

PART B

Scientific Council Annual Meeting, 16-20 September 2002

CONTENTS

	Page
Report of Scientific Council Meeting, 16-20 September 2002	185
Annex 1. Report of Special Session Symposium "Elasmobranch Fisheries" 11-13 September 2002	194
Appendix I. Report of Standing Committee on Fisheries Science (STACFIS)	217
Appendix II. Report of Standing Committee on Research Coordination (STACREC)	221
Appendix III. Report of Standing Committee on Publications (STACPUB)	225



Scientific Council Meeting Participants, 16-20 September 2002:

Back Row (left to right): V. K. Babayan, V. A. Rihkter, A. Avila de Melo, U. Skuladottir, S. J. Correia, D. Cross, A. Vazquez, T. Saat, D. B. Atkinson, F. M. Serchuk, W. B. Brodie, F. Gonzalez, R. Alpoim, H. Murua, J.-C. Mahé, T. Ichii, K. V. Gorchinsky, V. N. Shibanov

Front Row (left to right): W. R. Bowering, M. J. Morgan, R. K. Mayo, M. Stein, D. E. Stansbury, T. Amaratunga, A. Nicolajsen

Missing from picture: C. Allen, D. Kulka, E. De Cárdenas



The Chairs, Scientific Council Meeting, 16-20 September 2002 (left to right): M. Stein, Chair STACPUB; R. K. Mayo, Chair Scientific Council; M. J. Morgan, Chair STACREC; D. E. Stansbury, Chair STACFIS



Scientific Council Outing sponsored by Galician Hosts, 15 September 2002

SCIENTIFIC COUNCIL ANNUAL MEETING, 16-20 SEPTEMBER 2002

REPORT OF SCIENTIFIC COUNCIL MEETING

Chair: R. K. Mayo

Rapporteur: T. Amaratunga

I. PLENARY SESSIONS

The Scientific Council met at the Galicia Congress and Exhibition Centre in Santiago de Compostela, Spain, during 16-19 September 2002. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), Estonia, European Union (France, Germany, Portugal and Spain), Iceland, Japan, Russian Federation and United States of America.

The Executive Committee met prior to the opening session of the Council, and the Provisional Agenda, plan of work and other related matters were discussed. The Council noted the Scientific Council Special Session, Symposium on "Elasmobranch Fisheries: managing for sustainable use and biodiversity conservation" was successfully conducted during 11-13 September 2002. The Chair extended appreciation to the conveners.

The opening session of the Council was called to order at 0900 hours on 16 September 2002.

The Chair welcomed everyone to Santiago de Compostela, Galicia, Spain, and to this venue for the Meeting. The Assistant Executive Secretary was appointed rapporteur. The Chair particularly thanked the Galician hosts for the great facilities and support services offered for the meeting.

The Provisional Agenda was **adopted** as presented, noting some additional items will be addressed by Standing Committees.

The Council noted the Provisional Agenda for the Scientific Council Meeting on shrimp during 6-13 November 2002 in Nuuk, Greenland, was circulated 6 September 2002.

The Council noted that there were two errors in the STACFIS Report of the 6-20 June 2002, and agreed to circulate the corrections to participants at this Annual Meeting, and these corrections will be inserted in the Scientific Council Reports, 2002.

The Council reviewed the work plan noting scientific advice to the Fisheries Commission will be submitted on Tuesday, 17 September 2002, and the session was adjourned at 1010 hours.

The Council reconvened as needed and sessions were conducted through to 19 September 2002.

The concluding session was called to order at 1500 hours on 19 September 2002 when the Council addressed other outstanding agenda items and considered and **adopted** the reports of the Standing Committees (STACFIS, STACREC, STAC PUB). The Council then considered and **adopted** its report of this Scientific Council Meeting.

The meeting was adjourned at 1550 hours on 19 September 2002.

The Reports of the Standing Committees as **adopted** by the Council are appended as follows: Appendix I – Report of Standing Committee on Fisheries Science (STACFIS), Appendix II – Report of Standing Committee on Research Coordination (STACREC), and Appendix III – Report of Standing Committee on Publications (STAC PUB).

The Report of the Scientific Council Symposium on "Elasmobranch Fisheries: managing for sustainable use and biodiversity conservation" is presented at Annex 1 of this Scientific Council Report.

The Agenda, List of Research (SCR) and Summary (SCS) Documents, and the List of Representatives and Advisers/Experts of this meeting are given in Part D, this volume.

The Council's considerations of the Standing Committee Reports, and other matters addressed by the Council follow in Sections II-XII.

II. REVIEW OF SCIENTIFIC COUNCIL RECOMMENDATIONS IN 2001 AND 2002

The Council noted that recommendations made by the Scientific Council through 2001 and 2002 will be addressed as needed under relevant agenda items at this meeting.

III. FISHERIES SCIENCE

The Council **adopted** the Report of the Standing Committee on Fisheries Science (STACFIS) as presented by the Chair, D. E. Stansbury. The full report of STACFIS is at Appendix I.

IV. RESEARCH COORDINATION

The Council **adopted** the Report of the Standing Committee on Research Coordination (STACREC) as presented by the Chair, M. J. Morgan. The full report of STACREC is at Appendix II.

V. PUBLICATIONS

The Council **adopted** the Report of the Standing Committee on Publications (STACPUB) as presented by the Chair, M. Stein. The full report of STACPUB is at Appendix III.

The **recommendation** made by STACPUB for the work of the Scientific Council as **endorsed** by the Council is as follows:

1. *conveners of the Deep-sea Fisheries Symposium be asked to remind reviewers and authors of manuscripts to complete their work as soon as possible.*

VI. RESPONSE TO SPECIAL REQUEST FROM FISHERIES COMMISSION

1. **Distribution of Shrimp in Division 3M** (note: Scientific Council at its 6-20 June 2002 Meeting deferred this Item)

The Fisheries Commission had submitted to the Council: *for shrimp in Div. 3M, including the area in footnote 1 of Part I, G of the Conservation and Enforcement Measures (the Div. 3L 'box'), Scientific Council if requested, in advance of the annual NAFO meeting in September 2002, to provide information on the monthly distribution of shrimp by size as taken in the commercial fishery and to comment on these distributions in relation to the closed area of Div. 3M as defined by coordinates in footnote 2 of Part I, G of the Conservation and Enforcement Measures and the consequences to the stock of the following scenarios: a closure of the area during June 1 through December 31, and b) no closure at any time.*

The Council at this meeting responded:

In 1999 the Fisheries Commission requested Scientific Council to evaluate whether closure of the shallow part of the Flemish Cap for shrimp fisheries (approximately delineated by the 140 fathom depth contour) would be a precautionary-based measure. The Fisheries Commission agreed in September 2000 to endorse a closure for June- September in 2001. The Scientific Council was unable to assess the effect of the area closure with respect

to the Precautionary Approach but on the issue of the appropriateness of the area and timing Scientific Council recommended a whole year closure at the meeting of November 2000.

Monthly distributions of shrimp by size from the Icelandic fishery have now been analyzed. Small shrimp (two year olds) were generally more abundant in shallow water (<140 fath) in all months of the year. On average the proportion of two year olds in catches were twice as large in the shallow water compared to deeper water. The multiparous females were more abundant in deeper water (>140 fath) in all months except March and April (around hatching time) when they were more abundant in shallow water.

As the two year olds grow, within the year catchability increases and the proportion of two year olds in the catch doubles or triples from the period January to May to the period June to December. Historically catches in shallow water were larger in the period January-May (13.4%) compared to June-December (5.5%).

Therefore, if the area were closed, 12.4% of two year olds would be saved in January - May as compared to only 2.9% in June-December. However, in the event of targeting good year-classes of small shrimp a closure would save a larger proportion of the two year olds.

VII. REVIEW OF FUTURE MEETING ARRANGEMENTS

1. **Scientific Council Meeting on Shrimp, November 2002**

The Council noted its meeting on Northern shrimp will be held 6-13 November 2002 in Nuuk, Greenland. The Provisional Agenda, meeting dates and site were circulated to Contracting Parties in accordance with the Scientific Council Rules of Procedure, on 6 September 2002.

2. **Scientific Council Meeting, June 2003**

The Council was informed that the Alderney Gate venue in Dartmouth has informed the Secretariat of other commitments during the period 28 May to 2 June 2003. This is in conflict with the Scientific Council Meeting dates of 29 May to 12 June 2003 that the Council had agreed to earlier. Recognizing the suitability of venue, the Council discussed and agreed to re-schedule the meeting to 5 June to 19 June 2003. The meeting will now be held at the Alderney Landing, 2 Ochterloney Street, Dartmouth, during 5-19 June 2003.

3. **Precautionary Approach Workshop, Spring 2003**

The Council provisionally agreed to conduct a Workshop on the Precautionary Approach during 31 March to 4 April 2003 in St. John's, Newfoundland, Canada.

4. **Special Session and Annual Meeting, September 2003**

The Council noted that the Annual Meeting will be held during 15-19 September 2003, and the Scientific Council Special Session, the Workshop on Geostatistics Methods is scheduled for 10-12 September 2003. The meetings will be held in Dartmouth, Nova Scotia, Canada.

5. **Scientific Council Meeting on Shrimp, November 2003**

The Council provisionally noted the meeting on Northern shrimp would be held during 5-12 November 2003. The venue (and dates if needed) will be determined during the November 2002 Meeting.

6. **Scientific Council Meeting, June 2004**

The Council agreed to the date 3-17 June 2004 for this meeting to be held at the Alderney Landing, Dartmouth, Nova Scotia, Canada.

VIII. FUTURE SPECIAL SESSIONS

1. **Workshop on Mapping and Geostatistical Methods for Fisheries Stock Assessment for Special Session in 2003**

As requested by the Council in June 2002, the Council received an outline and course plan for a Workshop.

The Council noted the purpose of the Workshop is two fold:

- a) To introduce Scientific Council fisheries scientists, using practical demonstrations relevant to NAFO issues, to spatial techniques that can be applied to survey and environmental data to solve fisheries problems.
- b) To provide Scientific Council members with enough background that they can interpret GIS analyses.

GIS is a broad field and the Workshop can only touch upon some of the aspects of spatial analysis. It will focus on techniques that will be most useful to the user group. The Workshop will:

- show how the raw data (set attributes) can be effectively Visualized (mapping techniques), progressing through Point to Surface Transformation (i.e. methods such as Contouring, Voronoi, Potential Mapping, Kriging that produce the continuous surfaces required to facilitate spatial modeling),
- to Overlay Modeling, and geostatistics (outside expertise is required to deal with this aspect).
- evaluate mixed species interactions within the Precautionary Approach framework.

The workshop will be structured to introduce NAFO participants to a subset of techniques and concepts relevant to their work. Examples and demonstrations will use real data from the Grand Banks and Flemish Cap (see Data Sets). Where appropriate underlying theory and procedures of geostatistics will be elaborated to facilitate the understanding of GIS analyses.

Scientific Council agreed that the proposed workshop is important to the work of Scientific Council. Therefore, the Council has scheduled the workshop to be held in conjunction with the Annual meeting in 2003. The Council notes that the costs associated with running the workshop are \$5K CDN (for travel and expenses for the invited expert in geostatistics) and that amount be requested from the NAFO budget of 2003.

2. **Proposal for Special Session 2004**

Scientific Council discussed several variations on possible themes for a special session prior to the 2004 Annual Meeting. Themes included: 1) a session focused on a comprehensive review of available information on the Flemish Cap, and 2) factors related to changes in species composition in Subareas 2 and 3. However, there was no agreement on an appropriate theme for the 2004 session, and Scientific Council deferred a decision to the June 2003 Meeting when these and other topics will be discussed in further detail. It was agreed any proposal to be discussed in June 2003 should be submitted in written form.

IX. NAFO WORKING GROUPS OR MEETINGS

1. **Update on activities of NAFO WG on Reproductive Potential**

The Council had not received any update on the activities of the Working Group since the June 2002 Meeting. The Council anticipated the proposed scientific publications from the Working Group were proceeding on schedule.

2. Precautionary Approach Workshop, 2003

Since 1997, Scientific Council has dedicated considerable resources towards the development of a framework for implementing the Precautionary Approach. A proposed general framework was developed in 1997 to include limit and buffer reference points for fishing mortality and biomass. A Scientific Council Workshop on the Precautionary Approach to Fisheries Management was held in March 1998 to review methodology and propose reference points for some stocks. It is proposed that a second Workshop address reference points for additional priority stocks. The basis for reference points that have already been identified by Scientific Council should also be reviewed.

Terms of Reference for the Workshop are:

- Review the basis for existing PA reference points.
- Determine appropriate methodology to calculate reference points for data-limited stocks.
- Develop or revise additional reference points for the following stocks:

Greenland halibut in SA 2 and Div. 3LKMNO
 American plaice in Div. 3LNO
 Cod in Div. 3NO
 Yellowtail flounder in Div. 3LNO
 Redfish in Div. 3M
 Cod in Div. 3M
 Shrimp in SA 0 and 1

- Provide guidance to Designated Experts for calculating PA reference points for all remaining stocks for which sufficient data exist.

The Workshop will develop reference points for data-rich stocks, based on results from Analytical Models. For data-limited stocks, proxy reference points will be developed based on survey data using methodology developed to address proxy reference points.

The Joint Fisheries Commission/Scientific Council Working Group on the Precautionary Approach and the Working Group of Technical Experts have identified several managerial areas of concern with the specification of the PA framework originally proposed by the Scientific Council. In particular, the Working Group questioned the requirement for a linear reduction in F between B_{target} and B_{lim} , and a fishery closure when the stock is below B_{lim} , and the suitability of F_{msy} as a limit reference point. Therefore, an additional term of reference is proposed for the Scientific Council Workshop:

- Re-examine the PA framework as described in NAFO SCS Doc. 97/12 and develop more precise definitions of terms and concepts consistent with the role of scientists and managers as agreed in NAFO FC Doc. 98/2.

A small Study Group working by correspondence in advance of the proposed Scientific Council Workshop may address this last term of reference.

X. SCIENTIFIC COUNCIL WORKING PROCEDURES AND PROTOCOL

1. Timetable and Frequency of Assessments

The following schedule of Scientific Council assessments reflects decisions that some stocks should be reviewed on a multi-year basis, with monitoring during the interim years. The basis for the monitoring evaluation varies among stocks. Scientific Council has not yet determined a consistent analytical basis for an

interim monitoring evaluation of the stocks under multi-year schedules. A formal delineation of the basis will be discussed at the June 2003 Scientific Council Meeting.

Since 1999, the Scientific Council has agreed to the following overall schedule (+ is assessment year, *i* is interim monitor, 0 no assessments) subject to the Fisheries Commission requests for advice and concurrence:

Stock	1999	2000	2001	2002	2003	2004	2005
<i>Current schedule</i>							
MULTI-YEAR ASSESSMENTS							
American plaice in Div. 3LNO	+	<i>i</i>	+	+	+	<i>i</i>	+
Cod in Div. 3NO	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>	+
Redfish in Div. 3LN	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>	+
Witch flounder in Div. 2J3KL	+	+	+	<i>i</i>	+	<i>i</i>	+
Redfish in Div. 3M	+	+	+	+	+	<i>i</i>	+
Roughhead grenadier in SA 2+3	+	+	<i>i</i>	0	+	<i>i</i>	+
Redfish in SA 1	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>	+
Other finfish in SA 1	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>	+
Cod in Div. 3M	+	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>
American plaice in Div. 3M	+	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>
Witch flounder in Div. 3NO	+	+	<i>i</i>	+	<i>i</i>	+	<i>i</i>
Yellowtail flounder in Div. 3LNO	+	+	+	+	<i>i</i>	+	<i>i</i>
Northern shortfin squid in Subareas 3 and 4	+	+	+	+	<i>i</i>	+	<i>i</i>
Roundnose grenadier in SA 0+1	+	<i>i</i>	<i>i</i>	+	<i>i</i>	<i>i</i>	+
ANNUAL ASSESSMENTS							
Greenland halibut in SA2 and Div. 3KLMNO	+	+	+	+	+	+	+
Northern shirmp in Div. 3M	+	+	+	+	+	+	+
Northern shirmp in Div. 3LNO	+	+	+	+	+	+	+
Northern shirmp in SA 0+1	+	+	+	+	+	+	+
Northern shirmp in Denmark Strait	+	+	+	+	+	+	+
Scientific Council's Additional Schedule							
Capelin in Div. 3NO	+	+	+	+	+	<i>i</i>	+

For American plaice in Div. 3LNO, the Council decided to leave this stock on its current 2-year timetable, after some debate. Several reasons were considered for changing the frequency of assessments to an annual basis, including an increasing trend in fishing mortality, and perceived increases in some survey indices. However, considering its advice from the 2001 Meeting that the stock remains at a low level, Scientific Council concluded that the current schedule of assessment was acceptable. During the interim monitoring, there is a need to continue to monitor the level of fishing mortality. However, the Fisheries Commission requested that a full assessment of American plaice in Div. 3LNO be conducted in 2002.

Based on its life history, capelin in Div. 3NO should be assessed on an annual basis. However, the Council concluded that insufficient data exist to reliably determine annual changes in abundance. Until sufficient data are available the stock will be assessed on a multi-year basis.

XI. OTHER MATTERS

1. Consideration of MoU with ICES

The Scientific Council considered a proposal presented by the Executive Secretary to develop a Memorandum of Understanding (MoU) with ICES and referred to it by General Council.

Scientific Council noted that it has had a long-standing working relationship with ICES in many scientific activities of mutual interest. The Council at present continues to work effectively with ICES, e.g. Scientific Council nominees attending ACFM Meetings of ICES, a Joint NAFO/ICES Working Group on Harp and Hooded Seals, conducting co-sponsored Symposia, etc. Under the circumstances Scientific Council is unclear as to the incremental benefits that would accrue through a formal document such as a MoU. It was accordingly decided there is not any need for a formal MoU at this stage. Scientific Council, however, agreed this matter could be considered at a later date based on any additional documentation that may be prepared outlining, in more detail, the benefits and advantages of any MoU.

2. Scientific Council Participation at ICES Precautionary Approach Meetings

ICES is expected to hold 2 meetings on the Precautionary Approach in the upcoming year. The Study Group on the Further Development of the Precautionary Approach to Fishery Management (SGPA) is scheduled to meet during 2-6 December 2002 to complete technical guidelines for revision of PA reference points. Following this meeting, a Study Group on Precautionary Reference Points for Advice on Fishery Management will meet during 24-28 February 2003 to propose revisions of the reference points currently in use by ACFM based on the guidelines developed at the 2-6 December 2002 SGPA meeting. Both meetings will take place at ICES headquarters.

ICES has invited NAFO to send an observer to each meeting. After careful consideration of the focus of each meeting, the Scientific Council selected Jean-Claude Mahé (EU) to represent the Scientific Council at the 2-6 December 2002 SGPA Meeting, and Ray Bowering (Canada) to represent Scientific Council at the 24-28 February 2003 Meeting.

3. Other Business

There was no other business.

XII. ADOPTION OF REPORTS

1. Consideration of Report of the Symposium on Elasmobranch Fisheries, 11-13 September 2002

The Scientific Council was presented with an overview of the Symposium by the co-convenor D. W. Kulka. The Council was informed that the Symposium was attended by 119 participants from 22 countries. The majority of the participants were from European countries, United States and Australia, where elasmobranchs and their exploitation are particularly important fisheries issues. However, the broad representation of countries highlighted the importance of elasmobranchs and their fisheries worldwide.

The Keynote address presented by Sarah Fowler (Naturebureau International and co-chair, IUCN Elasmobranch Species Specialist Group) summarized the current state of shark management issues worldwide. In addition to the Keynote address, 3 invited papers by J. A. Musick, M. Pawson and A. Punt, 53 oral presentations and 30 posters were presented. The proceedings were divided among four sessions: Life History and Demographic Analysis (convened by J. A. Musick); Stock Identity (M. Pawson); Stock Assessment (D. W. Kulka) and Harvest Strategies and Biodiversity Maintenance (T. Walker). The report of the Symposium is given at Annex 1 of the Scientific Council Report.

Considerable attention has been focused on elasmobranchs and their exploitation in recent years in various parts of the world. The Council was introduced to some general issues generated from the discussions at the symposium:

1. Elasmobranchs are generally more vulnerable to exploitation and are slower to recover than other fish species due to life history characteristics such as slow growth and low fecundity. Deep-water sharks are particularly vulnerable.
2. Of particular concern is the catch of elasmobranchs with low intrinsic rates of increase in the mixed species fisheries driven by other fish species, which are more productive. In some cases, the less common elasmobranchs may be extirpated while the target fishery remains viable.
3. Information for the management of elasmobranch stocks needs to be greatly improved. Unrestricted fishing with less than effective monitoring, management and controls is typical for many of the world fisheries.
4. Increased public awareness of the vulnerability of elasmobranch stocks and the impact of fishing over the past decade has led to a significant increase in the national and international fisheries management instruments directed toward this group, although many remain poorly implemented.

The Symposium participants also generated a set of (international) recommendations, presented in Annex 1. The Council reviewed and **adopted** the Report of the Symposium on "Elasmobranch Fisheries" as presented at Annex 1.

The Council was pleased with the success of the Symposium. The Council extended special thanks to D. W. Kulka (DFO/NAFO) for the extra attention he offered to this Symposium and to the co-conveners J. A. Musick (VIMS), M. Pawson (CEFAS) and T. Walker (MAFRI). The Council recognized this Symposium was very informative and a valuable contribution to the scientific work of the Scientific Council. While adopting the report of the Symposium, the Council agreed with the STACPUB proposal that the papers presented at the Symposium be published in the NAFO *Journal of Northwest Atlantic Fishery Science*.

2. **Committee Reports of Present Meeting (STACFIS, STACREC, STACPUB)**

The Council at its concluding session considered and **adopted** the reports of its Standing Committees, STACFIS, STACREC and STACPUB. These reports are given in Appendix I, II and III, respectively.

3. **Report of Scientific Council Present Meeting**

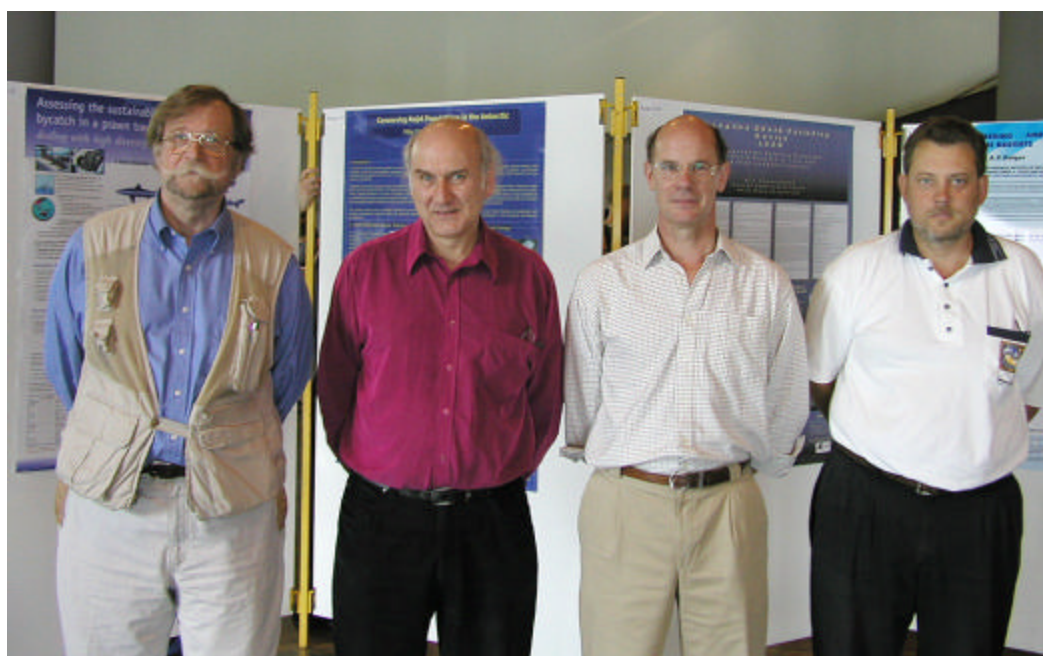
The Council at its concluding session on 19 September 2002 considered and **adopted** its own Report.

XIII. ADJOURNMENT

The Chair thanked the participants, and noted the contributions of the Committee chairs for their diligent work in completing their business. Special appreciation was extended to the Secretariat staff and the Assistant Executive Secretary for their support. Finally, the Chair expressed sincere appreciation to the Galician hosts for the fine facilities and to the staff of the Galician Congress Center for their technical and logistical support. There being no other business, the meeting was adjourned.



Participants of the Symposium on Elasmobranch Fisheries: Managing for Sustainable Use and Biodiversity Conservation
11-13 September 2002



Symposium Co-converors (left to right): John Musick, Terry Walker, Mike Pawson, David Kulka

ANNEX 1. SCIENTIFIC COUNCIL SPECIAL SESSION

REPORT OF THE SYMPOSIUM ON ELASMOBRANCH FISHERIES: MANAGING FOR SUSTAINABLE USE AND BIODIVERSITY CONSERVATION

Hosted by the Scientific Council of the Northwest Atlantic Fisheries Organization
11-13 September 2002

The **Symposium** *Elasmobranch Fisheries: Managing for Sustainable Use and Biodiversity Conservation*, was held at the Galicia Congress and Exhibition, Santiago de Compostela, Spain, and was co-convened by D. W. Kulka (DFO, NAFO), J. A. Musick (VIMS, co-chair, IUCN Elasmobranch Species Specialist Group), M. Pawson (CEFAS) and T. Walker (MAFRI) during 11-13 September 2002. It was attended by 119 participants from Argentina, Australia, Brazil, Canada, Faroe Islands, France, Germany, Ireland, Italy, Mauritania, Mexico, Namibia, New Zealand, Portugal, Russia, Scotland, South Africa, Spain, Sweden, The Netherlands, United Kingdom, and United States of America (refer to List of Participants).

R. K. Mayo, Chair of Scientific Council, opened the Symposium by welcoming the participants and presenting a brief overview of NAFO and its activities. The participants were welcomed to the Symposium and to Galicia by the host Government Minister, Hon. E. C Lopez Veiga, El Conselleiro de Pesca. As the Spanish host, he described Galicia as a place where fisheries were an important component of the economy and a way of life. He wished everyone a successful Symposium and an enjoyable stay in Santiago. D. W. Kulka then introduced the co-conveners and the Keynote speaker. He noted the wide international representation and as well, the volume and high quality of papers submitted.

The Keynote Address, given by Sarah Fowler (Naturebureau International and co-chair, IUCN Elasmobranch Species Specialist Group) summarized the current state of shark management issues worldwide. She pointed out that increased public awareness of the vulnerability of elasmobranch stocks and the impact of fishing over the past decade has led to a significant increase in the national and international fisheries management instruments directed toward this component. The recent history of international shark conservation and management initiatives and action plans for delivering conservation and sustainable use of elasmobranchs, particularly FAOs International Plan of Action (IPOA)-Sharks, was reviewed. Despite these initiatives, landing of and international trade in elasmobranchs has increased during the past decade. It was concluded that progress and commitment in all but a few fishing states has been less than adequate.

The remainder of the Symposium considered current research, advances and impacts of elasmobranch fisheries in many different locations around the world in the context of four themes: Life History and Demographic Analysis; Stock Identity; Stock Assessment and Harvest Strategies and Biodiversity Maintenance. Three invited speakers addressed specific issues within the four sessions. In addition to the invited papers, the program comprised 53 oral presentations and 30 posters.

SESSION 1. LIFE HISTORY AND DEMOGRAPHIC ANALYSIS (J. Musick, convener)

This session comprised 16 presentations: 8 focused on sharks, 4 on batoids 2 on Chimaeras and 2 were of a general nature concerning comparative life histories of elasmobranchs. Of the posters, 6 described life history aspects of batoids, 2 on sharks. The invited paper by J. A. Musick elaborated on the inherent vulnerability of elasmobranch fishes to over-harvesting and ultimately stock collapse because of their life history characteristics: slow growth, long lifespan, late maturation and low fecundity. These demographic parameters lead to low intrinsic rates of population increase, which in turn minimizes the rate of sustainable fishing mortality (F). Indeed, some species may be so constrained that even low levels of F may lead to negative population trajectories: exceptions are smaller species, which live in temperate or tropical environments.

A wide variety of subject matter was contained in the remaining session presentations. Among the papers presented was one on the application of life table models to Portuguese dogfish (*Centroscyllium coelolepis*). The author pointed out that matrix models in many instances might offer more insight into sustainable management of elasmobranch stocks than traditional assessment models. An investigation of the Irish ray fishery incorporated port sampling, commercial transaction data and logbook data to determine species, size and sex of batoids taken in this

mixed species fishery. Through the use of age/length keys the authors showed that total mortality (Z) was high, but demographic analysis of all species except *Raja montagui* still showed positive population growth. Aspects of age, growth and reproduction of the salmon shark, *Lamna ditropis*, were described for the eastern North Pacific. Growth rates of these sharks, which are endothermic, maintaining a constant, elevated body temperature, were higher than for ectothermic sharks inhabiting the same cold-water habitats. In addition, growth rate, length-at-age and weight-at-length were observed to be higher in eastern than in western Pacific salmon sharks.

The life history of the rabbitfish (*Chimaera monstrosa*) was documented. This species constitutes up to 15% of the discarded by-catch in deepwater trawl fisheries off Ireland. The authors, using sectioned fin spines to determine age and growth, showed that they are a long-lived (~40 years) species and as well are late maturing, with low fecundity. The age and growth of four commercial ray species was described from the Irish Sea. Smaller species had faster growth rates and all species had rather abrupt onset of maturity. Age, growth and reproduction were described in the barndoor skate (*Dipturus laevis*) a species severely depleted in the western North Atlantic. Age at maturity for this species was lower than previously assumed, and the species was found to be common in areas that have been closed to harvest on Georges Bank. Distribution, growth and reproduction were described in the white-spotted skate (*Bathyraja albomaculata*) from the Falkland Islands. Dorsal thorns were sectioned to determine age (although the method has not been validated) and age and size at maturity as well as seasonal reproductive and migration patterns were described.

Aspects of the reproductive biology of the thorny skate (*Amblyraja radiata*) was described in NAFO Division 3N. This large species apparently has slow growth and late maturity and limited fecundity. Age, growth and reproduction in the lesser-spotted dogfish (*Scyliorhinus canicula*) were described off Ireland. Males grow faster than females in this species, a situation common among elasmobranchs. However, the author also found that males reach a larger size. The combination of faster growth and larger size is unusual and the evolutionary implications of this were discussed.

Density dependent compensation was investigated in the sharpnose shark (*Rhizoprionodon terraenovae*) in the Gulf of Mexico. This species is a small subtropical shark with relatively fast growth. The author found that growth rate increased and length and age at maturity decreased in response to increased fishing mortality. No increase in fecundity was observed nor would it be expected in viviparous species in which the size of the uterus constrains the number of young that can be carried to term. Reproduction was reviewed in lamniform sharks, which are oophagous or adephagous. In this group of large and commercially important species, developing embryos are nourished in utero by unfertilized eggs, produced in large numbers by the female.

Both fishery dependent and independent data sets were used to determine demographics and status of the dusky shark (*Carcharhinus obscurus*) in the western North Atlantic. The species takes 21 years to mature and has a 3-year reproductive cycle during which it produces around 810 young. This species has declined by 80-90%, and demographic modeling suggests that population recovery is in question even though the species is protected by recent fishing regulations. Despite protection, by-catch mortality remains high (>50%) in the directed shark long-line fishery. Another study found that size at maturity has declined in female spiny dogfish (*Squalus acanthias*) in the North Atlantic in response to over-fishing. Litter size remained constant, although the average size of recruits declined because of fewer large females (pup size is correlated with female size).

Data from the literature were used to create stage-based population models with subsequent elasticity analysis to determine how mortality (M) and fertility (F) influence population growth rates (r) in elasmobranchs. The author found a negative association between species size and elasticity of fecundity and a positive relationship between size and elasticity of adult and juvenile stages. Information from similar analyses might be useful in determining management strategies.

Sonic telemetry was used with fixed receivers in a small bay in Florida to obtain direct estimates of natural and fishing mortality in neonate blacktip sharks (*Carcharhinus limbatus*). Both natural and fishing mortality were found to be very high (60-90%) for the first 15 weeks of life after which survivorship increased drastically.

In the ensuing discussion, several relevant points were raised:

1. Breeding age of elasmobranchs should be defined as the age at which females actually bear young or lay eggs, and not when ova begin to mature. This is especially relevant to demographic modeling.
2. Size selectivity of fishing gear may affect the growth curves that result from sampling the catch and may not actually represent growth in the general population.
3. More research is needed on the effect of density-dependent compensation on vital rates in elasmobranchs.
4. More research is needed to provide empirical estimates of natural mortality by age.
5. More research is needed on demographics, stock structure, habitat utilization and both ontogenetic and seasonal migrations in deepwater elasmobranchs.
6. Managers need to pay closer attention to life history differences among species taken in mixed species fisheries. In mixed fisheries, different life history characteristics among the catch components can be problematic. Large, slow growing, long-lived elasmobranchs may be depleted or locally extirpated while more productive fishes continue to drive the fisheries.

SESSION 2. STOCK IDENTITY (M. Pawson, convener)

This session comprised 13 papers and 5 posters covering approaches to stock identification in relation to assessment and management; movement patterns and spatial structure; distribution and related population biology; population genetics; and a fisherman's perspective on fishery developments. These papers indicated that, even in fisheries with a long history of exploitation and management, there is often a lack of information on the relationship between stock structure and those parts of a species' population that are subject to exploitation.

Four papers reported studies on the behaviour of individual fish using fishery-independent techniques (archival, acoustic and satellite tags), and these have begun to reveal hitherto unsuspected patterns of movements (white sharks in Australia, basking shark off the west coast of the UK, thornback ray in the southern North Sea, and juvenile sandbar shark along the Virginia shore). In the first three cases, there is evidence of movement into areas where conventionally tagged individuals have not been recaptured. Philopatry – a tendency to stay in or return to a breeding, nursery or feeding area – was observed in all species. This has implications for assessments based on CPUE data, where local depletion may obscure overall population trends, and because the sampled population (for tagging or biological studies – usually where the species can most readily be caught) may not be representative of the population as a whole.

Two papers reported progress in the development of genetic markers for species recognition and stock delineation, of sharks in the western Atlantic and rays in the Mediterranean Sea respectively, but there is, as yet, little evidence that this approach may soon be used to identify management units. Several papers in this and other sessions have shown that measured population parameters (growth, maturity, meristics, etc.) vary considerably in time and space, partly because there are few, if any standardized protocols for data collection and analysis. This limits their use in stock identity.

Three papers presented the results of analyses of elasmobranch data from trawl surveys carried out with standard gear over a time series, for the NAFO Regulatory Area, waters around the British Isles and in the western Mediterranean, and showed that these are valuable indicators of stock structure and distribution. There are similar data sets and other sources of information that should be investigated with this goal in mind.

It was claimed in the paper introducing this session, that tagging studies, especially those providing information on scale and rate of dispersal and migrations and some ability to interpret why these are taking place, currently provide most of our knowledge on stock identity of elasmobranchs. This was borne out in the final paper, which stressed the complications that philopatry introduced both to knowledge of stock units and to our ability to interpret population trends and status from data representing only part of a self-supporting stock unit. Clearly, this provides a less than solid basis upon which to develop management actions, though development of spatial models that recognize these features in population structure, and in the patterns and evolution of fisheries, is a promising solution.

SESSION 3. STOCK ASSESSMENT (D. Kulka, convener)

Fourteen papers, presented orally, described fisheries and monitoring (4 papers) and highlighted a variety of assessment techniques applied to elasmobranch stocks (10 papers). The latter focused mainly on innovative modeling and assessment methodologies. Of the posters, 1 described biomass dynamics/catch effort trend analysis and 8 provided descriptions of fisheries or described development of elasmobranch assessment techniques.

Elasmobranchs often make up a significant component in fisheries directed for other species, particularly those prosecuted in deep water. This was illustrated in a study of the deep-water fisheries off Portugal. Portuguese dogfish (*Centroscymnus coelolepis*) and Leaf-scale Gulper shark (*Centrophorus squamosus*) made up the major part of total annual elasmobranch landings although a great deal of variation was observed among areas fished and fleets. Socio-economic implications were also discussed in the context of conservation vs. exploitation. Elasmobranch trawl fisheries in the Sicily Strait were also described. A monitoring program identified a complex catch including 26 species of elasmobranchs belonging to 11 families. *Raja batis* and several other unusual species (for the area) were reported to be common in the catches. Landings and discard amounts were estimated (more than half discarded) and depth relationships were given. Two fisheries for blue shark (*Prionace glauca*) were also described. Developments in a long-standing fishery off Baja California Mexico (dating back to the 1880s), namely new markets led to expansion of the fleet to larger vessels. Small vessels captured mainly juveniles while the larger vessels took larger fish. Moderate downward trends were observed. A recommendation for a new management unit was described. In the Bay of Biscay the value of careful monitoring practices was illustrated in a presentation describing a recently initiated experimental artisanal fishery. Fishery observers there recorded very detailed information on fishing locations and times, gears, species compositions and size and sex distributions in the catches. A dramatic drop in the CPUE over a short period (3 years) was observed.

Most of the papers described methodologies used to assess elasmobranchs. Very often, data (input) was the key limiting factor to model output (and subsequent provision of advice). Assessments often rely on very basic data such as species integrated catch series and catch rates, or fishery independent indices. For example, where CPUE is not species disaggregated, while the rate might remain relatively stable, some of the more vulnerable components (such as elasmobranchs) might well be in decline. One study showed how port sampling and survey data could be used to split aggregated catch data by species. The multispecies rajid fishery off the Falkland Is. is another case illustrating data deficiencies. In the absence of detailed biological knowledge or catch at age information or even a species-specific breakdown of the catches, simple production models incorporating species aggregated catch/effort data were used to estimate sustainable levels of exploitation. The status of sharks taken in nets set near beaches of South Africa (to minimize the risk of shark attack) was also assessed on the basis of limited information. Given that effort was relatively constant through space and time, catch was used an index of abundance. Although effort was not high, catches of 4 species showed a significant decline (after removing the confounding effect of the annual sardine run). Uncertainty about local stock depletion and philopatry was noted. The issue of local stock depletion that would not be observed in spatially aggregated assessments was also noted in several other papers.

Where appropriate data are available elasmobranch assessments, depending on the available data have been based on quite a variety of methods from demographic analysis, surplus production models and more recently models that require the use of age disaggregated input as well as knowledge of life history (age and growth), stock structure and spatial distribution. As is the case for all fish stock assessments no matter how sophisticated the model, the interpretation of the results are constrained by assumptions in the input variables. It was pointed out that applying different models or varying model input (for parameters such as M that are poorly estimated) can result in very different results.

In some cases, appropriately detailed data such as age-disaggregated data are available and a number of cases were illustrated. A European (NE Atlantic) research project (DELASS) was initiated in 2000 to remedy some of the deficiencies aimed at collecting the required data and developing appropriate stock assessment models. It was pointed out that ageing elasmobranchs is generally more difficult than for teleosts. Generally, vertebrae are used but spines also contain annual rings. One paper described the age and growth of bull sharks (*Carcharhinus leucas*) from the Gulf of Mexico. For this study, four different techniques were applied to enhance ring definition of the vertebrae. Validation was done by marginal increment analysis. The study also described the Von Berlanffy parameters for the species. An age-structured model was implemented using a Bayesian approach. Information from multiple gears and fishery independent surveys was applied to Atlantic sharpnose shark (*Rhizoprionodon terraenovae*). It was pointed

out that a good understanding of life history parameters was important to the integrity of the model. Conversely, limited knowledge of life history leads to uncertainty in the model outcome. One paper dealing with sandbar sharks (*Carcharhinus plumbeus*) presented an age/sex structured population dynamics model that took into account biological and fishery characteristics. This presentation illustrated the advantage of accounting for such aspects as pupping areas or spatial aspects of shark dynamics in the model. Another paper dealing with gummy sharks (*Mustelus antarcticus*) employed a variant of the Integrated Analysis Method, and an age/sex structured population dynamic model that incorporated catch/recapture information. Issues raised were the spatial consistency on the stocks peculiarities of the pupping process and fishery over time and gear composition, which affect the analysis. A Bayesian stock production assessment of NE Atlantic spurdog (*Squalus acanthias*) was fitted to survey and commercial CPUE data. Demographic techniques were used to convert prior distributions for age specific fecundity and natural mortality (based on tagging data and maximum age/length).

A GIS approach was used in one study to investigate changes in the fishery and abundance of kitefin shark (*Dalatias licha*). Fishing ground, depth, distance to fishing ports and seasonality in species catches were overlaid to yield a spatio-temporal perspective of the fishery. It was suggested that least cost pathways may be useful to managers for evaluating resource exploitation sustainability, identifying potential fishing grounds and selecting suitable resource conservation measures.

In the ensuing discussion at the end of the session, it was stressed that elasmobranchs exhibit life history traits such as slow growth, low fecundity and extended gestation period. Further, it was suggested that deep water sharks are even more vulnerable to exploitation than orange roughy, a deepwater teleost well known to decline rapidly soon after the implementation of fisheries. Thus, stocks often declined before proper assessments could be conducted (i.e. availability of appropriate time series). Problems in assessing elasmobranchs related mainly to the non-availability of appropriate input data in addition to the rate at which these species decline once they are exploited. Combining species and gears was recognized as less than appropriate, yet in many cases, only aggregated data were available. It was suggested that a more pre-emptive management approach is required for elasmobranchs in the form of conservative measures (management plans that include immediate implementation of quotas and restrictions). The main issue is not the methods (generally quite sophisticated) used to assess elasmobranchs but rather data deficiencies and less than adequate managements measures derived from the advice given (and the political will to implement same). The first key step is to improve the data through enhanced monitoring programs, including ones that involve the fishers or employ independent observers.

SESSION 4. HARVEST STRATEGIES AND BIODIVERSITY MAINTENANCE (T. Walker, convener)

Thirteen papers were presented relating to sustainable use, biodiversity conservation, and maintenance of ecosystem structure and function.

Sustainable use

Several papers were presented on the shark fishery of southern Australia. Together, they provided examples of fisheries where there is a long history of monitoring, biological research, stock assessment, and management. The invited speaker indicated that harvest strategies could be evaluated using deterministic models to capture the biology of the species taken and the dynamics of the fishery. Harvest strategies are evaluated in terms of performance measures that relate to average catches, catch variability, and resource conservation. The need for risk assessment as part of the assessment of fishery and good consultative processes engaging fishery managers, scientists, fishermen, and other stakeholders were emphasized. The fishery of southern Australia demonstrates that, with the one important exception of the school shark (*Galeorhinus galeus*), the target, by-product, and by-catch of chondrichthyan catches by gillnets and longlines in the fishery are sustainable. School shark was identified as having very low productivity and in need of tight fisheries management.

It was emphasized that chondrichthyans, having low biological productivity are vulnerable to the effects of fishing. Several species from other parts of the world were identified as having been markedly depleted: notably the sandbar shark (*Carcharhinus plumbeus*), spiny dogfish (*Squalus acanthias*), and several species of skate in the Atlantic. On a broader scale, dogfish and chimaeras occurring in deep water on the slopes of the continental shelves of the world appear to be at high risk. These animals inhabit cold water and have particularly low productivity; their habitat area is small compared with species inhabiting the continental shelves and abyssal plains. In contrast, species such as

gummy shark (*Mustelus antarcticus*) and Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) were shown to be highly productive and provide for stable fisheries.

Attention was drawn to the need to give special protection to both pre-recruits and breeding animals in a harvested population. It was demonstrated that the mesh size used in a fishery could be tuned to minimize the impact on small sharks and large sharks. Choice of mesh size is a balance between the efficient take of target species and minimizing by-catch. It was also argued that closed areas are probably the only available method of conserving of some species. One paper drew attention to the value of fin trade data in Hong Kong. Whereas the data appear to be incomplete, careful application of raising factors to available numbers of fins in batches of known weight for known species (recorded by traders or determined from genetic testing) make it possible to estimate number of sharks killed. A major component of these sharks consisted of blue shark (*Prionace glauca*) and several other pelagic species taken in oceanic waters. More direct estimates of blue shark, shortfin mako (*Isurus oxyrinchus*), and porbeagle sharks (*Lamna nasus*) taken as by-catch in the tuna longline fishery of New Zealand were made from on-board observer programs. Following a decline in the catch during the early-1990s, there was a rapid rise in catch during the past 10 years, in response to the high demand for shark fins on Asian markets. As most of the catch of blue sharks comprises males, and based on evidence of stock structuring, the presenter emphasized the need for international collaboration for the assessment of these pelagic species.

Biodiversity conservation

Around the world, much of the chondrichthyan catch is reported as 'unspecified species' or is not reported at all. Several papers reported progress on evaluation of by-catch and by-product species through on-board observers during normal commercial fishing operations. Other papers reported progress on catch evaluation from fishery-independent trawl, longline, and gillnet surveys, or experimental fishing. Data were presented that indicate by catch of chondrichthyans can be reduced by the application of Turtle Exclusion Devices and other by-catch Reduction Devices.

There is an awareness that it is not feasible to undertake a detailed assessment of every species and that there is a need to apply rapid assessment techniques to identify those species at high risk and in need of special management or protection. Application of this approach was presented for northern Australia where species were compared on the basis of biological productivity and catch susceptibility. Biological productivity and catch susceptibility were quantified on the basis of various biological attributes (e.g. longevity, fecundity, proportion breeding, distribution in relation to the fisheries, position in water column in relation to the fishing gear).

Ecosystem structure and function

It was shown that most trawl, longline, and gillnet fisheries catch large numbers of chondrichthyan species and the number of animals taken varies greatly between species. In general, a small number of species dominate the catch. Chondrichthyans are clearly important in the ecosystem and some are apex predators. It also appears, in some regions at least, that the biggest animals in the ecosystem tend to be chondrichthyans.

Surveys of catches from the artisan fisheries of the coastline from Sierra Leone to Ghana indicate that the assemblages of the chondrichthyan fauna change from inshore across the continental shelf and down the continental slope. Another survey with trawl and longlines off the eastern and western coasts of Ireland indicate that dogfishes form the dominant species on the slope and that the predominance of dogfishes on the slope increases with increasing depth. Similarly, as indicated by a poster presentation, the dogfishes were much more significant in the fish communities of the deeply submerged seamounts than those of the more shallowly submerged seamounts of the Sierra Leone Rise in the Gulf of Guinea.

An ecosystem model for the Cantabrian Sea using ECOPATH was presented that incorporates fish biomass estimates, biological parameters, stomach contents data, and catches and discards. The model also includes the trophodynamics of phytoplankton, zooplankton, benthos, and demersal and pelagic communities. The model was used for evaluating the effects of various fishing gears and closed areas on chondrichthyan populations and catches. Other papers highlighted the complex spatial, temporal, and depth effects of stomach contents of sharks.

POSTER SESSION

A total of 30 posters were on display throughout the Symposium and there was a formal viewing session during the evening of September 11 where the authors were present to answer questions. Poster subject matter is summarized in the Session sections above.

SUMMING UP AND DISCUSSION

D. W. Kulka invited each of the chairs of the 4 sessions to present an overview of their session and to highlight what they considered to be the key results and concerns. The session specific outputs from these summaries have been incorporated in the report of each session described above.

CONCLUSION

Considerable attention has been focused on elasmobranchs and their exploitation in recent years in various parts of the world. The Council was introduced to some general issues generated from the discussions at the Symposium:

1. Elasmobranchs are generally more vulnerable to exploitation and are slower to recover than other fish species due to life history characteristics such as slow growth and low fecundity. Deep-water sharks are particularly vulnerable.
2. Of particular concern in the catch of elasmobranchs with low intrinsic rates of increase in the mixed species fisheries driven by other fish species which are more productive. In some cases, the less common elasmobranchs may be extirpated while the target fishery remains viable.
3. Information for the management of elasmobranch stocks needs to be greatly improved. Unrestricted fishing with less than effective monitoring, management and controls is typical for many of the world fisheries.
4. Increased public awareness of the vulnerability of elasmobranch stocks and the impact of fishing over the past decade has led to a significant increase in the national and international fisheries management instruments directed toward this group, although many remain poorly implemented.

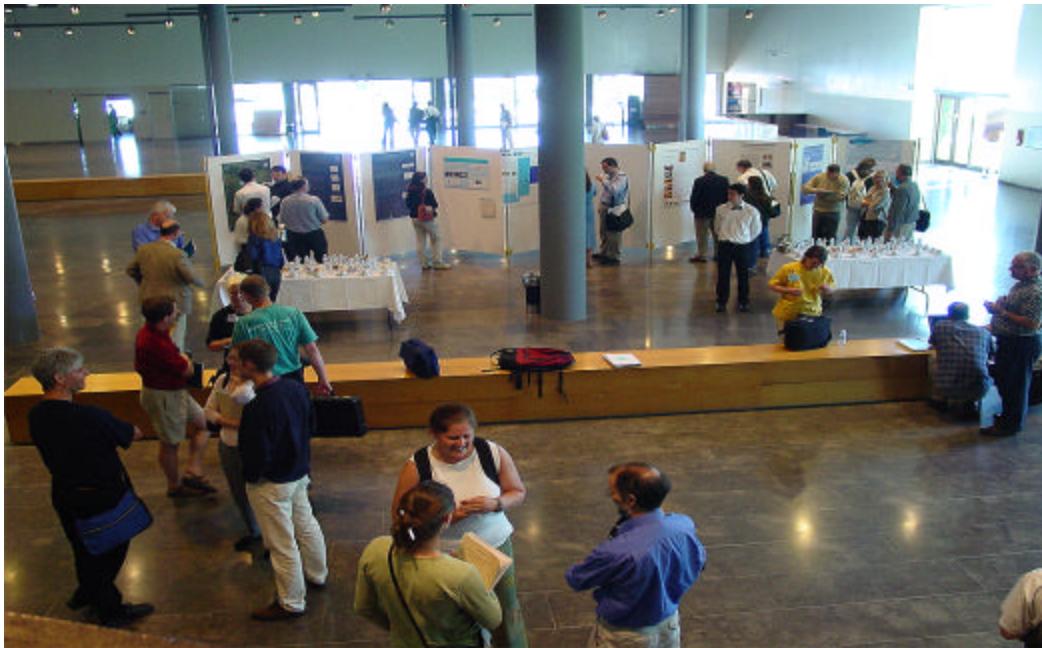
Many of these points were reiterated throughout the various theme sessions. In addition, participants at the 2002 NAFO Symposium on Elasmobranch Fisheries call for:

- NAFO to establish effective management measures for thorny skate and direct the NAFO Scientific Council to investigate the status and management needs of other elasmobranchs in NAFO waters;
- Fishing nations, regional fishery management organizations, and FAO to increase investment in elasmobranch biological and fishery research and management;
- NAFO and all fishing nations, even in the absence of complete fishery data, to implement precautionary quotas and measures to reduce by-catch for particularly vulnerable species;
- All shark-fishing nations, but especially the major fishing nations, to produce a National Plan of Action for their elasmobranchs;
- FAO and developed countries to provide the technical expertise to assist developing nations in the preparation of their National Plan of Action and the assessment and management of fisheries taking sharks.

The Chair of the NAFO Scientific Council thanked the host country for their support in making the Symposium possible. He also thanked the co-conveners for organizing such an interesting and varied collection of papers and posters, and the session chairs for helping the meeting to run smoothly. It is intended to publish a selection of the papers in the *Journal of Northwest Atlantic Fishery Science* within a target time frame of one year.



Co-conveners (left to right): Mike Pawson, David Kulka, John Musick and Terry Walker



Participants at Poster Presentations

SYMPOSIUM SCHEDULE***Wednesday, 11 September 2002**

0800-0830	Registration
0830-0837	Introduction (Scientific Council Chair, Convener)
0837-0912	Welcome Talk by E. Lopez-Veiga, Minister of Fisheries of the Galician Government.
0912-0942	Keynote Paper: FOWLER, S. International shark management: a status report.

SESSION 1: LIFE HISTORY AND DEMOGRAPHIC ANALYSIS

Session Chair: J. Musick

Paper #	Time	
	0942-0945	Introduction
1.1	0945-1003	Invited Paper: MUSICK, J. Life history and demographic analysis.
1.2	1003-1021	CARVALHO, L., M. QUARESMA and I. FIGUEIREDO. First approach to the application of life table models to the Portuguese dogfish (<i>Centroscyrnus coelolepis</i>).
	1021-1039	Break
1.3	1039-1057	GALLAGHER, M., F. JEAL and C. P. NOLAN. An investigation of the Irish ray fishery in ICES Divisions VIIa and VIIg.
1.4	1057-1115	GOLDMAN, K. J. and J. A. MUSICK. Growth and demographic dynamics of salmon sharks in the eastern and western North Pacific: a spatially structured population?
1.5	1115-1133	CALIS, E., E. JACKSON, C. P. NOLAN and F. JEAL. An insight into the life history of the rabbitfish <i>Chimaera monstrosa</i> with implications for future resource management.
1.6	1133-1151	CARLSON, J. and I. BAREMORE. Changes in biological parameters of Atlantic sharpnose shark, <i>Rhizoprionodon terraenovae</i> , in the Gulf of Mexico: evidence for density-dependent regulation?
1.7	1151-1209	CASTRO, J. I. Patterns of reproduction in the <i>Oophagous lamniform</i> sharks.
1.8	1209-1227	FRISK, M. G., N. K. DULVY and T. J. MILLER. Combining elasticity analyses and life history traits of elasmobranchs as indicators of vulnerability to exploitation.
	1227-1330	Lunch
1.9	1330-1348	GALLAGHER, M., C. P. NOLAN and F. JEAL. Age, growth and maturity of the commercial ray species from the Irish Sea.
1.10	1348-1406	GEDAMKE, T., W. D. DUPAUL and J. A. MUSICK. Observations on the distribution and life history of the barndoor skate (<i>Dipturus laevis</i>) in the Georges Bank closed area II.

* The list of documents and the sequence of presentations may have changed during the Symposium.

Paper # Time

- 1.11 1406-1424 HENDERSON, A. C., A. I. ARKHIPKIN and J. N. CHTCHERBICH. Distribution, growth and reproduction of the white-spotted skate *Bathyraja albomaculata* around the Falkland Islands.
- 1.12 1424-1442 HEUPEL, M. R., C. A. SIMPFENDORFER and R. E. HUETER. Direct estimation of survival and mortality of juvenile blacktip sharks, *Carcharhinus limbatus*, using telemetry data.
- 1.13 1442-1500 DEL RÍO IGLESIAS, J. L. Some aspects of the thorny skate (*Raja radiata* Donovan, 1808) reproductive biology in NAFO Division 3N.
- 1500-1518 **Break**
- 1.14 1518-1536 IVORY, P. and F. JEAL. Age determination, growth and reproduction in the lesser-spotted dogfish, *Scyliorhinus canicula* (L.).
- 1.15 1536-1554 MARQUEZ-FARIAS, J. F., D. CORRO-ESPINOSA and J. L. CASTILLO-GENIZ. Biology of the pacific sharpnose shark, (*Rhizoprionodon longurio*), caught in Sinaloa, Mexico.
- 1.16 1554-1612 ROMINE, J. G., J. A. MUSICK and G. H. BURGESS. Life history parameters of the dusky shark, *Carcharhinus obscurus*, revisited and their implications to estimates of population increase.
- 1.17 1612-1630 SOSEBEE, K. A. Are density-dependent effects on elasmobranch maturity possible?
- 1630-1645 **Discussion**

SESSION 2: STOCK IDENTITY

Session Chair: M. G. Pawson

1645-1648 **Introduction**

Paper # Time

- 2.1 1648-1706 **Invited Paper:** PAWSON, M. G. and J. R. ELLIS. Stock identity of elasmobranchs in the North-east Atlantic in relation to assessment and management.
- 2.2 1706-1724 BRUCE, B. and J. STEVENS. Movement patterns and spatial structure of white sharks in Australia.
- 2.3 1724-1742 SIMS, D. W., E. J. SOUTHALL and J. D. METCALFE. Movements and behaviour of basking sharks (*Cetorhinus maximus*) as revealed by pop-up archival transmitting tags.
- 2.4 1742-1800 CONRATH, C. L. and J. A. MUSICK. A delineation of nursery habitat and migratory patterns of juvenile sandbar sharks, *Carcharhinus plumbeus*, in the western Atlantic Ocean.

Thursday, 12 September 2002

SESSION 2: STOCK IDENTITY CONT'D.**Paper # Time**

- 2.5 0833-0851 CERVIÑO, S., J. L. DEL RÍO and E. ROMÁN. Abundance and distribution of elasmobranchs in NAFO Regulatory Area (Divisions 3MNO).
- 2.6 0851-0909 ELLIS, J. R., B. B. RACKHAM and S. I. ROGERS. The distribution of chondrichthyan fishes around the British Isles and their conservation status.
- 2.7 0909-0927 DURÁN MUÑOZ, P. and E. ROMÁN. Distribution and biological aspects of deepwater sharks in North East and Central Atlantic.

Paper # Time

- 2.8 0927-0945 HARIDAE, N.-R., G. GARNES, G. LANGEDAL and J. E. DYB. Distribution and biology of Portuguese dogfish (*Centroscymnus coelolepis*) and leafscale gulper shark (*Centrophorus squamosus*) at Hatton Bank and the Mid-Atlantic Ridge (33°-61°N).
- 2.9 0945-1003 REY, J., E. MASSUTI and L. GIL DE SOLA. Distribution and biology aspects of blackmouth catshark, *Galeus melastomus*, in the Alboran Sea (south-western Mediterranean).
- 2.10 1003-1021 MESEGUER, S. and J. REY. Distribution and biology of smallspotted catshark, *Scyliorhinus canicula*, in the Alboran Sea (western Mediterranean).
- 1021-1039 **Break**
- 2.11 1039-1057 PRINCE, J. D., P. RISELEY, T. I. WALKER, L. P. BROWN and A. E. PUNT. Assessing the costs and benefits of fishery-independent surveys in Australia's Southern shark fishery: results of a pilot survey.
- 2.12 1057-1115 VALSECCHI, E., M. VACCHI and G. NOTARBARTOLO DI SCIARA. Population genetics of two Mediterranean skate species (Genus *Raja*) of commercial interest.
- 2.13 1115-1133 HOENIG, J. and M. SHIVJI. Estimating species composition of shark catches from DNA assays: group testing reduces the number of laboratory tests.
- 2.14 1133-1151 DRAKE, S. C., J. A. DRAKE and M. L. JOHNSON. 2000 + UK shark tagging programme: an anglers led shark-tagging initiative in UK coastal waters.
- 2.15 1151-1209 HUETER, R. E., M. R. HEUPEL, E. J. HEIST and D. B. KEENEY. The implications of philopatry in sharks for the management of shark fisheries.
- 1209-1227 **Discussion**
- 1227-1345 **Lunch**

SESSION 3: STOCK ASSESSMENT

Session Chair: D. W. Kulka

1348-1351 **Introduction**

Paper # Time

- 1351-1409 **Invited Paper** – Not issued.
- 3.1 1309-1427 APOSTOLAKI, P. and M. MCALLISTER. Providing advice for the management of sandbar shark (*Carcharhinus plumbeus*). Application of an age- and spatially-structured model.
- 3.2 1427-1445 PRIBAC, F., A. E. PUNT, T. I. WALKER and B. L. TAYLOR. The value of length, age and tagging data in a stock assessment of a length selective fishery for gummy shark.
- 3.3 1445-1503 SIMPFENDORFER, C. A. and G. BURGESS. Assessment of the status of the Atlantic sharpnose shark (*Rhizoprionodon terraenovae*) using an age-structured population model.
- 1503-1521 **Break**
- 3.4 1521-1539 CLARKE, M. G., P. LORANCE and R. OFFICER. Approaches to the assessment of deepwater sharks in the northeast Atlantic.
- 3.5 1539-1557 DUDLEY, S. F. J. Shark catch trends and effort reduction in the beach protection program, KwaZulu-Natal, South Africa.

Paper #	Time	
3.6	1557-1615	FIGUEIREDO, I., L. S. GORDO and P. B. MACHADO. Deep-water sharks fisheries from off the Portuguese continental coast.
3.7	1615-1633	HAMMOND, T. R., C. DARBY, J. R. ELLIS and M. G. PAWSON. Bayesian assessment of NE Atlantic spurdog using a stock production model, with prior for intrinsic rate of increase set by demographic methods.
3.8	1633-1651	MACHADO, P. B. Finding trends on the fishery and abundance of kitefin shark, <i>Dalatias licha</i> (Bonaterre, 1788), from off Azores throughout a GIS spatial analysis.
3.9	1651-1709	SOLDAT, V. T. Spiny dogfish (<i>Squalus acanthias</i> L.) of the Northwest Atlantic Ocean (NWA).
3.10	1709-1727	WAKEFORD, R. C., A. J. AGNEW, D. A. J. MIDDLETON and J. H. W. POMPERT. Fisheries conservation of a multispecies skate and ray community in the Falkland Islands.
3.11	1727-1745	CRUZ-MARTÍNEZ, A., X. CHIAPPA-CARRARA and V. ARENAS-FUENTES. Age and growth of bull shark <i>Carcharhinus leucas</i> from the southern Gulf of Mexico.

Friday, 13 September 2002

SESSION 3: STOCK ASSESSMENT CONT'D.

Paper #	Time	
3.12	0833-0851	SCACCO, L., F. ANDARLORO, S. CAMPAGNUOLO, L. CASTRIOTA and M. VACCHI. Cartilaginous fish catches in the Sicily Strait trawl fisheries.
3.13	0851-0909	LUCIO, P., V. ORTIZ DE ZÁRATE, G. DIEZ, C. RODRÍGUEZ-CABELLO and M. SANTURTÚN. Description of an Experimental Artisanal Fishery Targeting Blue Shark in the Bay of Biscay, 1998-2000.
3.14	0909-0927	SOSA-NISHIZAKI O., E. FURLONG-ESTRADA, J. A. REYES-GONZÁLEZ and J. C. PÉREZ-JIMÉNEZ. Blue shark (<i>Prionace glauca</i>) fishery in Baja California, Mexico: an example of artisanal and middle scale fisheries interaction.
3.15	0927-0945	PASTOORS, M. A. Stock assessments of elasmobranchs in North-East Atlantic: making the most of the data.
	0945-1003	Discussion
	1003-1021	Break

SESSION 4. HARVEST STRATEGIES AND BIODIVERSITY MAINTENANCE

Session Chair: T. Walker

1021-1024 **Introduction**

Paper #	Time	
4.1	1024-1042	Invited Paper: PUNT, A. E., F. PRIBAC, B. L. TAYLOR and T. I. WALKER. Harvest strategy evaluation for school and gummy shark.
4.2	1042-1100	KYNE, P. M., A. J. COURTNEY, M. J. CAMPBELL, K. E. CHILCOTT, S. W. GADDES, C. T. TURNBULL, C. C. VAN DER GEEST and M. B. BENNETT. An overview of the elasmobranch by-catch of the Queensland east coast trawl fishery (Australia).
4.3	1100-1118	PRINCE, J. D. Gauntlet fisheries for elasmobranchs - the secret of sustainable shark fisheries.

Paper #	Time	
4.4	1118-1136	SACHSE, M. The role of the Australian Fisheries Management Authority in the management of the southern shark fishery.
4.5	1136-1154	CLARKE, M. W., R. OFFICER, D. STOKES and P. CONNOLLY. Comparisons of trawl and longline catches of deepwater elasmobranchs west and north of Ireland.
4.6	1154-1212	MARQUEZ -FARIAS, J. F. Fishery dependent gill net mesh selectivity for the shovelnose guitarfish, (<i>Rhinobatos productus</i>), taken in the artisanal ray fishery of the Gulf of California, Mexico.
	1212-1330	Lunch
4.7	1330-1348	CLARKE, S. and M. MCALLISTER. Estimates of shark mortality associated with the Shark Fin Trade based on Hong Kong auction data.
4.8	1348-1406	FRANCIS, M. P., L. H. GRIGGS and S. J. BAIRD. By-catch of pelagic sharks in New Zealand tuna longline fisheries.
4.9	1406-1424	SÁNCHEZ, F., C. RODRIGUEZ-CABELLO and I. OLASO. The role of elasmobranchs in the Cantabrian Sea shelf ecosystem and the impact of fisheries on them.
4.10	1424-1442	STOBUTZKI, I., T. STEVENS, T. TARANTO, J. STEVENS, R. MCAULEY, R. BUCKWORTH and N. GRIBBLE. Assessing the regional impact of fishing on elasmobranchs in northern Australian: 148 species, 33 fisheries and limited data.
4.11	1442-1500	WALKER, T. I., A. S. GASON, R. J. HUDSON and I. A. KNUCKEY. Assessing impacts of fisheries on biodiversity of sharks and other chondrichthyans in south-eastern Australia and the Great Australian Bight.
	1500-1518	Break
4.12	1518-1536	DOWD, W. W., J. A. MUSICK and R. BRILL. The role of elasmobranchs in coastal fisheries ecosystems: mass-balance and organismal bioenergetics approaches.
4.13	1536-1554	ELLIS, J. K. and J. A. MUSICK. Past and present diet of the sandbar shark in the lower Chesapeake Bay.
4.14	1554-1612	OLASO, I., F. VELASCO, F. SÁNCHEZ, A. SERRANO, C. RODRÍGUEZ-CABELLO and O. CENDRERO. Trophic relations of lesser spotted dogfish (<i>Scyliorhinus canicula</i>) and black mouth dogfish (<i>Galeus melastomus</i>) in the benthic and demersal communities of the Cantabrian Sea.
4.15	1612-1630	RAMOS, A., L. FERNÁNDEZ, and F. SALMERÓN. Chondrichthyes biodiversity on the central Gulf of Guinea continental shelf and slope (from Sierra Leona to Ghana)
	1630-1645	Discussion
	1645-1700	Summary

POSTER PRESENTATIONS

Life History

Poster

- P.1 COELHO, R., L. BENTES, C. CORREIA, J. M. S. GONÇALVES, P. G. LINO, P. MONTEIRO, J. RIBEIRO and K. ERZINI. Fisheries biology of the undulate ray, *Raja undulata*, in the Algarve (southern Portugal).
- P.2 GALLAGHER, M., C. P. NOLAN and F. JEAL. The structure and growth processes of the caudal thorns of Bathyrhajids.
- P.3 JEAL, F., D. FOLEY and M. GALLAGHER. Gonad maturity and age in male rajids.

Poster #

- P.4 RODRIGUEZ-CABELLO, C. and F. SÁNCHEZ. Growth estimates of the lesser spotted dogfish (*Scyliorhinus Canicula*) in the Cantabrian Sea.
- P.5 SOSEBEE, K. A. and A. WHITTINGHAM. Maturity of skates in northeast United States waters.
- P.6 KESKIN, C., M. SUHENDAN, O. MUAMMER and N. UNSAL. Research on the relationship between meat yield quality and the liver weight of the thornback ray (*Raja clavata* L. 1758) in the Black Sea.
- P.7 STENBERG, C. Life history of the piked dogfish (*Squalus acanthias* L.) in Swedish waters.
- P.8 CHARVET-ALMEIDA, P., M. L. GÓES DE ARAÚJO, and M. PINTO DE ALMEIDA. Reproductive aspects of freshwater stingrays (Chondrichthyes: Potamotrygonidae) in the Brazilian Amazon Basin.

Abundance Survey (Fishery Independent)

- P.9 CLÒ, S., M. DALÙ, R. DANOVARO and M. VACCHI. Segregation of the Mediterranean population of *Centroscyminus coelolepis* (Chondrichthyes: Squalidae): a description and survey.
- P.10 DOLGOV, A. V., K. V. DREVETNYAK and E. V. GUSEV. Status of skates stocks in the Barents Sea.
- P.11 HEESSEN, H. J. L. The by-catch of rays in the Dutch flatfish fisheries.
- P.12 SHESTOPAL, I. P., O. V. SMIRNOV and A. A. GREKOV. Bottom long-line fishing for deepwater sharks on sea-mounts in the international waters of the North Atlantic.

Abundance (Fishery Dependent)

- P.13 ELÍAS, I., A. RODRÍGUEZ, E. HASAN, L. LOTO and R. AMOROSO. First observation of the tope shark, *Galeorhinus Galeus*, in the northern Patagonian Gulfs of Argentina.
- P.14 GADIG, O. B. F., R. C. NAMORA and F. S. MOTTA. Data on juvenile pelagic sharks occurring in the nearshore area of São Paulo State, Southern Brazil.
- P.15 MACÍAS, D., J. VALEIRAS, J. M. ORTIZ and J. M. DE LA SERNA. Large pelagic sharks as by-catch in the Mediterranean swordfish longline fishery: some biological aspects.

Tagging

- P.16 HOLTZHAUSEN, J. A. Trans-boundary bronze whaler (*Carcharhinus brachyurus*) tagging program between Namibia and Angola.

Biomass Dynamics/Catch-effort Trend Analysis

- P.17 BONFIL, R. Drawing blood from a stone?: stock assessment of the multispecies shark fishery of Yucatan, Mexico.
- P.18 CASTILLO-GÉNIZ, J. L., S. R. SORIANO-VELÁSQUEZ, F. SANCHO-VÁZQUEZ, S. R. RAMÍREZ-SANTIAGO and A. CID DEL PRADO. Characterization of the Mexican shark artisanal fishery off the Gulf of Tehuantepec, México.

Fishery Description/Monitoring

- P.19 CASTILLO-GÉNIZ, J. L., S. R. SORIANO-VELÁSQUEZ and J. F. MÁRQUEZ-FARIAS. The proposal of the Mexican official standard for sharks fisheries: the long awaited tool for conserving shark stocks in México.
- P.20 ERZINI, K., L. BENTES, R. COELHO, C. CORREIA, P. G. LINO, P. MONTEIRO, J. RIBEIRO and J. M. S. GONÇALVES. Semi pelagic longline and trammel net elasmobranch catches in the Algarve (southern Portugal): catch composition, catch rates and discards.
- P.21 GANCEDO, F. R., A. RUNZÓN, C. RODRIGUEZ-CABELLO, I. OLASO, F. SÁNCHEZ and O. CENDRERO. Overview of Continental Shelf elasmobranch fisheries in the Cantabrian Sea.

Poster #

- P.22 FERNÁNDEZ, L., F. SALMERÓN and A. RAMOS. Evolution of elasmobranch by-catch from the Spanish deepwater black hake trawling fishery off Mauritania.
- P.23 GUALLART, J. The fishery of the gulper shark (*Centrophorus granulosus*) in the Balearic Sea (Western Mediterranean).
- P.24 DE MATTOS, S. M.G. Coastal shark fishery off Pernambuco - Brazil: is there any possibility of management?
- P.25 PÉREZ-JIMÉNEZ, J. C., O. SOSA-NISHIZAKI, E. FURLONG-ESTRADA and D. CORRO ESPINOSA. Artisanal shark fishery at Tres Marias and Isabel Islands, Nayarit, México.
- P.26 SALMERÓN, F., A. CARROCEDA, L. FERNÁNDEZ and A. RAMOS. Analysis of the elasmobranch by-catch from the Spanish deepwater bottom longline fishery in Mauritanian waters.
- P.27 ABELLA, A. and F. SERENA. Comparison of elasmobranch catches of trawl surveys and commercial landings of the Port of Viareggio (North Tyrrhenian-South Ligurian Sea, Italy) in the last decade.
- P.28 DOLGOV, A. V. A. A. GREKOV, I. P. SHESTOPAL AND K. M. SOKOLOV. By-catch of skates in trawl and long-line fisheries in the Barents Sea.
- P.29 GÓES DE ARAÚJO, M. L., P. CHARVET-ALMEIDA, and M. PINTO DE ALMEIDA. Fishery and conservation of freshwater stingrays (Chondrichthyes: Potamotrygonidae) in the North of Brazil.

Various Methods

- P.30 HEESSEN, H. J. L. DELASS. Development of elasmobranch assessments.

By-catch Management/Fishery Description

- P.31 RAMOS, A., F. SALMERÓN, F. MOYA, A. CARROCEDA, P. GARCÍA-PASTOR and I. FERNÁNDEZ. Elasmobranch biodiversity and abundance on the seamounts of Sierra Leone Rise (Gulf of Guinea).

By-catch (Discards) Evaluation

- P.32 STOBUTZKI, I., M. MILLER, D. HEALES and D. BREWER. Assessing the sustainability of elasmobranch by-catch in a prawn trawl fishery: a method for dealing with high diversity and limited information.

By-catch Management/Fishery Description

- P.33 ENDICOTT, M. and D. J. AGNEW. Conserving rajid populations in the Antarctic.
- P.34 FRENTZEL-BEYME, B. Z. Proposal for a new method of selectively reducing shark bycatch in longline fisheries.

Ecosystem Structure and Function

- P.35 DOLGOV, A.V. Feeding and food consumption by the Barents Sea skates.
- P.36 MASSUTÍ, E. and J. MORANTA. Demersal assemblages and depth distribution of elasmobranchs from the continental shelf and slope trawling grounds of the Balearic Islands (western Mediterranean).

LIST OF PARTICIPANTS

Co-conveners:

David W. Kulka
 Head, Resource Sampling - Aquatic Resources
 Department of Fisheries and Oceans
 P.O. Box 5667
 St. John's, Newfoundland A1C 5X1
 Canada
 Phone: +709 772 2064
 Fax: +709 772 5469
 Cell: +709 687 2658
 E-mail: kulkad@dfo-mpo.gc.ca

Mike Pawson
 CEFAS (Centre for Environment,
 Aquaculture and Fisheries Science)
 Lowestoft Laboratory
 Pakefield Road
 Lowestoft Suffolk NR33 0HT
 United Kingdom
 Phone: +44 1502 524436.
 Fax: +44 1502 524511
 Email: m.g.pawson@cefas.co.uk

John A. Musick
 Head, Vertebrate Ecology & Systematics Programs
 Virginia Institute of Marine Science
 P. O. Box 1346, Route 1208 Greate Rd.
 Gloucester Point, VA 23062
 USA
 Phone: +804 684 7317
 Fax: +804 684 7327
 E-mail: jmusick@vims.edu

Terry Walker
 Program Leader, Modelling and Data Management
 Marine and Freshwater Resources Institute
 P.O. Box 114
 Queenscliff, Victoria 3225
 Australia
 Phone: +61 3 5258 0251
 Fax: +61 3 5258 0270; Mobile: 0418 525530
 E-mail: terry.walker@nre.vic.gov.au

Argentina

Elias, I. Centro Nacional Patagónico (CONICET), Bvd. Brown s/n, (9120), Puerto Madryn, Chubut
 Phone: +54-02965-451-024 – Fax: +54-02965-451-543 – E-mail: elias@cenpat.edu.ar

Australia

Bennett, M.B. Dept. of Anatomy & Developmental Biology, University of Queensland, Brisbane, 4072, Queensland
 Phone: +61 7 33652705 – Fax: +61 7 3365 1299 – E-mail: m.bennett@uq.edu.au

Kyne, P.M. Dept. of Anatomy & Developmental Biology, University of Queensland, Brisbane, 4072, Queensland
 Phone: +61 7 33652720 – Fax: +61 7 3365 1299 – E-mail: p.kyne@uq.edu.au

McAuley, R. W.A. Marine Research Laboratory, P. O. Box 20, North Beach, WA 6920
 Phone: +61 8 9246 8423 – Fax: +61 8 9447 3062 – E-mail: rmcauley@fish.wa.gov.au

Pribac, F. CSIRO Marine Research, P. O. Box 1538, Hobart, Tasmania 7001
 Phone: +61 3 6232 5057 – Fax: +61 3 6232 5000 – E-mail: pribac@marine.csiro.au

Prince, J.D. Biospherics P/L & Murdock University, P.O. Box South Fremantle, Western Australia
 Phone: +61 9 336 3793 – Fax: 61 9 335 3793 – E-mail: biospherics@ozemail.com.au

Punt, A.E. CSIRO Marine Research, P. O. Box 1538, Hobart, Tasmania 7001
 Phone: +61 3 6232 2222 – E-mail: andre.punt@marine.csiro.au

Riseley, P. P. O. Box 410, Robe, SA 5276
 Phone: +61 8 8768 2042 – Fax: +61 8 9335 2485 – E-mail: merilyn@seol.net.au

Sachse, M. Australian Fisheries Management Authority, P. O. Box 7051, Canberra Mail Centre ACT 2601
 Phone: +61 2 6272 3376 – Fax: +61 2 6272 5167 – E-mail: margot.sachse@afma.gov.au

Stevens, J.D. CSIRO Marine Research, P. O. Box 1538, Hobart, Tasmania 7001
 Phone: +61 3 6232 5353 – Fax: +61 3 6232 5053 – E-mail: john.d.stevens@csiro.au

Stobutzki, I.C. CSIRO Marine Research, P. O. Box 120, 120 Cleveland QLD, 4163
 Phone: +61 7 3826 9299 – Fax: +61 7 3826 7222 – E-mail: ilona.stobutzki@csiro.au

Brazil

Almeida, M. P. Rua Mundurucus, 2445 ap., 1202 – Cremação, Belém – Pará 66040-270
 Phone: +55 (91) 242-7715 – Fax: +55 (91) 242-7715 – E-mail: maupalm@nautilus.com.br

Araújo, M.L. Av. Efigênio Salles, 750, Bl. Jutai, 303. Parque dos Rios I. Bairro Parque 10 Manaus,
 Amazonas CEP: 69.055-000
 Phone: +(55) 92-646-1492 – Fax: +(55) 92-646-1492 – E-mail: mlpotamotrygon@aol.com

Charvet-Almeida, P. Rua Mundurucus, 2445 ap., 1202 – Cremação, Belém – Pará 66040-270
 Phone: +55 (91) 242-7715 or +55 (91) 9112-9442 – Fax: +55 (91) 242-7715 –
 E-mail: pchalm@nautilus.com.br

Canada

Atkinson, D.B. Science, Oceans & Envir. Br., Dept. of Fish. & Oceans, P.O. Box 5667, St. John's, Nfld. A1C 5X1

Phone: + 709-772-2027 – Fax: + 709-772-6100 – E-mail: atkinsonb@dfo-mpo.gc.ca

Stansbury, D.E.

Science, Oceans & Envir. Br., Dept. of Fish. & Oceans, P. O. Box 5667, St. John's, Nfld. A1C 5X1

Phone: +709-772-0559 – Fax: +709-772-4105 – E-mail: stansburyd@dfo-mpo.gc.ca

Faroe Islands

Nicolajsen, A.

Fiskorannsiknarstovan, Noatun, Postboks 3051, FR-1100, Torshavn

Phone: +298 31 50 92 – Fax: +298 31 8264 – E-mail: arninic@frs.fo

France

Séret, B.

Muséum National d'Historie Naturelle, Laboratoire d'Ichtyologie, 43, rue Cuvier, 75231 Paris Cedex 05

Phone: +33 31 4079 3738 – Fax: +33 31 4079 4771 – E-mail: seret@mnhn.fr

Germany

Frentzel-Beyme, B.

German Elasmobranch Society, Juliusstr. 18, 22769 Hamburg

Phone: +49 040 43193400 – E-mail: boris_fbeyme@yahoo.com

Ireland

Calis, E.

Elasmobranch Unit, Zoology Department, Trinity College, University of Dublin, Dublin 2

Phone: +353 1 6081366 – Fax: +353 1 677 8094 – E-mail: erna.calis@oceanfree.net

Clarke, M.

Marine Institute, Abbotstown, Dublin 15

Phone: +353 1 8228354 – Fax: +353 1 820 5078 – E-mail: maurice.clarke@marine.ie

Gallagher, M.

Elasmobranch Unit, Zoology Department, Trinity College, University of Dublin, Dublin 2

Phone: +353 1 8397925 – Fax: +353 1 839 3759 – E-mail: gallagher@bim.ie

Ivory, P.

Elasmobranch Unit, Department of Zoology, Trinity College, University of Dublin, Dublin 2

Phone: + 353 1 6081366 – Fax: + 353 1 677 8094 – E-mail: ivoryp20002@yahoo.co.uk

Jackson, E.H.

Zoology Department, Trinity College, Dublin 2

Phone: +353 1 6081135 – Fax: +353 1 677 8094 – E-mail: emmetjackson@hotmail.com

Jeal, F.

Elasmobranch Unit, Zoology Department, Trinity College, University of Dublin, Dublin 2

Phone: +353 1 608 1135 – Fax: +353 1 677 8094 – E-mail: fjeal@tcd.ie

Nolan, C.P.

Zoology Department, Trinity College, Dublin 2

Phone: +353 1 608 2728 – Fax: +353 1 677 8094 – E-mail: nolancp@tcd.ie

Officer, R.

Marine Institute, Abbotstown, Dublin 15

Phone: +353 1 820 8200 – Fax: +353 1 820 5078 – E-mail: rick.officer@marine.ie

Italy

Abella, A.

ARPAT-AREANARE (Agenzia Regionale per la Protezione Ambientale della Toscana), Sez.Reg.

G.E.A. (Gestione della fauna ittica, Ecosistemi marini e Acquacoltura, Via Marradi 114, 57100 – Livorno

Fax: +39 0586 263476 – E-mail: a.abella@arpat.toscana.it

Scacco, U.

ICRAM, Vie oli Casalotti 300, 00166 Roma

Phone: +39 06 61 570518 – E-mail: umbertoscacco@hotmail.com

Serena, F.

ARPAT-AREANARE (Agenzia Regionale per la Protezione Ambientale della Toscana), Sez.Reg.

G.E.A. (Gestione della fauna ittica, Ecosistemi marini e Acquacoltura, Via Marradi 114, 57100 – Livorno

Phone: +39 0586 263496 – Fax: +39 0586 263476 – E-mail: f.serena@arpat.toscana.it

Mauritania

Valadou, B. IMROP, BP 22, Novadhibou c/o ISMER-UQAR, Allee des Ursulines, Rimouski
(Quebec-Canada) G5L 8A1
E-mail: bene_doud@hotmail.com

Mexico

Perez Jimenez, J.C. Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Km 107 Carretera
Tijuana-Ensenada, Ensenada, Baja California México CP. 22800.
Phone: +52 (646) 174 5050 – Fax: +52 (646) 175 0545 – E-mail: jcperez@cicese.mx

Sosa-Nishizaki, O. Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Km 107 Carretera
Tijuana-Ensenada, Ensenada, Baja California, México. CP. 22800
Phone: +52 (646) 174 5050 – Fax: +2 (646) 175 0545 – E-mail: ososa@cicese.mx

Namibia

Holtzhausen, J.A. Linefish and Shark Research, Ministry of Fisheries and Marine Resources, P. O. Box 912, Swakopmund
Phone: +264 64 4101145 – Fax: +264 64 404385 – E-mail: hholtzhausen@mfmr.gov.na

New Zealand

Francis, M.P. National Institute of Water and Atmospheric Research, P.O. Box 14901, Wellington, New Zealand
Phone: +64 4 386 0377 – Fax: +64 4 386 0574 – E-mail: m.francis@niwa.cri.nz

Portugal

Avila de Melo, A. Inst. de Investigacao das Pescas e do Mar (IPIMAR), Av. de Brasilia, 1400 Lisbon
Phone: +351 21 302 7000 – Fax: +351 21 301 5948 – E-mail: amelo@ipimar.pt

Alpoim, R. Inst. de Investigacao das Pescas e do Mar (IPIMAR), Av. de Brasilia, 1400 Lisbon
Phone: +351 21 302 7000 – Fax: +351 21 301 5948 – E-mail: ralpoim@ipimar.pt

Carvalho, J. N/A – does not want to receive any publications
E-mail: joanamando@iol.pt

Coelho, R. Universidade do Algarve, Faculdade de Ciências do Mar e Ambiente, Campus de Gambelas
8000 - Faro
Phone: +351-289-800900 Ext. 7242 – Fax: +351 289 818 353 – E-mail: rpscoelho@ualg.pt

Figueiredo, I. Instituto de Investigação das Pescas e do Mar, Av. de Brasília 1449-006 Lisboa
Phone: +351 21 3027131 – Fax: +351 21 3015948 – E-mail: ivonefig@ipimar.pt

Gordo, L.S. Departamento de Zoologia e Antropologia, Faculdade de Ciências de Lisboa, Bloco C2,
Campo Grande 1749-016 Lisboa
Phone: +351 21 7500000 Ext. 22304 – E-mail: lsgordo@fc.ul.pt

Machado, P.A.B. Instituto de Investigação das Pescas e do Mar, Av. de Brasília 1449-006 Lisboa
Phone: +351 21 3027108 – Fax: +351 21 3015948 – E-mail: bmachado@ipimar.pt

Santos, R.M.L. Rua Erigo Fraucide L. Garrett, No. 26, 30Dt0, 2745-Queluz
Phone: +351 96 4090719 – Fax: +351 21 4370523 – E-mail: trianodon@hotmail.com

Verissimo, A. Apartado 96, 2600 Achandra
Phone: +351 91 9858402 – Fax: +351 21 9510118 – E-mail: verissimo-ana@hotmail.com

Russia

Babayan, V.K. Russian Federal Research Institute of Fisheries & Oceanography (VNIRO), 17, V. Krasnoselskaya,
Moscow, 107140
Phone: +70 95 264 6983 – Fax: +70 95 264 9187 – E-mail: ybabayan@vniro.ru

Drevetnyak, K.V. Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO),
6 Knipovich Street, Murmansk 183763
Phone/Fax: +47 789 10-518 – E-mail: inter@pinro.murmansk.ru

Shibanov, V.N. Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO),
6 Knipovich Street, Murmansk 183763
Phone: +7 8152 47 2614 – Fax: +47 789 10 518 – E-mail: inter@pinro.murmansk.ru

Solodovnik, V. VNIRO, 17 Krasnoselskaya Str., Moscow B-140, 107140
Phone: +70 95 264 9143 – Fax: +70 95 264 9021 – E-mail: inter@vniro.ru

Scotland

Jones, E.G. FRS Marine Laboratory, P. O. Box 101, Victoria Road, Aberdeen AB11 9DB
Phone: +44 1224 295 572 – Fax: +44 1224 295 511 – E-mail: jonese@marlab.ac.uk

South Africa

Charter, G.E. Natal Sharks Board, Private Bag 2, Umhlanga Rocks 4320
Phone: +27 31 5660400 – Fax: +27 31 5660499 – E-mail: charter@shark.co.za
Dudley, S.F.J. Natal Sharks Board, P. Bag 2, Umhlanga 4320
Phone: +27-31-5660413 – Fax: +27-31-5660499 – E-mail: dudley@shark.co.za

Spain

Abad, E. Instituto Español de Oceanografía, Puerto Pesquero s/n 29640 Fuengirola (Malaga)
Phone: +34 952 47 19 07 – Fax: 34 952 463 808 – E-mail: esther.abad@ma.ieo.es
Armesto Lopez, A. Rue Chano Pineiro, 11, 10-13, 36208, Vigo-Pontevedra
Phone: +34 629 994 055 – E-mail: angelesarmesto@yahoo.es
Arnaiz, R. c/Rua do Valino 32, Direccia Xeral de Recursos Marinas, Conselleria de Pesca, Santiago de Compostela
Phone: +981 54 5020 – Fax: +981 54 5025 – E-mail: ricardo.arnaiz.ibarrondo@xunta.es
Carroceda, A. Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero s/n,
E-29640 Fuengirola (Málaga)
Phone: +34 95 2 47 69 55 – Fax: +34 95 2 46 38 08
Cendrero, O. Instituto Español de Oceanografía. Apdo. 240, 39080 Santander
Phone: +34 942-291068 – Fax: +34 942-275072 – E-mail: orestes.cendrero@st.ieo.es
Cervino, S. Dept. de Pesquerias, Instituto de Investigaciones Marinas, Eduardo Cabello, 6, 36208, Vigo
Phone: +34 986 231930 (ext. 241) – Fax: +34 986 292762 – E-mail: santi@iim.csic.es
De Cárdenas, E. Institute Español de Oceanografía, Avenida de Brasil 31, 28020 Madrid
Phone: + 34 91 417 5911 – Fax: + 34 91 597 4770 – E-mail: e.decardenas@md.ieo.es
Del Arbol Perez, J.P. Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero s/n,
E-29640 Fuengirola (Málaga)
Phone: +34 95 247 1907 – Fax: +44 95 246 3808 – E-mail: juan.delarbol@ma.ieo.es
Del Rio Iglesias, J.L. Instituto Español de Oceanografía (IEO), Cabo Estay – Canido, P. Box 1552, 36200 Vigo
Phone: +34 986 492111 – Fax: +34 986 492351 – E-mail: jose Luis.delrio@vi.ieo.es
Diez, G. Fundación AZTI, Departamento de Recursos Pesqueros, Arrantza Baliabideen Saila Txatxarramendi
Ugarte, , z/g 8395 Sukarrieta Bizkaia
Phone: +94 602 94 00 – Fax: +94 687 0006 – E-mail: gdiez@suk.azti.es
Durán Muñoz, P. Instituto Español de Oceanografía, Programa de Pesquerías Lejanas, Centro Oceanográfico
de Vigo, Apartado 1552, 36280 Vigo
Phone: +34 986 492111 – Fax: +34 986 492351 – E-mail: pablo.duran@vi.ieo.es
Fernández, L. Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero s/n,
E-29640 Fuengirola (Málaga)
Phone: +34 95 2 47 69 55 – Fax: +34 95 2 46 38 08 – E-mail: lourdes.fernandez@ma.ieo.es
Gonzalez-Iglesias, C. Carbol – Becerreira, Salón, 41 (36.318 Vigo)
Phone: +34 9 86 48 75 89
Gonzalez, F. Instituto Español de Oceanografía, Apto 1552, E-36280 Vigo (Pontevedra), Spain
Phone: +34 9 86 49 2111 – Fax: +34 9 86 49 2351 – E-mail: fernando.gonzalez@vi.ieo.es
Lucio, P. Dept. of Fisheries Resources, Fundacion AZTI Fundarioa, Txatxarramendi Irla z/g
48395 Sukarrieta (Bizkaia)
Phone: +34 94 602 9400 – Fax: +34 94 687 0006 – E-mail: plucio@suk.azti.es
Massutí, E. I.E.O., Centre Oceanogràfic de les Balears, P.O. Box 291, 07080 Palma de Mallorca
Phone: +34 971401561 – Fax: +34 971404945 – E-mail: enric.massuti@ba.ieo.es
Mattos, S.M.G. Institut de Ciències del Mar – ICM/CMIMA, Passeig Marítim de la Barceloneta, 37-49, 08003 Barcelona
Phone: +34 93 230 9500 (ext. 1182) – Fax: 34 93 230 9555 – E-mail: smattos@icm.csic.es
Meliane, I. IUCN Centre for Mediterranean Coopeation, P.O. Box 74, 29590 – Campanillas-Malag
Phone: +34 95 202 8430 – Fax: +34 95 202 8145 – E-mail: imene.meliane@iucn.org
Mesguer, S. Inst. de Ciències del Mar, Cmima, Passeig Marítim de la Barceloneta, 37-49, 08003 Barcelona
Phone: +34 93 230 95 00 – Fax: +34 93 230 95 55 – E-mail: sergim@icm.csic.es
Moranta, J. CSIC-UIB, Institut Mediterrani d'Estudis Avançats, Miquel Marquès 21, 07190 Esporles
Phone: +34 971611722 – Fax: +34 971611761 – E-mail: joan.moranta@uib.es
Moya, F. Instituto Español de Oceanografía, Puerto Pesquero s/n, E-29640 Fuengirola (Málaga)
E-mail: francina.moya@ma.ieo.es

- Murua, H. Fish, Resour. – AZTI Foundation, Herrera Kaia, Portualde z/g, 20110 Pasaia, Basque Country, Spain
Phone: + 34 9 43 00 48 00 – Fax: + 34 9 43 00 48 01 – E-mail: hmurua@pas.azti.es
- Olaso, I.T. Instituto Español de Oceanografía. Apdo. 240, 39080 Santander
Phone: +34 942-291060 – Fax: +34 942-275072 – E-mail: iolaso@st.ieo.es
- Ramos, A. Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero s/n,
E-29640 Fuengirola (Málaga)
Phone: +34 95 2 47 69 55 – Fax: +34 95 2 46 38 08 – E-mail: ana.ramos@ma.ieo.es
- Rey, J. Instituto Español de Oceanografía, Puerto Pesquero s/n 29640 Fuengirola (Málaga)
Phone: +34 952 47 19 07 – E-mail: javier.rey@ma.ieo.es
- Rodriguez-Cabello, C. Instituto Español de Oceanografía. Apdo. 240, 39080 Santander
Phone: +942-291060 – Fax: +942-275072 – E-mail: c.cabello@st.ieo.es
- Roman Marcote, E. Instituto Español de Oceanografía, Cabo Estay, Canido (Vigo)
Phone: +34 986 492111 – E-mail: ester.raman@ri.ieo.es
- Salmerón, F. Instituto Español de Oceanografía, Centro Oceanográfico de Málaga, Puerto Pesquero s/n,
E-29640 Fuengirola (Málaga)
Phone: +34 95 2 47 69 55 – Fax: +34 95 2 46 38 08 – E-mail: paqui.salmeron@ma.ieo.es
- Sanchez, F. Instituto Español de Oceanografía, Apdo. 240, 39080 Santander
Phone: +942-291060 – Fax: +942-275072 – E-mail: f.sánchez@st.ieo.es
- Valeiras, J. Instituto Español de Oceanografía, Puerto Pesquero s/n 29640 Fuengirola (Málaga)
Phone: +34 952 47 19 07 – Fax: 34 952 463808 – E-mail: julio.valieras@ma.ieo.es
- Vazquez, A. Instituto de Investigaciones Marinas, Eduardo Cabello 6, 36208 Vigo
Phone: +34 9 86 23 1930 – Fax: +34 9 86 29 2762 – E-mail: avazquez@iim.csic.es

Sweden

- Stenberg, C. National Board of Fisheries, Box 423, SE-401 26 Gothenburg
Phone: +46 31 743 04 20 – Fax: +46 31 743 04 34 – E-mail: charlott.stenberg@fiskeriverket.se

The Netherlands

- Heessen, H.J.L. Netherlands Institute for Fisheries Research, P. O. Box 68, 1970 AB Ijmuiden
Phone: +31 255 564 692 – Fax: +31 255 564 644 – E-mail: h.j.l.heessen@rivo.dlo.nl
- Pastors, M.A. Netherlands Institute for Fisheries Research, P.O. Box 68, 1970 AB Ijmuiden
Phone: +31 (0)255 564 690 (switchboard: 646) – Mobile: +31 (0)6 10 93 95 49
Fax: +31 (0)255 564 644 – E-mail: m.a.pastors@rivo.wag-ur.nl

United Kingdom

- Apostolaki, P. Imperial College, Renewable Resources Assessment Group, Department of Environmental Science and
Technology, Royal School of Mines, Prince Consort Road, London, SW7 2BP
Phone: +44 207 589 5111 ext: 59275 – Fax: +44 207 589 5319 – E-mail: y.apostolaki@ic.ac.uk
- Cavanagh, R.D. Nature Bureau International, 36 Kingfisher Court, Hambridge Rd., Newbury, Berks, RG14 5SJ
Phone: +44 1635 55 380 – Fax: +44 1635 550 230 – E-mail: rachel@naturebureau.co.uk
- Clarke, S. Renewable Resources Assessment Group, Imperial College, Royal School of Mines Building,
Prince Consort Road, SW7 WBP, London
Phone: +44 207 394 5111 ext 59276 – Fax: +44 207 589 5319 – E-mail: shelley.clarke@ic.ac.uk
- Cruz-Martinez, A. Present Address: School of Biological Sciences, University of East Anglia, Norwich NR4 7TJ
Phone: +01 603 59 31 32 – Fax: +01 603 59 22 50 – E-mail: a.cruz@uea.ac.uk
- Drake, J. 2000 + UK Shark Tagging Programme, 48 Woodbridge Avenue, Leatherhead, Surrey, KT22 7QN
Phone: +44 1372 386276 – E-mail: shark@ukshark.co.uk
- Ellis, J.R. CEFAS Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk NR33 0HT
Phone: +44 (01502) 524300 – E-mail: j.r.ellis@cefass.co.uk
- Endicott, M. RRAS, Imperial College, Royal School of Mines, Prince Consort Road, London EN6 2ER
Phone: +44 (0) 207 589 5111 ext. 59272 – E-mail: michael.endicott@ic.ac.uk
- Fowler, S. Naturebureau International, 36 Kingfisher Court, Hambridge Road, Newbury, Berkshire RG14 5SJ
Phone: +44 1635 550380 – Fax: +44 1635 550230 – E-mail: sarahfowler@naturebureau.co.uk
- Hammond, T. CEFAS Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk, NR33 0HT
Phone: +44 1502 524 213 – Fax: +44 1502 524 213 – E-mail: t.hammond@cefass.co.uk
- Hood, A.R. The Shark Trust, Rope Walk, Coxside, Plymouth PL4 0LF
Phone: +44 1752 672020 – Fax: +44 1752 672008 – E-mail: ali@sharktrust.org

- Metcalfe, J.D. CEFAS, Lowestoft Laboratory, Pakefield Road, Lowestoft Suffolk, NR33 0HT
Phone: +44 1502 524352 – Fax: +44 1502 52511 – E-mail: j.d.metcalfe@cefasc.co.uk
- Wakeford, R.C. Renewable Resources Assessment Group, Imperial College, Royal School of Mines Building,
Prince Consort Road, SW7 WBP, London
Phone: +44 (0) 207 594 7310 – Fax: +44 (0) 207 589 5319 – E-mail: r.wakeford@ic.ac.uk

United States of America

- Bonfil, R. Marine Program, International Conservation Programs, Wildlife Conservation Society,
2300 Southern Blvd., Bronx, NY 10460
Phone: +718 741 8205 – Fax: +718 364 4275 – E-mail: rbonfil@wcs.org
- Burgess, G. Florida Museum of Natural History, University of Florida, Florida
Phone: +352-392-2360 – Fax: +352-846-0287 – E-mail: gburgess@flmnh.ufl.edu
- Camhi, M. National Audubon Society, Scully Science Center, 550 South Bay Ave., Islip, NY 11751
Phone: +631 581-2927 – Fax: +631 581-5268 – E-mail: mcamhi@audubon.org
- Carlson, J. National Marine Fisheries Service, 3500 Delwood Beach Rd., Panama City, FL, 32408
Phone: +850 234 6541 – Fax: +850 235 3559 – E-mail: john.carlson@noaa.gov
- Castro, J. Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota, Florida 34236
Phone: +941 388 4441 – Fax: +941 388 4312 – E-mail: jcastro@mote.org
- Conrath, C.L. Virginia Institute of Marine Science, P.O. Box 1346, Gloucester Point, VA 23062
Phone: +804 684-7544 – Fax: +804 684-7327 – E-mail: conrath@vims.edu
- Correia, S. J. Massachusetts Division of Marine Fisheries, 50A Portside Drive, Pocasset, MA 02559
Phone: +508-563-1779 Ext. 111 – Fax: + 508-563-5482 – E-mail: steven.correia@state.ma.us
- Cortés, E. National Marine Fisheries Service, 3500 Delwood Beach Rd., Panama City, FL 32408
Phone: +850 234 6541 – Fax: +850 235 3559 – E-mail: enric.cortes@noaa.gov
- DuPaul, W. Virginia Institute of Marine Science, P. O. Box 1346, Gloucester Point, VA 23062
Phone: +804 684 7163 – Fax: +804 684 7161 – E-mail: dupaul@vims.edu
- Ellis, J.K. Virginia Institute of Marine Science, P. O. Box 1346, Gloucester Point, VA 23062
Phone: +804 684 7815 – Fax: +804 684 7327 – E-mail: julia@vims.edu
- Fordham, S. The Ocean Conservancy, Suite 600, 1725 DeSales St., NW, Washington, D.C. 20036
Phone: +202 857-3273 – Fax: +202 872-0619 – E-mail: sonja@oceanconservancy.org
- Frisk, M. Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science,
P. O. Box 38, Solomons, MD 20688
Phone: +410 326 7373 – Fax: +410 326 7318 – E-mail: frisk@cbl.umces.edu
- Gedamke, T. Virginia Inst. of Mar. Sci., College of William & Mary, P.O. Box 1346, Gloucester Point, VA 23062
Phone: +804 684 7315 – Fax: +804 684 7161 – E-mail: gedamke@vims.edu
- Heupel, M.R. Center for Shark Research, Mote Marine Lab., 1600 Ken Thompson Parkway, Sarasota, Florida 34236
Phone: +941 388 4441 – Fax: +941 388 4312 – E-mail: mheupel@mote.org
- Hueter, R.E. Center for Shark Research, Mote Marine Laboratory, 1600 Ken Thompson Parkway
Sarasota, Florida 34236
Phone: +941 388 4441 X323 – Fax: +941 388 4312 – Email: rhuetter@mote.org
- Mayo, R.K. National Marine Fisheries Service, NEFSC, 166 Water St., Woods Hole, MA 02543
Phone: +508 495 2310 - Fax: +508 495 2393 - E-mail: ralph.mayo@noaa.gov
- Romine, J.G. Virginia Institute of Marine Sci., P.O. Box 1346, Route 1208 Greate Rd., Gloucester Point, VA 23062
Phone: +804 684 1791 – Fax: +804 684 7327 – E-mail: jromine@vims.edu
- Serchuk, F.M. National Marine Fisheries Service, NEFSC, 166 Water St., Woods Hole, MA 02543
Phone: +508 495 2245 – Fax: +508 495 2258 – E-mail: fred.serchuk@noaa.gov
- Simpfendorfer, C.A. Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota, Florida 34236
Phone: +941 388 4441 – Fax: +941 388 4312 – E-mail: colins@mote.org
- Sosebee, K.A. National Marine Fisheries Service, NEFSC, 166 Water St., Woods Hole, MA 02543
Phone: +508-495-2372 - Fax: +508-495-2393 - E-mail: ksosebee@whsun1.wh.who.edu
- Taylor, I.G. School of Aquatic and fishery Science, University of Washington, Seattle, WA 98195
Phone: +206-221-6776 – E-mail: itaylor@u.washington.edu
- Tinkham, H.S. OES/OMC Room 5806, US Department of State, Washington, DC 20520-7818
Phone: +202-647-3941 – Fax: +202-736-7650 – E-mail: tinkhamsx@state.gov

NAFO SECRETARIAT

T. Amaratunga, Assistant Executive Secretary
D. C. A. Auby, Secretary
F. D. Keating, Administrative Assistant
S. Goodick, Accounting Officer

SECRETARIAT ASSISTANTS

Gisela Diaz López
Tegra Barreiro Martinez
Ana Maria Castro Fernández
Yolanda di Giacovo
Paloma Gonzalez Fontanais
Isabel Tembra Iglesias



Reception: E. Lopez-Veiga, Minister of Fisheries of the Galician Government and R. K. Mayo, Chair Scientific Council, at the Reception held for participants of the Symposium at Hotel AC Palacio Del Carmen, 11 September 2002.



Participants at Reception Room: Hotel AC Palacio Del Carmen

- From the Institute de Investigacao das Pescas e do Mar (IPIMAR), Av. de Brasilia, 1400 Lisbon, Portugal
[Phone: +351 21 302 7000 – Fax: +351 21 301 5948 – E-mail: listed below]

for	American plaice in Div. 3M	R. Alpoim	ralpoim@ipimar.pt
	Redfish in Div. 3M	A. Avila de Melo	amelo@ipimar.pt

- From the Greenland Institute of Natural Resources, P. O. Box 570, DK-3900 Nuuk, Greenland
[Phone: +299 32 1095 – Fax: +299 32 5957 – E-mail: listed below]

for	Northern shirmp in SA 0+1	H. Siegstad	helle@natur.gl
	Greenland halibut in Div. 1A	C. Simonsen	claus@natur.gl
	Redfish in SA1	H. Siegstad	helle@natur.gl
	Other Finfish in SA1	H. Siegstad	helle@natur.gl
	Northern shirmp in Denmark Strait	C. Hvingel	hvingel@natur.gl

- From the Danish Institute for Fisheries Research, Charlottenlund Slot, DK-2920, Charlottenlund, Denmark
[Phone: +45 33 96 33 00 – Fax: +45 33 96 33 33 – E-mail: olj@dfu.min.dk]

for	Roundnose grenadier in SA 0+1	O. Jørgensen
	Greenland halibut in SA 0+1	O. Jørgensen

- From the Marine Research Institute, Skulagata 4, P. O. Box 1390, 121 - Reykjavik, Iceland
[Phone: +354 552 0240 – Fax: +354 562 3790 – E-mail: unnur@hafro.is]

for	Shrimp in Div. 3M	U. Skúladóttir
-----	-------------------	----------------

- From Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO), 6 Knipovich Street, Murmansk, 183763, Russia
[Phone: +7 8152 47 25 32 – Fax: +7 8152 47 3331 – E-mail: inter@pinro.murmansk.ru]

for	Capelin in Div. 3NO	K. V. Gorchinsky
-----	---------------------	------------------

- From the Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543
[Phone: +508-495-2285 – Fax: +508-495-2393 – E-mail: lisa.hendrickson@noaa.gov]

for	Squid in SA 3+4	L. Hendrickson
-----	-----------------	----------------

III. STACFIS WORKING PROCEDURE

1. Presentation of Age-aggregated Survey Indices of Abundance and Biomass in STACFIS Reports

STACFIS considered the issue of how to present indices of abundance from surveys in a standard manner in its reports. Currently, these data are presented in a number of different ways. Forms of presentation are histograms and line graphs, population measures are abundance and biomass, and computational methods are swept area estimates, mean per tow, and model results.

STACFIS agreed that mean number or weight per tow was preferred over swept area estimates. Presenting the latter as indices in numbers of fish or biomass in tons has caused confusion between these measures and population estimates from models such as sequential population analysis. The calculation of actual area swept by the trawl is a key parameter in the swept area method, and it is not clear for some survey trawls whether door spread or wingspread should be the measure used. For some stocks, indices of abundance and biomass from surveys are several times larger than population estimates from SPA. It was noted that mean per tow indices, particularly when a stock area consists of more than one NAFO Division, are not currently presented in many assessments, and will require some work to calculate and compile. Whenever possible, indices should continue to be presented in SCR Documents as series disaggregated by Division.

There was also agreement that indices should not be presented with points standardized, e.g. to an individual data point, or to the mean of the series. Although STACFIS concluded that measures of variation should be presented for all survey indices, there was no agreement on the best way to show these measures of variation.

IV. OTHER MATTERS

1. Review of SCR and SCS Documents (SCR Doc. 02/121)

STACFIS reviewed a paper on "Biomass Partitioning and Catch History Summary". The paper provided considerable information on distribution with respect to the 200-mile limit, and catch histories. However, it was noted that there was insufficient time to deal adequately with material presented.

It was requested that a revised version of the paper be presented to the STACFIS Meeting of June 2003 and that the new version include a time series of the biomass proportion estimates and that seasonal patterns be examined comparing spring and autumn surveys. Also, it was suggested to remove NAFO Subdiv. 3Ps from all the calculations and provide a Table of maximum depth surveyed in each year. Concern was expressed about the utility of this work if distribution of the stock extends beyond Div. 3LNO.

2. Other Business

An errata sheet was circulated to Scientific Council and Fisheries Commission to correct a figure in the June 2002 STACFIS report on American plaice in Div. 3LNO and to clarify text in the June 2002 STACFIS report of Greenland Halibut in SA 2 + Div. 3KLMNO. STACFIS noted these corrections will also appear on the June 2002 Meeting Report (SCS Doc. 02/19) on NAFO website, and in the final publication of the Scientific Council Reports, 2002 at the end of the year.

There being no other business, the Chair extended particular gratitude to the Secretariat for their assistance and support, and the meeting was adjourned.

APPENDIX II. REPORT OF THE STANDING COMMITTEE ON RESEARCH COORDINATION (STACREC)

Chair: M. J. Morgan

Rapporteur: W. B. Brodie

The Committee met at the Galicia Congress and Exhibition Centre in Santiago de Compostela, Spain, during 16-19 September 2002 to discuss matters pertaining to statistics and research referred to it by the Scientific Council. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), Estonia, European Union (France, Germany, Portugal, and Spain), Iceland, Japan, Russian Federation and United States of America. The Assistant Executive Secretary was in attendance.

1. Opening

The Chair opened the meeting by welcoming the participants, and W.B. Brodie (Canada) was appointed rapporteur. The agenda was modified to include Item 6, and **adopted**.

2. Fisheries Statistics

a) Progress Report on Secretariat Activities in 2000/2001

i) Acquisition of STATLANT 21A and 21B reports for recent years

The Assistant Executive Secretary outlined the status of the STATLANT data submissions. Since the June 2002 meeting of STACREC, STATLANT 21A data for 2001 were received from E/DEU, and STATLANT 21 B data were received from EST, E/DNK, E/DEU, E/PRT, POL, and RUS. Greenland was added to the list of countries that have not submitted STATLANT 21A or 21B data for 2001.

ii) Publication of statistical information

STACREC noted that the FISHSTAT Plus program issued by FAO for STATLANT 21 data, and now available on the NAFO website, cannot be used at present to access data for 2001 as well as some data for 2000. The EUROSTAT representative reported that there were some problems with the user support provided by FAO for this software.

3. Review of FAO Fisheries Global Information System (FIGIS)

STACREC reviewed a draft partnership agreement concerning development and maintenance of the Fisheries Resources Monitoring System (FIRMS) within FAO's Fisheries Global Information System (FIGIS). FIRMS is a web-based collection of data on global fishery resource status and trends, including areas covered by regional fishery bodies (RFBs) such as NAFO. It is proposed that RFBs provide the necessary data for this system. STACREC noted several concerns with this approach, including workload issues for the Secretariat as well as Scientific Council, questions on maintenance of data and preserving the wording of scientific advice, possible involvement of some national agencies, and level of support provided by FAO. This system is being developed by FAO and further discussion will be required in STACREC as well as in other Committees within NAFO before specific recommendations concerning this project can be made.

4. NAFO Observer Program Protocol

There was nothing to report on this item.

5. Fleet-based Approach to Data Collection

There were no documents available for consideration, but STACREC had a brief discussion on the general issue. It was noted that Scientific Council had outlined its requirements for data collection in 2000 (SCS

Doc.00/23), and that these specified observer data were to be collected on a set-by-set basis. In discussing this, the issue of confidentiality and vessel identification was raised as a concern. Without any documentation, STACREC concluded that nothing further could be done with this agenda item at this time.

6. Review of Survey Activities in 2003-2004

The following schedule of proposed Russian research activities in the NAFO Regulatory Area (NRA) in 2003 and 2004 was presented. STACREC noted that a part of the Russian national quota would need to be allocated in order for these research surveys to be conducted.

Inventory of Russian research activities proposed in the NRA in 2003-2004

Period/Months	Research Program	Number of vessels	Area
April-May	Random-stratified multi-species demersal fish trawl survey	1	3M
March-August	Random-stratified bottom trawl shrimp survey and assessment of juvenile fish by-catches in the shrimp fishery	1	3M
April-June	Random-stratified Greenland halibut bottom trawl survey in NAFO Regulatory Area	1	3LMNO
June-July (2003 only)	Trawl-acoustic survey of pelagic Redfish in NAFO Regulatory Area (in frames of ICES international TAS)	1	1F, 2+3K
March-September	Selectivity of fishing gears for demersal Redfish	1	3M
July-November	Selectivity of fishing gears and investigation of biology and seasonal distribution of pelagic Redfish	5	1F, 2+3K
January-December	Selectivity of fishing gears for Greenland halibut	1	3LMNO

7. Other Matters

a) Review of SCR and SCS Documents

The results of a Greenland halibut (*Reinhardtius hippoglossoides*) otolith exchange between Spain, Canada and Portugal were described in SCR Doc. 02/142. A set of statistical and graphical methods was used to detect differences in terms of bias and precision. In general, there were no big differences in the recordings between the age readers. Most of the differences in ages were one or two years. The Spanish age reader had a tendency to assign lower ages to fish younger than 9 years old, and higher ages to the older ones, relative to the Canadian age readers. The age reader from Portugal, like the Spanish age reader, assigned higher ages to the older fish (>8 years old) than Canada, but for the younger fish the agreement was very good. Burning the otoliths before reading seems to enhance the last few annuli from the older fish. During the discussion of this paper, the importance was stressed of good agreement between age readers from several countries in the calculation of the catch-at-age.

b) **Other Business**

STACREC was informed that NEAFC has sent a letter to ICES requesting further areal breakdowns of catch data for ICES Divisions X and XII. These breakdowns of catch were to be included in the STATLANT 27A data.

The Chair thanked the participants for their valuable contributions to the Committee. Thanks were also extended to the rapporteur and to the Assistant Executive Secretary and staff of the NAFO Secretariat for their assistance. There being no other business, the Chair closed the September 2002 STACREC Meeting.

APPENDIX III. REPORT OF STANDING COMMITTEE ON PUBLICATIONS (STACPUB)

Chair: M. Stein

Rapporteur: S. J. Correia

The Committee met at the Galicia Congress and Exhibition Centre, Santiago de Compostela, Spain on 18 and 19 September 2002, to consider publication-related topics and report on various matters referred to it by the Scientific Council. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), European Union (France, Germany, Portugal and Spain), Estonia, Iceland, Japan, Russian Federation and United States of America. The Assistant Executive Secretary was in attendance.

1. Opening

The Chair opened the meeting by welcoming the participants. The agenda as presented in the Provisional Agenda was **adopted**. S. J. Correia (USA) was appointed rapporteur.

2. Review of Recommendations from June 2002

- i) STACPUB had recommended that *the Secretariat provide a copy of the mailing list to each delegation's representatives. Representatives are requested to review the list and provide a list of names that are no longer involved with NAFO and that should be removed from the list.*

STACPUB noted that the Secretariat provided a copy of the mailing list to each delegation's representatives after the June 2002 Meeting. The Assistant Executive Secretary reported that some Contracting Parties have already submitted a list of names that are no longer involved with NAFO and these names have been removed from the mailing list.

- ii) STACPUB had recommended that *the Secretariat maintain the restricted website area for specific Scientific Council business, and that the restricted website name be changed on an annual basis in order to maintain restricted access.*

STACPUB noted that the Secretariat has changed the name of the restricted website area specific for Scientific Council business and Scientific Council members were notified of the site name change. The Secretariat will change the name at the end of the year.

- iii) STACPUB had recommended that *STACFEN's annual climate status summary report on essential climatic conditions in the NAFO Convention area be published on the website.*

STACPUB noted that STACFEN's annual climate status summary report was published on the website after the June 2002 Meeting.

- iv) STACPUB recommended that *"Informational bulletins" of interest to NAFO Contracting Parties, such as location of mooring of ocean current meters in the Flemish Pass, should also be published on the website.*

STACPUB noted that "Informational bulletins" were published on the website after the June 2002 meeting. STACPUB suggested that Scientific Council review new "Informational bulletins" in order to determine the most appropriate area of the website to place them.

- v) STACPUB had recommended that *Secretariat ask the host country to fund a social event during the Elasmobranch Symposium.*

STACPUB thanked our hosts for providing a wonderful social event during the Elasmobranch Symposium.

3. Review of Scientific Publications

a) Papers from June 2002 Meeting

The 7 June 2002 Environmental Mini-Symposium resulted in 8 papers. The Council agreed to consider them for a special Volume of the Journal. Authors were requested to submit their papers by 15 October 2002. To-date one paper has been submitted.

Status of Scientific Publications

i) Journal of Northwest Atlantic Fishery Science

Volume 30. There are presently 7 papers in Secretariat files for this issue.

Volume 31 containing papers from the 2001 Symposium on "Deep-sea Fisheries". A total of 47 papers have been received at the Secretariat and sent to Co-convenors for editorial review. To-date 8 including an Abstract are in the final galley stage, 11 have been received at the Secretariat for final technical edit, 16 reviews have been sent back to authors for revision and 1 has been rejected, 1 withdrawn and 10 (probable 1 reject) are still in referee stages of the review process. This issue is targeted for publication by late-2002.

A **special Volume** containing 8 peer-reviewed articles by members of the Working Group on Reproductive Potential is being prepared by the editor. This volume is intended to provide state-of-the-art techniques and methods used to estimate reproductive potential of fish stocks. In addition, it reviews and synthesizes published results and provides case studies of various approaches that may be used to integrate knowledge of stock reproductive potential into improving scientific advice for fishery resource management. It is anticipated that this publication will be available in late-2002 or early-2003.

ii) NAFO Scientific Council Studies

Studies Number 35 containing a complete narrative of the proceedings and 9 papers presented at the 2000 Workshop on Assessment Methods held during 13-15 September 2000 in Boston, USA, is in final stage of preparation and targeted to be published by late-2002.

Studies Number 36 the report of "The Canada-United States yellowtail flounder Age Reading Workshop, 28-30 November 2000, St. John's, Newfoundland" is targeted to be published by late-2002.

The volume of the **Studies** from the Working Group on Reproductive Potential, containing short summaries and citation sources on stock structure and reproductive potential data (e.g. abundance, length at age data, maturation, condition, and fecundity) for over 50 fish stocks (all of the NAFO stocks and several ICES stocks) is being prepared. It is anticipated that this publication will be available in late-2002 or early-2003.

b) Status of the 2001 "Deep Sea Fisheries" Symposium Proceedings

STACPUB noted that nearly half of the manuscripts from the Deep-sea Fisheries Symposium are not ready for publication. STACPUB **recommended** that *convenors of the Deep-sea Fisheries Symposium be asked to remind reviewers and authors of manuscripts to complete their work as soon as possible.*

c) Information from the 2002 Elasmobranch Symposium

STACPUB **recommended** that *a summary of the Elasmobranch Symposium and a PowerPoint presentation summarizing the symposium be published on the NAFO website.*

d) **Status of Invitational Papers (Journal/Studies)**

STACPUB noted that no new information regarding the status of invitational papers was available.

e) **Other Reviews**

After consultation with K. Drinkwater, member of the publication group of the Edinburgh 2001 Symposium on "Hydrobiological Variability in the ICES Area during the 1990s", the chair informed the Committee that it is hoped that all of the papers will be ready for publication by the ICES Annual Science Conference at the beginning of October 2002. Over 75% of the papers and posters are ready now. There are a few lagging behind but most of them should be ready by then. Publication of the Symposium proceedings is envisaged for the end of the year 2002.

4. **Considerations of NAFO Website**

a) **Status of Implementation of Journal and Scientific Council Studies on Website**

Volumes 15-30 of the *Journal of Northwest Atlantic Fishery Science* are available on the website and the entire series is available on CD. *Scientific Council Studies* numbers 31-34 are available on the NAFO website. *Scientific Council Studies* numbers 15-34 are available on CD. Abstracts from all issues are available on web and the Secretariat is currently indexing papers.

b) **"Restricted site" for Scientific Council**

The code for restricted site was changed after the June 2002 meeting. The next schedule name change will occur at the end of this year. Scientific Council members will be notified of the change of the name site.

5. **Editorial Matters Regarding Scientific Publications**

STACPUB noted that no new information regarding editorial matters was available.

6. **Other Matters**

The Chair presented a summary of website usage for June through August 2002 based on information provided by the Secretariat. The website averaged 200 users per day with a peak occurring at the end of July. Website usage throughout this period was generally stable at about 200 users per day. A large peak in usage occurred at the end of July and this peak corresponded with the availability of June 2002 Scientific Council Report on the website. No problems were reported on website.

The Chair provided a brief description of users characterized by country and organization. Most hits were from Internet service providers located in the USA, followed by unknown country, unknown IP address, and Canada (other). Most users are from North America. The Chair thanked the Secretariat for providing information on website usage.

STACPUB noted that the requirement that presenters participating in NAFO Symposia submit both a research document for the Scientific Council and a manuscript for publication in a volume of symposium proceedings. Few symposia require submission of both research documents and manuscripts and this requirement has generated confusion among participants not familiar with NAFO procedures.

STACPUB **recommended** that *an additional agenda item for the 2003 June Meeting should be introduced to review the current requirement of submitting both research document and a manuscript for publication in Symposium Proceedings.*

There being no other business, the Chair closed the meeting by thanking the participants for their contributions and co-operation, the rapporteur for taking the minutes, and the NAFO Secretariat for their assistance.

