THEME 4: Management of fisheries on shared resources/
Aménagement des ressources partagées

Assessment and management advice for small pelagic fish off Northwest Africa

Conseils pour l'évaluation et l'aménagement des petits poissons pélagiques au large de l'Afrique du nord-ouest
(English only/En anglais seulement)

M. Tandstad* and A.M. Caramelo
*Food and Agriculture Organization of the United Nations (FAO)
Viale delle Terme di Caracalla, Rome, Italy
Merete.Tandstad@fao.org

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ABSTRACT

Small pelagic fish are of great importance to the countries in Northwest Africa, both in terms of income and food security. Concern expressed at various meetings in the 1990s regarding the importance of a more regional approach to research and management of these shared resources led to the establishment of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa in 2001. Since then, the Working Group has met annually. The overall objective of the Working Group is to assess the status of the small pelagic resources in Northwest Africa and recommend on fisheries management and exploitation options aimed at ensuring optimal and sustainable use of small pelagic fish. The results and recommendations of the Working Group are discussed at the Scientific Committee of CECAF, who reviews and discusses the assessments and recommendations made before they are presented to the Committee for endorsement.

The results of the assessments made during the seventh meeting of the Working Group in 2007 show that overall, the most important small pelagic fish stocks in the region are considered to be fully or overexploited and recommendations for management have been formulated. Although this excellent collaboration between scientists can be seen as a first step towards shared stocks management, it is noted that the advice of the Working Group sometimes does not have the desired effect as they are not taken into consideration by the various fisheries administrations. Given the commitment of the Governments to the conservation and sustainable exploitation of resources as shown through the various national legislations, it is hoped that a mechanism for the shared management will be put into place in the near future to ensure the sustainable state of these important shared resources.

RÉSUMÉ

Les petits poissons pélagiques ont une grande importance pour les pays de l'Afrique du nord-ouest en termes de revenu et de sécurité alimentaire. L'inquiétude exprimée lors de plusieurs réunions durant les années 1990 concernant l'importance d'une approche régionale pour entreprendre des recherches et procéder à l'aménagement des ressources de la région nord-ouest africaine a conduit à la mise en place en 2001 d'un Groupe de travail FAO sur l'évaluation des petits pélagiques au large de l'Afrique nord-occidentale. Depuis lors le Groupe s'est réuni annuellement. L'objectif global du Groupe de travail est d'évaluer l'état des stocks de petits pélagiques en Afrique du nord-ouest et de formuler des recommandations en matière d'aménagement des pêches pour des options d'exploitation visant à assurer une utilisation optimale et durable des ressources de poissons pélagiques. Les résultats et recommandations du Groupe de travail sont

discutés au Sous-Comité scientifique du COPACE, qui revoit et discute les évaluations et les recommandations faites avant de les présenter au Comité pour approbation.

Les résultats des évaluations obtenus pendant la septième réunion du Groupe de travail en 2007 indiquent que, globalement, les stocks les plus importants de petits pélagiques dans la région sont considérés comme étant pleinement exploités ou surexploités et des recommandations d'aménagement ont été préparées. Bien que cette excellente collaboration entre scientifiques peut être considérée comme un premier pas vers l'aménagement partagé des stocks, on note que les conseils du Groupe de travail n'ont parfois pas l'effet désiré car ils ne sont pas pris en considération par les diverses administrations des pêches. Etant donné l'engagement des gouvernements concernant la conservation et l'exploitation durable des ressources, comme il a été montré par les diverses législations nationales, on espère qu'un mécanisme d'aménagement partagée sera mis en place pour tous les pays de l'Afrique du nord-ouest dans un proche avenir pour assurer la durabilité de ces ressources partagées importantes.

1. INTRODUCTION

Small pelagic fish are of great importance to the countries in Northwest Africa, both in terms of income and food security. Small pelagic fish represent approximately 70 percent of the total marine fish landings in the Northwest Africa countries. An international working party held in Mauritania in December 1998 (CECAF, 1999) and a workshop to plan the 1999 R/V DR. FRIDTJOF NANSEN surveys in the Northern CECAF area and the standardization of acoustic surveys in the region held in October 1999 (Caramelo *et al*., 2001), both stressed an already expressed concern regarding the importance of a more regional approach to research and management of fishes in the area. Concern expressed in these meetings in the 1990s regarding the importance of a more regional approach to research and management of these shared resources led to the establishment of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa in 2001. The overall objective of the Working Group is to assess the state of the small pelagic resources in Northwest Africa and make recommendations on fisheries management and exploitation options aimed at ensuring optimal and sustainable use of small pelagic fish resources for the benefit of coastal countries.

The results and recommendations of the Working Group are discussed at the Scientific Committee of CECAF, who reviews and discusses the assessments and recommendations before they are brought to the Committee for endorsement. The seventh meeting of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa was held in Agadir, Morocco, from 17 to 26 April 2007; 18 scientists from seven countries and FAO participated.

The marine waters off Northwest Africa from Morocco to Southern Senegal are among the most productive in the world with annual catches of small pelagic fish reaching over 2 million tonnes. The most important pelagic species for commercial fisheries are sardine (*Sardina pilchardus*), sardinella (*Sardinella aurita* and *S. maderensis*), horse mackerels (*Trachurus trecae*, *Trachurus trachurus* and *Caranx rhonchus*) and chub mackerel (*Scomber japonicus*). Anchovy (*Engraulis encrasicolus*) and bonga (*Ethmalosa fimbriata*) are also considered important in some countries of this region. Important catches of anchovy have been recorded in Mauritania while bonga constitutes the bulk of fish catches in The Gambia.

This document emphasizes the work of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa and describes the commercially most important pelagic species, the respective fisheries, the results of the 2007 assessments and the management recommendations made (FAO, 2007).

2. THE PELAGIC RESOURCES

The Working Group assesses the following commercially important species: sardine (*Sardina pilchardus*), sardinella (*Sardinella aurita* and *Sardinella maderensis*), horse mackerel (*Trachurus trecae*, *Trachurus trachurus* and *Caranx rhonchus*), chub mackerel (*Scomber japonicus*), bonga (*Ethmalosa fimbriata*) and

anchovy (*Engraulis encrasicolus*) in the region between the southern border of Senegal and the northern Atlantic border of Morocco.

These species are distributed along the Northwest African coast (Figure 1). Chub mackerel is found throughout the zone and performs extensive migrations. Some of them such as the sardine, anchovy and Atlantic horse mackerel have more temperate affinities with higher abundance in the northern part of the area. Others such as the sardinellas, the Cunene horse mackerel and bonga prefer warmer waters. Some species have a more coastal distribution (*S. maderensis* and *E. fimbriata*).

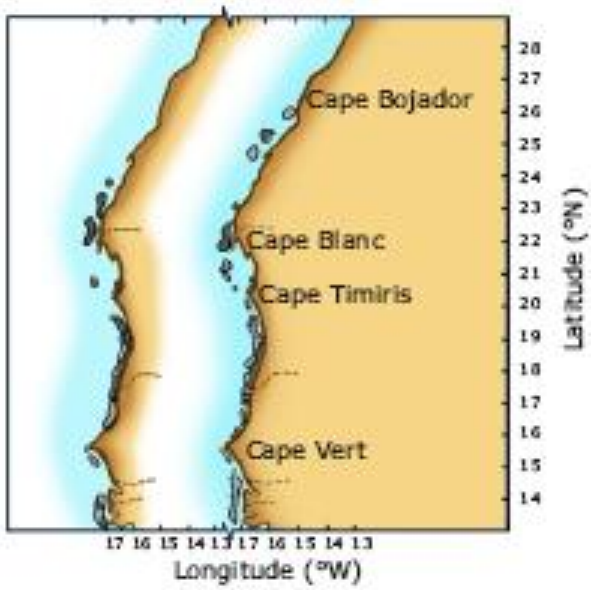

Figure 1: An example of the distribution of sardinella in Northwest Africa

Sardine (*Sardina pilchardus)*

Round sardinella (*Sardinella aurita*)

Flat sardinella (*Sardinella maderensis*)

Cunene horse mackerel (*Trachurus trecae*)

Atlantic horse mackerel (*Trachurus trachurus*)

Chub mackerel (*Scomber japonicus*)

Anchovy (*Engraulis encrasicolus*)

Bonga shad (*Ethmalosa fimbriata*)

Figure 2: Species studied by the Working Group

3. EXPLOITATION

The industrial vessels include purse seiners and large trawler vessels, including from Eastern Europe, European Union countries,Asia and others. The small pelagics are also exploited by thousands of canoes, thus providing substantial employment and food fish for coastal populations.

A decrease of 6 percent in total catches was observed of the main small pelagic fish from 2.02 million tonnes in 2005 to 1.91 million in 2006.

Total catch of small pelagic fish for the period 1990 to 2006 has fluctuated around 1.66 million tonnes (Figure 3) and the mean catch over the period 2002-2006 is shown in Table 1.

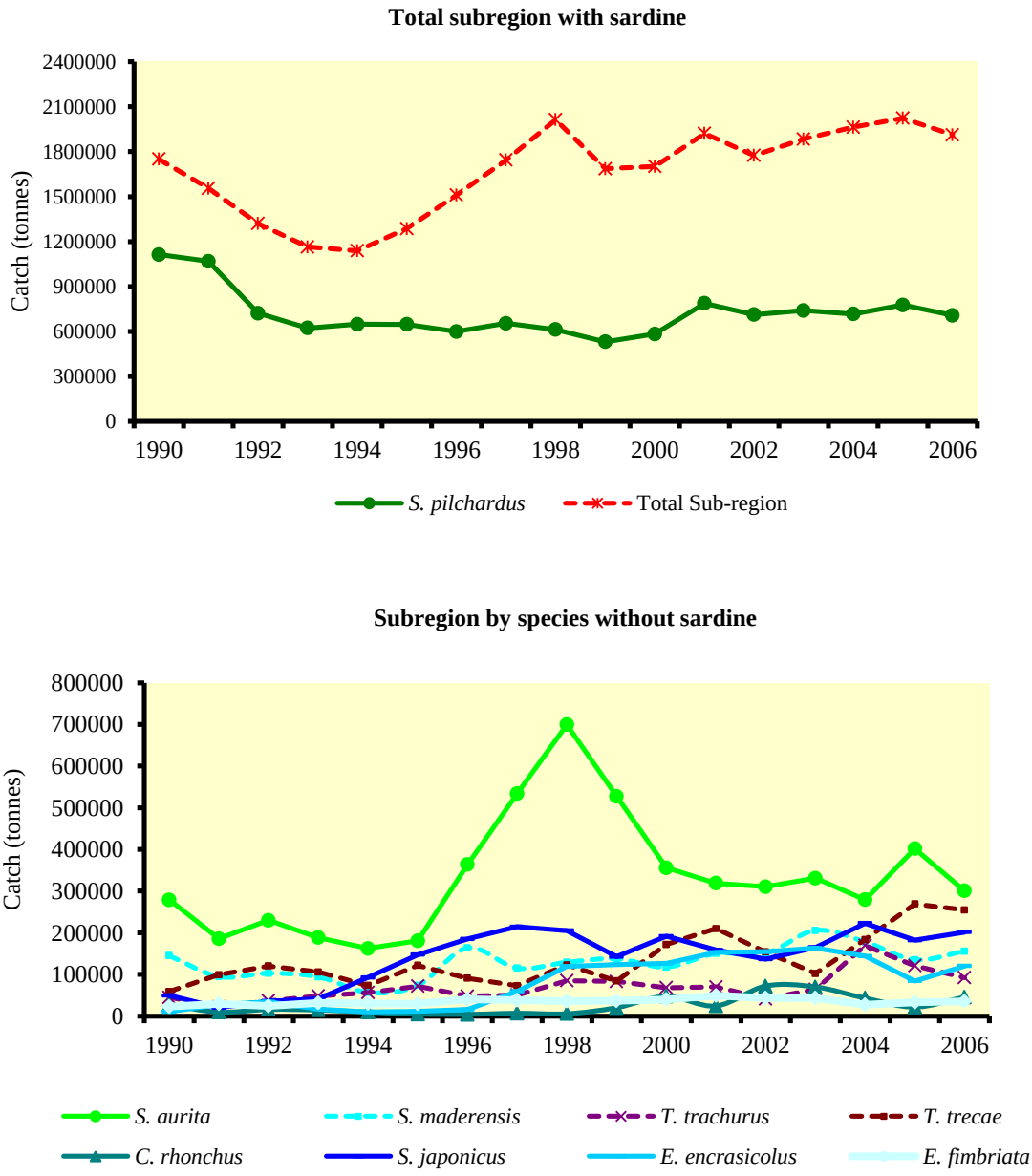

Figure 3: Catches (1990−2006) in the subregion by year (weight in tonnes)

Table 1: Mean catch of the main pelagic species in the period 2002-2006

Stocks	**Mean catch 2002–2006** (1 000 tonnes)
Sardina pilchardus zone A+B	540
Sardina pilchardus zone C	170
Sardinella aurita	325
Sardinella maderensis	163
Trachurus trecae	180
Trachurus trachurus	90
Caranx rhonchus	40
Scomber japonicus	185
Anchovy (*Engraulis encrasicolus*)	134
Bonga (*Ethmalosa fimbriata*)	37

4. ACOUSTIC SURVEYS

The Norwegian R/V DR. FRIDTJOF NANSEN has surveyed the subregion from 1995 to 2006, carrying out acoustic surveys during the months October–December each year. In addition, between 2001 and 2003, the vessel carried out acoustic surveys covering the same area in May–July. Occasional surveys were carried out before 1995. The assessment work is critically dependent on the quality of the acoustic estimates. Figure 4 shows the evolution of biomass (million tonnes) estimated by R/V DR. FRIDTJOF NANSEN in the period 1995–2006.

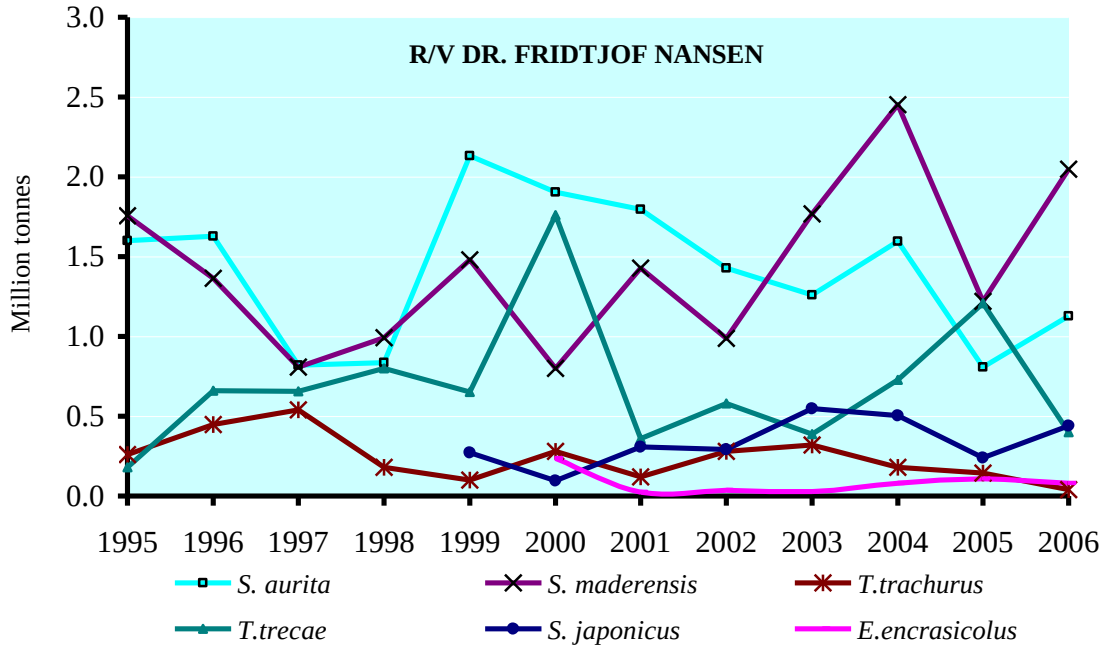

Figure 4: Evolution of biomass (million tonnes) estimated by R/V DR. FRIDTJOF NANSEN (1995-2006)

5. ASSESSMENT AND RESULTS

The Working Group takes into consideration all the information made available to them from the participating scientists, including both fisheries independent survey data and information from the fisheries.

The main assessment model used is the dynamic production model. Other models are also applied to some stocks depending on data availability. The Group makes projections of future yields and stock status under different hypotheses for future management measures. The advice on the stocks is given in relation to the agreed reference points and on the basis of the projections. Table 2 summarizes the results of fitting the dynamic production model with environmental covariates to the data on catch and abundance indices for the main small pelagic stocks.

Table 2: Summary of the results of fitting the logistic production model with environmental covariates to the data on catch and abundance indices for the main small pelagic stocks

Stock	Last year 2006 catch in 000 t (2002–2006 average)	$B_{cur}/B_{0.1}$	$F_{cur}/F_{0.1}$	Assessment	Management recommendations
Sardine *S. pilchardus* Zone A+B	389 (540)	19%	395%	Stock is overexploited.	Decrease effort by 20% corresponding to a catch level of 350 000 tonnes in 2008.
Sardine *S. pilchardus* Zone C	299 (170)	112%	3%	Stock is not fully exploited.	The total catch level may be temporarily increased but should be adjusted to natural changes in the stock.
Sardinellas *S. aurita* and *S.maderensis* *Sardinella* spp. Whole subregion	 300 (325) 150 (163) 450 (488)	 44% 89%	 481% 154%	Stock of *S. aurita* is overexploited. No reliable results for *S. maderensis*	Decrease effort in total sardinella fishery by 50%. For 2008, catches should not exceed the level recommended last year 220 000 tonnes.
Horse mackerel *T. trachurus* *T. trecae* Whole subregion	 120 (90) 220 (180)	 36% 129%	 427% 121%	Stock of *T. trachurus* is overexploited. Stock of *T. trecae* is fully exploited.	Because of the mixed horse mackerel fishery, decrease effort by 20%. For 2008 total catches of the two species should not exceed the level recommended last year, i.e. 260 000 tonnes.
Chub mackerel *Scomber japonicus* Whole subregion	202 (185)	-	-	Stock is not fully exploited.	As a precautionary measure, catch level should not exceed the current level (2006), i.e. 200 000 tonnes by 2008.
Anchovy *Engraulis encrasicolus* Whole subregion	120 (134)	NA	NA	NA, acoustic estimates show a decrease in biomass from 2005 to 2006.	As a precautionary measure, catch level should not exceed the average over the three last years (115 000 tonnes).
Bonga *Ethmalosa fimbriata* Whole subregion	35 (37)	NA	NA	NA, but catch rates have been stable since 2002.	As no new information is available on this species, the recommendation from 2006 is maintained, i.e. catch level should not exceed 42 000 tonnes.

6. DISCUSSION AND CONCLUSION

The FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa provides advice on the state of the pelagic resources and catches at a regional level. The results and recommendations of the Working Group are discussed at the Scientific Committee of CECAF, who reviews and discusses the assessments and recommendations before they are brought to the Committee for endorsement. The excellent cooperation between the scientists in the region can be seen as a first step in the concerted management of these important resources. The advice of the Working Group sometimes does not have the desired effect as they are not taken into consideration by the various fisheries administrations. Given the commitment of the Governments to the conservation and sustainable exploitation of resources as shown through the various national legislations, it is hoped that a mechanism for the shared management will be put into place in the near future to ensure the sustainable state of these important shared resources.

7. RESEARCH RECOMMENDATIONS

- Acoustic surveys and related activities such as coordination between countries and intercalibration should be continued to maintain and improve the time series; when possible, acoustic abundance estimates should be split by zones and age groups. The assessment work is critically dependent on the quality of the acoustic estimates. It is therefore strongly recommended that the participating vessels in the region coordinate and make intercalibrations.
- Recruitment surveys covering the whole subregion should be carried out regularly to provide an early estimate of year class strength and to improve the basis for stock assessment.
- Research activities aiming at a better understanding of the effect of environmental changes on the dynamics of pelagic stocks should be encouraged.
- Continue to develop and improve the assessment methods. Further develop the version of the production model used by the group including other versions of the production functions, multiple abundance indices and uncertainty estimates.
- Continue to improve sampling by increasing the numbers of individuals in each sample covering all size ranges. All fleet segments and all quarters of the year should be covered. Special attention must be given to the fisheries in The Gambia and the artisanal fishery in Mauritania.
- Continue work on age reading of sardine and sardinella.

8. ACKNOWLEDGEMENTS

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