Col.Vol.Sci.Pap. ICCAT, 48 (3) : 113-116 (1998)

REPORT TO THE ICCAT SCRS ON THE PARTICIPATION TO THE ICES STUDY GROUP (SG) ON THE ELASMOBRANCH FISHES *(COPENHAGEN, DENMARK, MAY 26-30, 1997)*

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1. Introduction

After the 2nd meeting in 1995(1st meeting was held in 1989), the SG decided that in order to be able to move forward in analyzing elasmobranch stocks, study should be done on those species for which we have most data, preferably covering a range of habitats and life histories (ICES 1996). Deep-water sharks, blue shark, spurdog and skates and rays were chosen. Information on fisheries, catches, landings and discarding of a particular species will be found under that species heading.

The 3rd meeting was held under the chairmanship of Dr. P. Walker from 26-30 May 1997 at ICES Headquarters, Copenhagen, Denmark. The agenda of the meeting is shown in the annex 1. Four participants from the member countries of ICES, two observers from IUCN(Sala fowler, acting chair of the SSG) and ICCAT(Matsunaga) joined the meeting (Annex 2).

2. Terms of reference of ICES study group on elasmobranch fishes

The terms of reference of the study group are as follows;

a) analyze the data available on the geographical distribution of species and identify species for which the data are sufficient for analytical assessment;

b) conduct analytical assessment and evaluate the effects of exploitation and/or environmental changes on the stocks considered;

c) prepare identification sheets for deep-water sharks, skates and rays, including 'skate wings' and identify the most important species;

d) re-evaluate the ICES species coding for sharks, skates & rays;

e) considered the status of the group in the light of future requirements for works on elasmobranch fishes.

3. Deep-water species

The available biological and fisheries information on some species, mainly squaloid sharks, has been reviewed in order to highlight the extent and limits of the present knowledge. Much of the collected information is taken from an ongoing EU-funded project which will be completed by late 1998. A drastic reduction of the stock of deep-water schooling sharks by fishery impact may unbalance the entire ecosystem, and recovery of depleted stocks would take much longer than will shallow water elasmobranch stocks. As deep-water fisheries are still at their beginning but are exploiting the last available resource in the oceans, precautionary measures are necessary, even if the background information will remain insufficient for a long time still in terms of providing evidence of the effect of exploitation.

4. Blue shark (*Prionace glauca*)

The blue shark was chosen by the SG as a species to be considered for analytical assessment because it is a pelagic species with a wide distributional area and data could be acquired from scientists working on both sides of the Atlantic. Most of the information in this section is taken from the IUCN shark specialist group's status report for chondrichthan fishes by John Stevens.

Biological characteristics (distribution, growth, reproduction, migration) were reviewed. Fisheries information about the estimation of catch quantity and CPUE trend was also reviewed. The reports which show the CPUE trend of Japanese longline fisheries were refereed. Blue sharks are a key species in the oceanic ecosystem and lack of knowledge prevents any assessment of the impacts of blue sharks mortality on the ecosystem or on the blue shark populations.

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5. Spurdog (*Squalus acanthias*)

Fisheries trends

a) North-east Atlantic

An examination of the national fishery trends indicates that spurdog catches in the North Sea have fallen since mid-late 1970's. Catches of spurdog increased in the late 1970's in the Irish Sea, Celtic Sea and English Channel, following a period in which little was caught, but declined after reaching a peak between 1980 and 1988, depending on area. The apparent decline of spurdog landings in all areas since the late 1980's may be partly due to the fact that spurdog are not a TAC species in the NE Atlantic, and reporting of catches is not mandatory. Therefore, it may be partly due to decline in reporting the catch.

b)North-west Atlantic

The total landings for NAFO areas 2,3,4,5 and 6 in 1996 were around 25,000 t. About 70% of the current landings are taken by set gill nets, with most of the remainder caught by otter trawlers.

State of stocks

a) North-east Atlantic

It appears that spurdog abundance might fluctuate widely in a particular sea area, irrespective of the overall stock trends, and that short time series for limited sea areas do not necessarily indicate their stock status. Local abundance increases may be the result of an influx of maturing fish to a particular area, which are soon depleted as fisheries develop. They should not be taken as representative of the state of the stock as a whole. The general conclusion is that there was a peak in abundance of spurdog in the NE Atlantic in the mid 1970s to mid 1980s , after which most indices of abundance have shown a marked decline.

b)North-west Atlantic

Swept-areas estimates from survey trawl data indicate that its biomass increased 6-fold between the late 1960s and 1989, but is now declining.

Population biology

There is more information on the reproductive dynamics of the spurdog than all other elasmobranchs, and there has been considerable variability in the average number of embryos or pups reported from the different populations of spurdog in the North Atlantic and North Pacific Oceans. It is difficult to judge if phenotypic plasticity is responsible for these area and time differences or whether they can be interpreted as responses to changes in population density due to exploitation. However some authors have suggested that, though recruitment and mature stock biomass in spurdogs are closely linked, some compensatory mechanisms must exist in order for these populations to survive in changing environments (Holden, 1973; Holden, 1977; Fogarty et al., 1989).

Modeling and assessment

Most attempts at assessing spurdog in European waters have been based on the application of production models, which imply compensatory changes in life-history parameters in response to exploitation. One characteristic of elasmobranchs that makes the application of the method more suited than to teleosts, is their deterministic stock/recruitment relationship, which enables incorporation of compensation in production models. These are an age-structured compensatory model (Wood et al., 1979), a biomass dynamics model (Brodziak et al., 1994) and a life-history type of model (Silvia, 1993, 1994; Rago et al., 1994).

Recommendations for the future work

There are many difficulties posed by spurdogs for the application of conventional stock assessment methods, because CPUE series for individual fisheries or surveys do not represent the trends in abundance of the stock as a whole. It is necessary to have reliable information on stock identity and stock delimitation, and to have a good knowledge of the fisheries exploiting the stock. The SG suggests that the other methods which have been tried on spurdog populations should be fully evaluated, using all the available data on spurdog in the NE Atlantic, on the assumption that they belong to one biological population.

6. Case study: North Sea rays & skates

In this section international landing data and three series of survey data have been examined to identify the changes occurring in abundance and distribution of the major species in the North Sea. Data on growth and maturation from ongoing research have also been analyzed to determine the differences between species with regard to life history parameters and compared to published and unpublished data to see how these have changed over time.

Changes in abundance & distribution

Landings of all skates and rays started declining in the North Sea in the early 1920s and again in the mid-1950s, following a period of recovery during the two world war, but have leveled out over the past 15-20 years. The present distribution of the four most common ray species (starry ray, cuckoo ray, thornback ray, spotted ray) in the North Sea shows that the species have quite discrete distributions. The limited evidence available suggests that in the past few decades the starry ray has replaced other species in the central North Sea.

Changes in life history parameters

A comparison of preliminary results produced by ongoing work to the previous published estimates shows the changes to a higher fecundity in the starry ray, a lower age at maturity for the spotted and cukoo rays and a higher age at maturity for the thornback ray, which illustrates quite well the effect of a shift in age at maturity on survival.

Concluding remarks

The life history of common skate, its large size and commercial importance make it the most susceptible of the North Sea Raja species and the stocks have, quite predictably, been severely depleted. Even the populations of the other species that are still present in the North Sea are unlikely to be able to withstand the current level of total mortarity for long, despite changes in maturation which, at a population level, appear to enable the spotted and starry ray to survive a slightly higher level of mortality now than in the past. The species-specific differences in the population changes(disappeared, decreased or increased) are especially interesting. It is a point for discussion what these apparent changes are due to.

7. Species identification guides

The identification sheet on skates was prepared for the 1996 meeting by correspondence by Dr. Matthias Stehmann. He prepared the other two, on skate wings and deep-water sharks, prior to the 1997 meeting. This work was carried out during an EU-funded project on deep-water sharks.

8. Species coding

The SG recommends some changes and additions in order to obtain as detailed as possible the urgently needed missing information on catches, eventual discards and landings of an increasing number of chondrichthyan species especially from deep water.

9. Initiatives related to elasmobranch management and conservarion

Existing or proposd international initiatives related to elasmobranch management and conservation

Sharks and other cartilaginous fishes have, in the past few years, become the focus of increased attention on the part of national, regional and international management authorities, conventions, and non-governmental organizations. This is the result not only of elasmobranch fisheries management concerns, but also the significant wildlife and wider marine ecological implications of their exploitation and trade. Several international initiatives have arisen as a result which overlap with ICES's activities, or do so. The implications of these initiatives for future ICES work on elasmobranch fishes are significant, and have been taken into account when considering the SGEF (Study Group on the Elasmobranch Fishes) recommendations for future work.

Concerted action plan

Concerted action must be taken to find out what type of data have been collected and where. And, more importantly, what information is required in order to develop an understanding of the population dynamics of the cartilaginous species and the changes in life history parameters in response to exploitation.

10. Conclusions & Recommendations

Conclusions

Elasmobranch species are not currently covered by ICES conventional assessment procedure because of the low priority. In the light of recent international initiatives and the precautionary principle, the need for appropriate advice on the status of the stocks has arisen. Although there is not enough data to carry out conventional VPA stock assessments on elasmobranchs, the population dynamics of these species are easier to predict than those of most teleosts, due to the deterministic relationship between stock and recruitment and relatively uniform survival rate of juveniles and adults.

Recommendations

a) three posters prepared by the group identifying skates, 'skate wings', and deep-water sharks be published by ICES;
b) steps are taken to improve the knowledge of the biology and exploitation patterns of elasmobranchs, i.e. by initiating data collection and biological sampling from commercial fleets and through market surveys;
c) ICES supports an initiative to examine the NE Atlantic data on spurdog in order to evaluate the effects of exploitation and to provide a blueprint for the evaluation of shark populations in general;
d)initiatives be explored for alternative methods of evaluating the status of elasomobranch stocks;
e) if the initiatives for a consultative meeting of experts to be convened by FAO and a CITES Marine Fish Working Group receive approval from the 10th Conference of Parties to CITES in June 1997, ICES should seek representation on both these fora;
f) ICES keep a register of available data on elasmobranch fishes;
g)the species coding as suggested in this report be adopted by ICES;
h) establish a database/register of named scientists and institutes which are or have been active in the field of elasmobranch research and management;
i)the Study group work by correspondence in 1998 in order to monitor the progress of the various course of action plan recommended above, and prioritise the course of action the group should take, with a view to consolidating this at a meeting in 1999.

11. Comments as observers of ICCAT

Promotion for the collection and analyses of data on bycatch species for stock studies has become increasingly important due to worldwide awareness of conservation of marine environments. ICES has accumulated fisheries statistics and research data on some benthic elasmobranch species, and the stock assessment has also been tried. But it is thought that some improvements such as more data accumulation are necessary to assess the stock of elasombreanch fishes sufficiently. So it is beneficial for both ICCAT and ICES to maintain and develop close relationship with each other and other fishery organizations in exchange of knowledge on the elasmobranch fishes.

ANNEX 1. Agenda of the meeting

ICES STUDY GROUP ELASMOBRANCH FISHES
MEETING 26-30 MAY 1997
ICES Headquarters

Agenda

The SG meeting is scheduled from 26th to 30th May at the ICES Headquarters in Copenhagan. We will start at 10.00 on the first day and at 09.00 thereafter. The aim is to have the report finished by Friday afternoon.

Terms of reference:
a) analyze the data available on the geographical distribution of species and identify species for which the data are sufficient for analytical assessment;
b) conduct analytical assessment and evaluate the effects of exploitation and/or environmental changes on the stocks considered;
c) prepare identification sheets for deep-water sharks, skates and rays, including 'skate wings' and identify the most important species;
d) re-evaluate the ICES species coding for sharks, skates & rays;
e) considered the status of the group in the light of future requirements for works on elasmobranch fishes.

In the 1996 report we distinguished the species as: Squalus acanthias and five species of skates and rays (*Raja clavata*, *R.montagui*, *R.naevus* & *R.radiata*). It was hoped to be able to get enought information for analytical assessment of the blue shark (*Prionace gluca*) and one of the deep-water species (*Dalatias licha*, *Centroscymnus coelolepsis* or *Centrophorus squamosus*).

We will have an observer from IUCN present Thursday.

ANNEX 2. Participants list

M.H. Du Buit	France
S. Fowler	IUCN(Observer)
H. Matsunaga	ICCAT(Observer)
M. Pawson	UK
M. Stehmann	Germany
P. Walker	Netherlands