GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN (GFCM)

WORKING GROUP ON DEMERSAL SPECIES
Tunis, Tunisia, 13-16 March 2001

OPENING OF THE MEETING

1. The Second Meeting of the SAC Working Group on Demersal Species of GFCM was held in Tunis from 13 to 16 March 2001. It was opened by the Coordinator of the Working Group, Mr H. Farrugio from IFREMER, Sète, France. The Secretary of GFCM, Mr H. Ben Alaya, thanked the Tunisian Authorities and the National Institute of Marine Sciences and Technology (INSTM, Tunisia) for hosting the meeting and welcomed the participants wishing them success in their discussions.

2. The meeting was attended by 35 scientists from six countries. The list of participants is attached as Appendix A.

3. The Agenda of the Working Group was adopted (Appendix B) and the list of documents was updated. The final list is attached as Appendix C.

4. Mr O. Jarboui (INSTM) was elected as Chairman of the Session; two rapporteurs were designated: Mr P. Oliver (FAO, Rome) and R. Baino (ARPAT, Italy).

5. The Working Group agreed that the papers presented at the present meeting should be sent to Mr Jordi Lleonard, Coordinator of the SAC/Sub-Committee on Stock Assessment and to the GFCM Secretariat in a camera-ready format for possible insertion on a website and for possible publication in the "Studies and Reviews" publication series of GFCM.

PRESENTATIONS TO AND DISCUSSIONS BY THE WORKING GROUP

6. Seventeen technical papers were presented and discussed by the Working Group.

7. These documents covered, totally or partially 12 Management Units (MUs) and nine species. The table attached in Appendix D shows the species studied and the MUs referred to.

8. Two types of documents were presented: (i) assessment documents and (ii) assessment-related documents. The conclusions and recommendations adopted by the Working Group and referring to assessment presented in each document are as follows:

ASSESSMENT DOCUMENTS

9. Twelve documents of this type were reviewed. They are referred to by their number (see Appendix C, by the FAO code of the species, by the number of the management unit and the year of presentation (the date indicated after the scientific name of the species refers to the period of the study). Such references should be used when completing the standard forms adopted by the last session of the Working Group.

10. Forms D, Z and TST, concerning the synthesis of the assessments and the abstracts of the working papers were discussed.

Document n°1. SEG_14_01 *Solea aegyptiaca* 1997-1998

11. The current biomass represents 38 percent of the Virgin Biomass and the current Y/R (26.165 grams) is slightly under the maximum estimated value (26.439 grams). For these reasons the Working Group considered the stock as fully exploited (the fact that Y/R is only indicating growth over-exploitation has to be considered). Taking also into account that this stock is exploited by two different gears, studies on different management strategies should be carried out.

Document n°2. ANN_12+13+14_01 *Diplodus annularis* 1997-1998

Document n°3. PAC_12+13+14_01 *Pagellus erythrinus* 1997-1998

12. The importance of these two species for the Tunisian fishery sector was discussed. They are both considered important by the volume of catches and the second one also by its value. Both species are exploited mainly by small-scale fishing fleet. It was pointed out that considering the flat shape of the Y/R curves the diagnosis of the levels of exploitation should be considered with precaution.

Document n°4. HKE_7_01 *Merluccius merluccius* 1997-1999

13. The assessment of this stock showed a situation of growth overfishing and a risk of recruitment overfishing. In order to correct it the Working Group recommended to improve the fishing pattern of the trawl and reduce effort of all gears.

Document n°5. MUT_9_01 *Mullus barbatus* 1990-1998

14. The assessment presented shows that the species was heavily exploited, especially in the southern eastern Ligurian sea. Indices of abundance (from both commercial landings and scientific surveys) did not show any trend for the red mullet biomass at sea.

15. Nevertheless with the current level of exploitation there was a risk of depletion of this stock that should be taken into consideration. See management recommendations on this stock in sheet Z.

Document n°6. HKE_9_01 *Merluccius merluccius* 1990-1998

16. The species did not show signs of recruitment overfishing. However, the current value for the rate SSB (current spawning stock biomass) / SSB (virgin stock) was markedly less than currently accepted as safe for the stock self-renewal. A modest reduction of effort of trawl vessels would drive this rate to a safer value.

17. Most of the adult individuals live in deep waters, on not trawlable grounds and this constitutes some kind of refugium of spawners. See management recommendations on this stock in sheet Z.

Document n°7. NEP_9_01 *Nephrops norvegicus* 1990-1998

18. This species can be considered as under-exploited according to most of the biological reference points currently used.

19. No risk is hypothesised for the near future for the species, and thus no particular new management measures were proposed for the species.

Document n°8. SSB_16_01 *Lithognatus mormyrus* 1997-1999

20. The analysis produced a diagnosis of full exploitation for this stock, with a low SSB (current spawning stock biomass) / SSB (virgin stock) ratio.

21. As the results of the assessment of this stock presented during the meeting were just preliminary, the Working Group recommended to keep the fishing effort at the current level, until further validated assessment works (including sensitivity analysis) are carried out.

Document n°9. ARA_6_01 *Aristeus antennatus* 1995-1998

22. The results of LCA, VPA and Y/R analysis over a pseudocohort showed that the stock was slightly overexploited.

23. There was a high biomass turnover, and the highest fishing mortalities were concentrated on the older age classes, especially for the females. This may be due to the fact that both sexes were not equally accessible, since exploitation was focused mainly on the largest sizes, where females predominated.

24. It was pointed out that considering the flat shape of the Y/R curves and the diagnosis of the levels of exploitation should be considered with precaution. Thus the Working Group recommended not to increase the effort at the present time.

Document n°10. ARA_5_01 *Aristeus antennatus* 1992-2000

25. The Working Group recognized that the stock was over-exploited and expressed concern about the decreasing trend of biomass (current biomass represents about 10% of the estimated virgin biomass). In consequence, the Working Group recommended:

1. to reduce the fishing effort targeting this species,
2. to implement a harvesting rule based on the fishing mortality and biomass estimates, and
3. considering that a 10-year series of data for this stock is available, a VPA (not assuming steady state) should be carried out.

Document n°11a HKE_22_01 *Merluccius merluccius* 1998-2000

26. The Central Aegean stock showed heavy growth overexploitation since 1988. The bulk of trawler catch for hake was of length size smaller than that at first maturity, the mesh size in use defined a length at first capture smaller than the legal one, and the recent increase of mesh size from 14 mm (from knot to knot) to 20 mm did not change the length at first capture.

27. In order to reach MSY and to avoid losses for the fishermen, the Working Group

recommended to:

- establish a seasonal closure during the recruitment period (late spring),
- decrease the time at sea and improve trawl selectivity, and
- enforce the current measures.

Document n°11b. PAC_22_01 *Pagellus erythrinus* 1998-2000

28. As the results of the assessment of this Central Aegean stock presented during the meeting were just preliminary, the Working Group recommended to keep the fishing effort at the current level, until more validated assessment works were available.

Document n°11c. MUT_22_01 *Mullus barbatus* I998-2000

29. This Central Aegean stock showed a slight growth overexploitation. The current exploitation rate increased by 20 percent of that estimated 15 years ago, when the stock was assessed as fully exploited.

30. The Working Group recommended to extend the fishing ban by one month for the protection of the young individuals at the beginning of the trawler-fishing season (October).

Document n°11d. MUR_22_01. *Mullus surmuletus* 1998-2000

31. As the results of the assessment of this Central Aegean stock presented during the meeting were just preliminary, the Working Group recommended to keep the fishing effort at the current level, until more validated assessment works are carried out.

Document n°14a. MUT_22+23_01 *Mullus barbatus* 1998-1999

32. This stock was defined as overexploited, therefore the enforcement of the existing measures and regulations was strongly recommended by the Working Group.

Document n°14b. HKE_20+22_01 *Merluccius merluccius* 1998-1999

33. This stock was defined as overexploited, therefore the enforcement of the existing measures and regulations were strongly recommended. Furthermore, a reduction of the fishing effort directed to the spawners was recommended by applying regulations to the fixed gears. In addition, the extension of closed seasons in the main nursery grounds would protect the recruits.

ASSESSMENT-RELATED DOCUMENTS

Document n° 12a. HKE_1+6_01 *Merluccius merluccius* 1994-1999
Document n° 12b. MUT_1+6_01 *Mullus barbatus* 1994-1999
Document n° 12c. MUR_1+6_01 *Mullus surmuletus* 1994-1999
Document n° 12d. ARA_1+6_01 *Aristeus antennatus* 1994-1999

34. The above documents did not present an assessment *per se;* however the information

provided may be relevant for assessment purposes. This applied to the series of indices of abundance whose trends might be used for the tuning of analytical models.

35. The Working Group was informed about the full and ready availability of MEDITS surveys data.

36. The Working Group was also informed that the EU SAMED (Stock Assessment in the Mediterranean) project would produce assessments by Management Units at the beginning of 2002 to be presented at the next session of the Working Group. A special issue of the scientific journal "Scientia Marina", including biological parameters and abundance indexes of the MEDITS target species, will be published by the end of 2001.

Document n° 13

37. This document showed an application of generalized linear modelling (GLM) over the CPUE series which gave consistent indices of abundance.

38. In its effort to identify common methods, the Working Group encouraged the use of the available statistical tools (GLM, etc.) to standardize CPUE's. Such an enhancement of the estimates would improve, by reducing variability, the relationships between CPUE's and fishing effort, as well as the interpretation of the commercial abundance indexes trends.

Document n° 15

39. Sensitivity analyses of a model performance to the parameter variations were encouraged by the Working Group.

Document n° 16

40. A Markovian model for the identification and verification of spacial and temporal trends based on the estimation of the transition probabilities matrices between successive trawl surveys images applied to MEDITS data from Spain was proposed.

41. The Working Group recommended the use of such methods, when possible, to carry out in-depth analyses of the trawl survey data.

Document n° 17

42. The hake is one of the main commercial and heavily exploited species of the coastal area in the Adriatic Sea. The paper made a critical review of the existing information on the population dynamics and stock assessments of this resource. It highlighted that apparently fishery production remained sustained over the years despite a very high level of exploitation of the species for a long period.

43. Inconsistencies were detected between the supposed fairly stable landings reported in the document and the available FAO landing statistics. the Working Group expressed doubts about several comments presented in the document, and expressed its concern about the possibility of long term sustainability of the resource in this area.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

44. As a result of the discussions and reviews of the documents made available to it, the Working Group agreed on the following conclusions and recommendations:

- Distribute copies of the documents or send them to every body in electronic format before the meeting.

- In 2001, only one assessment on a shared stock was presented and most assessments referred to only a part of a management unit.

- Priority should be given in future to papers dealing with shared stocks and prioritary species of regional or sub-regional concerns.

- Avoid papers which were not assessments, or are not dealing with methodologies directly linked with assessments.

- Follow the instructions to fill in the standard forms. Put at least the key data in these forms. Proposals for modifications or improvement of these forms were welcomed, especially for trawl surveys assessments.

- Use classic VPA method when long data series were available.

- When a new method is used, it should be interesting to present a summary of it.

- Necessity of Working Groups by species ? or by methodologies (trawl surveys data)?

- Try to organize synthetic analyses of the state of some species for which a large amount of information is available, and which were considered as prioritary by GFCM. This could be done through some parallel sessions of specific sub-groups.

- The Working Group should discuss the effects of various exploitation strategies on the resources, using simulation methodologies.

- The Working Group regretted the absence of experts from the Eastern Mediterranean and Black Sea region and called on these countries to make an effort to send scientist to the Working Group session.

Few countries represented

45. The address of the web site where the complete set of documents should be put is:

ftp://cucafera.icm.csic.es/pub/scsa

DATE AND PLACE OF THE NEXT MEETING

46. The next meeting will be held early in March 2002. The location of the meeting will be identified by the Scientific Advisory Committee.

APPENDIX A

LIST OF PARTICIPANTS

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APPENDIX B

AGENDA

1. Opening of the meeting

2. Adoption of the agenda and arrangements of the meeting

3. Presentation and discussion of new assessments : the assessments should be presented on the standard forms approved by the SCSA. Priority is given to:
   - Shared stocks
   - The species: *Merluccius merluccius, Mullus barbatus, Merlangus merlangus, Pagellus erythrinus, Aristaeomorpha foliacea, Aristeus antennatus, Parapenaeus longirostris, Nephrops norvegicus, Eledone spp. Sparidae, Psetta maxima*
   - Black Sea and Southern and Eastern Mediterranean

The assessment forms can be found at ftp://cucafera.icm.csic.es/pub/scsa

4. Presentation and analysis of alternative management options

5. Any other matters

6. Adoption of the report

APPENDIX C

LIST OF DOCUMENTS

1	Jarboui O. et al	Tunisia	Stock assessment of sole *Solea aegyptiaca* in Gabes gulf
2	Jarboui O. et al	Tunisia	Ecobiologie et évaluation du stock de sparaillon *Diplodus annularis* des côtes tunisiennes
3	Ghorbel M. et al	Tunisia	Etude bioécologique et dynamique du pageot commun *Pagellus erythrinus* des eaux tunisiennes
4	Farrugio H. & Massuti E.	France + Spain	Stock assessment of the French-Spanish shared stock of hake (*Merluccius merluccius*) in the gulf of Lions
5	Voliani A. & Abella A.	Italy	Stock assessment of red mullet (*Mullus barbatus*) in the southern Ligurian-northern Tyrrenian area
6	Abella A. & Serena F.	Italy	Stock assessment of hake (*Merluccius merluccius*) in the eastern Ligurian-northern Tyrrenian area
7	Abella A.	Italy	Stock assessment of norway lobster (*Nephrops norvegicus*) in the southern Ligurian-northern Tyrrenian area
8	Cannizaro L. et al	Italy	About pseudo cohort on striped bream Sicilian's stock
9	Garcia-Rodriguez M. & Esteban A.	Spain	An assessment on a red shrimp (*Aristeus antennatus*) fishery in the Alicante gulf
10	Carbonell A.	Spain	Stock assessment of Shrimp *Aristeus antennatus*, Balearic Islands
11	Karlou-Riga C. & Vrantas N.	Greece	Assesment of the state of some demersal fish stocks in the Saronikos gulf and the Cyclades islands
12	Gil de Sola L. & Gonzales L.	Spain	MEDITS trawl surveys results
13	Garcia-Rodriguez M	Spain	Characterisation and standardisation of a red shrimp (*Aristeus antennatus*) fishery off Alicante gulf
14	Labropolou M. et al	Greece	The status of the hake (*Merluccius merluccius*) and red mullet (*Mullus barbatus*) populations in the Hellenic seas
15	Karlou-Riga C. & Vrantas N.	Greece	Are the results of current assessments of the mediterranean stocks reliable ?
16	Ferrandis E. et al	Spain	Identifying trends in spatio-temporal distribution of mediterranean demersal resources; an elaboration from the MEDITS project
17	Adriamed	Adriatic	Study on Hake in the Adriatic sea

APPENDIX D

GFCM-SAC-SCSA-Demersal Working Group. Tunis, March 2001
Table of assessments presented by species (9) and Management Unit (11)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	TOTAL
Merluccius merluccius							1		1											1		2									5
Mullus barbatus									1													2	1								4
Mullus surmuletus														1								1									1
Solea aegyptiaca														1																	1
Diplodus annularis												1	1	1																	3
Pagellus erythrinus												1	1	1								1									4
Nephrops norvegicus						1			1																						2
Aristeus antennatus					1	1																									2
Lithognathus mormyrus																1															1
TOTAL	0	0	0	0	1	2	1	0	3	0	0	2	2	3	0	1	0	0	0	1	0	6	1	0	0	0	0	0	0	0	23

APPENDIX 5

DOC 1 : STOCK ASSESSMENT OF SOLE Solea aegyptiaca IN GABES GULF (TUNISIA)

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SAC GFCM. Subcommittee of Stock Assessment	Assessment form	Sheet D Diagnosis

Code	SEG_14_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	1 293	Tons		
SSB				
B_{virgin}	3 405	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

" Optimal state " – full exploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	SEG_14_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	To keep fishing effort at his actual level.
Minimum size	The minimum allowed size (20 cm) is higher than the first sexual maturity size (15,5 cm).
Technical steps concerning gear	It is recommended to improve the selectivity of the artisanal gears
Quotas	
Market	

DOC 2 : ECOBIOLOGIE ET EVALUATION DU STOCK DU SPARAILLON Diplodus annualris DES COTES TUNISINNES

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SAC GFCM. Subcommittee of Stock Assessment	Assessment form	Sheet D Diagnosis

Code	ASB_12_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	1209	Tons		
SSB				
B_{virgin}	2 121	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is under exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	ASB_12_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	This species is considered underexploited and in consequence no effort limitations can be proposed for the fishing ground in the area.
Minimum size	The real size of the first capture is near the L50% (size of the first sexual maturity).
Technical steps concerning gear	This species is only caught by artisanal gears.
Quotas	
Market	

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	ASB_13_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	1 932	Tons		
SSB				
B_{virgin}	5 683	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is full exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	ASB_13_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	This species is considered full exploited and in consequence no effort increasing can be now proposed for the fishing ground area.
Minimum size	For the two gears (artisanal and trawl), the real size of the first capture is near the L_{50}% (size of the first sexual maturity).
Technical steps concerning gear	
Quotas	
Market	

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Assessment form Sheet D

Diagnosis

Code	ASB_14_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	7 497	Tons		
SSB				
B_{virgin}		"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is full exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	ASB_14_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	This species is considered full exploited and in consequence no effort increasing can be now proposed for the fishing ground area.
Minimum size	For the two gears (artisanal and trawl), the real size of the first capture is near the L_{50} (size of the first sexual maturity).
Technical steps concerning gear	
Quotas	
Market	

DOC 3 : ETUDE ECOBIOLOGIQUE ET DYNAMIQUE DU PAGEOT COMMUN Pagellus erythrinus DES EAUX TUNISIENNES

Mohamed GHORBEL*, Othman JARBOUI*, Mohamed Nejmeddine BRADAI*, Abderrahmen BOUAIN & Amor ELABED***
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Assessment form	Sheet D
	Diagnosis

Code	PAC_12_01
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Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	1 981	Tons		
SSB				
B_{virgin}	4 979	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is under exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	PAC_12_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	This species is considered underexploited and in consequence no effort limitations can be proposed for the fishing ground in the area.
Minimum size	The real size of the first capture is near the L_{50} (size of the first sexual maturity).
Technical steps concerning gear	
Quotas	
Market	

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Assessment form Sheet D

Diagnosis

Code	PAC_13_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	3 977	Tons		
SSB				
B_{virgin}	12 457	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is full exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource seem to be in good condition

Risks

No risks for the species for the near future.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	PAC_13_01
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	This species is considered full exploited and in consequence no effort increasing can be now proposed for the fishing ground area.
Minimum size	For the two gears (artisanal and trawl), the real size of the first capture is near the L_{50} (size of the first sexual maturity).
Technical steps concerning gear	
Quotas	
Market	

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Diagnosis

Code	PAC_14_01
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}	3 625	Tons		
SSB				
B_{virgin}	35 689	"		
F_{now}				
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: under exploited, overexploited, collapsed, unknown, etc.

The resource is over exploited considering of Y/R curve trend

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Recruitment overexploitation

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	PAC_14_01
Page	

Management objectives

Improve the fishing pattern of the trawl Found an equilibrium with the exploitation of the others species in the area

Management recommendations

Area closures	
Temporal closures	
Effort limitation	
Minimum size	For the trawl, le real size of the first capture is less than the L_{50} (size of the first sexual maturity)
Technical steps concerning gear	Improve trawl selectivity
Quotas	
Market	

DOC 4 : Stock assessment of the French-Spanish shared stock of hake (*Merluccius merluccius*) in the gulf of Lions
IFREMER, Sète, France + IEO Palma de Mallorca, Spain + ICM/CSIC, Barcelona, Spain.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Code	MGL9800
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tech. Pap*., 347)

Criterion	Value	units	trend	Comments
B_{now}	4089	Tons	Decreasing	1998-2000: 2113 F + 1976 M= 4089 tons 1988-91 (Aldebert & Recasens, 1996): 2714 F+1500 M= 4214 tons
SSB	2508.1	Tons	Decreasing	1988-91 (Aldebert & Recasens, 1996): 3106 tons
B_{virgin}	56500	Tons		11700 F + 44800 M= 56500 tons
F_{now}	0.23 F 0.29 M			1988-91 (Aldebert & Recasens, 1996): 0.5 F; 0.9 M
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Growth overexploitation

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Current biomass under 2% of virgin biomass
Decreasing trend from 1988-1991 to 1998-2000 periods

Risks

Risk of recruitment overexploitation

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Z	Sheet Objectives and recommendations

Code	MGL9800
Page	

Management recommendations

Improve the fishing pattern of the trawl

Reduce effort of all gears

Management strategies

Area closures	
Temporal closures	
Effort limitation	Reduce time at sea or/and engine power
Minimum size	Enforce the existing regulations (especially mesh sizes), adopt a minimum landing size corresponding, at least, to length at first maturity
Technical steps concerning gear	Improve trawl selectivity, avoid “ghost fishing”, etc.
Quotas	
Market	Avoid commercialisation of undersized fish
Data collection	Improve national statistics on catches and effort Improve sampling activities

DOC 5 : Stock assessment of red mullet (Mullus barbatus) in the South-eastern Ligurian Sea.

Alessandro Voliani and Alvaro J. Abella
ARPAT-GEA Via Marradi 114, Livorno, Italy

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	15/2/2001	Person in charge	A.Voliani & A. Abella	Code	
Species Scientific name	**Mullus barbatus**		Species common name	Red mullet Triglia di fango (Italy)	

Data source

Geographical limits	Southern Ligurian-Northern Tyrrhenian	Period of time	1985-2000

Description of the analysis

Type of data	Size composition at sea Biological data (sex, maturity, fecundity) Commercial catch landings Yields and size structure with experimental fishing with artisanal gears	Data source	Trawl-surveys with different gears Catch assessment surveys Experimental fishing
Method of assessment	Y/R Composite Surplus Production model with Z as a direct index of effort	Software used	Self-made EXCEL spreadsheet Self-made EXCEL spreadsheet

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	D	Z	C
X	X	X	X	X				X	X	X	X

TS	TS1	TS2	TS3	TS4	AS	EP
X	X		X	X		

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Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}				
SSBcurrent/ SSBvirgin	0.04			
B_{virgin}				
F_{now}	vector			
F_{msy}				
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Z_{MBP}	3.04 (Schaeffer) 1.78 (Fox)			

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Results of assessment performed in our area show two different situations. The Northern part, corresponding to Viareggio fishery grounds, appears heavily overfished , while the Southern portion, Livorno and Piombino fisheries grounds, seems fully exploited or overexploited depending on the chosen model. These results are in agreement with what we know about the fishing pressure exerted in the two subareas. Commercial catches and catch rates suggest a steady state situation during the studied period (1990-98). From trawl-surveys results, a decrease in the early nineties seems evident, as well as an increase in abundance in the more recent years, particularly in the surveys carried out after the recruitment.

Risks

Even if the species is heavily exploited, especially in the Northern portion of the area, no risks for the self-renewal of the species have been detected. Trends of abundance (from both, commercial landings and scientific surveys) do not show any negative trend for the red mullet biomass at sea.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	
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Management objectives

To obtain the best sustainable yields (and commercial revenues) from the species at the level of effort and fishing pattern that guarrantees the species self-renewal.
To grant the current level of occupation and revenues for fishermen.
To exploit the species taking in consideration that it constitutes a part of several species assemblages defined by the gear in use and their spatio-temporal constraints, and hence, considering the principles of protection of all the resources consistent with a precautionary management principle. Harvesting has to be optimised, and hence changes in selection capacity of the gear in use may be hypothesised as well as some shift in the distribution of fishing effort addressed to a reduction of the fishing pressure over the grounds where more "fragile" or highly exploited species are concentrated. This suggests an adaptive strategy in order to try to solve the problems as soon as they appear.

Management recommendations

Area closures	The in force total closure of the three miles coastal stripe is considered enough for the protection of the juveniles immediately after recruitment. Artificial obstacles for trawling onto the three miles stripe were demonstrated useful.
Temporal closures	A seasonal closure during the period of post-recruitment could be theoretically efficient in order to delay the catch of new settled individuals even if no assessment have been done related to this matter. Moreover, this measure contributes to a reduction in overall fishing effort.
Effort limitation	The current level of effort is considered too high and produces growth overfishing. A reduction of effort should be encouraged, at least in the northern part of the area.
Minimum size	Mesh size currently in use defines a length of first capture smaller than the legal size. However, the enforcement of area and temporal closures can determine an increase in the above mentioned size.
Technical steps concerning gear	
Quotas	
Market	

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Subcommittee of Stock Assessment

Assessment form Sheet TS

Direct methods: swept area

Code	
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Cruise	GRUND and MEDITS trawl-surveys	B/O	
Total area (km^2)	10165 km2	Date	1985-2000

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and size Collection of biological data.
Sampling strategy	Stratified (by depth) random allocation of hauls.
Gear	1) Italian Bottom trawl net GRUND 2) Especially designed bottom trawl net MEDITS 3) Small mesh size trawl net used in shallow waters to catch *Aphia minuta*
Sampler	
Minimum and maximum depths	1 and 2)10-800 m; 3) 5-50 m

Results	Index 1	Variance	Index 2	Variance
Species	Kg/Km2 Spring	C.V. %	Kg/Km2 Autumn	C.V. %
Mullus barbatus				
1985	21.5 (GRUND)			
1986	33.6 (GRUND)			
1987	14.9 (GRUND)			
1990			21.7 (GRUND)	
1991	10.4 (GRUND)		29.9 (GRUND)	
1992	9.4 (GRUND)		18.2 (GRUND)	
1993	8.9 (GRUND)			
1994	15.4 (GRUND) 12.4 (MEDITS)		78.6 (GRUND)	
1995	18.8 (GRUND) 15.0 (MEDITS)		39.4 (GRUND)	
1996	19.7 (MEDITS)	189.6	58.0 (GRUND)	172.5
1997	18.5 (MEDITS)	184.2	94.2 (GRUND)	211.7
1998	28.6 (MEDITS)	184.8	61.0 (GRUND)	214.4
1999	36.5 (MEDITS)			
2000	26.5 (MEDITS)		108.6 (GRUND)	

Comments

Spring surveys furnished lower values than Autumn ones because recruitment occurs in late Summer. MEDITS Spring cruises during 1994-95 were done about one-two months after GRUND cruises and both before recruitment. This fact may explain (at least in part) the lower values of relative abundance derived from MEDITS trawl-surveys due to the longer period at which the stock was exposed to mortality effects.

Sampling intensity was not the same all along the considered period. In many cases, for consecutive years, the hauls were replicated in the same geographical position, and this fact, together with the poor number of tows, might produce some systematic under or overestimation of the abundance. Anyhow a decrease in the early nineties seems evident, as well as an increase in abundance in the more recent years, particularly in the surveys carried out after the recruitment.

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Subcommittee of Stock Assessment

Assessment form Sheet TS1
Direct methods: trawl based abundance indices

Code	
Page	

Survey	1998 (as an example)	Species	Mullus barbatus	Trawler
GFCM – Management Unit	Southern Ligurian-Northern Tyrrhenian		Date	

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and by size Collection of biological data.
Sampling strategy	Stratified (by depth) random allocation of hauls.
Sampler (gear used)	1) Italian Bottom trawl net (GRUND Project) 2) Especially designed bottom trawl net (MEDITS Project) 3) Small mesh size trawl net used in shallow waters to catch *Aphia minuta*
Cod –end mesh size as opening in mm	40 mm (sampler 1); 20 mm (sampler 2) 3 mm (sampler 3)
Minimum and maximum depths in m	10-800m (samplers 1 and 2) 5-50 m (sampler 3)

stratum	Total surface (km^2)	Trawlable surface (km^2)	Number of hauls
1 (10-50 m)	2053	1774	11
2 (51 –100 m)	1598	1598	10
3 (101 – 200 m)	3186	3065	18
4 (201 – 500 m)	2449	2449	14
5 (501 – 800 m)	879	879	5
Shelf (10-200m)	6837	6437	39
Slope (201–800m)	3328	3328	19
Total (10 – 800 m)	10165	9765	58

stratum	Kg per km^2	CV	Relative * biomass All age group	CV	N per km^2	CV	Relative * abundance All age group	CV
1 (10-50 m)	224.03	103.3	459933					
2 (51 –100 m)	42.42	137.7	67787					
3 (101 – 200 m)	36.19	119.0	115301					
4 (201 – 500 m)	0.02	374.2	49					
5 (501 – 800 m)								
Shelf (10-200m)								
Slope (201–800m)								
Total (10 – 800 m)	132.0	214.4	643070					

* with catchability coefficient assumed 1

Comments

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Subcommittee of Stock Assessment

Assessment form Sheet TS 2
Direct methods: trawl based length structure of population at sea

Code	
Page	

Survey		Species	Trawler
Total area (km^2)		Date	

Objective (in general)	
Sampling strategy	
Cod –end mesh size as opening in mm	
Sampler (gear used)	
Minimum and maximum depths of presence of species	

Length classes	females	males	not sexed	total	Sex ratio (females/ Females + males)
total					

Comments

Length distributions will be available during the workshop of Tunis.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS 3 Direct methods: Trawl based total mortality rates

Code	
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Survey			Trawler		
Total area (km^2)			Date		

Objective (in general)	To calculate the decline of the number of individuals of cohorts in time by analysing the size structure of the population at sea in different moments.
Sampling strategy	Random stratified surveys
Z method	Survival equation ($Z_t = -\ln N_t/N_0$)
Sampler (gear used)	Bottom trawl
Minimum and maximum depths of presence of species	1 – 250 m

Survey	Total mortality rates (Z)	Survey	Total mortality rates (Z)	Survey	Total mortality rates (Z)

Note: Z is expressed by year

Comments

Z vector is available for some years.

For the red mullet the application of the length transformed catch curve for the estimation of mortality rates might constitute an important source of error because is not possible to assume for instance a constant natural and fishing mortality rate along its whole exploited life period. In fact, this approach has been conceived for fisheries addressed mainly to adult individuals, for which it is possible to assume more uniform biological characteristics and similar vulnerability related to the used fishing strategies. In the case of red mullet, juvenile fish very often constitute the main component of the catch.

Moreover, it is necessary that the length distribution used be representative of the mean size structure at sea in the year and this is impossible utilizing data proceeding only from one or two surveys.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS 4 Direct methods: trawl based Recruitment analysis

Code	
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Survey	Small mesh size trawl net for *Aphia minuta*	B/O	
Total area (km^2)		Date	

Objective (in general)	Main goal was the study of the impact of Aphia fishery on other species. Secondary the study of the recruitment of coastal species.
Sampling strategy	Systematic with transepts.
Cod –end mesh size as opening in mm	3 mm
Sampler (gear used)	Small bottom trawl net for *Aphia minuta*
Minimum and maximum depths of presence of species	
Recruitment season	Late Summer- Autumn
Age at fishing-grounds recruitment	About 2 months
Length at fishing-grounds recruitment	4 - 5 cm

Surveys	Area in km^2	N of recruit per km^2	CV (%)	Relative recruitment (N of individuals)	CV (%)

Comments

Note on type of recruitment:
1) continuous and diffuse
2) discrete and diffuse
3) discrete and localised **YES**
4) continuous and localised.

DOC 6 : Stock assessment of hake (Merluccius merluccius) in the South-eastern Ligurian Sea.

Alvaro J. Abella and Fabrizio Serena
ARPAT-GEA Via Marradi 114, Livorno, Italy

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	13/2/2001	Person in charge	A.Abella & F. Serena	Code	
Species Scientific name	Hake Merluccius merluccius		Species common name	hake nasello (Italy)	

Data source

Geographical limits	Eastern Ligurian Sea Northern Tyrrhenian	Period of time	1985-2000

Description of the analysis

Type of data	Size composition at sea Size composition of landings Catch and effort	Data source	Trawl-surveys GRUND+MEDITS Catch assessment survey Catch assessment survey
Method of assessment	Swept-area Length cohort analysis Distribution by size Composite Surplus Prod- Model	Software used	Self-made software EXCEL Self-made software EXCEL GIS ArcView Self-made software EXCEL

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	D	Z	C
x	x	x	x	x	x	x	x	x	x		

TS	TS1	TS2	TS3	TS4	AS	EP
x	x	x	x	x		

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}			positive	Swept area method period 1985-2000
SSB/SSBv	0.171			Estimated only for 1995
$B_{virgin\ (\%)}$	0.275			Estimated only for 1995
F_{now}				Used a multiplier of F and an F vector
F_{msy}				Used a multiplier of F and an F vector
$F_{0.1}$				Used a multiplier of F and an F vector
$F_{2/3msy}$				Used a multiplier of F and an F vector
F_{low}				Used a multiplier of F and an F vector
F_{med}				Used a multiplier of F and an F vector
F_{high}				Used a multiplier of F and an F vector
$F_{\%\ SPR}$				Used a multiplier of F and an F vector
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Z_{MBP} (juveniles)	1.12-1.32			1.96 is the estimated value of Z_{MBP} Period 1994-96
CPUE			negative	Catch assessment survey in Viareggio The trend seems sensible to changes in target and hence in spatial distribution of effort that did occur along the analysed period 1990-2000

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Data derived from trawl surveys and from a catch assessment survey for the same period (1990-1998) show trends of indexes of abundance that are not in agreement. It is possible that the distribution and the catchability of each species may change at different exploitation rates and hence catch per unit effort from commercial fleet may not be a good index of abundance. Probably, another explaination can be more close to the reality. In fact, the fleet behaviour is dynamic and may direct their fishing pressure to areas other than the traditional ones, due to changes in resources availability, in target species or due

to enforced measures of control of effort or area restrictions based on certain management goals. These changes in time may condition the analysis. The contrasting results obtained with both approaches for hake in the Viareggio fishery (Ligurian Sea) may be due to changes in the fleet behaviour.
The contrast can be explained by the changes in the target species (and consequently in the operation area) of the bottom trawling fleet that followed an enforcement of the minimum legal size for hake. These changes determined the progressive abandon by the fleet of the traditional fishing grounds where consistent concentrations of young hakes occur. This fact produced consequently a reduction in catch rates in time.
It is hypothesised for the species a status of growth overfishing but less dramatic than that previously assumed if assumptions of variable M and different vulnerability by size are introduced. A light increase in mesh size should be encouraged in order to improve Y/R and to allow a major proportion of juveniles to survive up to adult phase.
The species does not show signals of recruitment overfishing. However, the current value for the rate SSB(current spawning stock biomass) / SSB(virgin stock) of about 0.17 is markedly less than the currently accepted as safe (Clark, 1991; Mace, 1995) in order to guarantee the stock self renewal (0.3-0.4).
A modest reduction of effort of trawl vessels should drive this rate to a more safe value.
Most of the adult individuals live in deep waters, many times on not trawlable grounds and this constitutes some kind of refugium of spawners. However, on these grounds trammel nets and long lines can be used.

Risks

Considering the fraction of the Spawning Biomass surviving at the current level of effort, an adequate number of spawners have to be maintained and hence, it is important to control and not encourage a more general use of gears as long lines and trammel nets, suitable for the capture of big fish living offshore some times in non-trawlable areas). A major use of the mentioned gears could be accepted only after a drastic reduction of effort of bottom trawl fisheries.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

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Management objectives

To obtain the best sustainable yields (and commercial revenues) from the species at the level of effort and fishing pattern that guarrantees the species self-renewal.
To grant the current level of ocupation and revenues for fishermen.
To exploit the species taking in consideration that it constitutes a part of several species assemblages defined by the gear in use and their spatio-temporal constraints, and hence, considering the principles of protection of all the resources consistent with a precautionary management principle. Harvesting has to be optimised, and hence changes in selection capacity of the gear in use may be hypothesised as well as some shift in the distribution of fishing effort addressed to a reduction of the fishing pressure over the grounds where more "fragile" or highly exploited species are concentrated. This suggests an adaptive strategy in order to try to solve the problems as soon as they appear.

Management recommendations

Area closures	Nursery areas of relatively high importance were already identified. These areas have a quite stable allocation even if some seasonal spatial shift do exist. An area closure should be useful in order to protect these highly concentrated and vulnerable individuals.
Temporal closures	Nursery areas seasonal closures should be useful. Timing could be defined taking in consideration the period when density is higher.
Effort limitation	A moderate reduction of effort (of about 15%) should drive the spawning biomass to a safer level
Minimum size	The mesh size currently in use define a too small size of first capture (8-9 cm), that is much lower than the legal size of the species (20 cm). It is practically impossible to impose a new mesh size that shifts the probability of selection defining an L50% compatible with the legal minimum size for the species. The adoption of a bigger mesh size (about 55 mm) should produce a light improvement in Y/R for hake but contemporarily important losses as regards to the catch of several other species that make part of the commercial assemblages. An increase in the size of first capture can also be obtained by self-regulation of the fleet by avoiding the fishing grounds where small hakes are concentrated or by enforcement of temporal or total closures of defined areas. The first of these two options apply now in the Viareggio fishing area.
Technical steps concerning gear	To identify suitable structural changes of the gears in order to reduce the undesired retention of small sized individuals of non-commercial species (squared mesh? double codend?)
Quotas	No reliable official data on catch of hake by gear of fleet is available

	and hence it is almost impossible to define catch quotas.
Market	Improvement of the statistics of landings that includes catch by species and by gear, commercial prices as well as size structure of the catch.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS Direct methods: swept area

Code	
Page	

Cruise		B/O	
Total area (km^2)		Date	

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and by size Collection of biological data.
Sampling strategy	Stratified (by depth) random allocation of hauls.
Gear (?)	1) Italian Bottom trawl net 2) Especially designed bottom trawl net
Sampler (?) (gear used)	
Minimum and maximum depths	10-800m

Results	Index 1	Variance	Index 2	Variance
Species				
Merluccius merluccius	biomass		Cpue (Kg/Km2)	

Comments

25 national trawl-surveys + 7 MEDITS

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet AS Direct methods: acoustics

Code	
Page	

Cruise		B/O	
Total area (km^2)		Date	

Objective (in general)	
Target species	
Echosounder	
Sampling strategy	
ESDU	
Pulse duration	
Echogramm identification	
Samples (gear used)	
Biological data obtained	

Results obtained. (Biomass in metric tons, amount of fish etc.)	

Comments

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet TS1
Direct methods: trawl based abundance indices

Code	
Page	

Survey		Species	Trawler
GFCM – Management Unit	Geographical area	Date	

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and by size Collection of biological data.
Sampling strategy	Stratified (by depth) random
Sampler (gear used)	Traditional Italian Bottom trawl
Cod –end mesh size as opening in mm	40 mm
Minimum and maximum depths in m	10-800 m

stratum	Total surface (km^2)	Trawlable surface (km^2)	Number of hauls
1 (10-50 m)	2053	1774	11
2 (51 –100 m)	1598	1598	10
3 (101 – 200 m)	3186	3065	18
4 (201 – 500 m)	2449	2449	14
5 (501 – 800 m)	879	879	5
Shelf (10-200m)	6837		
Slope (201–800m)	3328		
Total (10 – 800 m)	10165	9765	58

stratum	Kg per km^2	CV	Relative * biomass All age group	CV	N per km^2	CV	Relative * abundance All age group	CV
1 (10-50 m)	5.7	125.5	438					
2 (51 –100 m)	15.0	45.3	999					
3 (101 – 200 m)	49.8	85.1	6522					
4 (201 – 500 m)	33.7	169.6	3379					
5 (501 – 800 m)	1.5	194.6	40					
Shelf (10-200m)								
Slope (201–800m)								
Total (10 – 800 m)			11378					

* with catchability coefficient assumed 1

Comments

Data refers here to 1998

There are so many surveys and hence too much estimates

Biom in Kg	Spring	Summer	Autumn
1985			
1986	86694	304197	
1987	170888		
1988			
1989			
1990			283294
1991	136812	101746	74626
1992		161942	151449
1993		435166	
1994			
1995	74262		169775
1996			226419
1997			109733
1998			432152

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet TS 2
Direct methods: trawl based length structure of population at sea

FISHING GEAR NOT SUITABLE FOR A REAL REPRESENTATION OF SIZE STRUCTURE AT SEA

Code	
Page	

Survey		Species	Trawler
Total area (km^2)		Date	

Objective (in general)	
Sampling strategy	
Cod –end mesh size as opening in mm	
Sampler (gear used)	
Minimum and maximum depths of presence of species	

Length classes	females	males	not sexed	total	Sex ratio (females/ Females + males)
total					

Comments

There are 25 data on size structure at sea, one for each national survey (GRUND) and 7 from international surveys MEDITS in the area.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS 3 Direct methods: Trawl based total mortality rates

FISHING GEAR NOT SUITABLE FOR A REAL REPRESENTATION OF SIZE STRUCTURE AT SEA AND HENCE FOR MORTALITY ESTIMATES

Code	
Page	

Survey			Trawler		
Total area (km^2)			Date		

Objective (in general)	
Sampling strategy	
Z method	Report formula
Sampler (gear used)	
Minimum and maximum depths of presence of species	

Survey	Total mortality rates (Z)	Survey	Total mortality rates (Z)	Survey	Total mortality rates (Z)

Note: Z is expressed by year

Comments

Not possible to obtain reliable estimates of mortality for the species due to size-dependent vulnerability. It was estimated that a reduction in vulnerability starts at 20-25 cm and increases progressively with size.

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet TS 4

Direct methods: trawl based
Recruitment analysis

Code	
Page	

Survey		B/O	
Total area (km^2)	10165 (explored area)	Date	1985-1998

Objective (in general)	Among other goals, to assess the importance of recruitment (in numbers and in biomass) and to detect seasonal changes or along the years.
Sampling strategy	Stratified (by depth) random
Cod –end mesh size as opening in mm	Cod end cover of 20mm
Sampler (gear used)	Traditional Italian Bottom Trawl net
Minimum and maximum depths of presence of species	30-800 m
Recruitment season	Cruises performed mainly in autumn and spring, but also in summer
Age at fishing-grounds recruitment	3 months
Length at fishing-grounds recruitment	3-4 cm

Surveys	Area in km^2	N of recruit per km^2	CV (%	Relative recruitment (N of individuals)	CV (%)
1 april 85					
2 aug 85					
3 may 86	222.1	7426		5062501	
4 sept 86	308.4	20074		40984856	
5 apr 87	433.7	9764		10110079	
6 sept 88					
7 dic 88					
8 feb 89					
9 june 90					
10 nov 90	1508,0	14854		22399679	
11 may 91	732.2	6820		10657133	
12 jul 91	353.7	3314		5551956	
13 nov 91	1161,876	8309		9653985	
14 may 92					
15 aug 92	485.8	4459		13467933	
16 dec 92		8564			
17 may 93					
18 jul 93	1514.5	63145		91784183	
19 may 94	291.5	6948		6880260	
20 nov 94	826.0	18365		62602421	
21 may 95	284.5	5862		6895132	
22 oct 95	572.6	19855		23655155	
23 nov 96	1127.9	30945		31268594	
24 nov 97	426.9	10420		11461344	

25 nov 98	805.2	26486		30804485	

Comments

Note on type of recruitment:
5) continuous and diffuse
6) discrete and diffuse
7) discrete and localised
8) continuous and localised. YES

Definition of nursery areas was done considering areas with more than 500 0+ juvenile individuals per Km2
Contours and areas were calculated with the Spatial analyst extension of the ArcView.
In many cases, quality of data (sampling density, hauls random allocation did not allow to a precise definition of nursery areas contours. In these cases, measurements were not performed.

DOC 7 : Stock assessment of Norway lobster (Nephrops norvegicus) in the South-eastern Ligurian Sea.

Alvaro J. Abella
ARPAT-GEA Via Marradi 114, Livorno, Italy

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	15/2/2001	Person in charge	A.Abella ARPAT-GEA Livorno	Code	
Species Scientific name	Nephrops norvegicus		Species common name	Norway lobster Scampo (Italy)	

Data source

Geographical limits	Southern Ligurian-Northern Tyrrhenian Sea	Period of time	1990-2000

Description of the analysis

Type of data	Length frequencies by sex by year Maturity at size/age Geographical distribution of abundance and by size by year Commercial catch and effort with spatial information on effort allocation	Data source	Trawl-surveys + Catch assessment surveys
Method of assessment	Yield per recruit analysis	Software used	Self made EXCEL spreadsheet

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	D	Z	C
x	x	x	x					x	x	x	

TS	TS1	TS2	TS3	TS4	AS	EP
x	x	x	x			

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	value	units	trend	Comments
B_{now}				
SSB				
B_{virgin}				
F_{now}	0.3	year		
$F_{msy=M}$	0.68	year		
$F_{0.1}$	0.75	year		
$F_{2/3msy}$	0.38	year		
F_{low}				
F_{med}				
F_{high}				
$F_{35\% SPR}$	0.95	year		
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Underexploited considering most of the biological reference points currently used.

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The resource is located in areas that are quite far from the Viareggio port. Vessels need a long time for reach the Nephrops grounds and during winter the frequency of rough sea many times unables the fishing activity in the area .
Fishing vessels have to be relatively big and well equipped for offshore and deep-water operations.
By-catch is almost composed by low commercial value species and hence the revenues are almost exclusively composed by the Norway lobster catch. For these reasons, the fishing pressure on this species is low

Risks

No risks are hypothesised for the near future for the species.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	
Page	

Management objectives

No particular management objectives have been defined for the species.

Management recommendations

Area closures	
Temporal closures	
Effort limitation	The species is considered underexploited and in consequence no effort limitations can be now proposed for the fishing ground in the area. Anyhow, an increasing trend in total mortality seems to occur in the last years probably due to the increase in abundance that have driven to an increase of the number of fishing vessels targeting Nephrops with a consequent rise of amount of effort (and mortality) . If this trend continues the stock status has to be carefully monitored in order to take management measures in the future if necessary
Minimum size	The real size of first capture is much higher than the L50% that potentially define the gear in use.
Technical steps concerning gear	To study some structural modification of the gear suitable for the escapement of small individuals of some species that are no commercial value.
Quotas	
Market	

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS Direct methods: swept area

Code	
Page	

Cruise	Trawl surveys	B/O	
Total area (km^2)	10165 km2	Date	1985-2000

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and by size Collection of biological data.
Sampling strategy	Stratified (by depth) random allocation of hauls.
Gear (?)	1) Italian Bottom trawl net 2) Especially designed bottom trawl net
Sampler (?) (gear used)	
Minimum and maximum depths	10-800m

Results	Index 1	Variance	Index 2	Variance
Species				
Nephrops norvegicus	biomass		Cpue (Kg/Km2)	

Comments

25 national trawl-surveys + 7 MEDITS
Data will be available during the workshop

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet TS1
Direct methods: trawl based abundance indices

Code	
Page	

Survey		Species	Trawler
GFCM – Management Unit	Geographical area	Date	

Objective (in general)	Evaluation of standing stock of several species considered vulnerable to the gear in use. Description of their spatial distribution by abundance, sex and by size. Collection of biological data. Definition of fecundity by size
Sampling strategy	Stratified (by depth) random
Sampler (gear used)	Traditional Italian Bottom trawl
Cod –end mesh size as opening in mm	40 mm
Minimum and maximum depths in m	10-800 m

stratum	Total surface (km^2)	Trawlable surface (km^2)	Number of hauls
1 (10-50 m)	2053	1774	11
2 (51 –100 m)	1598	1598	10
3 (101 – 200 m)	3186	3065	18
4 (201 – 500 m)	2449	2449	14
5 (501 – 800 m)	879	879	5
Shelf (10-200m)	6837		
Slope (201–800m)	3328		
Total (10 – 800 m)	10165	9765	58

stratum	Kg per km^2	CV	Relative * biomass All age group	CV	N per km^2	CV	Relative * abundance All age group	CV
1 (10-50 m)								
2 (51 –100 m)								
3 (101 – 200 m)								
4 (201 – 500 m)	11.3	85.7	27674					
5 (501 – 800 m)	9.0	61.5	7911					
Shelf (10-200m)								
Slope (201–800m)								
Total (10 – 800 m)								

* with catchability coefficient assumed 1

Comments

Data refers here to 1998

There are so many surveys and hence too much estimates

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS 2 Direct methods: trawl based length structure of population at sea

Code	
Page	

Survey		Species	Nephrops	Trawler	
Total area (km^2)				Date	

Objective (in general)	We can only know the structure by size of the portion of the population vulnerable to the gear in use and during the time period of the full day when hauls were performed
Sampling strategy	Random stratified (by depth) design. Haul made only during the light hours
Cod –end mesh size as opening in mm	40 mm
Sampler (gear used)	Italian traditional bottom trawl net
Minimum and maximum depths of presence of species	122-633 m

Length classes	females	males	not sexed	total	Sex ratio (females/ Females + males)
total					

Comments

There are data available from 26 national surveys (GRUND) plus 7 international surveys (MEDITS)

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet TS 3
Direct methods: Trawl based total mortality rates

Code	
Page	

Survey	Trawl-survey		Trawler
Total area (km^2)	10165 km2	Date	

Objective (in general)	To estimate a mean value of the total mortality rate Z by analysing the structure of the catch assuming representative of the true size structure at sea.
Sampling strategy	
Z method	Report formula
Sampler (gear used)	
Minimum and maximum depths of presence of species	122-633

Survey	Total mortality rates (Z)		Survey	Total mortality rates (Z)	Survey	Total mortality rates (Z)
	males	females				
1991						
1992						
1993	0.81	1.15				
1994						
1995	0.68	1.18				
1996	0.78	1.26				
1997	0.82	1.31				
1998	0.88	1.39				

Note: Z is expressed by year

Comments

No Z vector derived from commercial catch is available

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TS 4 Direct methods: trawl based Recruitment analysis

Code	
Page	

Survey		B/O	
Total area (km^2)		Date	

Objective (in general)	
Sampling strategy	
Cod –end mesh size as opening in mm	
Sampler (gear used)	
Minimum and maximum depths of presence of species	
Recruitment season	
Age at fishing-grounds recruitment	
Length at fishing-grounds recruitment	

Surveys	Area in km^2	N of recruit per km^2	CV (%)	Relative recruitment (N of individuals)	CV (%)

Comments

Note on type of recruitment:
9) continuous and diffuse
10) discrete and diffuse
11) discrete and localised
12) continuous and localised.

DOC 8 : Lithognathus mormyrus, Licata, Sicily
L. Cannizaro

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	March 01	Person in charge	Cannizzaro - Bono - Garau	Code	LIM SSE 97-99
Species Scientific name	*Lithognathus mormyrus*		Species common name	striped seabream	

Data source

Geographical limits	Southern Sicilian coast (from San Leone to Pozzallo)	Period of time	October 97 – September 99

Description of the analysis

Type of data	Age composition of artisanal fishery landings	Data source	IRMA-CNR
Method of assessment	Pseudocohort Analysis	Software used	VIT Package (Lleonart and Salat, 1992)

Sheets filled out

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

TS	TS1	TS2	TS3	TS4	AS	EP

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	LIM SSE 97-99
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value 1° year	Value 2°year	units	trend	Comments
B_{now}	26.4	33.4	tons		
SSB	19.1	26.4	tons		
B_{virgin}	143	242	tons		
F_{now}					
F_{msy}					
$F_{0.1}$					
$F_{2/3msy}$					
F_{low}					
F_{med}	0.258	0.323			
F_{high}					
$F_{\% SPR}$					
TAC					
$TAC_{0.1}$					
Y_{now}	7.9	13.0	tons		
MSY					
MBAL					

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

1° year: full exploited
2° year: full exploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The stock is full exploited (Y/R ≈ Maximum Y/R) but the $SSB_c/SSB_v = 0.16$ (1° year) and $SSB_c/SSB_v = 0.11$ (2° year) is low. Probable existence of inaccessible segments of SSB_c. If so, a strong caveat must be put forward before jumping to conclusions of overfishing. Fisherman report catches of by individuals, much bigger than the sampled ones. So, a simple sensitivity analysis would show that the Y/R curve comes out with a better exploitation scenario. It is worth recalling here similar caveat wormed by Caddy for hake: a problem of availability/accessibility may exist.

Risks

Overexploited

DOC 8 : Lithognathus mormyrus, Selinunte, Sicily
L. Cannizaro

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	March 01	Person in charge	Cannizzaro - Bono - Garau	Code	LIM SSW 97-99
Species Scientific name	*Lithognathus mormyrus*		Species common name	striped seabream	

Data source

Geographical limits	Southern Sicilian coast (from Trapani to Porto Empedocle)	Period of time	October 97 – September 99

Description of the analysis

Type of data	Age composition of artisanal fishery landings	Data source	IRMA-CNR
Method of assessment	Pseudocohort Analysis	Software used	VIT Package (Lleonart and Salat, 1992)

Sheets filled out

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

TS	TS1	TS2	TS3	TS4	AS	EP

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	LIM SSW 97-99
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value 1° year	Value 2°year	units	trend	Comments
B_{now}			tons		
SSB	12.9	7.0	tons		
B_{virgin}	93	49	tons		
F_{now}					
F_{msy}					
$F_{0.1}$					
$F_{2/3msy}$					
F_{low}					
F_{med}	0.254	0.291			
F_{high}					
$F_{\% SPR}$					
TAC					
$TAC_{0.1}$					
Y_{now}	5.7	3.6	tons		
MSY					
MBAL					

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

1° year: full exploited
2° year: full exploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

The stock is full exploited (Y/R ≈ Maximum Y/R) but the $SSB_c/SSB_v = 0.15$ (1° year) and $SSB_c/SSB_v = 0.16$ (2° year) is low. Probable existence of inaccessible segments of SSB_c. If so, a strong caveat must be put forward before jumping to conclusions of overfishing. Fisherman report catches of by individuals, much bigger than the sampled ones. So, a simple sensitivity analysis would show that the Y/R curve comes out with a better exploitation scenario. It is worth recalling here similar caveat wormed by Caddy for hake: a problem of availability/accessibility may exist.

Risks

Overexploited

DOC 9 : An Assessment on a Red Shrimp (*Aristeus antennatus* Risso, 1816), Decapoda, Dendrobranchiata) Fishery in the Alicante Gulf (S.E, Spain).

M. García-Rodriguez[1] and A. Esteban[2]
Instituto Español de Oceanografía, [1]Servicios Centrales, Avda. Del Brasil 31, 28020-Madrid-Spain.
Instituto Español de Oceanografía, [2]Centro Oceanográfico de Murcia, C/ Varadero 1, 30740 San Pedro del Pinatar, Murcia-Spain.

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	11-2000	Person in charge	Mariano García-Rodriguez	Code	AASP001
Species Scientific name	ARISTEUS ANTENNATUS		Species common name	RED SHRIMP	

Data source

Geographical limits	ALICANTE GULF (SPAIN)	Period of time	JAN.1995-DEC1998

Description of the analysis

Type of data	LEGTH FREQUENCY DISTRIBUTIONS	Data source	DIRECT SAMPLING
Method of assessment	VPA Y/R	Software used	ELEFAN, VIT

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	D	Z	C
X	X	X	X		X				x	x	

TS	TS1	TS2	TS3	TS4	AS	EP

SAC GFCM. Subcommittee of Stock Assessment	Assessment form	Sheet D Diagnosis

Code	AASPOO 1
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value	units	trend	Comments
B_{now}	53.9	T		
SSB	5.45	G/r		
B_{virgin}	103.2	T		
F_{now}				
F_{msy}	0.55			
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}	11.90	G		
MSY	13.34	G		
MBAL				

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Slightly Overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

growth overexploitation, existence of inaccessible segments (mainly males)

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	AASP001
Page	

Management objectives

Management recommendations

Area closures	
Temporal closures	May be considered to apply some temporal closure (summer)
Effort limitation	It is desirable to reduce effort as a general rule.
Minimum size	
Technical steps concerning gear	
Quotas	
Market	

DOC 10 : Stock assessment of Shrimps *Aristeus antennatus*, Balearic Islands

Carbonell, A. Torres.
Centro Oceanográfico de Baleares. Instituto Español de Oceanografía (IEO).

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet #0 Basic data on the assessment

Date	5/03/01	Person in charge	Aina Carbonell	Code	BAL001
Species Scientific name	*Aristeus antennatus* (Risso, 1816)		Species common name	Rose or Red shrimp	

Data source

Geographical limits	40º05'-01º15' 38º35'-04º20'	Period of time	1992-2000

Description of the analysis

Type of data	Commercial landing, Catches, Discards. Size distribution and biological paramenters (sex-ratio, reproduction cycle, length-weight relationship)	Data source	Trawl demersal fishery Mallorca Island (Balearic Islands)
Method of assessment	VPA; LCA,	Software used	VIT (Lleonart and Salat...) ELEFAN FISAT

Sheets filled out

B	P1	P2a	P2b	G	A1	A2	A3	Y	D	Z	C
X	X	X	X		X	X		X	X		

TS	TS1	TS2	TS3	TS4	AS	EP

SAC GFCM.
Subcommittee of Stock Assessment

Assessment form Sheet D

Diagnosis

Code	AABAL
Page	

Values of the year 2000 (females and males)
Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value	Units	trend	Comments
B_{now}	102.7	Tones		
SSB				
B_{virgin}	883.6	Tones		
F_{now}	1			
F_{msy}	0.56			
$F_{0.1}$	0.18			
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Growth overexploitation

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	
Page	

Management recommendation :

- Effort limitation: results showed that the effort will be reduced the actual effort for females and not increased for males.

Management strategies

Area closures	It would be considered zones where fish will be banned.
Temporal closures	It can be choose between the recruitment to the fishery (autumn) or in the reproduction period (summer).
Effort limitation	The effort must be reduce the actual effort. Reducing time at sea or/and engine power.
Minimum size	None about the selectivity size. It is needed studies in this sense.
Technical steps concerning gear	Yes, the gear dimensions and door weight is one of the most important factor that increase the effort. Material of the gear is other of the factor that can be studied in order to reach a mesh size standard and non deformable for all the fleet.
Quotas	
Market	

DOC 11 : **Assessment** of **demersal fish stocks in the Saronikos Gulf and the Cyclades islands**

C. Karlou-Riga and N. Vrantzas, Ministry of Agriculture – Fisheries Laboratory

The relative yield per recruit model of Beverton and Holt was employed using length frequency composition data from trawl surveys in the years 1998 to 2000.

HAKE

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Code	M229800
Page	1

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value *	Value **	trend	Comments
B_{now}				
SSB				
B_{virgin}				
F_{now}	3.08	2.10		
F_{msy}	1.57	1.12		
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Emax/Ecur	0.51	0.54	Slight decreasing *	1988-92 : ratio Emax/Emin = 0.54 (fisheries laboratory 1998)

* Saronicos Gulf _ ** Cyclades Islands

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

overexploitation

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Growth overexploitation. In the Saronicos Gulf, the state of the stock is as that of ten years earlier. A slight increase of the exploitation rate should be mentioned

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	M229800
Page	1

Management objectives

Because : 1) the bulk of trawler catch for hake is of length size smaller than that at first maturity,
2) The mesh size in use defines a length at first capture smaller than the legal one ,
3) the recent increase of mesh size from 14 mm (from knot to knot) to 20 mm did not change the length at first capture,

in order to obtain MSY and to avoid losses for the fishermen, the following recommendation are needed

Management recommendations

Area closures	
Temporal closures	A seasonal closure during the post recruitment period (late spring) would be effective to protect the juveniles
Effort limitation	Decreasing of fishing days
Minimum size	
Technical steps concerning gear	Improve trawl selectivity
Quotas	
Market	Not only enforce the EC measures to all the fishermen, but improve the authority control system

RED MULLET

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Code	MB22990
Page	2

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap.*, 347)

Criterion	value	units	trend	Comments
B_{now}				
SSB				
B_{virgin}				
F_{now}	1.66			
F_{msy}	2.08			
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Emax/Ecur	1.25		decreasing	1985-92 : Emax/Ecur = 1.51 , taking as ref.point E0.1 or F0.1 the stock was shown fully exploited

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

The current exploitation rate has increased by 20 % of that estimated 15 years ago, when the stock had been assessed as fully exploitEd. This increase shows a present slight overexploitation of the stock.

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Growth overexploitation. A trend from fully exploited to overexploited is observed.

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	MB22990
Page	2

Management objectives

Management recommendations

Area closures	
Temporal closures	A limitation of fishing period by one month should be effective for the protection of the young individuals caught in the beginning of trawler fishing season (october)
Effort limitation	
Minimum size	
Technical steps concerning gear	
Quotas	
Market	Improve the authority control system

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Code	PE229800
Page	3

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value*	Value**	trend	Comments
B_{now}				
SSB				
B_{virgin}				
F_{now}	0.33	0.71		
F_{msy}	0.52	0.80		
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Emax/Ecur	1.57	1.14		

* Saronicos Gulf - ** Cyclades islands

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Underexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Because : 1) growth parameters used were taken from the literature,
2) high percentages of undersized individuals are caught during the fishing season,
3) data from one year for each area studied were used for the assessment,
the result of the state of the stock is just preliminary

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	PE229800
Page	3

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	Keep the fishing effort to the current level until more validated assessment works will be done
Minimum size	
Technical steps concerning gear	
Quotas	
Market	Improve the authority control system

MULLUS SURMULETUS

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Code	MS229800
Page	4

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Value*	Value**	trend	Comments
B_{now}				
SSB				
B_{virgin}				
F_{now}	1.89	1.15		
F_{msy}	2.15	1.43		
$F_{0.1}$				
$F_{2/3msy}$				
F_{low}				
F_{med}				
F_{high}				
$F_{\% SPR}$				
TAC				
$TAC_{0.1}$				
Y_{now}				
MSY				
MBAL				
Emax/Ecur	1.14	1.25		

*Saronicos Gulf - ** Cyclades islands

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

underexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Because : 1) growth parameters taken from literature, and
2) data from one year for each area studied were used for the assessment,
the result of the state of the stock is just preliminary

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	MS229800
Page	4

Management objectives

Management recommendations

Area closures	
Temporal closures	
Effort limitation	Keep the fishing effort to the current level until more validated assessment works will be done
Minimum size	
Technical steps concerning gear	
Quotas	
Market	Improve the authority control system

DOC 12 : MEDITS trawl surveys results
Gil de Sola L. & Gonzales L.

TS, TS1 and TS2 assessment forms for Merluccius merluccius, Mullus barbatus, Aristeus antennatus and Nephrops norvergicus data from the Spanish MEDITS survey in the last 7 years

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MER-MEDITSS
Page	1

Cruise	MEDITS Northern Alboran Sea		R/V	Cornide de Saavedra	
Total area (km^2)	13836 / 12753*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	*Merluccius merluccius*			
	kg/km2	Variance	n/km2	Variance
1994	9.63	6.8	154	4122
1995	4.38	18.6	104	32.7
1996	13.68	24.9	340	49.2
1997	12.19	43.5	343	41.6
1998	6.70	36.8	42	55.6
1999	4.67	50.7	225	65.9
2000	7.88	26.3	209	33.8

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MUB- MEDITSS
Page	1

Cruise	MEDITS Northern Alboran Sea		R/V	Cornide de Saavedra		
Total area (km^2)	13836 / 12753*	Season	May-June	Series	1994-2000	

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Mullus barbatus**			
	kg/km2	Variance	n/km2	Variance
1994	4.58	66.4	125	70.9
1995	16.82	67.0	427	64.8
1996	3.08	63.6	92	64.6
1997	1.38	53.2	33	57.8
1998	4.85	53.0	112	55.8
1999	1.71	44.2	41	45.8
2000	3.49	62.9	83	60.1

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	ARA- MEDITSS
Page	1

Cruise	MEDITS Northern Alboran Sea		R/V	Cornide de Saavedra	
Total area (km^2)	13836 / 12753*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Aristeus antennatus**			
	kg/km2	Variance	n/km2	Variance
1994	0.84	73.3	47	82.9
1995	2.44	74.5	184	73.7
1996	1.28	61.3	81	64.1
1997	2.81	54.9	244	55.6
1998	2.15	58.6	184	59.5
1999	1.93	39.0	123	36.1
2000	5.79	53.5	538	54.6

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	NEP- MEDITSS
Page	1

Cruise	MEDITS Northern Alboran Sea		R/V	Cornide de Saavedra	
Total area (km^2)	13836 / 12753*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species:	**Nephrops norvegicus**			
	kg/km2	Variance	n/km2	Variance
1994	0.67	41.4	12	40.3
1995	0.97	38.3	19	35.1
1996	1.87	42.6	28	43.5
1997	2.60	61.6	63	55.0
1998	0.59	49.5	17	45.4
1999	0.79	65.1	21	58.0
2000	0.92	36.1	19	39.2

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MER-MEDITSS
Page	3

Cruise	MEDITS Northern Spain North		R/V	Cornide de Saavedra		
Total area (km^2)	21795 / 16578*	Season	May-June		Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	*Merluccius merluccius*			
	kg/km2	Variance	n/km2	Variance
1994	23.26	20.2	2172	19.6
1995	9.16	32.1	638	25.8
1996	28.65	18.7	1663	23.4
1997	32.22	18.0	2948	21.1
1998	34.16	29.4	3007	31.6
1999	24.25	13.4	2173	17.3
2000	40.47	13.5	5045	19.0

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MUB- MEDITSS
Page	3

Cruise	MEDITS Northern Spain North		R/V	Cornide de Saavedra	
Total area (km^2)	21795 / 16578*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Mullus barbatus**			
	kg/km2	Variance	n/km2	Variance
1994	18.9	45.2	752	50.9
1995	15.82	20.9	486	20.1
1996	13.76	25.2	369	23.1
1997	7.44	39.2	158	40.1
1998	18.85	32.6	459	39.3
1999	12.33	26.8	301	28.0
2000	16.26	22.1	484	24.0

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	ARA- MEDITSS
Page	3

Cruise	MEDITS Northern Spain North		R/V	Cornide de Saavedra		
Total area (km^2)	21795 / 16578*	Season	May-June		Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Aristeus antennatus**			
	kg/km2	Variance	n/km2	Variance
1994	1.39	36.1	73	35.2
1995	1.05	69.9	78	75.7
1996	1.60	43.2	84	51.5
1997	1.24	46.9	64	51.5
1998	1.02	0.0	58	0.0
1999	0.56	157.8	52	192.0
2000	0.21	95.1	8	93.5

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	NEP- MEDITSS
Page	3

Cruise	MEDITS Northern Spain North		R/V	Cornide de Saavedra		
Total area (km^2)	21795 / 16578*	Season	May-June		Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Nephrops norvegicus**			
	kg/km2	Variance	n/km2	Variance
1994	3.76	31.3	161	20.9
1995	4.41	21.3	188	16.5
1996	6.49	28.9	251	25.4
1997	7.37	43.3	320	40.2
1998	0.05	83.6	2	45.4
1999	1.77	39.1	102	48.1
2000	3.50	38.9	206	44.2

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MER-MEDITSS
Page	2

Cruise	MEDITS South	Northern Spain	R/V	Cornide de Saavedra	
Total area (km^2)	20651 / 15928*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	*Merluccius merluccius*			
	kg/km2	Variance	n/km2	Variance
1994	11.04	29.9	767	42.2
1995	6.40	19.1	429	33.6
1996	20.10	28.8	1358	39.1
1997	14.00	24.1	1169	34.1
1998	12.30	17.0	868	24.6
1999	10.51	22.6	1286	35.1
2000	26.22	21.2	3624	25.7

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	MUB- MEDITSS
Page	2

Cruise	MEDITS South	Northern Spain	R/V	Cornide de Saavedra	
Total area (km^2)	20651 / 15928*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Mullus barbatus**			
	kg/km2	Variance	n/km2	Variance
1994	1.95	26.6	62	28.6
1995	8.04	44.6	231	44.1
1996	4.04	34.8	103	34.8
1997	6.19	51.0	96	50.0
1998	6.79	44.4	131	44.5
1999	6.02	28.8	127	29.3
2000	6.02	28.8	127	29.3

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	ARA- MEDITSS
Page	2

Cruise	MEDITS South	Northern Spain	R/V	Cornide de Saavedra	
Total area (km^2)	20651 / 15928*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Aristeus antennatus**			
	kg/km2	Variance	n/km2	Variance
1994	0.53	59.4	34	57.0
1995	1.45	35.6	95	40.9
1996	2.65	65.0	172	53.8
1997	2.65	65.0	172	53.8
1998	1.46	35.3	110	37.8
1999	1.46	44.0	117	40.4
2000	4.35	62.7	410	64.2

Comments

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet TST Direct methods: swept area

Code	NEP- MEDITSS
Page	2

Cruise	MEDITS South	Northern Spain	R/V	Cornide de Saavedra	
Total area (km^2)	20651 / 15928*	Season	May-June	Series	1994-2000

Objective (in general)	Obtain relative abundance indices and distribution lengths of the 36 demersal species (spring) comparables between different Mediterranean sea areas.
Sampling strategy	Stratified sampling scheme with random drawing inside each stratum.
Gear	Trawl
Sampler (gear used)	GOC 73
Minimum and maximum depths	10 – 800 m.

Species :	**Nephrops norvegicus**			
	kg/km2	Variance	n/km2	Variance
1994	1.78	29.2	83	29.9
1995	2.78	31.7	73	38.4
1996	3.40	45.8	81	41.6
1997	4.97	30.1	153	32.4
1998	3.47	41.6	128	42.1
1999	1.89	66.5	58	69.3
2000	1.05	56.3	23	50.2

Comments

DOC 14 : hake *(Merluccius merluccius*) and red mullet (*Mullus barbatus*) populations in the Hellenic seas

M. Labropoulou[1], C. Papaconstantinou[1] and G. Tserpes[2]
[1] National Centre for Marine Research, Hellinikon, Athens, 16604 Greece
[2] Institute of Marine Biology of Crete, 71003 Heraklion, Crete, Greece

HAKE

SAC GFCM. Subcommittee of Stock Assessment	Assessment form	Sheet D Diagnosis

Merluccius merlucciuss

Code	
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Area 22 (1998)	Area 20 (1998)	Area 22 (1999	Area 20 (1999)	Comments
B_{now}					
SSB					
B_{virgin}					
F_{now}	0.6450	0.4417	0.5172	0.6014	$F_{cur}>M_{cur}$
F_{msy}					
$F_{0.1}$					
$F_{2/3msy}$					
F_{low}					
F_{med}					
F_{high}					
$F_{\% SPR}$					
TAC					
$TAC_{0.1}$					
Y_{now}					
MSY					
MBAL					

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	MerlMerl
Page	

Management recommendations

Fishery regulations currently applied in the Greek Seas include mesh size measures, minimum landing sizes, closed seasons and areas and distance from the coast, where fishing activities should take place. Therefore the enforcement of the existing measures and regulations are strongly recommended. Furthermore, a reduction of the fishing effort directed to the spawners is recommended by applying regulations to the trammel nets and long lines. In addition, the expansion of closed seasons in the main nursery grounds would protect the recruits.

Management strategies

Area closures	
Temporal closures	
Effort limitation	
Minimum size	
Technical steps concerning gear	
Quotas	
Market	

RED MULLET

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet D Diagnosis

Mullus barbarus

Code	
Page	

Reference points (for further information see CADDY, 1996, *FAO Fish. Tecn. Pap*., 347)

Criterion	Area 22 (1998)	Area 23 (1998)	Area 22 (1999	Area 23 (1999)	Comments
B_{now}					
SSB					
B_{virgin}					
F_{now}	0.63	0.59	0.65	0.69	$F_{cur}>M_{cur}$
F_{msy}					
$F_{0.1}$					
$F_{2/3msy}$					
F_{low}					
F_{med}					
F_{high}					
$F_{\% SPR}$					
TAC					
$TAC_{0.1}$					
Y_{now}					
MSY					
MBAL					

General state of resource: underexploited, overexploited, collapsed, unknown, etc.

Overexploited

Particularities of the state of the resource: growth overexploitation, recruitment overexploitation, existence of inaccessible segments, trends observed, etc.

Risks

SAC GFCM. Subcommittee of Stock Assessment	Assessment form Sheet Z Objectives and recommendations

Code	MulBarb
Page	

Management recommendations

Fishery regulations currently applied in the Greek Seas include mesh size measures, minimum landing sizes, closed seasons and areas and distance from the coast, where fishing activities should take place. Therefore the enforcement of the existing measures and regulations are strongly recommended.

Management strategies

Area closures	
Temporal closures	
Effort limitation	
Minimum size	
Technical steps concerning gear	
Quotas	
Market	