustic biomass estimates and in landings of small pelagic fish populations in relation to hydrology in the Strait of Sicily. Chemistry and Ecology, 20(5): 365-375.

Patti, B., Venezia, S., Piazza, I., Basilone, G., Patti, C., Caruana, L. and Mazzola, S. (2007). Final Report of Project CAS.FO. "Cattura e sforzo di piccoli pelagici nel Canale di Sicilia per la gestione delle risorse pescabili". In Italian. Regolamento C.E.E. n. 1263/99 – SFOP – Misura n 4.17 – Sottomisura B.

Comments, bibliography, etc.

Patti, B., Guisande, C., Bonanno, A., Basilone, G., Cuttitta, A., Mazzola, S. (2010). Role of physical forcings and nutrient availability on the control of satellite-based chlorophyll a concentration in the coastal upwelling area of the Sicilian Channel. *Scientia Marina*, 74(3), 577-588.

Pauly, D. (1980). On the interrelationships between natural mortality, growth parameters and mean environmental temperature in 175 fish stocks. *J. Cons. Int. Explor. Mer*, 39 (3): 175-192.

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Sheet B
Biology of the species

Code: ANE1611Pat

Biology

Somatic magnitude measured (LH, LC, etc)*	LT	Units*	cm
Sex	Fem	Mal	Both
Maximum size observed			18
Size at first maturity			11.2
Recruitment size			9
Reproduction season	Spring-Summer		
Reproduction areas	South Sicilian Shelf		
Nursery areas	Cape Passero area		

Parameters used (state units and information sources)

		Units	Sex			
			female	male	both	unsexed
Growth model	L ∞	cm			19.83	
	K	y-1			0.31	
	t0	year			-1.95	
	Data source	DCF 2007-2009				
Length weight relationship	a				0.0089	
	b				2.98	

M	0.66	Pauly (1980) relationship. Ref. Temp=13.5 °C
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sex ratio (mal/fem)	1.02
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Comments

XXX

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Sheet P1

General information about the fishery

Code: ANE1611Pat

Data source*	Landings in port of Sciacca	Year (s)*	1998-2010
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Data aggregation (by year, average figures between years, etc.)*	by year, average 1998-2010
--	----------------------------

Fleet and catches (please state units)

	Country	GSA	Fleet Segment	Fishing Gear Class	Group of Target Species	Species
Operational Unit 1*	ITA	16	H - Purse Seine (12-24 metres)	01 - Surrounding Nets	31 - Small gregarious pelagic	ANE
Operational Unit 2	ITA	16	J - Pelagic Trawl (12-24 metres)	03 - Trawls	31 - Small gregarious pelagic	ANE
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 16 H 01 31 - ANE	17	Tons	729	sardine	negligible	negligible	fishing d
ITA 16 J 03 31 - ANE	30	Tons	1190	sardine	negligible	negligible	fishing d
	* Dec 2006		ave 1998-2010				
	census data						
Total	47		1919				

Legal minimum size	9 cm
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Comments

Landings data from Sciacca port are reported here because of their importance (they accounts for about 2/3 of total landings; Patti et al., 2007) in GSA 16 and the availability of a longer time series (1998-2010) compared to the official data for the whole GSA 16 (2004-2010).

Comments



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Sheet P2a
Fishery by Operational Unit

Code: ANE1611Pat

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Data source*	Port of Sciacca	OpUnit 1*	ITA 16 H 01 31 - ANE
---------------------	-----------------	------------------	----------------------

Time series

Year*	2000	2001	2002	2003	2004	2005
Catch	619	830	627	318	781	660
Minimum size						
Average size Lc						
Maximum size						
Fleet						

Year	2006	2007	2008	2009	2010	2011(*)
Catch	1553	224	1469	799	591	1936
Minimum size						
Average size Lc						
Maximum size						
Fleet						(*) updated Sept 2011

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		
		

Structure by size or age

Structure by size or age

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Assessment form

Sheet P2a
Fishery by Operational Unit

Code: ANE1611Pat

Page 2 / 2

Data source*	Port of Sciacca	OpUnit 2*	ITA 16 J 03 31 - ANE
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Time series

Year*	2000	2001	2002	2003	2004	2005
Catch	466	1482	851	718	813	2181
Minimum size						
Average size Lc						
Maximum size						
Fleet						

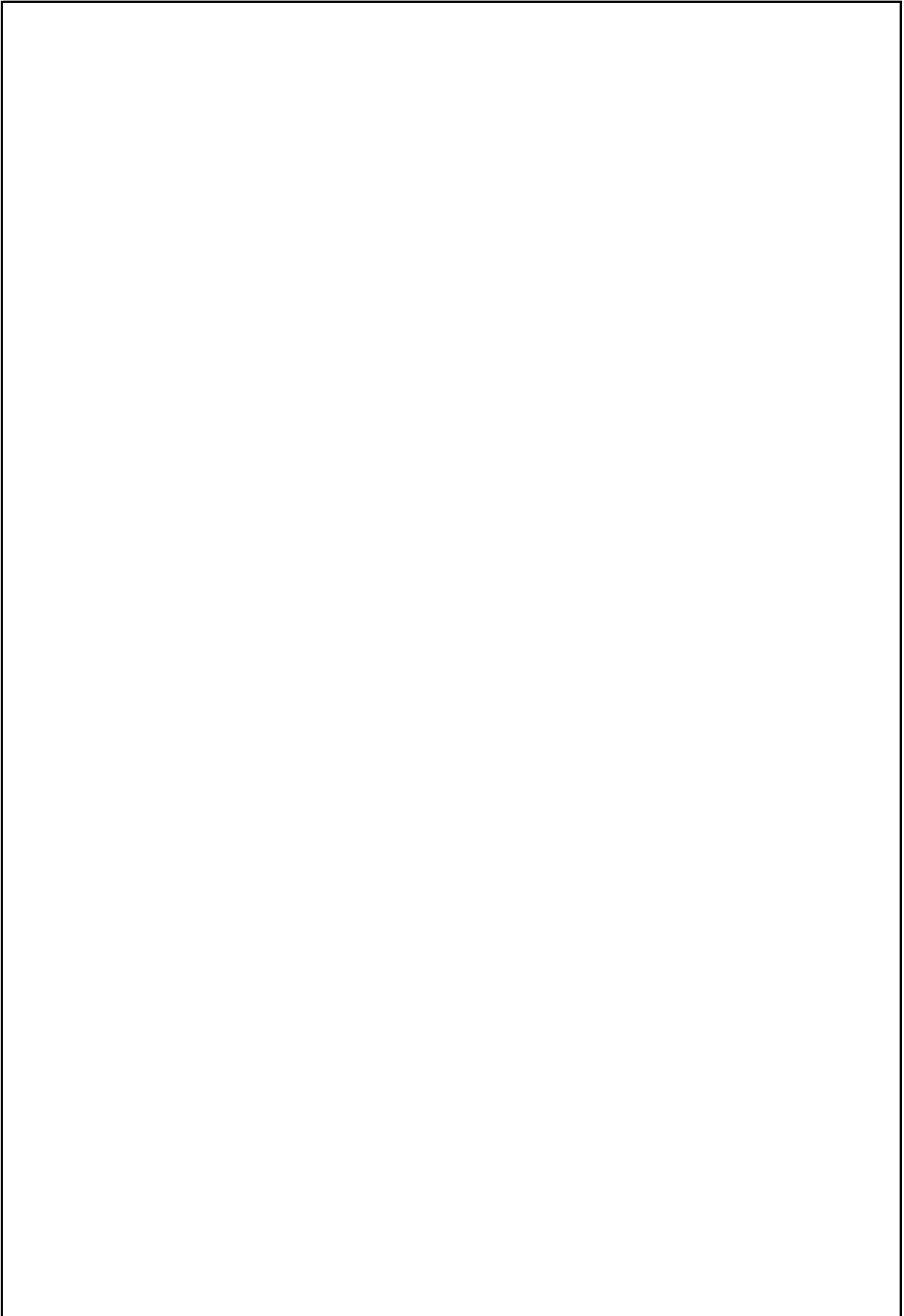
Year	2006	2007	2008	2009	2010	2011(*)
Catch	1656	484	1400	2617	1607	1307
Minimum size						
Average size Lc						
Maximum size						
Fleet						(*) updated Sept 2011

Selectivity

Remarks

L25		
L50		
L75		
Selection factor		

Structure by size or age



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Sheet G
Indirect methods. Global model

Code: ANE1611Pat

Analysis #* 1

Page 1 / 2

Data source* Total Landings - Acoustic biomass estimates	Gear* Purse seine - Pelagic trawl
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Model characteristic

Type of model*	Non-equilibrium surplus production model	Fitting criterion	Non linear Generalized Reduced Gradient (MS Excel Solver tool)
Software	MS Excel spreadsheets distributed by FAO under the BioDyn package	Bibliographical source	Report on the Assessment of Small Pelagic Fish off Northwest Africa

Data

Year	1998	1999	2000	2001	2002	2003	2004
Catch	2043	190	1627	3467	2218	1554	2390
Effort							
CPUE							

Year	2005	2006	2007	2008	2009	2010	
Catch	4262	4812	1062	4320	5124	2397	
Effort							
CPUE							

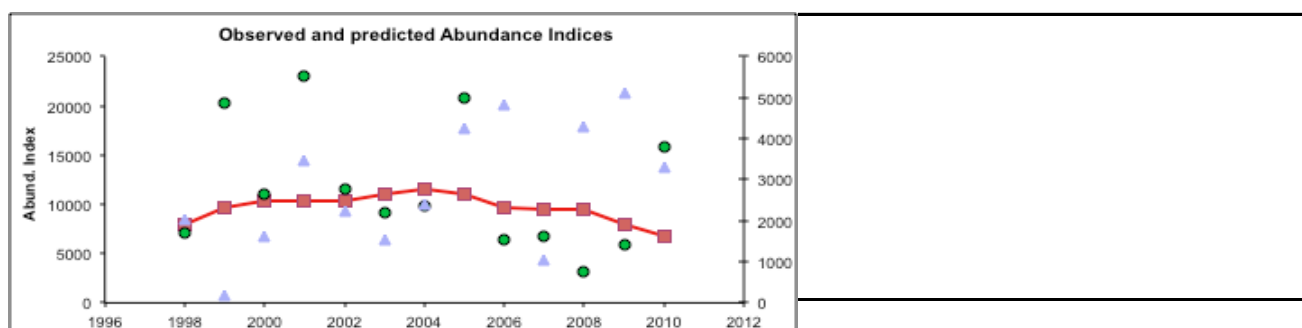
Adjustment

RMS	3.39
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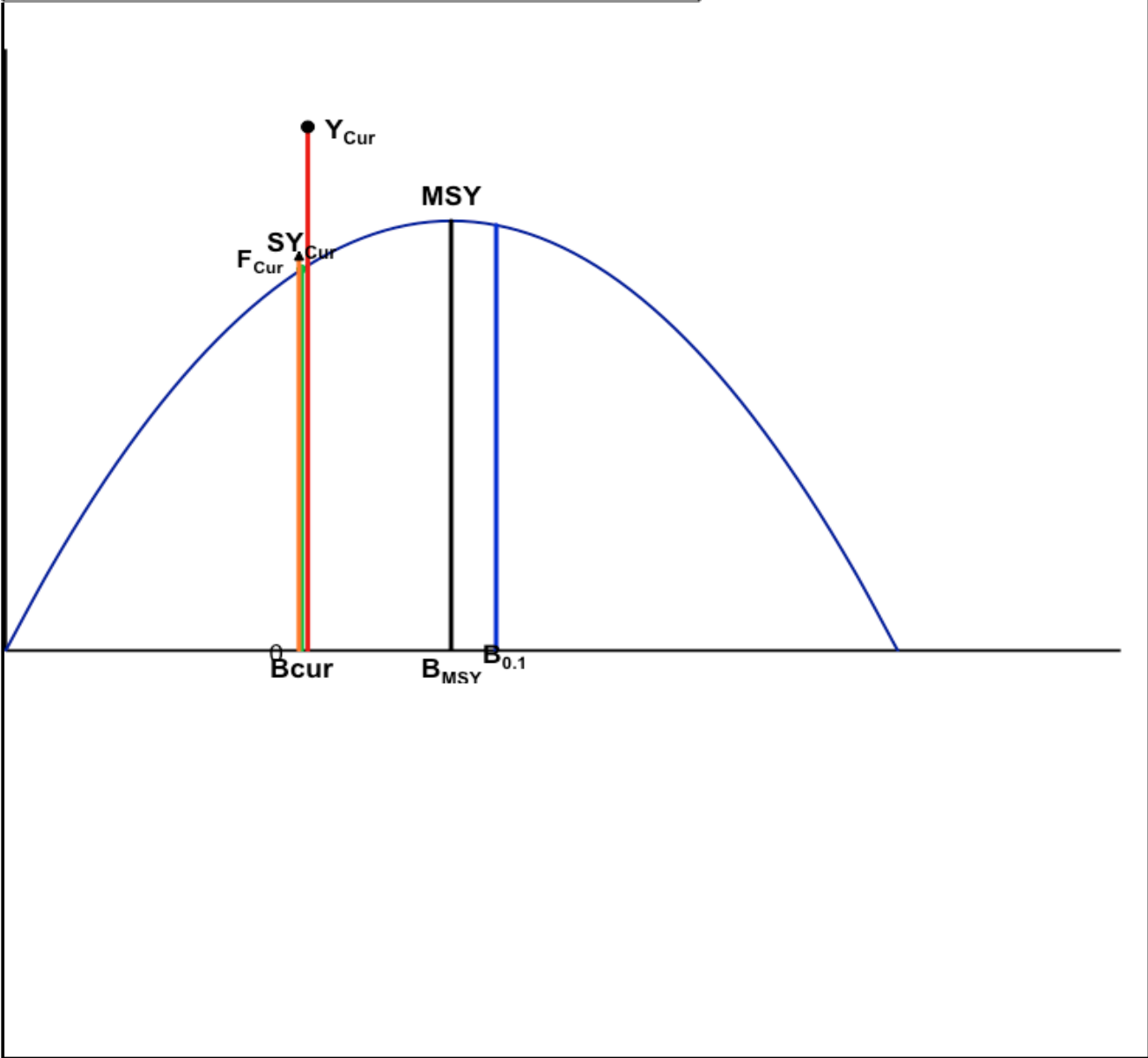
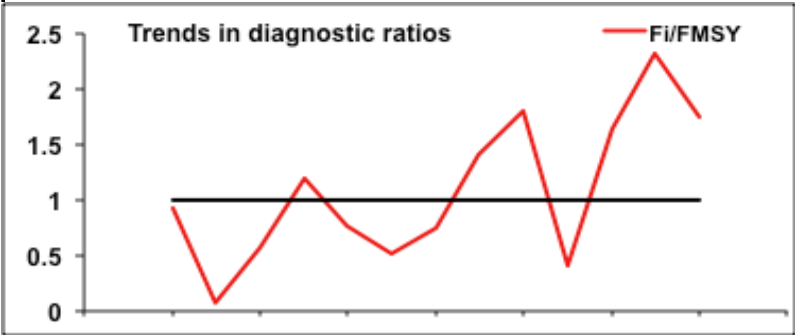
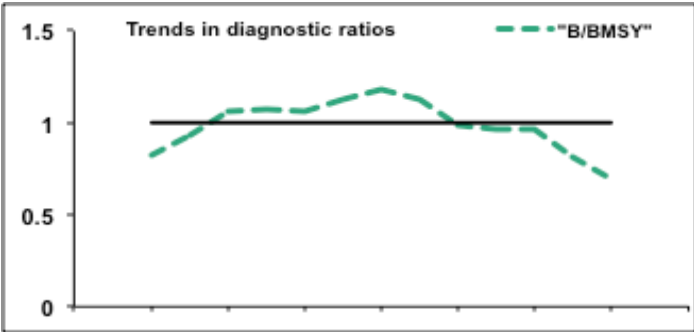
Results

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

Comments



Comments



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Assessment form

Sheet G
Indirect methods. Global model

Code: ANE1611Pat

Analysis #* 2

Page 2 / 2

Data source*	Total Landings - Acoustic biomass estimates	Gear*	Purse seine - Pelagic trawl
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Model characteristic

Type of model*	Non-equilibrium surplus production model, with variable r (environmental effect)	Fitting criterion	Non linear Generalized Reduced Gradient (MS Excel Solver tool)
Software	MS Excel spreadsheets distributed by FAO under the BioDyn package	Bibliographical source	Report on the Assessment of Small Pelagic Fish off Northwest Africa

Data

Year	1998	1999	2000	2001	2002	2003	2004
Catch	2043	190	1627	3467	2218	1554	2390
Effort							
CPUE							

Year	2005	2006	2007	2008	2009	2010	
Catch	4262	4812	1062	4320	5124	2397	
Effort							
CPUE							

Adjustment

RMS	2.17
------------	------

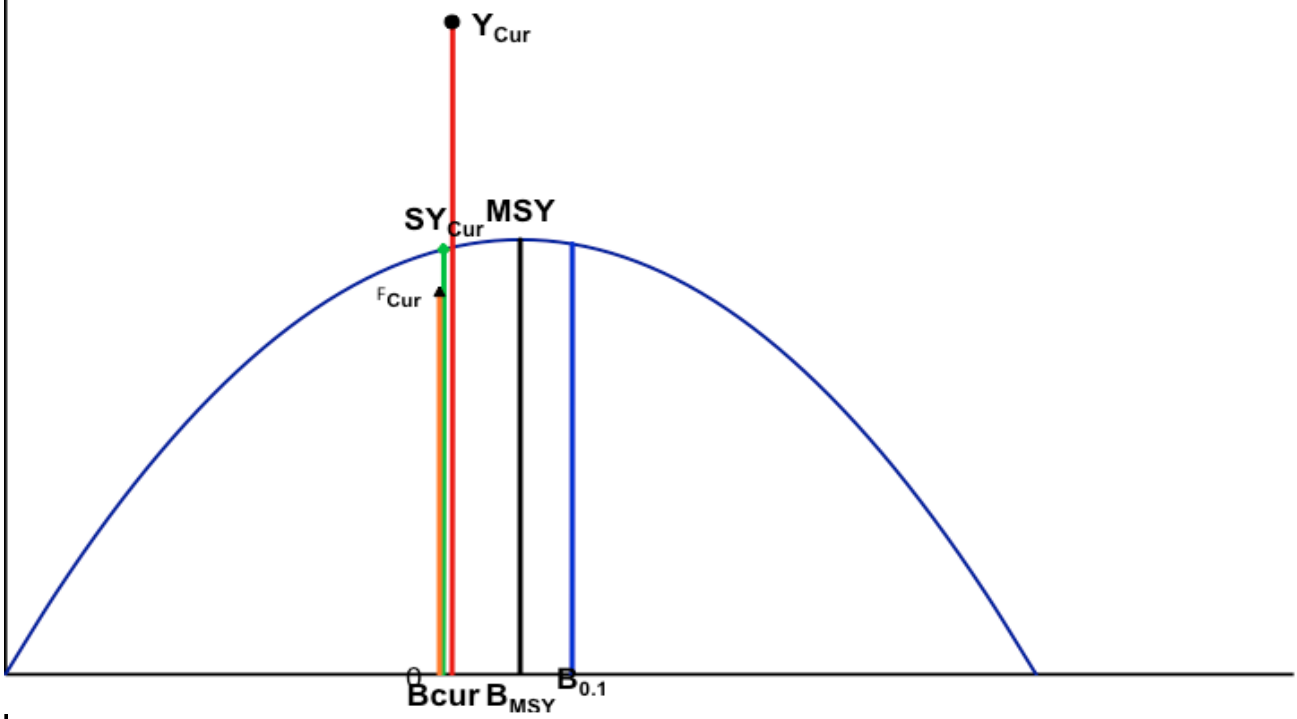
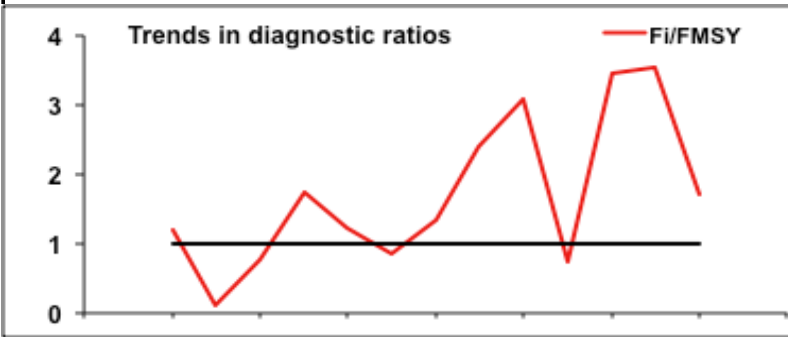
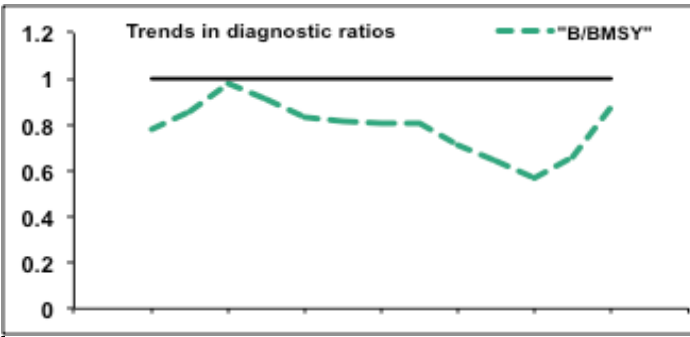
Results

Carryng capacity	35169	a	
Growth rate	0.25 (precautionary, min value)	b	
Catchability	0.72		
MSY	2198		
EMSY	0.16	TACMSY	2149 (current sustainable production)
E0.1	0.15	TAC0.1	
Ecurrent	0.25 (year 2010)		

Comments



Comments



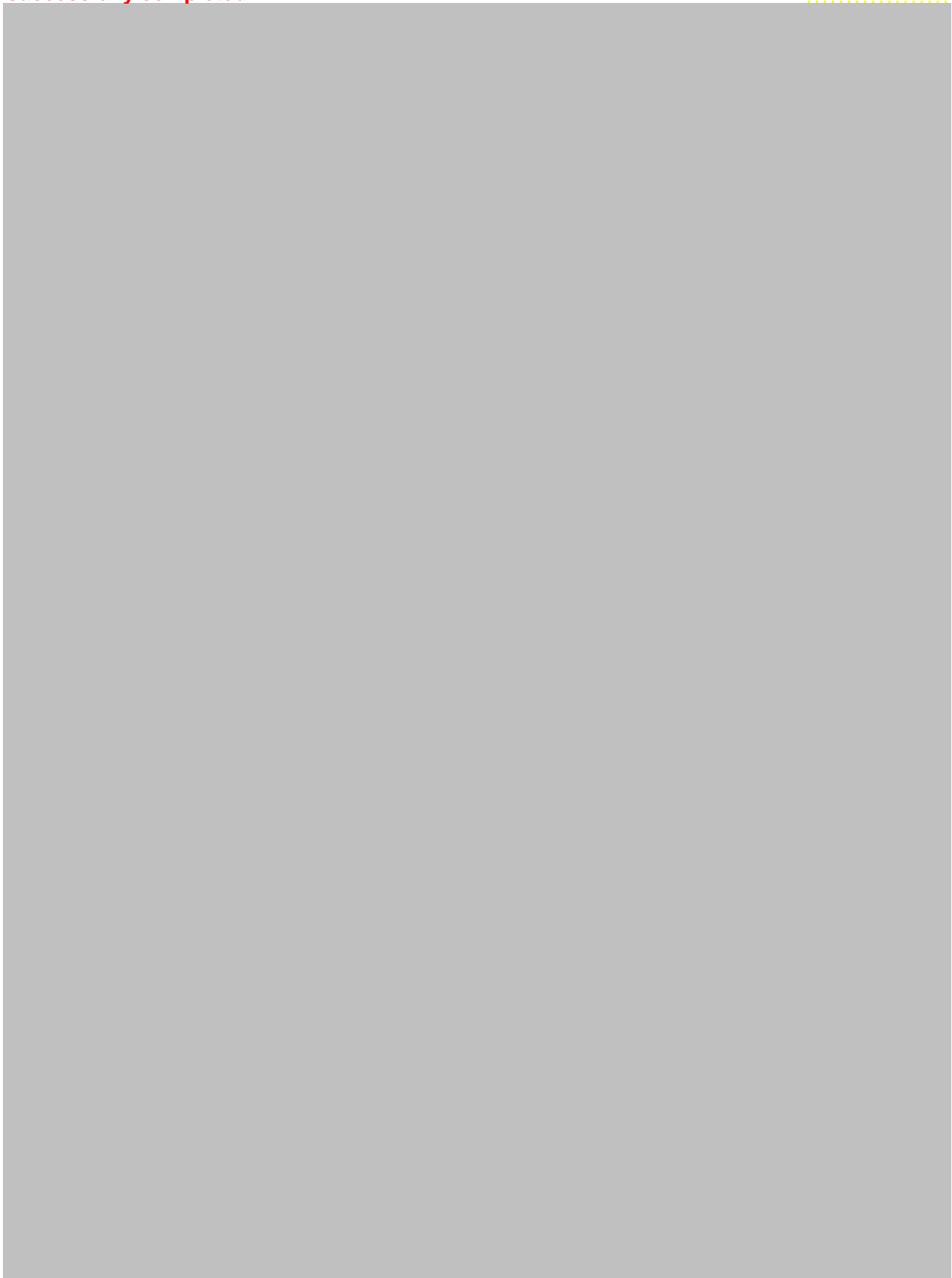
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Assessment form

Sheet A3
Indirect methods: VPA results

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

Code: ANE1611Pat



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Sheet other

Code: ANE1611Pat

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Other assessment methods

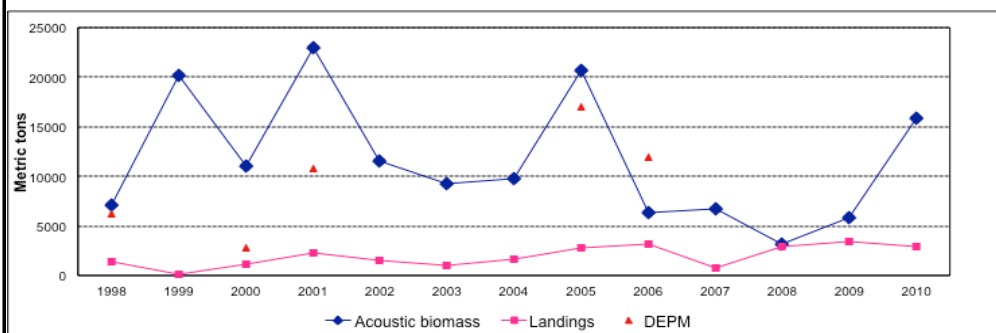
Acoustics

Vessel: R/V Dallaporta
 Date: June to September
 Transects design: perpendicular to bathymetry
 Inter-transect distance (nm): 5
 Area covered: 2500 nm²
 Time of day: Full time
 EDSU (nm): 1
 Bottom depth (min, m): 10
 Echo sounding depth (min, m): 3
 Echo sounding depth (max, m): 300
 Fishing gear: Pelagic trawl
 Geographic area: G.S.A. 16 (1998-2010), 15 (2004-2010)
 Target species: Anchovy and Sardine
 Other species: Mackerel, Sardinella Horse mackerel
 Echo sounder: Simrad Ek-60
 Frequency for assessment (kHz): 38
 Complementary frequencies (kHz): 120, 200
 Pulse duration (ms): 1
 Threshold for acquisition (db): -80

(figures in tons)

YEAR	Acoustics	DEPM	Landings (Sciaccia port only)
1998	7100	6218	1362
1999	20200		127
2000	11000	2850	1085
2001	22950	10736	2312
2002	11500		1478
2003	9200		1036
2004	9820		1593
2005	20702	16956	2841
2006	6370	11978	3208
2007	6725		708
2008	3130		2868
2009	5833		3416
2010	15880		1919

Year	Total GSA16 landings
2006	4052
2007	2921
2008	3672
2009	5486
2010	4207



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Sheet D
Diagnosis

Code: ANE1611Pat

Indicators and reference points

Criterion	Current value	Units	Reference Point	Trend	Comments
B					
SSB					
F					
Y					
CPUE					
E	0.51		0.4	increasing	Harvest rate used for E estimate is the average over the last four years (2007-2010). Landing data from DCR for the whole GSA16. Exploitation rate is estimated assuming M=0.66

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"/>	Depleted
	<input type="radio"/>	Uncertain / Not assessed	<input type="radio"/>	Uncertain / Not assessed

Comments

Graphs for diagnostics are in the previous sheet ("Other") and on sheet "G".

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Sheet Z

Objectives and recommendations

Code: ANE1611Pat

Management advice and recommendations*

Results of the adopted modelling approach suggest that the environmental factors can be very important in explaining the variability in yearly biomass levels (mostly based on recruitment success) and indicate that the stock status was below the BMSY during the considered period. Though in 2010 the stock biomass increased significantly from the low biomass levels experienced during the period 2006-2009, fishing mortality levels over the last years are higher than those required for extracting the MSY of the resource.

Given that the stock is currently overexploited, fishing effort should be reduced by means of a multi-annual management plan until there is evidence for stock recovery. Consistent catch reductions along with effort reductions should be determined. However, the mixed fisheries effects, mainly the interaction with sardine, need to be taken into account when managing the anchovy fishery. As the small pelagic fishery is generally multispecies, any management of fishing effort targeting the anchovy stock would also have effects on sardine. Local small pelagic fishery appears to be able to adapt at resource availability and market constraints, targeting the fishing effort mainly on anchovy. But due to the low biomass levels experienced by the anchovy stock over the last years, measures should be taken to prevent a possible further shift of effort back from anchovy to sardine.

Advice for scientific research*

xxx

Abstract for SCSA reporting

Authors Patti B., Quinci E.M., Bonanno A., Basilone G.,
Mazzola S. **Year** 2011

Species Scientific name Engraulis encrasicolus - ANE
Source: GFCM Priority Species

Source: -

Source: -

Geographical Sub-Area 16 - South of Sicily

Fisheries (brief description of the fishery)*

In Sciacca port, the most important base port for the landings of small pelagic fish species along the southern Sicilian coast (GSA16), explaining for about 2/3 of total landings in GSA 16, two operational units are presently active, purse seiners and pelagic pair trawlers. Average anchovy landings over the period (1998-2010) were about 1,900 metric tons, with large interannual fluctuations. Anchovy biomass, estimated by acoustic methods, ranged from a minimum of 3,100 tons in 2008 to a maximum of 23,000 tons in 2001. Current acoustic biomass estimate is above the average (15,880 vs. 11,550).

Source of management advice*

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

Census data for catch and effort information (on deck interviews) in Sciacca port since 1998. Biological samples for fish biology information (DCF, 2007-2008 data). Acoustic data for fish biomass evaluations. Total official landings (DCF) for the last 4 years (2007-2010) were also taken into account.

Modelling approach based on a non-equilibrium surplus production model (BioDyn package; Fao, 2004). The model uses four basic parameters: Carrying capacity (or Virgin Biomass) K, population intrinsic growth rate r, initial depletion B/K (starting biomass relative to K) and catchability q. Given the best parameter estimates, the model calculates the MSY, BMSY and FMSY reference points. The model implementation adopted allows for the optional incorporation of environmental indices, so that the r and K parameters of each year can be considered to depend on the corresponding value of the applied index.

The input data used for the stock was total yearly catch estimates, and a series of abundance indices from acoustic surveys over the period 1998-2010. In addition an environmental index, based on the satellite estimate of yearly average chlorophyll-a concentration over the continental shelf off the southern sicilian coast, was used in the attempt of improving the performance of the model fitting, as expected because pelagic stocks are known to be significantly affected by environmental variability.

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*

Faint, illegible text within a large rectangular box, likely representing a redacted or low-resolution scan of the management advice and recommendations section.

Advice for scientific research*

