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Managing Risks to Biodiversity and the Environment on the High Sea, Including Tools Such as Marine Protected Areas

- Scientific Requirements and Legal Aspects -

Proceedings of the
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Preface

The threat to biodiversity on the high seas is a typical example for the „tragedy of the commons“. The biggest part of the planet, the so-called high sea, lies beyond national jurisdiction and, hence, no law except for the UN Convention on the Law of the Sea (UNCLOS) applies to the oceans. And UNCLOS, unfortunately, does not provide easily for conservation measures on the high seas but, instead, stresses the principle of the freedom of the sea.

Research in the past decades has both unveiled the tremendous biological treasures of the high sea as well as has brought forward evidence on the ongoing destruction of the highly unique high sea faunal communities. Among these scientists are Prof. Dr. Hjalmar Thiel and Dr. Anthony Koslow who approached the German Federal Agency for Nature Conservation to combine efforts in exploring mechanisms to conserve the threatened biodiversity on the high seas. Their initiative coincided with the UN Open-ended Informal Consultative Process on the Oceans and the Law of the Sea (UNICPOLOS) which opened up an excellent opportunity to raise these issues in the appropriate global fora.

The Federal Agency for Nature Conservation was happy to host an expert workshop on “Managing risks to biodiversity and the environment on the high seas, including tools such as marine protected areas” at its International Academy for Nature Conservation on the Isle of Vilm, since it hoped that the results will also benefit its conservation activities as lead country for the establishment of a system of marine protected areas in the North East Atlantic in the OSPAR context.

The aims of the workshop were basically threefold:

- To identify conservation needs and priorities on the high seas on a worldwide scale
- To review existing activities that aim at conserving valuable sites on the high seas
- To develop ideas on how to achieve a sound protection regime on the high seas.

The proceedings of the workshop should help to distribute the conclusions of the meeting that address a range of stakeholders and come up with sound suggestions on how to put forward the conservation case in the relevant international fora, notably UNICPOLOS and the different fisheries commissions. Additionally, this collection of scientific contributions provides excellent reference material for those concerned with conservation on the high seas.

I sincerely hope that the workshop and the proceedings will contribute to conserving one of the last areas of wilderness of this planet – the high seas. And I would like to take the opportunity to thank all those who, highly committed, participated in the preparations and in the workshop and led it to results.

Prof. Dr. Hartmut Vogtmann

President of the Federal Agency for Nature Conservation

Introduction

The past 50 years have seen tremendous advances in the marine biological sciences. Research was stimulated initially by basic questions - the functioning of the sea, relationships with climate conditions and life processes - followed by the need to solve applied problems related to food production, conservation and the impacts of mining, climate change and pollution. Most research has concentrated on coastal and offshore waters; research on the high seas - including the deep sea - has been far more limited. However, the deep sea is increasingly subject to anthropogenic impacts: nuclear waste dumping, mineral exploration and fishing. The spread of fisheries into the deep sea has undoubtedly had the greatest ecological impact to date, both on the target species and on marine habitats and communities generally through disturbance and bycatch.

As these activities stimulated ecological research, scientific perspectives on the deep sea have changed dramatically. The diversity of the 'Lilliputian' fauna of the abyssal plains is now recognized to rival that of tropical rain forests. New ecosystems supported by chemosynthesis, rather than photosynthesis, have been discovered at deep sea vents. And seamounts are now recognized to host a diverse and little-explored coral-based fauna characterized by high levels of endemism and highly threatened by current fishing activities. Already several nations - Australia, New Zealand, Norway and the United States - have extended protection to deep-water habitats within their Exclusive Economic Zones. But how can threatened habitats on the high seas be best conserved?

Interest in this issue dates back to a seminal paper by Maxine McCloskey, delivered in 1993 at the Fifth World Wilderness Congress, which led to formation of an IUCN Working Group on High Seas Marine Protected Areas, with Maxine McCloskey as chairperson, Kristina Gjerde and Tony Koslow as legal and scientific advisors, respectively. In March 1999, the Working Group convened a meeting of scientific experts at Montpellier, sponsored by IUCN and IOC. The meeting concluded that deep-water trawling posed significant threats to high seas environments, seamounts in particular; what was missing was a consensus on the legal basis to protect them. The workshop at the International Academy for Nature Conservation on the Isle of Vilm was organized to address this issue.

During the preparation of the Vilm workshop the steering committee placed emphasis on the participation of legal experts in international law and nature protection. This group clearly formed the majority at the workshop, whereas marine ecologists were invited primarily to advise the group on the ecological status of deep-sea habitats both in general (e.g. vents, seamounts, the open ocean) and in particular regions, and the efficacy of potential models for environmental protection.

A list of participants with their affiliations is given in Annex I to this report. Also invited to participate in the workshop were the United Nations Food and Agriculture Organization and the International Maritime Organization. Regrettably they were unable to send delegates because of other commitments.

A number of participants were asked to present papers on legal and ecological aspects during the meeting and to prepare extended abstracts for distribution before the workshop. Together with the "Statement of Conclusions" (pp 15-19) and the "Summary Record" (pp 20 -30) these contributions form the basis for this issue of "BfN-Skripten". The views expressed in these papers are those of the authors and do not necessarily conform with the ultimate

“Statement of Conclusions” of the workshop. The legal issues, in particular, opened the way to a variety of ideas and interpretations of existing laws, regulations and standpoints. This collection is probably somewhat unique in that it provides a rather comprehensive overview of ecological, administrative and legal aspects of protective measures in areas beyond national jurisdiction.

The steering group intended the workshop to result in a document that would stimulate discussions on marine protected areas in the United Nations Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS). This target was confirmed by the discussions during the workshop, and the document (see "Statement of Conclusions" pp 15 – 19) was delivered to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and subsequently sent to the United Nations via the German Foreign Office. During this year's UNICPOLOS meeting (New York, May 2001), the subject of protected areas was not on the agenda, but it was proposed to the General Assembly that conservation of biodiversity on the high seas be placed on the agenda for next year’s meeting.

The steering committee and participants gratefully acknowledge the support received for organizing the workshop. A proposal for substantial financial support was positively answered by the BMU. Because the general problem "marine protected areas on the high seas" is not the subject of any international committee, most participants were not able to raise travelling funds in their home countries. The funding made available by the BMU allowed all participants to partake of accommodation and board without cost at the International Academy for Nature Conservation on the Isle of Vilm, and most of the participants received their travelling funds from this same source. We are most grateful to the BMU for realizing the importance of the workshop subject and for the generous support received. National travelling funds were also made available and are acknowledged for participants of the World Conservation Union (3), Australia (Environment Australia, 3, Great Barrier Reef Marine Protected Area Authority, 1), the Republic of Ireland (2), the UK Joint Nature Conservation Committee (1), and the Secretariat of the Convention on Biodiversity (1). All participants are grateful to the staff of the International Academy for Nature Conservation for arranging a comfortable meeting and a pleasant stay on the wintry Isle of Vilm.

Hjalmar Thiel

J.Anthony Koslow

List of Acronyms

ACES	-	Atlantic Coral Ecosystem Study
ACFM	-	Advisory Committee for Fishery Management (ICES)
BAP	-	Biodiversity Action Plan (CBD)
BAT	-	Best Available Technique
BIOTRANS	-	Biological Vertical Transport and Energetics in the Benthic Boundary Layer of the Deep Sea
BEP	-	Best Environmental Practice
BSPA	-	Baltic Sea Protected Area
&c.	-	Council Directive 92/43/EEC 'on the Conservation of Natural Habitats and of Wild Fauna and Flora'
CBD	-	Convention on Biological Diversity
CCAMLR	-	Convention on the Conservation of Antarctic Marine Living Resources *or* Commission on the Conservation of Antarctic Marine Living Resources
COFI	-	Committee on Fisheries (FAO)
CONSSO	-	Committee of North Sea Senior Officials
COP	-	Conference of Parties
CP	-	Contracting Party
CPUE	-	Catch per Unit Effort
CSD	-	Commission on Sustainable Development (UN)
ECOMOUND	-	Environmental Controls of Carbonate Mounds (ACES)
EC	-	European Commission
EEA	-	European Environmental Agency
EEC	-	European Economic Commission
EEZ	-	Exclusive Economic Zone
EU	-	European Union
FAD	-	Fish Aggregating Device
FAO	-	Food and Agriculture Organisation
5 FP	-	Fifth Framework Project (EU)
GEOMOUND	-	Geological Controls of Carbonate Mounds (ACES)
GO	-	Governmental Organisation
GPA	-	Global Programme of Action to Protect the Marine Environment from Land-based Activities
HELCOM	-	Helsinki Commission
HSMPA	-	High Sea Marine Protected Area
ICCAT	-	International Commission for the Conservation of Atlantic Tuna (FAO)

ICES	-	International Council for the Exploration of the Sea
IFAW	-	International Fund for Animal Welfare
IMCAM	-	Integrated Marine and Coastal Area Management
IMR	-	Institute of Marine Research (Ireland)
IMO	-	International Maritime Organisation
IOTC	-	Indian Ocean Tuna Commission (FAO)
IRA	-	Impact Reference Area
ISA or ISBA	-	International Seabed Authority
IUCN	-	International Union for the Conservation of Nature, now: World Conservation Union
IWC	-	International Whaling Commission
JNCC	-	Joint Nature Conservation Committee (UK)
LOS	-	Law of the Sea
LOSC	-	Law of the Sea Convention (same as UNCLOS)
MAT	-	Mutually Agreed Terms
MARPOL	-	International Convention for the Prevention of Pollution from Ships
MCPA	-	Marine and Coastal Protected Area (CBD)
MEHRA	-	Marine Environment High Risk Area (UK)
MEPC	-	Marine Environment Protection Committee (IMO)
MPA	-	Marine Protected Area
MSPA	-	Marine Specially Protected Area
MSY	-	Maximum Sustainable Yield
NAFO	-	Northwest Atlantic Fisheries Organisation
NEAFC	-	North East Atlantic Fisheries Commission
NGO	-	Non-governmental Organisation
OSPAR	-	Convention on the Protection of the Marine Environment of the Northeast Atlantic (Oslo Paris Convention)
PIC	-	Prior Informed Consent
PRA	-	Preservational Reference Area
PSSA	-	Particularly Sensitive Sea Area
RAMOGE	-	Agreement on the Protection of the Waters of the Mediterranean between France, Italy and Monaco (derived from the towns of St. Raphael, Monaco and Genua)
RFO	-	Regional Fisheries Organisation
ROV	-	Remotely Operated Vehicle
SAC	-	Special Area of Conservation (EU-Habitats Directive)
SBSTTA	-	Subsidiary Body on Scientific, Technical and Technological Advice (CBD)

SGDEEP	-	Study Group on the Biology and Assessment of Deep-sea Fishery Resources (ICES)
SOC	-	Southampton Oceanography Centre (UK)
SOLAS	-	Convention on Safety of Life at Sea
SPA	-	Science Priority Area
SPA	-	Special Protection Area (EU Birds Directive)
SPAMI	-	Specially Protected Areas of Mediterranean Interest
SPLOSC	-	States Parties to the Law of the Sea Convention
SRA	-	Stable Reference Area
SSB	-	Spawning Stock Biomass
TAC	-	Total Allowable Catch
TSS	-	Traffic Separation Scheme
TSPP	-	Tanker Safety and Pollution Prevention
TAG	-	Trans-Atlantic Geotraverse
UK	-	United Kingdom
UN	-	United Nations
UNCED	-	United Nations Conference on Environment and Development
UNCLOS	-	United Nations Convention on the Law of the Sea
UNEP	-	United Nations Environment Programme
UNESCO	-	United Nations Educational Scientific and Cultural Organisation
UNICPO or UNICPOLOS	-	United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea
VMS	-	Vessel Monitoring System
WWF	-	World Wide Fund for Nature

CONCLUSIONS AND SUMMARY RECORD
OF THE EXPERT WORKSHOP ON MANAGING RISKS TO BIODIVERSITY AND THE ENVIRONMENT ON THE HIGH SEAS, INCLUDING TOOLS SUCH AS MARINE PROTECTED AREAS

– SCIENTIFIC REQUIREMENTS AND LEGAL ASPECTS -

27 FEBRUARY – 4 MARCH 2001

ISLE OF VILM / GERMANY

1. STATEMENT OF CONCLUSIONS

A meeting of legal and scientific experts was held on the on the Isle of Vilm, Germany from February 27 – March 4, 2001, to discuss the legal and scientific aspects of marine protected areas on the high seas. They reached the following conclusions:

General Approach

1 The United Nations Convention on the Law of the Sea (UNCLOS) provides the framework for all action to conserve biodiversity and other components of the marine environment of the high seas. It is the bedrock on which all actions must be based.

2 There are areas of the high seas where more effective means of sustainable management and conservation within this framework are considered desirable, and in some cases urgent, to give effect to the obligation to protect and preserve the marine environment.

3 From an indicative list of aspects of the marine environment of the high seas which give rise to concern, and without suggesting any particular priorities, the meeting decided to use seven cases as examples for deriving approaches to develop such means. These are:

(1) the ecosystems of seamounts;
(2) cold water coral communities;
(3) hydrothermal vents and their communities;
(4) deep sea fish;
(5) seabirds;
(6) cetaceans; and
(7) unique scientific reference areas (i.e., areas that have been thoroughly studied and therefore provide a reference in space and time).

4 Such approaches have to include identifying the risks which need to be managed and establishing the basis for management actions.

5 This identification includes addressing such questions as who should do what and on what timetable.

Defining "Marine Protected Areas"

6 The meeting acknowledged that it had been set up to discuss marine protected areas on the high seas. It was recognized that the phrase "marine protected areas" is an umbrella term with several applications and which covers a suite of ideas.

7 In certain fields, the term has clear connotations and provides a useful shorthand in those contexts. However, in the context of the high seas, there is a risk of confusion with the use of the term in relation its use in to areas under national jurisdiction.

8 The conclusions reached by the meeting therefore are not based on using any specific concept of "marine protected areas", but rather discuss management of risks to biodiversity and other components of the marine environment in the high seas. Such management approaches may be related to an integrated treatment of the risks arising in a specific area. These conclusions, however, take no position as to whether such areas can helpfully be described as "marine protected areas".

Identifying the Risks

9 The first step is to review the vulnerable aspects of the ecosystems in the high seas. It is then necessary to identify the significant risks to those aspects of biodiversity and other components of the marine environment in the high seas arising from specific sectors/human activities. Action to manage these risks should then be channelled to those international organisations competent with respect to those specific sectors/human activities.

10 Initiatives by one or more national governments would be needed to invite those organisations to consider such action.

11 The meeting started with the example of seamount ecosystems. In the first instance, regional fisheries management organisations (RFOs) (or, in some cases, regional seas organisations) would be likely to be the appropriate competent international organisation. The RFOs would need to bear in mind the provisions of Article 119(1)(b) of UNCLOS on species associated with or dependent upon harvested species and the need, in accordance with Article 194(5), to preserve rare or fragile ecosystems. In some cases, special inter-governmental conferences might be a more effective way forward. Regional organisations or special conferences should strive to include all coastal States and user States, both to achieve full effectiveness and to avoid the problem of "free riders".

12 In some cases, affecting a range of sectors/human activities, com-plementary measures may need to be adopted by a number of international organisations in order to cover all aspects of the risk management needed.

13 To provide a safety net and to avoid problems from the absence in some areas of competent regional organisations, global organisations with respon-sibilities for certain resources (for example, the Convention on Biological Diversity with respect to biodiversity, the Food and Agricultural Organisation for living marine resources, the International Seabed Authority for mineral resources in areas beyond national jurisdiction) should consider whether significant threats arise in such areas and what mechanisms could be used to develop appropriate risk management approaches.

14 The meeting then considered the other six examples and concluded that for some of these examples the appropriate global body would most appro-priately take primary responsibility (for example, the Intergovernmental Oceanographic Commission in relation to scientific reference areas or scientific investigation of hydrothermal vents).

15 In addition, it could be appropriate to consider global action to establish risk management approaches. This might inter alia take the form of either:

(a) a resolution of the U.N. General Assembly on the model of the Driftnet Resolution; or
(b) an initiative to amend or apply an existing international agreement or to establish a new international agreement to cover all problems of a particular nature (for example, seamount ecosystems).

Establishing the Basis for Action and Implementing Measures

16 It is essential to recognize the need for responses to threats to biodiversity and other components of the marine environment in the high seas to match in their speed the rapidity by which threats can arise and be realized.

17 Proposals by States for action at the regional level should seek to ensure that all aspects of the problem are addressed in an integrated way. In particular cases, where the risk is linked to a specific geographical area, the risk management measures may well need to be specified by reference to that area.

18 In designing risk management measures, the precautionary approach as defined by Principle 15 of the Rio Declaration should be applied.

19 The scientific information upon which the proposals are based should be peer reviewed and made easily available to all interested parties, which should also have easy access to the proposals.

20 Recognizing that the organisation considering such proposals may have conflicting demands placed upon it, the consequences of inaction or delay in adopting risk management measures would need to be ranked against its competing priorities.

21 The resources needed to develop and implement the risk management measures should be proportionate to the seriousness of the threat.

22 Risk management measures would need to be tailored to the specific case, but would also need to be consistent with the obligations, powers, and duties established by UNCLOS.

23 The aims and objectives of the risk management measures need to form part of any proposal by States and take account of any legitimate interests and uses of the oceans.

24 The practice of reviewing the effectiveness of implementation of measures is well established and should be applied to risk management measures in relation to biodiversity and other components of the marine environment in the high seas.

25 Where complementary measures by several organisations are needed, the total effectiveness of the sum of the measures should be considered collectively by all such organisations.

26 The annual report of the United Nations Secretary General on Oceans and the Law of the Sea can be expected to report progress on risk management measures of this kind. This will provide a basis for comparison and evaluation.

Follow-up Actions

27 Actions to develop risk management measures of this kind need to recognize the importance in many instances of the rapid response referred to in paragraph 16 above.

28 States and intergovernmental organisations should be encouraged to review their knowledge of biodiversity and other components of the marine environment in the high seas, in order to determine the risks in need of concerted international effort to manage them.

29 States should equally be encouraged to bring forward the necessary proposals to the appropriate competent international organisation(s).

30 Non-governmental organisations should be encouraged to review the knowledge about biodiversity and other components of the marine environment in the high seas which they hold and make appropriate representations to States or intergovernmental organisations.

31 The Conference of Parties and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) to the Convention on Biological Diversity could usefully examine the possible contributions which their work could make to improving management of risks to biodiversity and other components of the marine environment in the high seas.

The meeting suggested that an important subject for early discussion within the UN Informal Consultative Process on Oceans and the Law of the Sea should be the management of risks to biodiversity and other components of the marine environment in the high seas.

2. SUMMARY RECORD

2.0 Introduction

HENNING VON NORDHEIM (German Federal Agency for Nature Conservation, BfN) welcomed the participants of the "Expert Workshop on Marine Protected Areas on the High Seas – Scientific Requirements and Legal Aspects" also on behalf of HARTMUT VOGTMANN, President of BfN. THOMAS BORCHERS (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) also welcomed the participants and pointed out the need for thorough discussion on the topic of the workshop. ANTHONY KOSLOW (Commonwealth Scientific and Industrial Research Organization, Australia) gave a short record of how the idea for this meeting evolved and pointed out the concern within the scientific community regarding different environmental issues on the high seas. HJALMAR THIEL (University of Hamburg) gave a short overview on the aims of the workshop and welcomed all participants.

2.1 Scientific Arguments for High Sea Marine Protected Areas (MPAs) – Part 1

(Chaired by HJALMAR THIEL & LYLE GLOWKA)

2.1.1 JOHN GORDON gave an introduction to deep water fish and fisheries. He stressed that deep sea fish are very vulnerable to exploitation, partly because of their longevity, low fecundity, slow growth rate. He pointed out, that very little is known about some species with respect to their reproductive cycle, spawning grounds or mobility.

There has been a steep increase in the areas where deep-water fisheries occur and in the amount of fish that is being caught. A rapid decline in at least some species or stocks is evident. Among the problems associated with deep-water fisheries are:

- Setting total allowable catch (TACs) for "mixed species fisheries" on their own is not an adequate management tool.
- Some fish are not separated at the species level in the landings.
- Species of no commercial value (e.g. Smoothhead) are discarded and can be a significant part of the total catch and do not appear in landings data.
- Some deep-water species occur within national fishery limits as well as on the high seas resulting in the need for more complicated management measures.

2.1.2 JOHN GORDON also gave a short overview on the "Response by the International Council for the Exploration of the Sea (ICES) to the "Request for Advice on Deep Water Fisheries Management by the European Communities", based on a summary prepared by CORNELIUS HAMMER, Federal Research Centre for Fisheries, Hamburg, who could not participate in the workshop. ICES has prepared 13 recommendations on how to control and manage deep water fish stocks, including drastic reductions of fishing intensities.

2.1.3 ANTHONY KOSLOW described the unique ecosystems of seamounts, based on their distinct physical characteristics (e.g. higher currents, isolation). Seamount communities have a high species diversity and high degree of endemism, compared to the broad distributions characteristic of most other deep sea species.

A number of commercially important species on and above seamounts attract fishing. Unsustainable fishing techniques result in degradation or even destruction of the benthic community and a rapid collapse of the fish stocks. Both have uncertain but presumably very long recovery periods.

2.1.4 ANTHONY KOSLOW also presented a summary of the paper "Potential Use of Marine Protected Areas Applied to Tuna Fisheries and Offshore Pelagic Ecosystems" supplied for presentation at the workshop by ALAIN FONTENEAU, Institut de Recherche pour le Développement, Victoria, Seychelles. Pelagic fish have been caught for a number of decades on the high seas, but only a few species are of commercial value. In tuna fisheries very little is known about bycatch because it is mostly discarded and remains unrecorded. The problems of bycatch of albatrosses (long-line fishing) or sea turtles, sharks and dolphins (purse sein, drift net) were mentioned and solutions (some are already implemented) described.

The intensive fishing on tuna has at least led to local depletions of the stocks. Hence, a list of factors to be considered when selecting HS MPAs and also a few potential areas for protection were proposed.

2.1.5 ANTHONY GREHAN described cold water coral reefs in the Atlantic as an unique and extremely diverse ecosystem with added potential as a refuge for juveniles of commercial important fish species. Destructive fishing practices where trawlers open up new fishing ground by dragging heavy chain over the reefs were identified as the major threat to the corals at present. Assessment of the status of Norwegian *Lophelia pertusa* reefs show that between 30 to 50 % of the existing habitats has already been impacted.

Corals are very slow growing so that recovery of reefs already impacted will take 100's to 1000's of years. The effect of this loss of biodiversity on the local deep-sea biosphere remains to be assessed.

2.1.6 GREG DONOVAN summarised the general life history patterns of the migratory baleen whales, looked at the potential threats they face and at the possible role high seas MPAs may have in their conservation. Crudely, their habitats can be classified as 'feeding', 'breeding' and 'migratory'. The total ocean area in which these whales are found throughout the year is enormous and too large for it all to be included in any practical and enforceable MPA. An important area of research is the determination of what comprises 'critical' habitats for whales in terms of quantifiable variables. He stressed that for many cetacean species it can be very difficult to identify strict geographical and temporal boundaries for 'protected' areas on the high seas. It is particularly important that if MPAs are declared for endangered cetacean populations (e.g. the North Atlantic Right Whale) that they encompass 'critical' habitats and focus on *all* the major threats facing, not merely direct hunting. Such threats include those that may result in the almost instan-taneous death of animals (e.g. incidental capture in fishing gear, ship strikes) and those that affect the general 'fitness' of the population to recover (e.g. chemical pollutants, factors associated with climate change, prey availability and condition etc.).

2.2 Scientific Arguments for High Sea MPAs – Part 2

(Chaired by HENNING VON NORDHEIM)

2.2.1 CHARLOTTE JOHNSTON introduced current United Kingdom (UK) activities concerning the conservation of birds outside UK territorial waters. Measures taken under European Commission (EC) Directives may include the protection of feeding areas which may be defined (e.g. sandbanks important for sandeel) but also features more difficult to define spatially such as fronts or upwelling areas. Implementation of different measures is also needed to deal with adverse human impacts of a wider distribution, e.g., from particular fishing techniques, competition with other fisheries or potential threats from offshore developments.

2.2.2 HJALMAR THIEL presented some data on the impact of long-line fisheries on the three species of Albatross living in the northern hemisphere of the Pacific Ocean. While the Short-tailed Albatross population had reached minimum numbers several decades ago and increases slowly, both the Laysan and the Black-footed Albatrosses have severely decreasing populations. Various reasons are responsible for these losses, but most of it is due to long-line fishing, summing up to a total of 34, 700 individuals per year. Deterrent measures have been tested and by these the impact on albatrosses may be reduced by more than 90%. The data from the North Pacific are also valid for the South Pacific. Protection of albatrosses should become effective with the United Nations Food and Agriculture Organization´s "International

Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries" and the recently adopted "Agreement on the Conservation of Albatrosses and Petrels", prepared under the auspices of the Convention of Migratory Species.

2.2.3 KIM JUNIPER described the high species-abundance around hydrothermal vents. In contrast to other “typical” deep-sea food-chains, communities associated to hydrothermal vents depend on chemosynthesis using the energy-rich hydrothermal fluid. A special tubeworm/bacteria symbiosis provides the main foodsupply for the whole community. Most species on hydrothermal vents, subduction seeps, cold seeps or hydrocarbon seeps have a very limited distribution and thus a high degree of endemism. Major threats to these ecosystems were intensive scientific sampling and, potentially, eco-tourism and mining.

2.2.4 HJALMAR THIEL outlined the long tradition of deep-sea research in areas such as the Rockall Trough, the Porcupine Seabight, and the Biological Vertical Transport and Energetics in the Benthic Boundary Layer of the Deep Sea (BIOTRANS) area, about half way between SW Ireland and the Azores. These and other areas were investigated during the preceeding decades by various European national and international research groups with immense efforts of financial, technical and human resources. The value of these long-term studies was highlighted and the need for a system "Unique Scientific Reference Areas" (USRAs) was stressed. Although no actual human stress on these regions exists today, precautionary measures should be taken that those USRAs remain undisturbed by human impacts.

2.2.5 General Discussion

MPAs were agreed to be one among many tools for managing marine biological diversity. Some features, such as cetaceans or some highly migratory pelagic fish species, might need other treatment. Three different categories for potential MPAs were identified:

- distinct ecosystems (e.g. hydrothermal vents, seamounts, cold water seeps, hydrocarbon deposits)
- individual species (with distinct spawning, breeding, feeding grounds)
- science reference areas

Several examples, and their respective potential and actual threats were listed (Table 1); however, in some cases legal mechanisms may already exist to deal with possible threats:

Table 1: Indicative List of Possible Threats to Biodiversity and the Environment on the High Sea

Vulnerable Features, Species and Communities (A: discussed in detail)	**Threats**	
A. Seamount Ecosystems	- trawling	- exploration
A. Hydrothermal Vents Communities	- scientific research - mining	- bioprospecting - tourism
A. Deep-sea/Cold Water Coral Communities	- trawling	- exploration
A. Sea Birds	- longliners - set nets	- discharges
A. Reference Areas	- trawling	
A. Deep Sea Fish	- overfishing	
A. Whales	- overharvesting - ship strikes - pollutants/noise - overfishing of prey - ozone depletion	- incidental catch - climate change - habitat destruction - research - tourism/whale watching
Soft Bottom Sediment Communities	- trawling	
Pelagic Fish	- overfishing	
Sargasso Sea	- discharges	
Deep Sea Trenches	- litter	
Cold Water Seeps/Pockmarks	- trawling	- mineral exploitation
Polymetallic nodules (as a habitat)	- mining	
Gas Hydrate Zones	- extraction	
Oceanic Ridges	- litter	- trawling

2.3 Reports by Organisations on Their Respective Activities Concerning High Sea MPAs

(chaired by JOHN TANZER & LOUISE DE LA FAYETTE)

2.3.1 DAVID OSBORN pointed out the need for a high level of international cooperation in marine conservation, and for integration at regional, national and local levels in measures such as MPAs.

To obtain international support for establishing HS MPAs it needs to be demonstrated

- why MPAs on the high seas are needed;
- how they might be constructed form a legal perspective,
- how they might work in practice.

The point was stressed that high seas MPAs must not be viewed as an extension of coastal state jurisdiction, sovereignty or sovereign rights, and that they do not necessarily imply a "no take" zone for fisheries. A pilot MPA endorsed by like-minded states was proposed. The legal and other challenges in setting up an MPA in areas outside national jurisdiction were described, together with the efforts made by Australia. He did not, however, propose any amendment or reinterpretation of United Nations Convention on the Law of the Sea (UNCLOS).

2.3.2 HENNING VON NORDHEIM described the process of establishing a system of MPAs under the Convention on the Protection of the Marine Environment of the Northeast Atlantic (OSPAR Convention). A list of the aims of possible future MPAs, a list of management objectives and a set of selection criteria was presented. An already established system of marine protected areas under the Helsinki Convention was outlined (Baltic Sea Protected Areas (BSPA)). Both the OSPAR and the Helsinki Conventions processes focus on MPAs within EEZs, and the importance of European Community law (e.g., the EC Birds Directive and the Habitats Directive) within territorial seas and Exclusive Economic Zones (EEZs) for the implementation of MPAs was pointed out. In this context the comprehensive legal study "Legal Regu-lations, Legal Instruments and Competent Authorities with Relevance for Marine Protected Areas (MPAs) in the Exclusive Economic Zone and the High Seas of the OSPAR Maritime Area" by D. CZYBULKA and P. KERSANDT (BfN, 2000) was mentioned.

2.3.3 GREG DONOVAN gave a brief overview on the history of the International Whaling Commission (IWC) and sanctuaries. There are two IWC-designated sanctuaries at present: the Indian Ocean Sanctuary and the Southern Ocean Sanctuary. These

prevent commercial whaling on all the great whale species within their boundaries but do not address the other potential threats to whales he described under Item 1.4. Most species of baleen whale (apart from the southern hemisphere minke whale) are at such low levels within those areas that no catches would be allowed under the IWC's management procedure (RMP) for commercial whaling even without Sanctuary provisions. He summarised the differing legal and scientific views that have been expressed within the IWC over the value and legality of sanctuaries under the IWC Convention.

MPAs for critical habitat (e.g. known breeding areas) of endangered whale populations, provided that they address all major threats and are well-monitored and enforced, can be of value as a conservation tool. They are probably of more significance for smaller cetaceans with more defined distribution (e.g. the vaquita). Finally, he stressed that a small number of MPAs should not be seen as a replacement for effective management of the oceans.

2.3.4 CHARLOTTE DE FONTAUBERT introduced to the work of the World Conservation Union (IUCN) and its members, including activities on the marine environment. The IUCN will assist in different conservation initiatives and will give guidance.

2.3.5 SIMON CRIPPS gave a presentation on WWF's activities on the world's oceans. He described the Global 200 initiative, a system of over 200 ecologically important areas around the world including marine areas. The scientifically proven importance of networks of representative, effectively managed ecologically MPAs was indicated.

Furthermore, a list of critical habitats within high seas areas outside national juridiction was presented and negative human impacts identified. A strategy for legal protection was outlined. The concept of having high seas MPAs was supported, but the rights of legitimate users of the high seas must be respected. He stressed the need for a holistic approach to evaluating the need for protecting resources or habitats that recognizes the interconnectivity of marine ecosystems.

2.3.6 General Discussion

The participants discussed the benefit of having a high sea MPA pilot case study. Among other problems, was the need to work together with the local stakeholders. The influence of the stakeholders should not lead to weak or inadequate measures.

The participants agreed that the term MPA does not imply per se a strict form of nature conservation where no activities whatsoever are allowed (e.g. no-take zone). Different levels of protection status are needed to deal with different management objectives. The workshop also agreed that measures other than an MPA might be more effective and are already provided under some existing international agreements.

2.4 Legal Aspects of High Sea MPAs – Part 1

(Chaired by CRAIG H. ALLEN & BERNARD H. OXMAN)

2.4.1 ROBIN WARNER described the challenge in further developing International Law to provide essential protection for the high seas environment. The respective roles of international agreements, customary international law and soft law (such as the Rio Declaration, and chapter 17 of Agenda 21) were explained in providing protection for the marine environment beyond national jurisdiction. The meanings of Art. 192, 194 (5), 196 (1) and 197 of UNCLOS were described and their applicability to the protection of the marine environment beyond national jurisdiction. Some possible International Law frameworks for high seas MPAs were discussed.

2.4.2 RENATE PLATZÖDER described the elements of the United Nations Convention on the Law of the Sea (UNCLOS) relating to matters concerning high seas MPAs. The reluctance of international lawmakers to define the term “marine environment” and the lack of any special area defined outside boundaries of national jurisdiction other than ice covered areas (Art. 234) was stressed. UNCLOS gives far more priority to the utilization of the marine resources than to their protection, preservation and conservation.

She proposed that the question of high sea MPAs under International Law should be introduced for discussion by the United Nations Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS), as a preliminary to submitting the issue to the UN General Assembly.

A standard procedure following agreed guidelines for high seas MPAs was proposed.

2.4.3 VLADIMIR KOTLIAR stressed that all instruments necessary for the protection and management of the natural resources of the high seas exist already within the context of different legally binding international agreements, conventions or organisations. He expressed serious doubts as to whether there is a need for high sea MPAs at all.

2.4.3 MARJO VIERROS explained the Convention on Biological Diversity (CBD) relating to the conservation and management of the marine resources of the high seas, including the precautionary approach. The CBD applies to processes and activities beyond areas of national jurisdiction (i.e. beyond the EEZ), but does not contain measures to protect components of biological diversity in these areas.

The establishment of an Ad Hoc Technical Expert Group on Marine and Coastal Protection Areas was highlighted as well as the fact that the concept of protected areas in the marine environment will be one of the priority issues for the seventh conference of parties (COP 7), which probably will be held in 2004.

2.4.5 DETLEF CZYBULKA explained the background under international law to the OSPAR Convention on the Protection of the Marine Environment of the North-East Atlantic.

He then presented an overview on relevant elements within OSPAR that address the concept of (high seas) MPAs. Annex V which was accepted in 1998 deals especially with the protection and conservation of the ecosystems and biological diversity of the maritime area.

2.4.6 LOUISE DE LA FAYETTE outlined the very general principles in Art. 192, 194, 196 of UNCLOS and also mentioned Art. 211 which deals with the prevention of ship-based forms of pollution.

MARPOL, the instrument of the International Maritime Organisation against pollution from ships, was explained and the concept of Special Areas (SA) against pollutants within MARPOL was presented.

The function and use of Particularly Sensitive Sea Areas (PSSAs) in protecting sea areas from the impact of international shipping activities was presented. The selection criteria including sensitivity, uniqueness, rarity or scientific value were described.

There is no reason why the concept of PSSAs cannot be extended to the high seas. The status of a PSSA does not provide the site with any legally binding protection status; only the measures approved by IMO will be legally binding.

2.4.7 General Discussion

The participants discussed how to find the most effective measures for each objective in conserving and managing biological diversity, both on the high seas and under national jurisdiction. Many management measures that would be useful components of an MPA already exist in international law. A combination of actions under existing legal instruments could provide the same degree of protection as some of the hypothetical types of high sea MPAs.

In reviewing the need for urgent measures to address the risks the following analytical methodology was put forth:

1. What is the problem to be addressed?
2. Is or has this issue been addressed by the international community?

    a. Are there existing international instruments addressing the identified problem?
        1. If yes:
            (i) Are there any general principles that are applicable?
            (ii) Do the provisions of the instruments provide the means for resolving the problem? If not, should another instrument be developed or should an instrument be amended?
            (iii) Is an instrument being effectively implemented and en-forced? If not, why not?
        2. If not:
            (i) Is there an international instrument that could be amended to address this issue or should a new one be developed?
            (ii) In what set should any work on new provisions or a new instrument be negotiated? (Considerations include timeliness, ability to include all States interested in the biodiversity and other components of the marine environment of the high seas, and whether action should be taken at a regional or global level)

    b. Is there an international institution that deals with this issue?
        1. If yes:
            (i) Is it addressing the specific threat to the biodiversity and other components of the marine environment of the high seas?
            If not, are there means to generate appropriate action?
            (ii) Is the action being taken effective to address the threat?
        2. If not, in what state should a new international instrument be negotiated (see 2 (2)(ii) above).

The interpretation of international law on environmental protection is still under debate, but many considered that under certain circumstances high sea MPAs might be established under UNCLOS. The question was however raised whether it is lawful for a country or group of countries to declare a high sea MPA binding on other states, since the freedoms of the high seas are one of the most important themes - actually defining the term high seas - in areas beyond national jurisdiction. It was agreed that any such attempt could only be legally binding on those nations setting up the MPA.

Interim or short-term measures need to be considered when there is an urgent need for action. It was emphasised that there is need for education and public awareness-building on

issues relating to risks to biodiversity and the environment on the high seas. That could then lead to more public pressure building up and hence to more progress on nature conservation.

A number of other possibilities were also canvassed, but the reluctance of national authorities/agencies to hand over competence to international bodies/organisations was pointed out.

2.5 Legal Aspects of MPAs on the High Seas – Part 2

(Chaired by RENATE PLATZÖDER)

2.5.1 ALAN SIMCOCK described the genesis of the UN Informal Open-ended Consultative Process on the Oceans and the Law of the Sea, the problems encountered in achieving its establishment, and the outcome of the first meeting.

2.5.2 In the subsequent discussion, a number of points were made which were incorporated into the Statement of Conclusions.

2.6 General Conclusions

(Chaired by ALAN SIMCOCK)

2.6.1 The Statement of Conclusions (pp. 15 – 19) was developed and agreed during the general discussion.

Deep-water Fish and Fisheries[1]

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For the purposes of this presentation a deep-water fish is one that lives, at least for most of its life cycle, at depths greater than 400 m depth. Also, because almost all the exploited species are demersal (benthic or benthopelagic[3]) the other deep-water realms of mesopelagic and bathypelagic species will not be considered. However, it is important to recognise that the mesopelagic fishes, many of which are diel vertical migrators, can be important links in the deep-water food-chain. Some mesopelagic lanternfishes, (family *Myctophidae*) which form dense aggregations are or have been exploited in areas such as the Arabian Sea and the Southern Oceans.

Other contributors to this workshop have described the open ocean pelagic and the seamount fisheries. Most of the demersal fisheries of seamounts in international waters, and in this category I include the Mid-Atlantic Ridge, can probably be considered as distinct stocks and as such could benefit from Marine Protected Area (MPA) status. Most of the other deep-water fisheries are for species that extend from the continental slope into international waters and any MPAs in international waters would have to interface with the management of that part of the stock that is within coastal state jurisdiction. It is these fish stocks that I will consider in this presentation and, because my area of expertise is in the Northeast Atlantic, I will use examples from this area. The experiences of these fisheries should be applicable to similar fisheries world-wide.

Deep-water demersal fish can somewhat arbitrarily be divided into three main groups.

(1) On the upper continental slopes there are many species that extend from the outer continental shelf into deeper water. In the northeastern Atlantic examples of such species are the anglerfishes (*Lophius* spp.) and the ling (*Molva molva*).

(2) Also on the upper continental slope are species that are predominantly deep-water but are closely related to shelf species . Examples from the Northeast Atlantic are the blue ling (*Molva dypterygia*) and the deep-water redfish (*Sebastes mentella*) and from the South Atlantic the cape hake (*Merluccius paradoxus*).

(3) The true deep-water species, that are the species most likely to be exploited in international waters, extend from the upper slope to abyssal depths and are

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1 Prepared for the Workshop Proceedings: Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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3 Benthopelagic fishes are those that swim freely and habitually near the ocean floor

characterised by families such as the *Macrouridae* (grenadiers) and *Alepocephalidae* (smoothheads). These demersal fishes have probably evolved mainly in the shallower waters and have secondarily invaded the deep sea but on many separate occasions. Although well-adapted for life at depth, their special morphological features are usually less well-developed than those found in the meso- and bathypelagic fishes that have undergone much of their evolution in deep-water. It is the demersal fishes that have many of the characteristics, such as great longevity, high age at first maturity and low fecundity, that make them vulnerable to exploitation. These characteristics are probably most accentuated in species such as the orange roughy (*Hoplostethus atlanticus*) and the pelagic armourhead (*Psuedopentaceros wheeleri*) where much of their energy may be expended in maintaining position around seamounts.

The deep-water fisheries are concentrated on the continental slopes or around oceanic islands and seamounts. The most important fisheries occur at depths between about 400 and 1500 m. Below 1500 m there is a marked decrease in total fish biomass and there are few species of commercial interest. The deep-water fisheries of the continental slope tend to be associated with areas where there is high surface productivity. These are generally at higher latitudes or in upwelling areas where the nutrients required for photosynthesis are recycled. The impingement of the vertically migrating mesopelagic fauna onto the continental slope is probably an important factor in enhancing the deep-water biomass. The peak of the demersal fish biomass often coincides with the lower daytime depth of the mesopelagic fauna (the deep-scattering layer). Similar explanations could account for the aggregation of exploitable fish around oceanic islands and seamounts. However, additional factors such as to enhanced productivity around seamounts resulting from topographical modifications to the hydrography may also be important.

Quantifying the global scale deep-water fisheries is difficult because of the way in which the landings are reported. Many of the upper slope species, which are closely related to shallow water species, are not separated into species in the reported landings. For example in the North Atlantic the landings of the deep-water redfish (*Sebastes mentella*) are combined with those of the shallower species (*S. marinus and S. fasciatus*) as redfish. In the North Pacific the dominant redfish is the Pacific perch (*Sebastes alutus*) but the fishery extends from the shelf to the upper slope and the proportion of the catch taken from deep-water is not recorded. All the other redfishes or rockfishes of the North Pacific from both shallow and deep-water are recorded in the landings under the grouped category of *Scorpaenidae*. Similarly in the South Atlantic the reported landings of cape hakes are a mixture of the shallow living *Merluccius capenensis* and the deep-water *M. paradoxus*. There are also problems with the landings data for many of the true deep-water species. For example the FAO statistics only identify two grenadiers (family *Macrouridae*) to species level. The remainder are either categorised as grenadiers (*Macrourus* spp.) or Gadiformes. In earlier landings the term grenadier could include significant quantities of *Macruronus* spp which belong to the hake family (*Merluccidae*) but these are now separated and the term blue grenadier is used for unidentified fish of the genus *Macruronus*. Gadiformes is the term used to combine the landings of species of several families from all depths and can include

deep-water gadids, morids and macrourids. Most of the deep-water sharks are landed as 'Various sharks' but this category also includes many shelf and pelagic oceanic species. Even when deep-water species are landed as individual species there is often some doubt as to the accuracy of the information. One of the earliest deep-water fisheries in the North Atlantic was for the roundnose grenadier. The fishery, which was prosecuted mainly by the former Soviet Union and other eastern European countries, began in the 1960s and rapidly increased reaching peak levels in the 1970s. Much of the fishery was in what were international waters before the introduction of the 200 mile fishery limits. The decline in the fishery was partly the result of extending fisheries limits to exclude or regulate the activities of foreign vessels in areas such as the continental slopes of Canada and Greenland, the Icelandic sector of the Reykjanes Ridge and the UK sector of the Rockall and Hatton Banks. However, in the western Atlantic there remain doubts about the accuracy of the data on landings. It is almost certain that the two species, roundnose grenadier and roughhead grenadier were not always separated in the landings and there is also the suggestion that some cod catches were deliberately mis-reported as grenadiers.

The uncertainty about the true extent and scale of deep-water fisheries is a major problem for the management of deep-water fishery resources. This is compounded, at least for many species, by a lack of basic biological knowledge for adequate assessment and where such knowledge exists it often lags far behind the exploitation of the resource. It should also be recognised that many of the management methods used for shelf fisheries may not be as appropriate for deep-water fisheries. For example, management by TAC may be suitable for species such as orange roughy or redfish which tend to be caught as single species and are thus more similar to the pelagic fisheries of the shelf, such as herring and mackerel. However, TACs are undoubtedly of less value as a management tool for the mixed deep-water demersal bottom trawl fisheries and indeed could be counter productive. The targeting of different species at different seasons or depths would make it difficult to set realistic single species or even multi-species quotas. It is important to recognise that all deep-water fish caught by a trawl and brought to the surface will be dead either from severe damage to their fragile skins or the detrimental effects of the pressure/temperature changes. The peculiar shape of many deep-water species also means that mesh selection will be a less effective technical conservation measure since many more immature fish will be retained. Another problem concerns the fate of smaller fish that enter the trawl and subsequently escape through the meshes. It is now recognised that the skins of a very high proportion of these fish will be so damaged as to result in a high mortality. This will affect both the juveniles of the target species and also the small non-target species. Since most of the commercially exploited species are top predators these small non-target species are important links in the food chain. The effects of trawling on deep-water benthopelagic and benthic invertebrate fauna, another link in the food chain, are largely unknown. At the start of a deep-water fishery the catch rates will be relatively high, but will decrease as the accumulated biomass of older fish is fished down. As a result the fishing effort will increase in an attempt to maintain the same level of catches and the damage to the ecosystem will be compounded.

Another major factor of importance for the effective management of deep-water resources is stock identity. For management purposes a stock is defined by an area and species. For example one might manage a North Sea or a west of Scotland herring stock. However, the herring of these areas might comprise of fish belonging to one or more spawning populations or biological stocks. For example, on the west coast of Scotland the fishery for herring is on a mixture of a spring and an autumn spawning stock. In the deep-sea, with very few exceptions, e.g. orange roughy in the South Pacific, virtually nothing is known about stock identity. Some species such as the orange roughy and some deep-water sharks have an almost global distribution while others are often much more widely distributed than shelf species. Where attempts have been made to assess the fisheries it has usually been done on an arbitrary definition of a unit stock. This can cause problems and the roundnose grenadier in the North Atlantic is a good example. This species is distributed along the continental margins of Canada, southern Greenland and Iceland, south of the Faroe Islands and southward to about the Bay of Biscay. It is also found around the Rockall Bank, on Hatton Bank and on the northern Mid-Atlantic Ridge/Reykjanes Ridge. In the International Council for the Exploration of the Sea (ICES) sector of the Eastern North Atlantic landings are reported by Statistical Sub-areas that in most cases are further subdivided into Divisions. While these have relevance for the shallow water species, for which they were devised, they are often inappropriate for the new fisheries for deep-water species. It seems reasonable to suppose that for assessment purposes the roundnose grenadier to the west of the British Isles and around the Faroes (including the Rockall and Hatton Banks) might form a discrete breeding population separate from that south of Iceland and on the Mid-Atlantic/Reykjanes Ridge. Relevant data are available on catch and effort for the continental slopes but for the offshore Hatton Bank the data are combined in one large sub-area (ICES Sub-area XII) that includes a large part of the Mid-Atlantic Ridge thus making it difficult to assess the true extent of the fishery. There is also the added problem of the quality of the data. The continental slope fishery, and until 1997 that included almost all the Rockall and Hatton Bank fisheries, was within waters under the jurisdiction of either the European Union or the Faroe Islands. Entry to the fishery was restricted to certain member states and as roundnose grenadier was a non-quota species there was no incentive to mis-report landings. In 1997, the UK government abandoned its claim for a 200 mile fishery zone around Rockall and in doing so a large part of the Rockall Bank and the whole of the Hatton Bank became international waters. Since then several nations that were previously excluded from the area have begun both trawl and longline fisheries. Historically there is good reason to believe that the landings from the Mid-Atlantic Ridge have been poorly reported and now it is probable that not all the landings from this new and completely uncontrolled fishery on the Hatton Bank are being reported. The ICES Study Group on the Biology and Assessment of Deep-sea Fishery Resources (SGDEEP) has expressed concern about the inadequate reporting of landings of deep-water species from international waters but so far the North East Atlantic Fisheries Commission (NEAFC) has failed to take any action to regulate deep-water fisheries, including those for roundnose grenadier.

Using the best available catch per unit of effort (CPUE) data the ICES SGDEEP concluded that all deep-water species were beyond safe biological limits. The ICES Advisory

Committee for Fishery Management (ACFM) recommended significant cuts in fishing effort, which for roundnose grenadier amounted to 50%. ACFM in their advice to the European Commission and to the NEAFC considered the different management and technical measures that could be used to regulate the fishery. Management by setting quotas or TACs was one of the options that was considered. However, it was noted that this method was not the most appropriate for mixed fisheries. Despite this the EC decided to reduce fishing effort by proposing TACs for deep-water species at the December 2000 meeting of fisheries ministers. Apparently, the rationale was that urgent action was required and the legislation already in place allowed TACs to be implemented with minimal delay. Any other measures could take extended periods of negotiation to gain approval. In the event, the fisheries ministers deferred the Commission's proposals, which had only amounted to a 20% reduction in landings. TACs are generally allocated between countries on the basis of previous track records and since the deep-water trawl fishery to the west of Scotland and Ireland has mainly been carried out by the French they were being given most of the quota. Hence the opposition from other countries who are late entrants into this deep-water fishery. However, the commission also stated that reported landings after 2000 would be excluded from any future allocation of quota, thereby hoping to prevent an increase in the fishery to gain track records. NEAFC at their meeting in November 2000 once again decided to take no action on deep-water fisheries until more information was available.

In the context of this meeting it is of interest to consider whether MPAs or no take zones might be relevant and useful for this fishery. The ICES ACFM in their 2000 report considered their possible role as a management tool and in their advice to the EC commented as follows. *"Closed Areas to Fishing may be considered a viable measure only for the long term, though research will have to show how effective they can be for stock management and which size they must have. Imposing closed areas for the deep~sea will not solve the present situation in the short term. Far more research will have to be done before it can be properly assessed how they could function for the deep-sea.*" (In the Annex to this advice there is a more detailed comment) In their advice to NEAFC ACFM gave the following comment *"Imposing closed areas is not likely to be effective since a patchwork of highly sensitive areas, such as certain widely scattered seamounts, are unlikely to be controlled adequately. The different life cycle stages of deep-water species span a wide range of depths, but protection of juveniles, for example by limiting fishing to certain depths, could not be enforced.*"

It appears that there is no legal basis for establishing MPAs in international waters and that there may also be problems within the national 200 mile fishery limits. In the UK sector of the waters under EU jurisdiction, the Habitats Directive now extends out to the EEZ including the 200 mile fishery limit and selected areas could be protected. However, it appears that the legislation does not apply to the Common Fisheries Policy and while the UK could prevent its own vessels from fishing in designated protected areas the vessels of other nations, with historical fishing rights, could continue to fish.

Despite the failure of NEAFC to take action on deep-water fishing in deep-water it appears that the EU could exert some control on its own vessels working in these waters. In proposing quotas for deep-water species it was implicit that they applied to all ICES Sub-

areas irrespective of whether the catch was taken in EU or international waters. For example for roundnose grenadier the applicable zone was "*Community waters and waters not under the sovereignty or jurisdiction of third countries in ICES Sub-areas I through XIV*." If quotas had been imposed on deep-water species then it would appear to me that EU vessels would be limited to their allocated quota irrespective of where it was caught within the ICES area. Non EU countries however would be free of any controls over their deep-water fishing in international waters. It is this situation that is causing the present controversy over the haddock on the Rockall plateau, large part of which is now in international waters. It is my understanding that before NEAFC can begin to attempt to regulate the deep-water fishery in international waters the species must be incorporated into the NEAFC list of designated species. This has yet to be achieved for deep-water species.

If MPAs could be established and enforced in the international waters of the Northeast Atlantic how effective would they be as a management tool? This is a difficult question to answer because it requires a much better understanding of the biology and ecology of the fishes than is currently available. Again, using roundnose grenadier as an example, there is the problem of stock identification (see above). Depth distribution is another important factor. The roundnose grenadier has a depth range from about 600 to 2000 m and, as for many other deep-water species, different stages of the life cycle inhabit different depths. This in turn implies that to protect all life history stages any MPA would have to be very large. We also know very little about the spawning areas and nursery grounds, and indeed for many species running ripe females and juveniles have rarely been caught or observed.

WWF have produced a briefing on the "*Justification for the potential selection of the Rockall Trough/Channel as an Offshore Marine Protected area*". The document recognises that deep-water fishing is a human impact on the area but makes no comment on the present scale of the fishery and how it might be managed within an MPA. The upper and mid continental slopes of large areas of the Rockall Trough have been heavily impacted by bottom trawling in recent years. However, extensive biological investigations by the Scottish Association for Marine Science since the early 1970s have resulted in a substantial amount of pre-fishery data. Long-term, time-series at two deep-water stations at 2200 and 2900 m, which are depths considerably greater than those currently fished, are candidates for protection as "*unique scientific reference areas*".

In the western Atlantic the dispute between Canada and the European Union over fishery for Greenland Halibut (= turbot in Canada) in international waters is an example of how agreement can be reached under the auspices of a regional fisheries organisation such as the Northwest Atlantic Fisheries Organisation (NAFO).

In the Southern Ocean the fisheries are regulated by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). However it is widely recognised that illegal fishing for species, such as the toothfish (*Dissostichus elegenoides*), is a very major problem.

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Response by the International Council for the Exploration of the Sea (ICES) to the Request for Advice on Deep Water Fisheries Management by the European Community (EC)[1]

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In the year 2000 ICES was requested by the EC (Directorate General for Fisheries) to provide advice on possible management measures to be applied to deep water fish species. To respond to this an ICES ad hoc working group was established from ICES Advisory Committee on Fisheries Management (ACFM) to propose management and protection measures. The ICES recommendations for the future management of the deep water fish stocks of the North Atlantic are presented in this paper.

The fisheries management must recognize and accept that most of the deep water fish stocks can not be harvested and managed in the same way and with the same methods as in shallower waters. Due to the general sensitivity and the largely unknown biology of the deep water stocks (see contributions by J.D.M. Gordon and A. Koslow), the exploitation rate should be very low and the general attitude should be not to exploit until far more biological data have been collected. Such an approach is consistent with the Precautionary Approach because impacts of fisheries on the resources are most difficult to reverse. However, since the deep water fishery in the North Atlantic has developed substantially throughout the 80ies and 90ies, it is already too late to adopt such precautionary standpoint for many of the deep living species and stocks.

In the past many warnings have been formulated from ICES that the development of deep water fisheries have not been sustainable. Recommendations to immediately reduce the fishery on deep water stocks have been numerous. The fishery management must accept that it manages a resource in an ecosystem different from shallow water systems with its own limitations and rules, which, according to the OSPAR terminology, is a sensitive or very sensitive habitat. The management must also accept that managerial measures will have to be drastic, having probably an impact that will drive some fishermen out of particular fisheries or will at least change effectively their way of fishing. Moreover, the management will have to couple exploitation with fundamental and very extensive research, and should allow fisheries to expand from a very low level only with the pace of the progress in

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research, even though this may be a substantial change in the diction of recent managerial concepts.

In particular, ICES has recommended:

1. Deep water ecosystems, including deep water fish stocks are highly vulnerable to exploitation. Immediate measures for their rebuilding and to prevent further stock decline must be implemented. According to the OSPAR definition, deep sea habitats may be regarded as sensitive or even as very sensitive and therefore deserve a high degree of protection.
2. No management measure, if implemented alone, seems to guarantee that the objectives of a sustainable exploitation of the fish stocks could be achieved; therefore, a combination of different actions is needed.
3. Closed Areas to Fishing may be considered a viable measure only for the long term, though research will have to show how effective they can be for stock management and which size they must have. Imposing closed areas for the deep sea will not solve the present situation in the short term. Therefore, far more research will have to be done before it can be properly assessed how they could function for the deep sea.
4. Gear limitation: In the light of the environmental sensitivity of the deep sea floor, a general trawl ban for the deep sea seems sensible and possible for some fisheries and/or areas. As a short term step for the implementation of such measures, zonation systems to prevent expansion of trawl fisheries into new areas should be instituted as quickly as possible. Gear limitation to long-lines should be considered.
5. Drastic reductions of catches seem unavoidable. TACs on the basis of 1-2% of B_o/year, or a higher percentage should be considered. A higher percentage should be used only if the species in question is demonstrated to be a less stringent k-strategist as the orange roughy. ICES should be asked to examine the possibility to rank the most important deep sea species of the North Atlantic and their live strategy in relation to the orange roughy. If this is achievable, a species- or stock-specific maximum exploitation rate could be defined on this basis, taking into account all available biological information. The primary objective could be to set TACs to maintain the spawning stock biomass (SSB) of each stock above 30% of the virgin biomass (B_o). If below this level, TACs are to be reduced so that SSB reaches 30% B_o in a period of 10 years. The fishery is to be closed if SSB fell below 20% B_o. These figures are adopted from the presently used Australian and New Zealand system and may not necessarily be optimal for the North Atlantic. Here they are considered minimum-values and should preferably be set higher, while the recovery period of 10 years seems sensible and should be adopted.
6. A general licensing system should be implemented by the European Commission (yearly notification system). The licensing system should be combined with TACs, seasonal and area closures and possibly with gear limitation (max. number of hooks, trawl ban etc.). Gear technological specifications (hook sizes etc.) have to be explored separately.

7. None of the proposed measures can be of success if there is not a strict and effective enforcement. This includes satellite tracking and the use of such recordings in court cases. Specific log-books should be mandatory.
8. A comprehensive data collection system should be established. Observers should be placed on board of deep sea vessels where possible be mandatory. Otherwise appropriate log-book keeping cannot be provided.
9. The Commission should support projects to improve the collection of information on fisheries, biological parameters and stock definitions and for research on the biology of deep-sea species. A list of deep sea species for which this may be applied for is given in the *Study Group on the Biology and Assessment of Deep Sea Fisheries Resources, ICES CM 1998/ACFM:12*.
10. The Commission should strongly support projects for investigating the impact of trawl gear on the deep sea floor.
11. The international survey activities should be increased drastically. This will not be possible without increased funding of research institutes. It is suggested to strongly centralise the research activities.
12. For data collection and management specific deep sea areas should be defined where possible. The Commission and NEAFC should be encouraged to adopt these in the international negotiations.
13. Workshops with managers and scientists or open hearings, such as initiated by the EC should be repeated, with clear orientation towards developing specific and sufficiently far-reaching solutions.

Fish Stocks and Benthos of Seamounts[1]

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Abstract

There are some 30,000 seamounts in the world's oceans, mostly in the Pacific Ocean. Seamounts create their own micro-environment by enhancing local currents, which winnow away sediments, enhance local productivity and aggregate prey. They often have a unique fauna dominated by corals and other suspension feeders on the seafloor and fishes, such as orange roughy (*Hoplostethus atlanticus*) and pelagic armourhead (*Pseudopentaceros wheeleri*), that aggregate above the bottom. Seamount fisheries first developed in the late 1960s for pelagic armourhead in the North Pacific, followed by fisheries for the precious coral, *Corallium* sp., also in the North Pacific, and subsequently for various stocks of orange roughy, exploited first around New Zealand and Tasmania, and subsequently in the North Atlantic, off Namibia and most recently in the southwestern Indian Ocean. These fisheries are commonly characterized by a boom-and-bust cycle, whereby a stock (and some-times the entire species) is fished to commercial extinction within ten years. Seamount trawl fisheries also have severe impacts on the benthic environment, essentially removing the deepwater reefs and associated fauna from heavily fished areas.

Seamount species are generally characterized by extreme longevity, low productivity and highly variable recruitment; these characteristics, combined with their vulnerability on small topographic features, leads to their rapid depletion. A recent study also suggests that a substantial proportion of seamount benthic species may be endemics with distributions limited to particular seamount clusters or ridge systems, greatly increasing the risk of extinction. Adequate conservation will require establishing a network of Marine Protected Areas on the high seas, with representation of all major biogeographic units.

Introduction

Seamounts are steep-sided conical topographic features, mostly extinct volcanoes, rising from the seafloor. Some authors have reserved the term for features at least 1000 m in height and of limited extent across the summit, smaller structures being termed 'knolls,' 'hills' or 'pinnacles.' The term *guyot* refers to submarine flat-topped structures, which once rose above sea-level, such that their peaks eroded, and subsequently subsided below the sea surface. However the term seamount is often used generically to cover all these, as I

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will use it here, since fisheries and the resulting conservation issues are to be found on the broad class of these submarine structures.

There are an estimated 30,000 seamounts over 1000 m in height in the Pacific Ocean (Smith and Jordan 1988), only about 810 that are > 100 m in height in the North Atlantic (Epp and Smoot 1989) and an indeterminate number in the Indian Ocean (Rogers 1994). Although seamounts were first sampled during the *Challenger* expedition of 1872-1876, their widespread occurrence only became apparent after World War II, following the development of echo-sounders.

Carl Hubbs (1959) first raised many of the issues that continue to provide much of the scientific impetus for biological investigations of seamounts and, ultimately, the need for their conservation:

I. What species inhabit the individual banks and seamounts, and in what regularity and abundance?

II. How did these species become dispersed to and established on these structures?

III. Do the banks and seamounts provide [biogeographic] stepping stones?

IV. To what degree has isolation on the banks and seamounts led to speciation?

V. Are either demersal or pelagic fishes (or other animals) sufficiently abundant and available on or over these isolated rises to yield profitable fisheries?

VI. What factors, physico-chemical or biotic, are responsible for the abundance of life on and over these rises?

Productivity Over Seamounts

I will examine first Hubbs' last question, the factors responsible for the abundance of life on and over seamounts. Two types of factors have been proposed: those responsible for enhancing *in situ* productivity, and factors that may aggregate or increase the flux of prey into the seamount environment.

Currents in the vicinity of seamounts may be highly complex and are not yet well understood (Roden 1986, Rogers 1994). Taylor columns (in unstratified regions or Taylor caps, where the water column is stratified) are anticyclonic gyres formed by the Coriolis force acting on an ocean current moving up and over a seamount (Roden 1986). Taylor columns generate upwelling, which may enhance local productivity, if the upwelling penetrates the euphotic zone. However, the strength and persistence of a Taylor column depends on a number of factors: current speed, diameter of the seamount, water column stratification, and the presence of tidal currents, which may be rectified by the topography as well and generating fast (> 40 cm sec^{-1}) oscillating currents, may dominate the Taylor column (e.g. Mullineaux and Mills 1997).

Given the number of factors that may influence Taylor column formation, its strength and persistence, it is not surprising that enhanced productivity or enhanced phytoplankton are inconsistently observed over seamounts. Thus Genin and Boehlert (1985) observed a Taylor column over Minami-Kasuga Seamount in the Mariana Archipelago only on one of three surveys. However, on that survey (but not the others) upwelling and higher concentrations of chlorophyll were observed over the seamount. Dower et al. (1992) similarly reported upwelling and heightened chlorophyll concentrations related to Taylor column activity over Cobb Seamount in the Northeast Pacific.

Only if water retention over seamounts is on the order of weeks or longer - the generation time of zooplankton - would one expect higher trophic levels to respond to higher primary productivity in the vicinity of the seamount. Although such extended retention times have been observed (Richardson 1980), they do not appear to be a regular feature of most seamounts. Furthermore, enhanced *in situ* productivity appears inadequate to sustain the aggregations of fishes observed in the vicinity of seamounts, where substantial commercial fishing operations have occurred (Tseitlin 1985, Koslow 1997); indeed commercial fisheries for orange roughy around New Zealand and Australia occur on small seamounts on the continental slope, only several hundred meters high, too small to generate significant Taylor columns. Additional mechanisms have therefore been invoked to explain the higher abundances of zooplankton (Fedosova 1974) and micronekton (Boehlert and Genin 1987) generally observed in the vicinity of seamounts, in addition to aggregations of higher predators, including tunas in the water column over seamounts (Hubbs 1959, Yasui 1986) and fishes over the bottom, such as pelagic armourhead (*Pseudopentaceros wheeleri)*, alfonsin (*Beryx* spp), and orange roughy (*Hoplostethus atlanticus*) (Uchida et al 1986, Koslow 1997).

Advection and vertical migration of organisms onto banks and seamounts may cause them to become aggregated, if the organisms are intercepted in their migrations by the seamount or if they actively swim to maintain a preferred depth level (Isaacs and Schwartzlose 1965). Predatory fish have been observed to aggregate and feed on zooplankton that migrate onto banks or seamounts and become trapped there (Genin et al. 1994). Also, organisms may become physically aggregated where accelerated current flows past seamounts generate a Taylor column and shed vortices downstream, as noted at fronts and convergences elsewhere.

Seamount Fisheries

Although pioneering oceanographers, such as Henry Menard and John Isaacs early noted heavy fish concentrations over banks and seamounts (Hubbs 1959, Isaacs and Schwartzlose 1965), they were not mainstream fishery scientists, and oceanographers and fishery scientists did not seriously examine the potential for seamount fisheries and their implications until after these fisheries were developed by commercial fishermen. Even after seamount fisheries had been developed in the North Pacific, deepwater fisheries were generally not covered in reviews of fisheries and deep-sea biology until the 1980s. The

scientific consensus held that the deep sea was depauperate, due to the generally observed exponential decline with depth of organic sedimentation, zooplankton and benthic biomass (Vinogradov and Tseitlin 1983, Rowe 1983). It was therefore considered unlikely that significant fisheries would develop for species confined to deep water. Virtually all deepwater biological studies were carried out on relatively flat, easily trawled bottoms, where conditions were in fact depauperate. The principal fish species for which seamount fisheries developed, such as pelagic armourhead, orange roughy and the oreos, aggregate only on seamounts; prior to the onset of fisheries for them, they were considered rather obscure taxa and were little studied.

Over the past fifty years, commercial fishermen have developed seamount fisheries over much of the world's oceans. Rogers (1994) lists over 75 species of fishes and crustaceans that have now been fished commercially from seamounts around the world. Some of the earliest seamount fisheries were for pelagic fishes. For example, Japanese fishermen began pole-and-line fishing for albacore (*Thunnus alalunga)* around the Emperor Seamounts of the North Pacific in the 1940s, the seamount fishery increasing considerably in the early 1970s (Yasui 1986), when it contributed as much as 15% of the total landings for the species. The albacore fed on planktivorous fish around the seamounts, such as sardine. Similarly, Hubbs (1959) noted that tuna fishermen operating out of southern California began to fish on seamounts in the 1950s, and obtained substantial catches, even on seamounts whose peaks were far below the surface. However, these species are fished from a variety of habitats; moreover, although long-line fisheries for pelagic fishes, such as tunas, over seamounts, may lead to overfishing, they do not impact on the seamount benthos. I will therefore examine below only demersal fisheries for specifically seamount-associated species, which have the greatest impact on the seamount environment.

Demersal trawl fisheries on seamounts first developed in 1967, when a Soviet trawler discovered commercial aggregations of pelagic armourhead on the southern Emperor Seamounts in the North Pacific (Uchida et al. 1986, p. v). The armourhead were fished from depths of 200-600 m, along with several other species, including alfonsino (*Beryx* spp*.).* The fishery was unregulated and in the following eight years, Soviet and, to a lesser extent, Japanese trawlers landed 50,000 – 200,000 tonnes of armourhead annually from a relatively few seamounts in the southeast Emperor-Northern Hawaiian Ridge system. The pelagic armourhead stocks were rapidly depleted, and landings were subsequently reduced to a few thousand tonnes, with only minor landings since 1982, the species having been fished to commercial extinction (Figure 1). The intensity of the fishing and potential impact on the benthic environment may be gauged from the Soviet fishing effort alone, which totalled 18,000 trawler days in the period from 1969 to 1975 (Borets 1975), and the limited trawl area available on the seamounts: summit areas ranged from 3 - 450 km^2 (Sasaki 1986).

Following upon the demise of the armourhead fishery, orange roughy was first fished in 1978-79 from the Chatham Rise off New Zealand. In the ensuing 20 years, orange roughy stocks were discovered and fished in several regions around the temperate Southern Hemisphere (elsewhere around New Zealand, off Tasmania, Namibia and Chile) and in the North Atlantic as well. Orange roughy and several associated species of oreosomatids are

fished at depths of ca. 600-1400 m, making them among the world's deepest fished species. Most roughy fisheries have been fished down within 5-10 years to < 20% of their original stock size (and, where unregulated, to commercial extinction); even the Chatham Rise, which is still actively fished, appears to have experienced serial depletion of a number of sub-populations (Koslow et al. 1997, Clark 1999), so the apparent longevity of the fishery, based on overall landings (Figure 1), may be misleading.

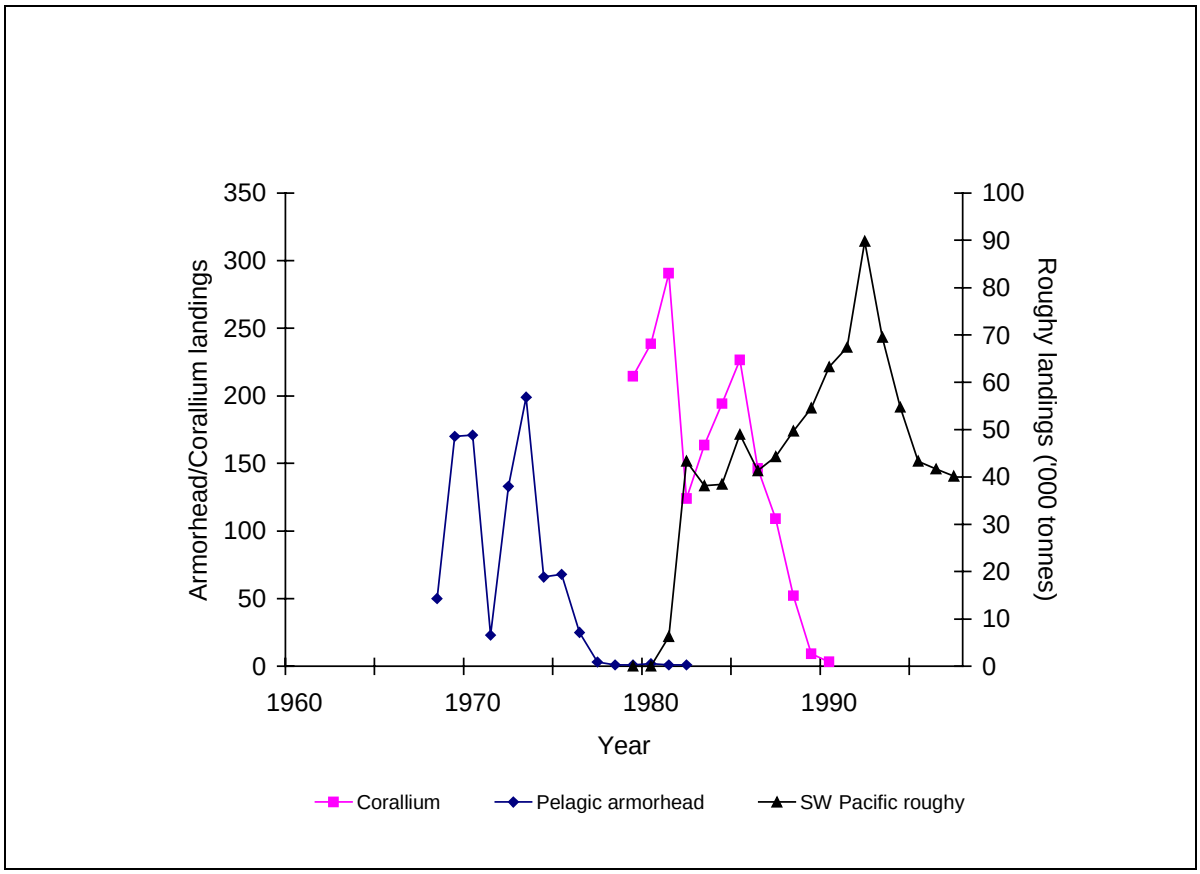

Figure 1: Landings from the Fisheries for Pelagic Armourhead, Orange Roughy in the Southwest Pacific (source: FAO), and Precious Pink Coral (*Coral-lium* sp. nov.) from North Pacific (source: Grigg 1993). *Corallium* landings in Tones; Armourhead Landings in Thousands of Tones.

Ecology and Life-History of Seamount-Associated Fishes

The sluggish currents characteristic of the deep sea (< 5 cm sec^{-1}) are topographically enhanced around seamounts by approximately an order of magnitude, greatly increasing the flux of organic matter and winnowing away the sediments. The benthic and fish communities of seamounts therefore differ substantially from those on the flat seafloor. The benthic fauna is dominated by suspension feeders (e.g. corals, sponges, brisingid seastars, crinoids) rather than deposit feeders. The fishes that aggregate on seamounts are derived from a number of different families and orders (e.g. orange roughy: *Trachichthyidae*, *Beryciformes*; oreos: *Oreosomatidae*, *Zeiformes*; pelagic armourhead: *Penta-cerotidae,*

Perciformes; Sebastes spp: *Scorpaenidae, Scorpaeniformes*), but have independently evolved a suite of morphological, physiological, ecological and life-history features that enable them to successfully exploit this niche.

Fishes living over the relatively flat deep-sea floor (e.g. macrourids) are typically adapted for slow cruising within a food-poor, low-energy environment. Their body shape is often characterized by an elongate caudal region; physiologically they have exceptionally low rates of metabolism, food intake and growth; and their muscle is characterized by high water (> 80%) and low lipid (< 5%) content (Koslow 1996).

Seamount-associated fishes, on the other hand, are typically adapted for strong swimming performance. They are deep-bodied, have relatively high rates of metabolism and food intake, and their proximate bodily composition is similar to that of a near-surface dwelling fish, with low water and relatively high protein and lipid contents (Koslow 1996). Many deep-water fishes are long-lived (longevity > 50 years), but several of the seamount-associated fishes (the pelagic armourhead is an exception) are noted for their extreme longevity and slow growth, with life-spans well in excess of 100 years (Archibald et al. 1981, Fenton et al. 1991, Smith and Stewart 1994, Smith et al. 1995). There are indications that these species are also subject to extremely high recruitment variability, successful recruitment occurring on approximately decadal time scales (Leaman and Beamish 1984, Clark 1995).

Pelagic armourhead has an unusual life history, even for a seamount-associated species, which likely contributed to its rapid decline. The species may be semelparous (i.e. spawn only once) (Humphreys and Tagami 1986), spawning on seamounts, mostly in the southern Emperor-northern Hawaiian ridge seamount chain. The young disperse into the open ocean for 1.5 –2.5 years, achieving full growth before they recruit back to the seamounts. Food resources on the seamount appear inadequate for the aggregations, causing the fish to lose weight prior to spawning (Seki and Somerton 1994). Recruitment is highly variable (Sasaki 1986).

These life-history characteristics, together with their ecological habit of aggregating on isolated fixed features, renders them exceptionally vulnerable to overfishing and stock collapse (Koslow et al. 2000). It is therefore not surprising that unregulated fisheries for pelagic armourhead and orange roughy have proved viable for only 5-10 years (or less). The degree to which genetically distinct sub-populations have been lost is not known.

Seamount Benthos

Benthic communities on seamounts have been impacted by both directed fisheries for corals and physical damage from trawl fisheries. In future there may also be impacts if seamounts are mined for manganese crusts, but such enterprises have not yet been undertaken (Grigg et al. 1987).

Corals have long been used in jewellery making, coral fisheries in the Mediterranean extending back to antiquity (Grigg 1984). Precious corals belong to three orders: the Gorgonacea, including the red or pink corals (*Corallium* spp.), bamboo and gold corals; the

Antipatharia or black corals, and the Zoanthidae, which contains *Gerardia*, another gold coral (Grigg 1984). Several further orders of corals are considered semi-precious for jewellery making. The age of everal species of corals has been determined, and they have similar longevity to deepwater fish species, on the order of 75 years (Grigg 1974). Corals are harvested over a range of depths, from less than one hundred meters for some black corals to ~1500 m depth for a new species of *Corallium* (Grigg 1993). Standard fishery models may be used to sustainably manage precious coral harvesting, and this has been applied to some Hawaiian coral fisheries; most coral fisheries are unregulated, however, are often carried out on the high seas and are characterized by rapid boom-and-bust cycles (Grigg 1984) (Figure 1).

The overall impact of the coral fishery on seamount and other coral habitats is not known. Although the highly regulated coral harvest around Hawaii is carried out selectively, by diving or submersibles, coral harvests elsewhere are generally carried out with highly destructive and inefficient tangle nets, a combination of weights and netting designed to break up the corals and entangle them sufficiently to bring them to the surface. Over 100 boats from Japan and Taiwan fished the Midway seamounts coral grounds in the North Pacific in 1981, the peak of the fishery for *Corallium* (sp. nov.) (Grigg 1993). The activity of this fleet on the high seas is unknown; it has also engaged heavily in poaching corals from the EEZ of other countries (Grigg 1993).

Demersal trawl fishing is also highly destructive to the seamount benthic environment. Probert et al (1997) recorded the benthic bycatch from the New Zealand orange roughy fishery. Bycatch from seamounts consisted predominantly of long-lived corals. Koslow et al. (in press) examined the impact of orange roughy trawling on seamount benthos off Tasmania. They found that the reef, which covered ~50% of the seamount slopes on unfished seamounts, was effectively removed from the most heavily fished seamounts: a photographic survey revealed that > 95% of the slopes of the most heavily fished seamount were reduced to bare rock. Comparison of fished and unfished areas based on dredge sampling found that benthic biomass per dredge sample was reduced by 83% and the number of species per sample by 59% on heavily fished sites.

In their thorough review of the seamount literature, Wilson and Kaufmann (1987) concluded that the proportion of endemic invertebrate species was at most 15%. However, although seamounts were first sampled by the *Challenger* expedition (1872-1876), they remained poorly sampled, such that 72% of all species recorded to that time were derived from only 5 seamounts.

Richer de Forges et al. (2000) studied the fauna of 25 seamounts on the Norfolk Ridge and Lord Howe Rise in the northern Tasman Sea and south of Tasmania in the southern Tasman Sea. Although their sampling was not exhaustive - their data still indicated a linear relationship between number of species and number of samples per site - this was the most thorough study to date, and they recorded more species than were known from all previous seamount studies. Approximately a third were new to science and considered potential seamount endemics. Most significantly, they found very low overlap of species between seamounts on the parallel Norfolk and Lord Howe ridge systems, which are at the same

latitude but separated by ~1000 km. No species were found in common between seamounts south of Tasmania at 44° S latitude and seamounts at 22-24° S latitude in the same regional sea, despite close affinity of the soft-sediment fauna between these areas.

Deep sea benthic species typically have extensive (i.e. basin-scale) ranges, due to the similarity of environmental conditions over vast portions of the deep sea and the lack of zoogeographic barriers. However, reproductive isolation between seamount ridge systems appears to result from the rectification of flows around seamounts and submarine ridges, combined with reproductive strategies of limited larval dispersal (Lutjeharms and Heydorn 1981, Mullineaux and Mills 1997). Seamount clusters and ridge systems may therefore function, like the Galapagos Islands, as centers for speciation in the deep sea (Richer de Forges et al. 2000). The authors concluded that "the localized distribution of many benthic seamount species greatly increases the threat of extinction and may require that conservation and protection of seamount communities be undertaken on a local scale".

Conservation

Seamount fisheries are extremely prone to overfishing and stock collapse, due to the fish aggregating on fixed topographic features, their extreme longevity and low productivity, and high recruitment variability. Where seamount fisheries have not been managed, either because they are on the high seas (e.g. pelagic armourhead, *Corallium* sp.) or because the stocks have been too small to justify the expense, stock collapse has generally occurred within ten years (Koslow et al. 2000). Even where seamount fisheries have been monitored and regulated, such as for certain Australian and New Zealand orange roughy stocks, they have generally been fished down quickly to critical levels ($\leq$ 20% of pre-fishery biomass) (Koslow et al. 1997, Clark 1999). Recruitment appears to be highly episodic, and there is little evidence of these stocks rebuilding, even the pelagic armourhead, which was fished down in the early 1980s.

Several authors have raised concerns about the impact of seamount fisheries on the seamount benthos (Probert et al. 1997, Probert 1999, Koslow et al. 2000, in press). These concerns are heightened due to the presumed longevity of many species (on the order of a century or longer), and the distribution of many species being limited to seamount habitats and, apparently, often only to a particular ridge or seamount cluster. Too little is still known about the biogeography of seamount fauna, but there is a substantial risk that the unregulated spread of seamount fisheries could entail significant loss of species.

To address these concerns, several nations have instituted (MPAs) to protect seamount fauna. The United States created the first coral harvest refuge (the so-called "Westpac" bed between Nihoa and Necker Islands) in the Hawaiian archipelago, as part of managing their coral fisheries (Grigg 1993). In December 2000 this became part of the 2000 km long Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve; however, current harvest levels will continue within this reserve (Science 2000). In 1999, Australia declared an MPA around a group of a dozen seamounts south of Tasmania, adjacent to an orange roughy fishing ground, and New Zealand has announced its intent to establish 19 MPAs on the

deepwater fishing banks and seamounts around that country. Norway created two MPAs on Sula Bank to protect beds of the stony coral *Lophelia pertusa* on its continental slope.

This past year, deepwater trawlers began to fish orange roughy on previously unexploited ridges and seamounts on the high seas of the Indian Ocean. These fisheries are unregulated and the seamount communities are virtually unexplored. In response, the Australian government proposed at the first meeting of UNICPO, May-June 2000, a precursor to the next Law of the Sea negotiations, that MPAs be established on the high seas. This was opposed by many traditional maritime nations but supported by others and will be presented again at the 2001 UNICPO meeting.

Given the impact of deepwater trawl fisheries on these habitats and their rapid global expansion, adequate conservation of seamount environments will require a network of MPAs created on the scale of the seamount faunal biogeographic provinces. This may require protection at the scale of major seamount cluster and ridge systems, if this proves to be the dominant scale of species endemism (Richer de Forges et al. 2000). Further research is required to assess this hypothesis, with research in the Indian and western Pacific Oceans given the highest priority, based on the concentration of seamounts and seamount-based fisheries in those areas. Key seamount features from each of the major ocean basins to be considered as provisional candidates for protected status are listed in Table 1.

Table 1: A Provisional List of Seamount Sites Proposed for Protected Status as MPAs on the High Seas.

Ocean basin	**Seamounts**
N Atlantic	Great Meteor (30° N, 28° W)
S Atlantic	Vema or Discovery
N Pacific	Koko (35°20'N, 171°30'E), areas on Emperor seamount chain, NW Christmas Is Ridge
S Pacific	Seamounts on Lord Howe Rise, Norfolk Ridge, Tonga Ridge, Austral Seamount Chain, Tuamotu Ridge
Indian Ocean	Sites on Broken Ridge, Carlsberg Ridge
Southern Ocean	Seamount between Macquarie Is & S Tasman Rise (52°S, 153°E)

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Potential Use of Marine Protected Areas Applied to Tuna Fisheries and Offshore Pelagic Ecosystems[1]

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Introduction

The pelagic offshore ecosystems exploited world wide by tuna fisheries are very large with an area of about 250 million square nautical miles, but limited to the relatively shallow upper layers down to approximately 500 meters depth. Only a small number of six tuna species (yellowfin, skipjack, bigeye, albacore and northern/southern bluefin) and one billfish species, swordfish, are targeted by industrial tuna fisheries. Various billfishes (marlin, sailfishes) are also taken and often sold in significant quantities as by-catches of the same tuna fisheries. Very few fisheries other than those for tuna actively target the offshore pelagic ocean. However, most tuna stocks are now approaching or they have already reached their maximum sustainable yield; furthermore, many by-catch species of the tuna fisheries appear to be in bad shape (some billfishes) or endangered (some sharks, turtles and birds), following the world-wide increase in tuna fishing effort over the last 50 years.

Tuna stocks world wide are managed by various international tuna commissions which are active in each ocean (Fig. 1). Until recently, these bodies focused only on the status of tuna stocks and used traditional fishery management tools, such as quotas and size limits for target species. However there is now an increasing ecosystem concern in the management of tuna fisheries at both national and international levels (e.g. the tuna commissions, the FAO and UN). The newly emerging consensus is that management of pelagic stocks should be more precautionary (Anon. FAO Phuket meeting) and should also ensure the long term health of both tuna stocks and of the various non-targeted components of pelagic ecosystems.

In the context of these increasing concerns for both tuna stocks and pelagic ecosystems, various tuna commissions[3] are now starting to elaborate management plans based on closed areas to reduce fishing mortality of both tunas and their by-catch species. Surprisingly, however, there has still been little thought concerning the management prospects for such closed areas offshore. The goal of this paper is to develop a first overview of such prospects from a tuna expert's point of view.

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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3 Such a type of temporarily closed area was established by ICCAT in the Atlantic and is under discussion in the Indian Ocean (IOTC scientific committee).

Tuna Resources and their Overfishing

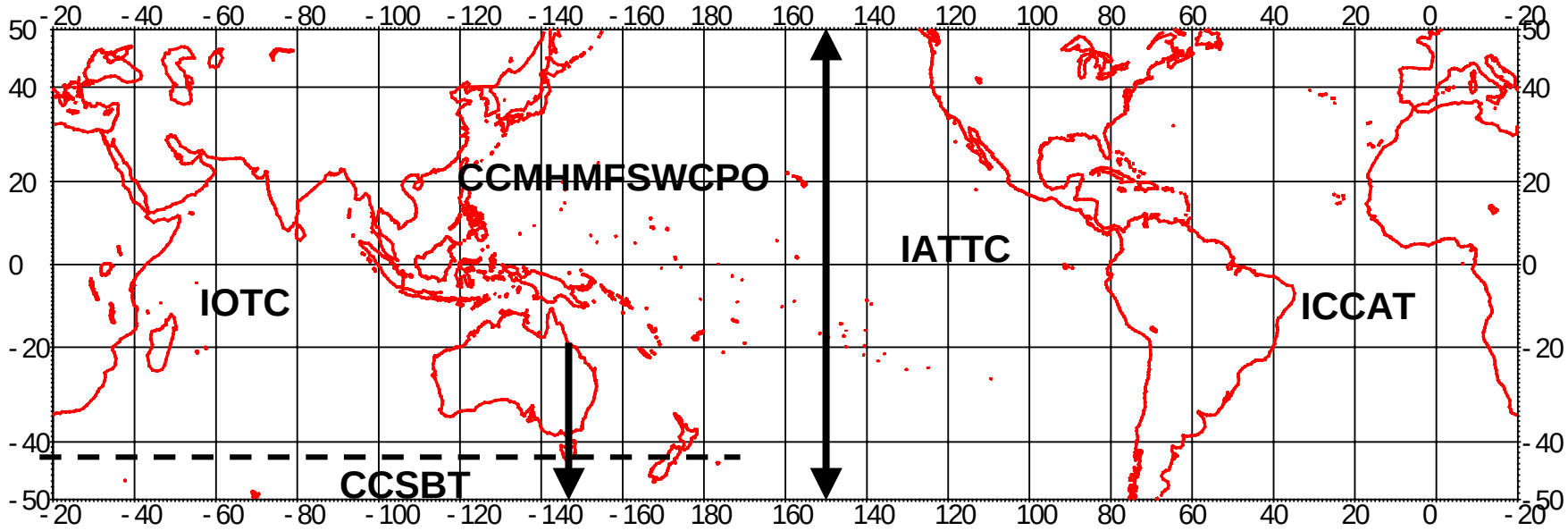
It is surprising that while most tuna stocks world wide tend to reach during recent years their full level of exploitation (e.g. close to their Maximum Sustainable Yield), most of them were not yet overfished as in the case of many demersal or coastal stocks. This quite good shape of most tuna stocks is well shown by the increasing trend of tuna catches which was observed world wide until now (at a variable degree in each ocean and for each species, some stocks being severely overfished). Most tuna stocks tend to show, quite early in their exploitation, symptoms of local overfishing or an apparent leveling off of catches following locally increasing fishing effort. However this local overfishing is generally not indicative of the real status of the ocean-wide stock. Tuna and billfishes are highly migratory species, but their movements are not sufficient to produce complete mixing over large oceanic basins. This stock "viscosity" (Mac Call 1992) is confirmed by the limited distances traveled by most tagged tunas, as well as by the fact that the maximum sustainable yield for most tuna stocks tend to increase in proportion to the size of the area fished (Fig. 2). This increased size of the area fished has been observed world wide for most surface fisheries during the last 50 years (e.g. since the beginning of the industrial tuna fisheries), as it is well shown by Figure 3. Most of the suitable pelagic ecosystems are now exploited by tuna fisheries, but the fishing effort by surface fleets remain low or moderate in some areas, for instance the Eastern Indian Ocean, Western Atlantic and Central Pacific oceans (Fig. 4).

This viscosity is quite typical of each species, small tunas such as skipjack showing a lower movement rate (e.g. large viscosity), while large tunas (such as bluefin) show large scale and fast movement (and low viscosity).

Because of this viscosity of tuna stocks (e.g. an incomplete or slow mixing between the various geographical components of each stock), the effect of fisheries on the biomass of tuna stocks are not equal over the entire area of distribution of each stock: local depletion in the fished strata tends to be greater than the decrease for the total stock. Stock viscosity is also at the heart of the concept of so called "*cryptic*" biomass: the fraction of the total biomass of a stock that survives even when a very high (or infinite) fishing effort is exerted in the presently exploited fishing zones.

Accepting that all tuna stocks are migratory but exhibit viscosity, the implementation of MPAs becomes a very promising management concept. Such MPAs should be:

- ***of significant size***: for instance at least 10 to 20% of the area of distribution, in order to significantly limit the exploitation rates on the stock.
- ***well selected***: taking into account location of **spawning zones**, where tunas tend to be highly vulnerable, and of **nursery areas**, where large numbers of juveniles are often taken.



IATTC: Inter American Tuna Commission

ICCAT: International Commission for the Conservation of Atlantic Tunas

CCSBT: Commission for the Conservation of Southern Bluefin Tuna, without a specific area

IOTC: Indian Ocean Tuna Commission

CCMHMFSWCPO: Convention on the conservation and management of higly migratory fish stocks in the western and central Pacific ocean.

Figure 1: Major International Commissions in Charge of Tuna Stock Conservation

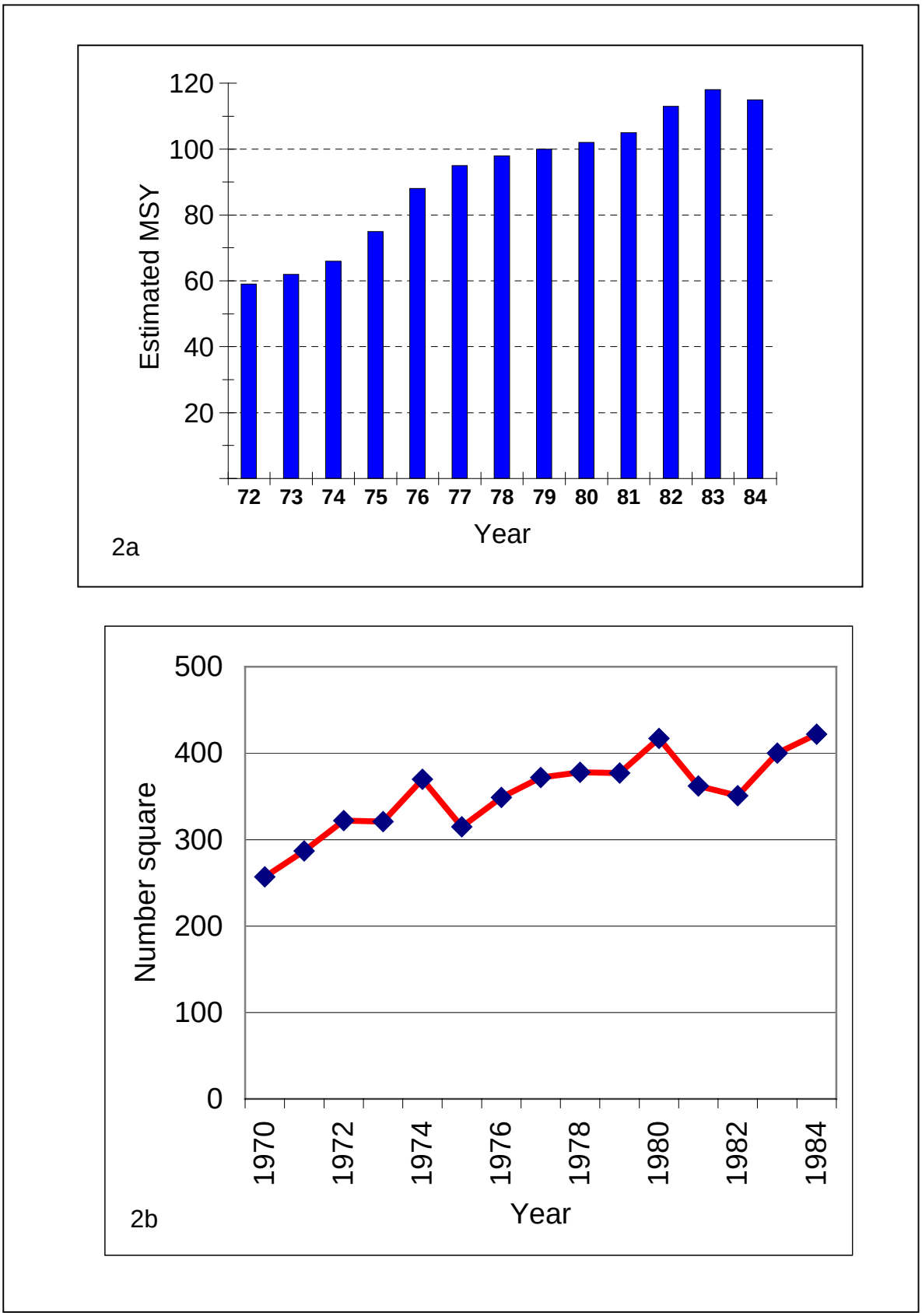


Figure 2: Changes in the Estimated Maximum Sustainable Yield (MSY) of the Eastern Atlantic Yellowfin (2a), and Size of the Fished Area (Number of 1° Squares with a Yellowfin Catch, 2b)

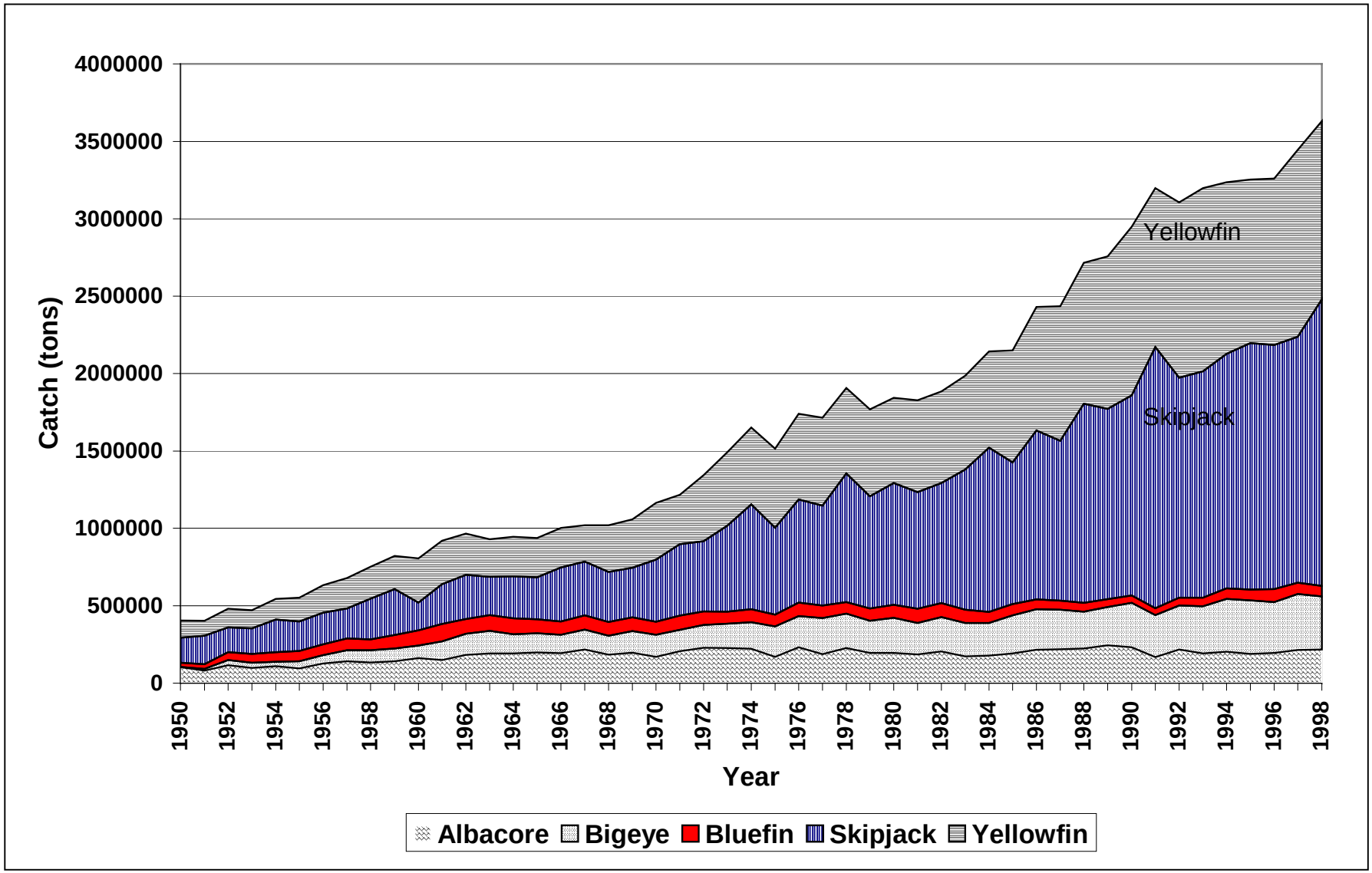


Figure 3: Yearly World Catches of Major Tuna Species (taken from FAO)

Such MPAs could become a very positive management scheme as they would allow full protection for a significant fraction of tuna and billfish stocks. They would also probably maintain the yearly production of each stock at levels lower than their maximum sustainable catches, but with more safety in their long term management.

Status and Prospects of the Offshore Pelagic Species and Ecosystems

As in every ecosystem, the pelagic ecosystem is inhabited by a combination of predators and prey (Fig. 6). Among the top predators inhabiting pelagic ecosystems, tunas are the main species most actively targeted by large scale industrial fisheries. Marine mammals (mainly dolphins and whales) are also top predators but at present they fortunately experience a low or zero exploitation rate in most areas, despite their large biomass. Other top predators, such as pelagic sharks, are often taken as by-catch, their fins being removed and sold to the Asian markets. Sharks are long living and low fecundity species which are easily endangered. Most offshore epipelagic[4] and mesopelagic[5] prey, such as krill, mollusks, mesopelagic fauna, small tunas or small species of fishes, etc., are currently unexploited in pelagic ecosystems, with a few exceptions, such as various localized squid fisheries. The main reasons are that these species lack a market, are too small to exploit and process, too dilute in the large pelagic environment and too expensive to catch with present gears.

Thus tuna fisheries can become a potential threat for various pelagic species or birds obtained as by-catch. The situation is quite different for tuna longliners (vessels fishing with long lines equipped with multiple hooks) and for purse seiners (vessels that catch surface schools in a purse seine net).

- Large fleets of longliners have been targeting tuna since the early 1950s (thousands of longliners are active world wide) and they exploit a very large area in tropical and temperate, coastal and offshore ecosystems (see Figure 5). Longline by-catch varies considerably as a function of the ecosystem fished and of fishing mode (primarily hook depth which varies between depths of 20 - 400 meters or more but also setting hours). Few observer data are available for longline fleets and their discards are largely unknown, but they appear to be quite high. Furthermore, a significant proportion of sensitive species, such as billfishes, turtles, birds or sharks, are sometimes taken as by-catch by longliners. Some of these species being endangered, such as some turtles and albatrosses, even small by-catches may threaten such species.
- Although there are only about 500 large purse seiners active world wide, they are responsible for most of the world's tuna catch. Available data indicate that

[4] This epelagic fauna is living in the shallow waters of the ocean, e.g., in the first 100 or 150 m.

[5] The mesopelagic fauna is living in deeper waters, e.g., from 150 to 2000 m depth, at least during the day.

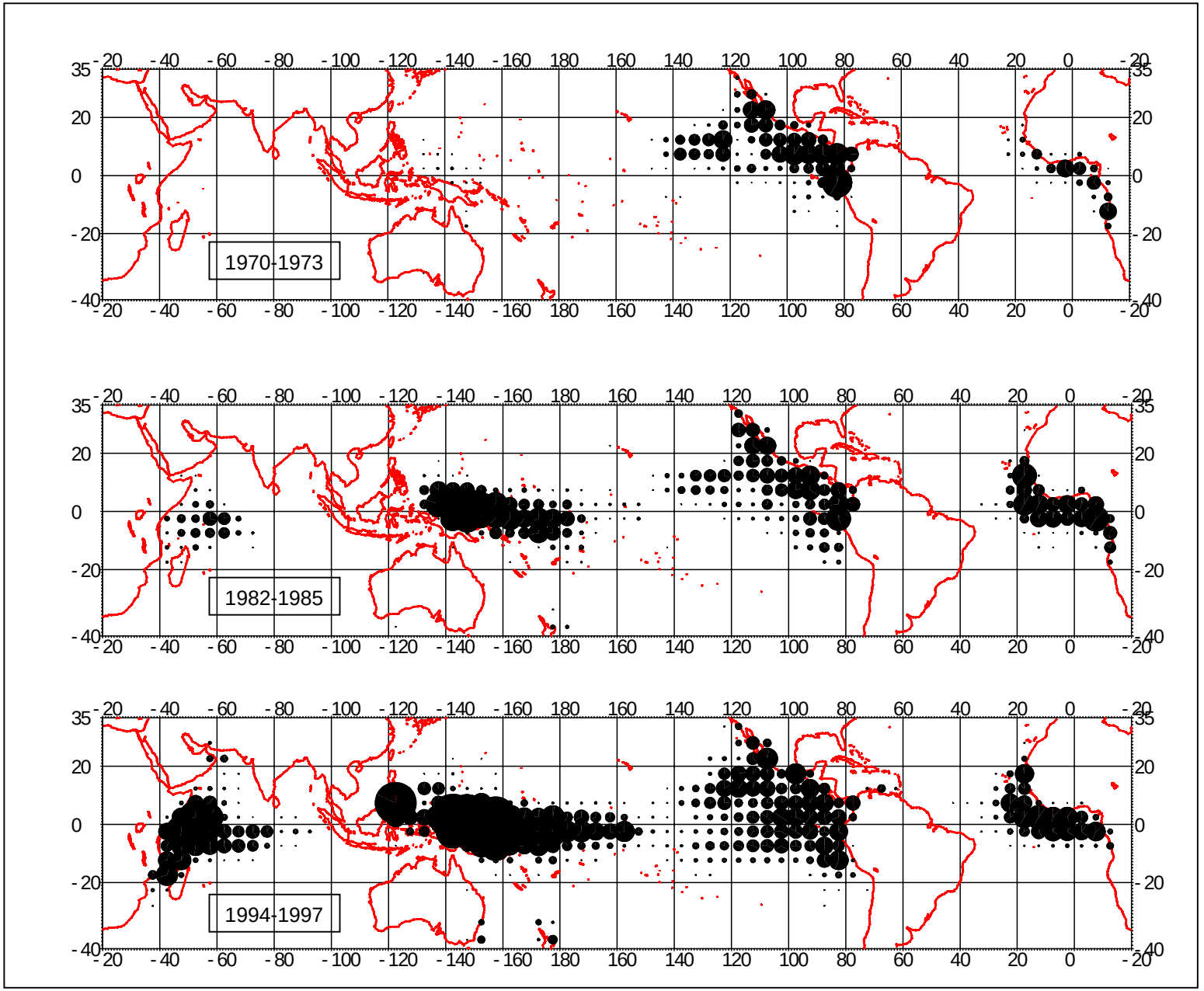


Figure 4: Increase of Fishing Zones by Purse Seiners during the last 30 Years.

although discards are frequently observed on purse seiners (e.g., sharks, small tunas, turtles, porpoises, billfishes, dolphinfish *Coryphaena*, etc.), the total amount of discarded by-catches is relatively a minor one compared with that from other fisheries (discards are estimated world wide at less than 100.000 tons yearly, this figure being possibly underestimated). A majority of discards by purse seiners is taken even under Fish Aggregating Devices (FADs) which today account for about 60% of landings by purse seiners. Furthermore, only very small numbers of sensitive species, such as turtles, are killed by purse seiners. This fishery once inflicted high accidental mortality on dolphins in the Eastern Pacific, but this mortality has been reduced to nearly zero following active research and management carried out by the Inter American Tuna Commission.

In conclusion, it seems that pelagic ecosystems are increasingly suffering the effects of tuna fisheries. These negative effects are still poorly known, primarily because of a lack of observer data on most fleets and also because of a lack of sufficient scientific research done in the offshore pelagic ecosystems (scientific research conducted in these offshore pelagic areas being very costly). Precautionary approach should lead In this context to reduce the accidental fishing mortality of non-target species as much as possible.

In this context, the implementation of offshore MPAs, with a complete closure of large pelagic areas to tuna fishing, should reduce accidental fishing mortality by tuna fishing, without significantly reducing potential tuna catches. Knowledge of the distribution of key by-catches species should be incorporated into the choice of potential MPAs.

Legal and Practical Difficulties to Promote Offshore MPAs

The potential use of MPAs for tuna fisheries, which are predominantly in offshore international waters, raises complex legal and practical issues.

However, their present prospects may be quite promising due to several factors:

- Increasing needs to limit fishing capacity of tuna fleets and to limit exploitation rates exerted on most tuna stocks.
- Increasing needs to limit accidental fishing mortality for various sensitive by-catch species.
- Nowadays, all tuna stocks and fishing zones world wide are covered by *ad hoc* international commissions. These tuna commissions have full mandates to recommend any management measure to the fishing nations in order to obtain safer management of tuna stocks and their associated species.
- The new agreement of the United Nations on straddling stocks and highly migratory species will soon provide a strong legal framework to establish such MPAs, even in international waters.

Figure 5:

Average Fishing Zones by Tuna Longliners during the Period 1970-1996

(grey: Tropical Tunas: Yellowfin and Bigeye;

black: Temperate Tunas: Albacore and Bluefin)

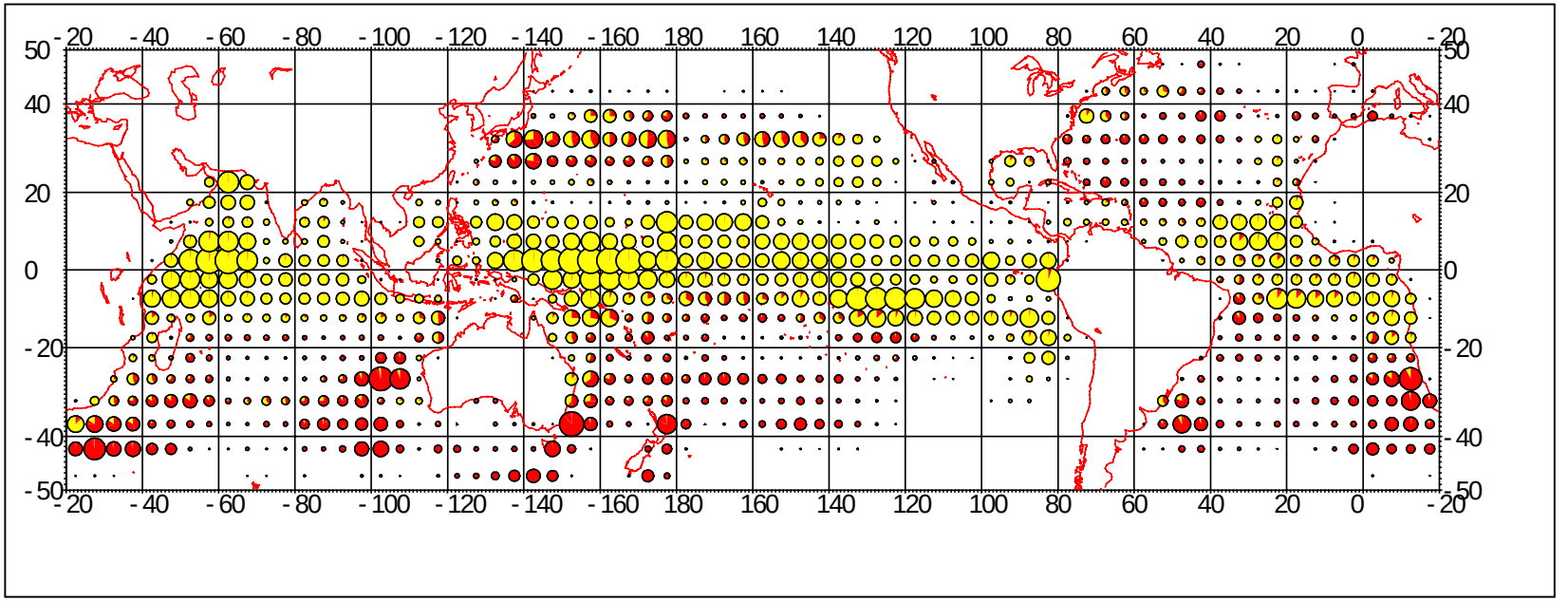
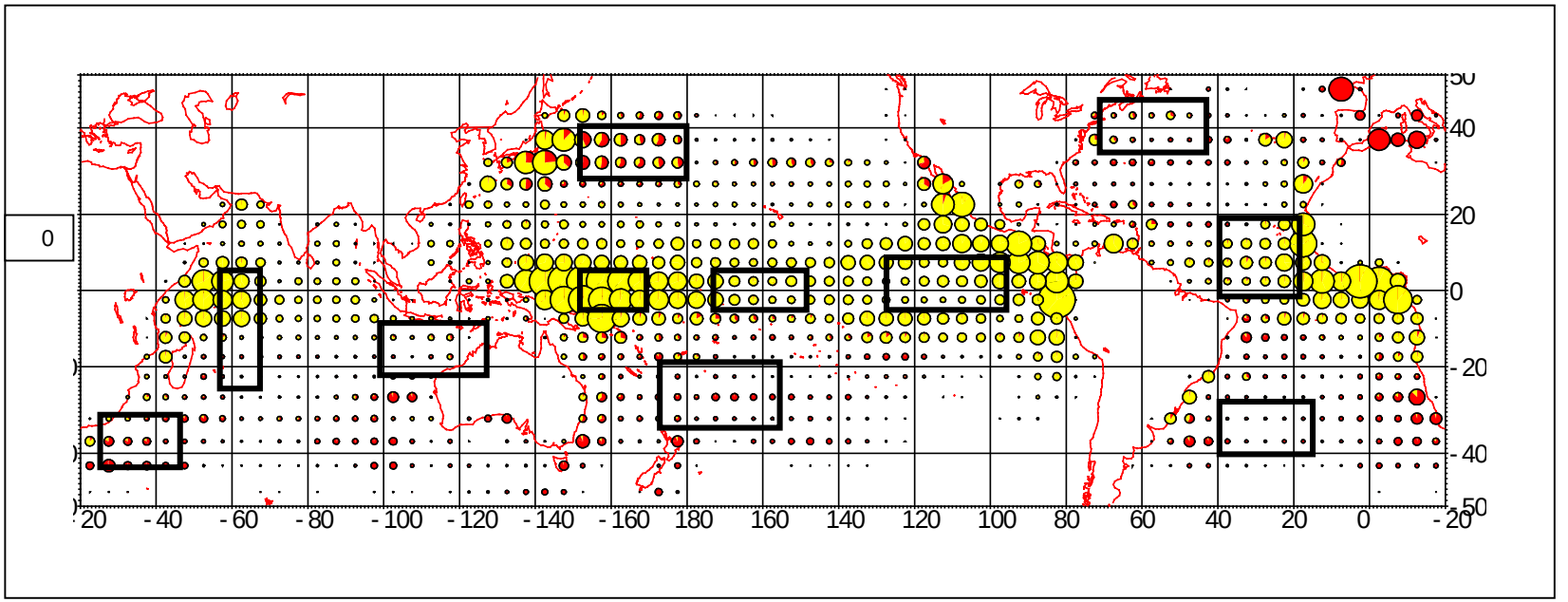


Figure 6:

Average Fishing Zones of Tuna Fisheries (All Gears, Major Species Only) and Examples of Potential MPAs



- Vessel monitoring systems (or VMS) will soon enable the international agencies to monitor the position of fishing vessels at low cost. In the near future every tuna vessel registered with commission-signatory nations will be equipped with VMS, with an international body monitoring their position in real time. It will also be necessary to incorporate in the present VMS systems the information upon setting the fishing gears (as the MPAs will be closed to fishing but not to navigation).

Of course, the prospect of offshore MPAs still faces many problems and uncer-tainties. Among the most critical are the practical and legal difficulties associated with enforcing international law in remote offshore areas. These problems will be exacerbated by the increasing fraction of the tuna fleets fishing under flags of convenience, enabling them to escape national controls. These non-cooperating vessels are not yet equipped with VMS and are therefore difficult to control unless an at sea international control could be deployed in the MPAs. Such a control would clearly raise serious problems both concerning its **high cost** and its **legal framework**. Another solution would be to promote the full implementation of these MPAs (and a 100% coverage of fleets by VMS positioning systems) closing the international tuna markets to all tuna vessels which are not cooperating to the MPAs international management scheme. Such a control at the level of the world tuna markets would possibly be realistic to implement, as relatively few countries are importing and processing tunas in significant quantities.

Potential choice of closed areas

The choice of the areas closed as MPAs in each ocean would clearly need an extensive multidisciplinary analysis done by tuna experts, experts in ecosystems, lawyers and economists. This work should be based on a good knowledge by the expert of a wide range of biological, fishery, environmental, legal and economical data well handled by geographical information systems. Such large panels would be necessary to take into account the complexity of the problem.

However, as it is always positive to initiate such multi-disciplinary discussions starting with practical proposals; a very first list of such potential offshore MPAs is then proposed in Figure 6. These potential MPAs were selected in each ocean following a combination of various criteria which were temporarily chosen such as:

- The MPAs were chosen with a significant size, more than 10% in each ocean;
- The MPAs were proposed for various ecosystems, targeting conservation of various tuna species and various sensitive by-catches;

- MPAs were chosen, when possible, primarily outside EEZ of developing countries for which tuna fisheries play an important economical or/and social role (it would be for instance impossible to close the area of Maldives or of Ghana, two countries where tuna fisheries have been playing a major role).
- The MPAs were chosen in order to cover part of the nurseries (areas were juveniles are concentrated and fished) and of the spawning zones (where spawners tend to be highly vulnerable to fisheries).

This potential set of closed areas is obviously very tentative and a provisional one. Such closed areas would correspond to about 14, 18 and 13 % respectively of the sizes of the ecosystems inhabited by tunas in the Atlantic, Indian and Pacific Oceans. The percentage of tuna catches taken during recent years in these areas were approximately at levels corresponding from 15 to 20% of the total tuna world catches during recent years (only for the major tuna species), with similar percentages of catches in each ocean.

In the concept of MPA applied to migratory species, the decline of total catches due to the MPAs would be lower than this percentage, because part of this catch will be taken in other areas as a function of tuna movements.

Conclusions

MPAs may prove to be a positive tool for the conservation of most components of pelagic offshore ecosystems. Their potential use for a better conservation and management of the offshore pelagic ecosystems and tuna stocks should be carefully assessed. This multidisciplinary work should be done by experts in fisheries and in ecosystems (scientists, lawyers, managers). It will also require a full coordination between international bodies, such as the various tuna commissions. The FAO would probably be a possible conduit, but not the only one, to promote such a global effort. Spatial simulation programming which can fully rebuild all the known movement patterns of the various tuna species and their spatial distribution and of fishing fleets would probably be a positive tool that could be built to analyze the biological prospects of these offshore MPAs.

Deep-water Coral Conservation[1]

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Introduction

Some deep-water corals are capable of forming large reef structures, which harbour a rich and diverse fauna. Although we normally associate coral reefs with tropical waters, it is now known that the reefs found in cold and deep waters rival their tropical cousins in terms of biological complexity. Deep-water corals have been known to occur along the European margin since the last century (Le Danois, 1948). It is however only recently that their extent (Wilson, 1979; Zibrowius, 1980; Frederiksen et al., 1992; Rogers, 1999) and potential importance as a key structural element in the European deep-water biotope has become apparent (Jensen and Frederiksen, 1992; Freiwald et al., 1997; Freiwald, 1998; Rogers, 1999). Advances in multi-beam and side-scan mapping technology combined with improved *in situ* exploration capabilities (principally ROV's and other imaging platforms) have revealed a hitherto unexpected realm of coral colonies, reefs and giant bioherms (Mortensen et al., 1995; Hovland et al., 1998; Freiwald, 1998; Henriet et al., 1998).

The principal framework forming coral species are *Lophelia pertusa* and *Madrepora oculata*. *Lophelia* has a global distribution but appears to particularly favour the NE Atlantic where it is found from the Galicia Banks off Spain all the way to the upper continental slope and fjords of Norway. *Lophelia* once settled on a suitable hard substrate, forms a self-sustaining colony which varies in size from small individual colonies of about a meter in diameter to reefal structures, the largest of which is the Sula Ridge in Norway with dimensions: 14 km long, 400m wide and up to 30 m high. The corals provide a complex habitat for other species and are well known to support a diverse fauna. Over 800 other species have already been recorded co-occurring with the coral and it is well known that corals also attract abundant populations of commercial exploited fish species such as redfish, saithe, ling, blueling and tusk. Little is currently known about the basic biology and ecology of the corals and associated fauna.

The ACES, a recently funded EU Fifth Framework Project will answer these fundamental questions as well as providing a margin-wide environmental baseline assessment of the status of Europe's deep-water coral ecosystem and provide recommendations for essential monitoring and methodology requirements to support future sustainable development. This study will greatly improve the scientific basis for the implementation of conservation measures pertaining to cold water corals.

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[1] Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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At an ACES run workshop that brought together ACES scientists and principal stakeholders (Grehan et al., 2001), a potential threat from deep-water trawling was identified. Damage to reefs by trawling is well-documented (see below) in Norway where corals are found much shallower (<400m) than off Ireland (600-1000m). However, to date, evidence of destructive fishing techniques damaging reefs off Ireland is purely anecdotal although recent video and photography of Irish corals shows several instances of lost fishing gear.

Irish corals are usually found growing near the summits of enigmatic underwater hills (up to 300m high) called carbonate mounds. These mounds appear to be largely composed of coral skeletons mixed with mud that has accumulated over thousands to ten of thousands of years. The genesis of the mounds is unknown and they are now the focus of two other 5FP's ECOMOUND and GEOMOUND. The Porcupine Bight and Rockall Trough areas to the west of Ireland are among the most heavily researched locations in the three projects.

Although definitive evidence of coral damage in the Irish sector has yet to be shown discussions at the ACES workshop highlighted the potential difficulties of implementing swift conservation measures. Indeed, it was quite unclear as to where the legal competence resided and which organisation should take responsibility for implementation and enforcement of such conservation measures as might appear warranted in the future.

Currently Ireland has a territorial sea extending 12 miles, a fisheries zone extending to 200 miles and has designated an extensive continental shelf area under UNCLOS. Duchas, the Irish National Heritage Agency appear reluctant to implement the EU Habitats Directive past the 12 mile limit to encompass the 200 mile fishery zone even though the UK Government recently were obliged, after losing a high court case, to do so.

The discussion of potential coral conservation measures and suggested sites for MPA's in Irish waters are presented here theoretically as a test case for the purposes of the workshop only.

This does <u>not</u> represent an official position of any Irish Governmental Agency.

Scientific Basis for the Identification of Potential MPAs on the High Seas

In September 1998 the OSPAR (Convention on the Protection of the Marine Environment in the Northeast Atlantik) workshop in Vilm arrived at a 3-step procedure to select MPAs essentially by: I) identifying sites according to ecological criteria, II) prioritizing, and III) considering practical constraints. Criteria were agreed for evaluating the candidate sites during the process.

Application of the OSPAR Selection Criteria for Species to *Lophelia*

1. Global importance, when a high proportion (>75% when known) of the species, at any point in its life cycle, occurs in the OSPAR area.

   Has a global distribution but appears to favour the NE Atlantic (Rogers, 1999). May be of global importance.

2. Locally important, where a high proportion of the total population is restricted to a small number of locations in the OSPAR area.

   Not locally important, however, areas where the corals are abundant and thriving may be limited.

3. Rarity, if the species occurs in a limited number of locations in the OSPAR area, and in small numbers

   Not rare.

4. Sensitivity, if the species is very easily affected by human activity, and if it is expected to recover over a long (>25 years) period, or not at all

   May be quite sensitive to human activity, polyps may be smothered through increased sedimentation and repeated physical disturbance of colonies may not permit recovery. Growth rates are in the order of 1 to 2 cm per year.

5. Keystone, if the species has a controlling influence on a community

   Plays a keystone role in providing physical habitat for diverse associated fauna and refuge for juvenile fish.

6. Decline in numbers, extent, or quality (life history parameters).

   Reports from Norway suggest that 30-50% of known coral locations in Norway have already been impacted. Anecdotal evidence suggests Irish corals may also be under threat

Application of the OSPAR Selection Criteria for Habitat to *Lophelia*

1. Global importance, when a high proportion (>75% when known) of the habitat occurs in the OSPAR area

   Has a global distribution but appears to favour the NE Atlantic (Rogers, 1999). May be of global importance.

2. Regional importance, where a high proportion (>75% when known) of the habitat occurs in a specific biogeographic region in the OSPAR area

   Not regionally important.

3. Rarity, if the habitat is restricted to few, small, and scattered locations in the OSPAR area

   Not rare.

4. Sensitivity: very sensitive if the habitat is very easily affected by human activity, and if it is expected to recover over a very long (>25 years) period; sensitive if it is easily adversely affected and would be expected to require 5-25 years to recover

   Sensitive. Slow growth rates would prevent rapid replacement of large reefal structures once destroyed.

5. Ecological significance, if the habitat is very important for the ecological processes, functions, and species that it supports (e.g., spawning, breeding, reproduction, feeding, resting areas; high natural productivity or diversity; endemic species; migratory routes, etc.

   May be a key structural element in the local deep-sea ecosystem.

6. Decline in extent or quality

   As above: destruction of habitat may have occurred in 30-50% of known coral locations in Norway.

An application scheme suggested by BirdLife International to apply these criteria was tested with *Lophelia* at a WWF sponsored workshop in Brest (WWF, 1999). In a three-step process, first the species or habitat is classified as "green", "amber", or "red" by applying criteria 2, 3, 4, and 5 above. The species and habitats are scored according to local importance (0 or 1), rarity (0 or 1), sensitivity (0, 1, or 2), and keystone/ecological importance (0 or 1). The aggregate score then places the species or habitat in the green, amber, or red category. Secondly, the decline criteria are applied as in Table 1 to determine the priority for conservation action. Third, global importance is considered.

Table 1: Suggested Scheme to Apply the Horta Selection Criteria to Determine Conservation Priority (L=low; M=medium; H=high)

Species/ Habitat	**State of Decline**					
	Not Known	**Stable**	**Probable**	**Significant**	**Severe**	**Extinct**
GREEN	L	L	M	L	H	H
AMBER	M	M	M	H	H	H
RED	H	H	H	H	H	H

It should be noted that careful consideration of the fundamental philosophy behind the selection process is necessary so as not to bias the outcome towards certain species/habitats.

Application of the Selection Criteria gave the results outlined in Table 2 below. Depending on the degree of observed damage, *Lophelia* has medium to high priority in terms of a requirement for urgent conservation action.

Table 2: Test Results of Applying the OSPAR Criteria to *Lophelia*

Species/ Habitat	**Local/ Region. Import.**	***Rarity***	**Sensi-tivity**	**Keystone /Ecolog. Import.**	**1st Stage Class.**	**State of Decline**	**Conserv. Priority**	**Global Import.**
Lophelia	0	0	0	1	AMBER	If probable	M	
Lophelia	0	0	0	1	*AMBER*	If Significant	H	
Test Results of Applying the OSPAR Criteria to Habitats								
Lophelia	0	0	0	1	AMBER	Probable	M	

Existing or Potential Activities Threatening Some or All Sites in Question

The steady downslope movement and subsequent increased depth of operation of Europe's hydrocarbon exploration and deep-sea fishing industries has for the first time brought them into the realm of deep water coral. Concerns about the potential environmental damage to corals which could result from oil and gas exploration activities (Rogers, 1999) and documented evidence of large scale damage to reefs off Norway due to destructive fishing practices (Fosså et al., 2000), have brought sharply into the focus, the urgent need to develop a sustainable management strategy to protect the coral ecosystem.

It must also be noted that the topical nature of coral research has generated intense activity among teams of biologists, geologists and sedimentologists, all of whom require samples. The use of dredges, box-corers, gravity cores etc. all impact the coral sites under-investigation.

Recommended Regulations for Conserving Sites

Three areas where corals are abundant on carbonate mounds are shown in Figure 1. These areas are currently under intense investigation in the three EU 5FP's mentioned above. Each of these areas could contain suitable sites for MPA designation. An area of 5 x 5 km might be sufficient to protect particular mounds. Total closure to all fishing activities would be the preferred option. Consideration should also be given to the implementation of multi-user MPA's with appropriate buffer zones.

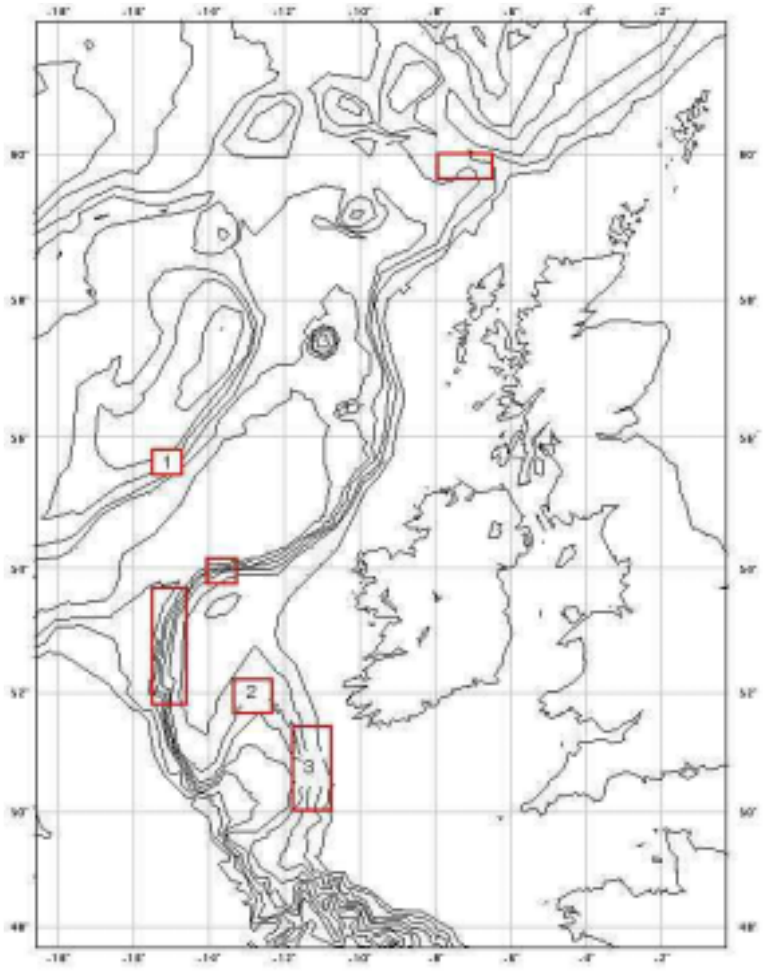

Figure 1:

Principal ACES, ECOMOUND and GEOMOUND Study Areas; Three Potential MPA Sites (1-3)

Review of Any Earlier Activities to Protect Such Areas

Impact of fisheries on *Lophelia*-reefs and conservation measures in Norwegian waters. (Abstract prepared by Pål Buhl Mortensen and Jan Helge Fosså, Institute of Marine Research, Bergen, Norway for Report on the First ACES Workshop for Principal Stakeholders in Galway, June, 2000).

The IMR has assessed the effects of fisheries on the *Lophelia*-reef habitat (see Fosså *et al*. 2000). The *Lophelia*-reefs are old, slow-growing biological structures that support a high diversity of benthic species. The reef areas have traditionally been rich fishing grounds for longline and gill-net fisheries. However, anecdotal reports from fishermen indicated that modern trawlers are damaging the reefs. Inspections with ROVs and videocameras and mapping of the seabed with sidescan sonar verified reports from fishermen that several reef-areas were heavily impacted by bottom trawling off mid-Norway. The documentation included crushed coral-reefs, scars from trawl doors in the sediments and remains of lost fishing gear. At Storegga (62˚ 30' - 63˚ 30' N) destructed corals were observed most frequently at depths between 200 and 300 m. Deeper, down to c. 400 m intact reefs occurred. Fosså *et al.* (2000) estimated that 30 – 50 % of all known reef areas are impacted by trawling activities. These results are dramatic and the damage may not only have

consequences for the distribution of large, old reefs, but also on the diversity of associated species and abundance of redfish (*Sebastes* spp.). The most obvious effect from mechanical impact by bottom trawling is increased mortality in coral populations. Crushing of coral colonies changes the spatial arrangement of polyps and damages the polyp tissue. This probably reduces the polyps' ability to catch food particles and increase the risk of microbial infections. Furthermore, trawling over coral-reefs will also lead resuspension of bottom material that may impact the corals negatively.

In order to promote the government to take action for protection of the reefs, communication of results has been essential. Documentation of damaged reefs and information on the potential ecological importance of the reefs for fish were presented to the Ministry of Fisheries. The results were also presented in National television channels and newspapers. It has been important to express the extent of impact from trawling to the fishermen and authorities in an understandable way. The project-report documents the distribution of *Lophelia pertusa* and impacted areas along the Norwegian coast, and now serves as a basis for selecting new protection areas. The communication of scientific results and suggested measures resulted in a general restriction that forbid bottom trawling on known coral reefs. In addition, two areas, the Sula Ridge and the Iver Ridge, were closed against bottom trawling in 1999 and 2000 respectively. In 2000 Norway's first marine national park was provisionally declared at the Tautra Ridge in Tronhjemsfjorden. This is the worlds shallowest occurrence of *Lophelia pertusa* at 39 m depth, and the park has been established to protect the corals from harmful human activities such as anchoring, scuba diving, and dredge sampling.

The project has contributed significantly to the challenging task of mapping the deep-water reefs, but a large part of the Norwegian continental shelf is still not investigated. At present, two coral areas are closed on the Norwegian shelf. However, this may be far too little to ensure the future of the reefs and their diverse associated fauna.

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Conservation Status and Needs of High Seas Birds: Consideration from the UK Perspective[1]

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Conservation of Birds on the High Seas Around the UK

Bird species that occur regularly in UK waters outside territorial limits are listed below. Commission Directive 91/244/EEC amends Council Directive 79/409/EEC on the conservation of wild birds. This Council Directive requires that species listed on Annex 1 and all species of migratory birds shall be the subject of special conservation measures concerning their habitat. Relevant high seas birds on Annex 1 are noted below.

Bird Species Occurring Commonly in UK Offshore Waters (from 12-200 nautical miles):

Name	Scientific name	Notes
Fulmar	*Fulmarus glacialis*	
Sooty shearwater	*Puffinus griseus*	
Manx shearwater	*Puffinus puffinus*	
Storm petrel	*Hydrobates pelagicus*	Annex 1
Leach's petrel	*Oceanodroma leucorhoa*	Annex 1
Gannet	*Sula bassana*	
Arctic skua	*Stercorarius parasiticus*	
Great skua	*Stercorarius skua*	
Black-headed gull	*Larus ridibundus*	
Common gull	*Larus canus*	
Lesser black-backed gull	*Larus fuscus*	
Herring gull	*Larus argentatus*	
Iceland gull	*Larus glaucoides*	
Glaucous gull	*Larus hyperboreus*	

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Name	Scientific name	Notes
Great black-backed gull	*Larus marinus*	
Kittiwake	*Rissa tridactyla*	
Sandwich tern	*Sterna sandvicensis*	Annex 1
Common tern	*Sterna hirundo*	Annex 1
Arctic tern	*Sterna paradisaea*	Annex 1
Guillemot	*Uria aalge*	
Razorbill	*Alca torda*	
Little auk	*Alle alle*	
Puffin	*Fratercula arctica*	

Other relevant bird species occur in this zone, but in very low numbers.

There are three main reasons for aggregations of seabirds in the marine environ-ment around the UK:

1. Adjacent to breeding colonies;
2. Divers and seaduck in winter;
3. Seabird aggregations at sea.

Adjacent to breeding colonies

Waters adjacent to breeding colonies are used for a number of social activities such as bathing, loafing, courtship and mating (especially puffins), resting and roosting (e.g. gannets), and collecting nest material (e.g. cormorants). Although the distance from the colony used by any bird varies from species-to-species, waters used are normally within 1 to 5 km of the colony, and therefore inside territorial waters.

Some seabirds also feed in waters adjacent to the colony, while others may use these waters and feeding areas up to 400km from the colony. The distances seabirds travel from their colonies varies according to species and location.

Divers and seaduck in winter

Divers: Two species nest regularly in the UK; the red-throated and black-throated divers. After the breeding season, divers leave their breeding lochs and lochans and move to inshore areas all around the UK coasts - to sheltered bays and firths on the east and west coasts as well as sealochs in the north-west. These concentrations, some of which are of international importance, consist initially of moulting birds (red-throated diver) that later remain through the winter to exploit inshore feeding resources. Some moulting aggregations of international importance form in spring (all three species).

Seaduck: After the breeding season, and through the winter, very large concentrations of seaduck occur predictably at a discrete number of important

locations, such as bays and wide firths. After the breeding season these concentrations comprise birds that are moulting, but concentrations may reform in different locations later in the season, and overwinter to exploit rich food sources, such as shellfish beds.

Seabird aggregations at sea

Aggregations of seabirds away from breeding colonies are usually associated with concentrations of food. Banks of, usually, medium-grained sand in shallow (<150m deep) water are particularly important for many species that exploit adult sandeels, which overwinter in the sand. Young sandeels are more dispersed than adults, shoal over a wider range of substrates, and are available to seabirds in the water column between May and August. Other mid-water or surface-shoaling fish (herring, sprat, mackerel) are highly mobile and less predictable in their occurrence away from spawning grounds. Various oceanographic features may concentrate seabird prey indirectly or directly, usually outside of winter. These include tidal and other rips, currents and upwellings, for example at shelfbreaks, and fronts. Fronts form predictably at several locations around the UK coasts outside winter and but usually do not attract great numbers of seabirds. Inshore kelp beds are an important habitat for black guillemots.

Existing or Potential Activities Threatening High Seas Birds

For aggregations of seabirds, including at seabird breeding colonies, the main threats are:

i. fishing activity causing reduction of prey species and/or reduced breeding success (e.g. sandeels, shellfish inshore);
ii. oiling, or other chemical contamination, due to spillage from motor vessels, from oil and gas exploration and production activity;
iii. drowning of seabirds in set nets, gill nets or other fishing gear;
iv. disturbance from recreation or other sources, in inshore areas used by seaduck and divers, and near to breeding colonies.

A number of other activities and developments have the potential to cause problems. For example, proposals for offshore windfarms have caused recent concern.

It is difficult to assess the extent of the impacts of these threats on seabird populations in practice; many of the problems are local in nature, and some of them are probably acting in concert. Seabird colonies are also subject to land-based threats.

Mechanisms for Conservation of High Seas Birds Around the UK

Existing mechanisms from 12 to 200 nautical miles from baseline:

Nature conservation legislation

There is currently no existing UK legislation in this zone directly relating to seabirds. The only legislation directly relevant to nature conservation in the 12 to 200 nautical mile zone is a prohibition on the use of any ship for the whaling of any species of cetacean.

Up until now, SPAs designated by the UK under the EC Birds Directive (79/409/EEC) have not extended below mean low water (England and Wales) or mean low water springs (Scotland). UK implementing legislation for the Habitats Directive (92/43/EEC), which also implements certain aspects of the Birds Directive, currently applies only within UK territorial waters. However, as a result of a judicial review in December 1999, the UK government are now drafting and/or amending Regulations to implement the Habitats and Birds Directives in UK offshore waters (12-200 nm from baseline). The UK Joint Nature Conservation Committee is now working on a project to select SPA sites for submission to UK government and ultimately the EC, for the protection of high seas birds in the 12-200 nm offshore zone.

Fishing activity

Through EC Council Regulations, closed areas for certain types of fishing activity can be established within the 12 to 200 nautical mile zone, for example the 'mackerel box' off south-west England and Wales. In December 1999, the EU Fisheries Council adopted proposals to close the sandeel fishery off the east coast of Scotland. These proposals were based, in part, on the European Seabirds at Sea database (indicating which areas hold the highest concentrations of birds vulnerable to decreases in sandeel availability) and partly on information from the UK Seabird Monitoring Programme on seabird breeding success. These measures are the first EU fisheries measures based on seabird information.

The need for measures to regulate fishing between 12-200 nautical miles to be taken by the European Commission is seen as a constraint on the effective regulation of fisheries activity for environmental purposes. However, the UK legal ruling that the Birds and Habitats Directives extend out to 200 nautical miles, places the Commission in the position of being required to ensure action is taken to implement its own Directives.

Oil and gas exploration and production

Below low water mark, the oil and gas exploration and production is regulated through the licensing procedure operated by the UK Department of Trade and Industry. The Petroleum Act 1998 vests ownership of the petroleum resources of Great Britain and the UK territorial sea in the Crown and grants the government rights to issue licences which extend over the UK Continental shelf. Operators are strictly controlled. Environmental assessment for petroleum extraction projects likely to have a significant effect on the environment is required under the offshore Petroleum Production and Pipelines (Assessment of

Environment Effects) Regulations 1999, which again cover the UK Continental shelf. The UK government Department of Trade and Industry have also issued proposals for Offshore Petroleum Activities (Conservation of habitats) Regulations, which would implement the EC Habitats Directive as far as oil and gas activities are concerned, in UK offshore waters.

The UK government advisors on nature conservation (JNCC and country agencies) comment on all proposals for oil and gas exploration and production licences. Their advice is followed by the UK licensing authority in the vast majority of cases. The present regulatory mechanisms are working well in the UK and the operation of the oil and gas industry is being well regulated. There have been significant incidents involving release of oil in UK waters but, despite this, there have been very few cases of proven harm to nature conservation interests from this industry occurring in the marine environment.

Oil and chemical spillage and discharges

The discharge of oil from ships in UK waters is controlled by Regulations made under the Merchant Shipping Act 1995 (now amended by the Merchant Shipping and Maritime Security Act 1997). These Regulations implement the relevant provisions of international treaties (in particular MARPOL 73/78) and control the discharge from a ship of 'oil or any mixture containing oil'. Remedial action to deal with accidentally discharged oil or chemicals is co-ordinated at sea by the UK Maritime and Coastguard Agency's Counter Pollution Branch, and, where the oil reaches land, by the appropriate local authorities.

The illegal discharge of oil wastes from ships continues to be a problem, there have been numerous cases of illegal spillage, cleaning out of tanks, dumping at sea etc. However, detection and enforcement measures, and the ability to receive such wastes by port facilities, are constantly improving. Spillages resulting from accidents to ships also remain a problem.

The deposit of substances (including potentially polluting substances) at sea is covered by the Food and Environment Protection Act 1995, which requires a licence to deposit substances and articles within United Kingdom waters or UK controlled waters.

Regulation of navigation

MEHRAs proposed by the Lord Donaldson's Inquiry following the *Braer* accident, are currently being consulted upon by the UK Government. These are designed to alert mariners to particularly sensitive areas for wildlife, such as import seabird aggregations vulnerable to pollution from ships, and are intended to afford greater protection from risks posed by oil or chemical spills. However, MEHRAs will be non-statutory, and the criteria for identifying them are still under discussion within UK government departments, in consultation with UK conservation agencies.

A number of statutory forms of navigation control exist in nearshore waters in order to reduce the risk of accident. These range from pilotage schemes for most harbours to compulsory ship routing schemes in areas of high shipping density. Some areas have been designated Areas to be Avoided for certain categories of shipping (e.g. tankers near

Shetland). The existing international rights pertaining to innocent navigation mean that all such schemes have to be agreed by the IMO.

There is no experience on which to base an evaluation of MEHRAs, though they are likely to prove beneficial. On the whole, however, regulation of the use of the sea by ships and smaller craft is one of the weaker areas of control, and accidents leading to oil spills, and disturbance to wildlife, look likely to continue.

Current Initiatives for the Protection of Marine Wildlife

OSPAR

OSPAR is the international Convention for the protection of the marine environment of the North-East Atlantic. Following agreement arising from the North Sea Ministerial process that OSPAR take a lead in formulating a marine habitat classification for the NE Atlantic, and also in formulating proposals relating to marine protected areas outside territorial waters, OSPAR, in 1998, adopted a new Annex V to the Convention which enabled it to fulfil this role. Since that time, OSPAR has undertaken work on a number of themes, including:

i. developing a marine habitat classification (in collaboration with ICES and EEA);
ii. the identification of biogeographic sub-regions (in collaboration with ICES and EEA);
iii. developing an approach to the conservation of threatened species and habitats outside territorial waters, including the establishment of marine protected areas.

It is anticipated that OSPAR will develop recommendations in relation to the conservation of threatened habitats and species, and that these could have some relevance in relation to aggregations of seabirds (measures to protect sandbanks, and in relation to some seabird species, e.g. Manx shearwater and black guillemot). In practice, it seems probable, following the judicial ruling on what constitutes the European territory of a Member State, that the existing Birds and Habitats Directives will provide the implementation mechanism for this within the European Union.

UK Government review of marine nature conservation

The UK Government is conducting a Review of Marine Nature Conservation. The aims of the review are to evaluate the success of previous statutory and voluntary marine nature conservation measures, and to make practical and proportionate proposals for improving marine nature conservation in England, which may also inform separate proposals for Wales.

The Review focussed initially on marine nature conservation between 0-12 nautical miles from baseline, but is now expanding its remit out to 200nm. It will take account of, but not seek to duplicate international, European and national marine conservation initiatives. Recommendations are likely to include changes to current legislation to facilitate marine conservation in England and Wales, including the implementation of Biodiversity Action Plans for marine habitats and species.

UK Biodiversity Action Plans

Only two species of seabird are included in the current Species Action Plans (common scoter and roseate tern) under the UK Biodiversity Action Plan. These species and others are likely to benefit as a consequence of these plans and other marine BAP activity, for example actions taken under the Sublittoral Sands and Gravels Habitat Action Plan are likely to benefit seabirds.

Existing Regulatory Mechanisms Available for Controlling Threats to Bird Aggregations: Within Uk Territorial Waters (12 nm from baseline)

Conservation (Natural Habitats, & c.) Regulations, 1994

Areas listed as Special Protection Areas for birds (and also SACs) are covered by the mechanisms for implementing the Habitats Directive in the UK (the Conservation (Natural Habitats, & c.) Regulations, 1994 in Great Britain and analogous Regulations in Northern Ireland). These Regulations currently only apply only within territorial waters, but, as mentioned above, are currently being implemented in the offshore zone.

Wildlife and Countryside Act 1981

Section 36 of the 1981 Act enables the Secretary of State, by order, to designate areas of intertidal land and sea within territorial waters as Marine Nature Reserves. Such reserves may be established for the conservation of marine flora or fauna, or earth science, features of special interest, or for providing special opportunities for the study of, or research into, such features. Section 37 of the Act enables the country agencies, with the consent of the Secretary of State, to protect such reserves with bylaws.

For a number of reasons, most notably perhaps the lack of any obligation to establish Marine Nature Reserves, the legislation has not proved successful. Only three Marine Nature Reserves have been established in the UK since 1981 (principally for their marine biological interest), and the bylaw-making power has proved of limited value. The policy requirement of Government to secure support from all Parties has proved a major obstacle. Where Marine Nature Reserves have been established, however, conservation benefits have accrued but primarily as a result of better management planning and more intensive conservation effort.

Section 1 of the 1981 Act prohibits the intentional killing, injuring or taking of any wild bird (including any seabird) within Great Britain or territorial waters. Offences relating to birds

listed on Schedule 1 (includes all divers, black-necked and Slavonian grebes, Leach's petrel and a number of species of gull, seaduck and terns) are subject to a special penalty.

The main limitation on the protection afforded by Section 1, is that a person will not be guilty of an offence if he shows the act was an incidental result of a lawful operation and could not reasonably have been avoided. Deaths resulting from incidental take by fishing gear, or due to oiling, could fall under this defence.

Section 3 of the 1981 Act enables the Secretary of State to make by Order an Area of Special Protection for Birds. Such an order can *inter alia* prevent access to the Area, or part of it, by the general public. This power extends over territorial waters. It has been used in a small number of specific cases.

Areas closed to fishing

Between baseline and 6 nautical miles from baseline, a number of UK authorities may designate areas and make bylaws for the protection of fisheries, usually for the protection of a commercial fish species, or the spawning or nursery grounds of a species, or a particular fishery. There are also areas closed to particular types of fishing gear, including seine nets, fixed nets and drift nets. However, no closed area has yet been established for fisheries purposes which excludes all forms of fishing. Nonetheless, under the Conservation etc Regulations (see above) these powers can be used in support of the objectives of the Habitats Directive, including those relating to the protection of SPAs.

Fishing activities are excluded from certain ports occupied by the Royal Navy, and fishing vessels are also excluded from sea artillery ranges while these are in use. Towed fishing gears may not be used within 412 historic wreck sites, and fisheries activity is effectively excluded in safety zones around oil and gas installations. Benefits of these measures for aggregations of seabirds are, however, mainly indirect.

There is some information available on the effects of areas closed to fishing on seabed communities but there is little information available on the subsequent effects on fish stocks using these areas. It has been argued, from UK data, that while protected areas are beneficial to protect fish nursery areas, the protection of spawning areas is of limited use if the fish can be caught outside the area. The Regulations which transpose the Habitats Directive into UK law, in relation to plans and projects do not yet cover fisheries, and this is causing some problems.

Protection for Birds on the High Seas[1]

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The true high sea birds are the albatrosses and petrels, gliding with only a few beats of their wings close above the ocean surface, effortlessly using the wind patterns above the waves. They feed on fish and invertebrates from the ocean surface, dipping their heads into the water. Some petrel and shearwater species can dive to depths of 40 metres or more and may catch their bait totally submerged. During breeding times they search for food hundreds to thousands of kilometers away from their nesting colony and non-breeding individuals are observed on the high seas thousands of kilometers from their breeding colonies. Owing to the impact of human activities the albatrosses are one of the most threatened families of migratory animals having the highest proportion of threatened species in any bird family with more than a single species (Croxall and Gales 1998). According to the latest IUCN *Red List of Threatened Species* 16 of the 24 albatross species are listed as threatened.

With this account we concentrate on the three albatross species living in various regions of the North Pacific Ocean, listed with some characterictics in Table 1. However, the main results on human threats to albatrosses can be extrapolated to other species inhabiting other ocean regions.

Table 1: Some Data on North Pacific Albatross Species

Albatross Species	Number of World Population	Change in Breeding Pairs	Remarks
Short-tailed	1200	+ 7% p/a	Recovering from near extinction in the 1940s
Black-footed	300 000	- 9.6% during 1996 – 2000	75 % of world population observed
Laysan	24 Mill.	- 30 % during 1992 - 2000	90 % of world populationobserved

Whereas the black-footed and the Laysan albatrosses exhibited a strong reduction in the number of breeding pairs during the preceding five to ten years, the short-tailed albatross was nearly extinct in the 1940s due to the feather trade and volcanic activities of southern

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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Japanese islands, and is now slowly recovering due to a cessation of the feather trade.

Human threats to albatrosses are nummerous, and those encountered by these birds on the high seas are the ingestion of plastic debries drifting in the ocean surface, organochlorine and heavy metal uptake with bait, and the most important one, the loss of specimens through longline fisheries. The bait on the hooks at the end of the branch lines remains for some time drifting and visible in the water surface. Albatrosses may swallow the bait and get hooked. Since most specimens get caught during paying out the longline, the hooked birds are being pulled under the water and drown. Albatross caught during hauling may be released from the hook and may survive. Occasionally, the smaller diving petrels may bring a bait back to the surface. Because the bait is too large for them to swallow, they may tear off a piece of it, but the larger and more aggressive albatross may swallow this same bait and become hooked.

Quantitative assessments of bird bycatch in longline fisheries are rare. An extrapolation from data from US fisheries (Cousins, et al, 2001, Gilman 2001) allows a rough estimate of an annual loss of 35, 000 North Pacific albatrosses in pelagic longline fisheries. Approximately equal numbers of Laysan and black-footed albatrosses are observered to be killed in North Pacific longline fisheries. Since the total population of the latter species is about one tenth of the Laysan, the black-footed albatross is severely more impacted. With 44 000 albatrosses per year a similar figure is reported by Bergin (1997) alone for the Japanese southern bluefin tuna longline fishery operating off Tasmania. It is also estimated that the illegal, pirate Patagonian toothfish fisheries in the Southern Ocean alone may have killed approximately 145,000 seabirds in a single year (Thomas, 2000). Of the order of two hundred thousand seabirds and tens of thousands of albatrosses each year are being taken incidentally in several commercial longline fisheries worldwide, jeopardising the continued existence of some albatross and other petrel species (Brothers, et al., 1999; Brothers, 1995; Bergin, 1997; Gilman, in press).

These direct losses of albatrosses are accompanied by starvation and death of albatross nestlings in their breeding colonies. In many albatross species both parent birds are necessary for sufficient feeding of the young. Thus, the primary loss of adults through longline fisheries is followed by an unknown figure of secondary loss of nestlings. Population modeling exercises indicate that the current recruitment rate of black-footed albatross is likely below that required to maintain stable populations. Mortality rates of this species seems to severely threaten its population sustainability and bycatch in longline fisheries also poses a significant threat to the Laysan and short-tailed albatrosses. This situation is expected of species exhibiting long life cycles and low reproductive rates.

Numerous albatross and other petrel species are reported to be threatened with extinction in large part due to interactions with longline fisheries (Brothers *et al*., 1999). Albatross species must be regarded as severely threatened, and it is surprising that measures for their protection have not been installed earlier.

Under the workshop aspect of "Marine Protected Areas on the High Seas" it becomes evident that in accordance with the population biology of albatrosses the concept of MPAs should not be an effective measure to address problems associated with interactions

between seabirds and longline fisheries. The area of protection would need to be very large, it would become necessary to abandon or reduce fishery activities at least for certain seasons and to effective control systems. Furthermore, there are significant legal constraints that would make it extremely difficult and require a significant amount of timeto establish a high seas MPA to protect seabirds from interactions with longline vessels. Because certain species of albatrosses and other petrels are immediately threatened with extinction due in large part to their mortality in longline fisheries, high seas MPAs do not present the requisite vehicle to address this problem on a short time scale. The adoption of legally binding accords and development of seabird mitigation measures through collaborative efforts by industry, government, and fishery bodies, promise needed timely solutions to address problems associated with seabird and longline interactions (e.g., Cooper, 2000; New Zealand Department of Conservation, et al., 2000; Gilman, 2001 in press).

Table 2 summarizes the effectiveness for some of the deterrent measures investigated. It becomes evident that techniques exist to severely reduce the bycatch of albatrosses in longline fishing. Even the application of only one of the methods would result in effective bird loss reduction, and the combination of various methods would be the measure of choice for the protection of albatrosses, yet the establishment of MPAs on the high seas to protect important seabird foraging areas and reduce the threat of mortality in longline fisheries is much less likely to be achieved in time to prevent permanent loss of some seabird species.

Table 2: Effectiveness of Selected Seabird Deterrent Measures in Hawaii-based Long-line Fisheries

Method of bird-catch reduction	**Reduction (%) in**	
	Black-footed Albatross	Laysan Albatross
Strategic offal discharge	83	91
Longlines set at night	95	40
Blue-dyed squid as bait	95	90
Weighted branch lines	93	91
Line setting by machine + weighted branch lines	95	97

The UN FAO's International Plan of Action for Reducing Incidental catch of Seabirds in Longline Fisheries is a voluntary plan that holds much promise to resolve the seabird bycatch problem. The plan calls on all States to conduct an assessment of longline fisheries to determine if a seabird bycatch problem exists. If a problem exists, States are then encouraged to develop a National Plan of Action (FAO, 1999). While eleven countries and the European Community have reported that they have made or are in the progress of making a decision to produce a National Plan of Action, several additional countries with

longline fisheries known to kill numerous seabirds have not declared an intention to prepare a National Plan of Action. Also, a number of conventions and agreements exists that aid in the protection of albatrosses and other seabirds on the high seas. The most promising multilateral accords to address the problem of seabird bycatch in longline fisheries are the *Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Central and Western Pacific Region*, which establishes a regional mechanism for the conservation and management of highly migratory fish stocks in the central and Western Pacific Ocean and obligates Contracting Parties to adopt measures to minimize catch of seabirds; the *Agreement on the Conservation of Albatrosses and Petrels*, prepared under the auspices of the Convention on Migratory Species, provides a comprehensive framework to conserve Southern Hemisphere alba-trosses and petrels, and has the capability of expansion to cover the three North Pacific albatrosses; the *United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks* includes measures to conserve non-target species, including seabirds; and the *Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing the High Seas* obligates contracting parties to ensure that fishing vessels flying their flags do not engage in activities that violate international treaties (Gilman, 2001). None of these accords have yet to enter into force.

A fair chance exists that the deterrent techniques will be applied to reduce albatross death by longline fisheries. Fishermen experience considerable loss of bait and reduction of catch rates due to unbaited hooks. The total loss in revenue by seabird interaction with longlining was estimated in 1989 to fall in the order of seven million Australian dollar only in the Japanese tuna longline fishery in the Australian fishing zone during 1989 (Brothers 1991, Bergin 1997). This loss in profit should force the installation of deterrent techniques on the fishing vessels.

The results of this short summary, particularly for the North but extrapolatable to the Southern Hemisphere, demonstrates that albatrosses and other petrels suffer under severe threat from longline fisheries. However, these birds may be protected by the application of various measures on the fishing vessels to reduce the bycatch rate, and conventions and agreements are available which should help minimize the losses of these birds. Under these aspects the protection of albatrosses and petrels to address mortality in longline fisheries by the establishment of MPAs on the high seas is not feasible due to the urgency of the problem and the expected inability to quickly establish high seas MPAs to address the problem in time to prevent species extinctions.

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Background Paper on Deep-sea Hydrothermal Vents[1]

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Introduction

The discovery of chemosynthetic-based ecosystems at hydrothermal vents in the deep ocean was arguably one of the most important findings in biological science in the latter quarter of the 20th century. More than 500 new animal species, most of which are endemic to the vents, have been described from this environment. Unusual, highly-evolved symbioses between invertebrates and chemolithoautotrophic bacteria are common at vents, and can produce concen-trations of biomass that rival the most productive ecosystems on Earth. The abundance of chemoautotrophic and hyperthermophilic microbes in hydrothermal vent waters has stimulated new theories of the origin of life on Earth. It has also prompted astrobiologists to seriously consider geothermal energy as a viable power source for biosynthesis and maintenance of carbon-based life forms on other worlds. Subsequent deep ocean exploration have revealed similar chemo-synthetically-based communities at geologically-controlled seeps along active and passive continental margins and in association with seabed hydrocarbon reservoirs.

Hydrothermal Vents

Plant life is impossible in the total darkness of the deep sea and food resources are consequently rare. Most deep-sea food chains are nourished by organic debris that sediments down from surface waters where phytoplankton carry out photosynthesis. Only a very small fraction (1% or less) of this surface productivity reaches the deep ocean floor. As a result, animal life is very scarce. The discovery of luxuriant oases of giant worms, clams and mussels clustering around hydrothermal vents >2000m deep came as a complete surprise to biologists who scrambled to identify the food source for this unusual ecosystem. Vent faunal biomass, measured as kg tissue/m^2, can be 500 to 1000 times that of the surrounding deep sea, and rivals values in the most productive marine ecosystems such as shellfish cultures (Sarrazin and Juniper 1999). Another surprise to biologists was the novel nature of the vent organisms, most previously unknown to science and many exhibiting unusual adaptations to the severe, potentially toxic nature of hydrothermal fluids. High animal density and the presence of unusual species are now known to be common

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characteristics of deep-sea hydrothermal vents all over the globe, with the composition of the fauna varying between sites and regions.

The presence of hydrogen sulphide in hydrothermal fluids and an abundance of sulphide-oxidizing bacteria were the first clues that led to the development of the hypothesis whereby biological productivity at hydrothermal vents is sustained not by photosynthetic products arriving from the sunlit surface ocean, but rather by the chemosynthesis of organic matter by vent microorganisms (Corliss et al. 1979), using energy from chemical oxidations to produce organic matter from CO_2 and mineral nutrients. Hydrogen sulphide and other reducing substances present in hydrothermal fluids provide the 'fuel' for organic matter synthesis. Since hydrothermal fluids are formed by reaction of seawater with hot rock, researchers quickly realized that vent ecosystems were ultimately powered by heat from the earth's mantle. This was a startling conceptual challenge to the long held view that all of our planet's ecosystems require sunlight and photosynthesis to create new biomass and nourish animal food chains.

Vent ecosystems are not completely independent of sunlight. All animals and many microorganisms at vents require dissolved oxygen for their metabolism. Since dissolved oxygen in the world's oceans is a byproduct of photosynthesis, there is a critical biogeochemical link between the vent ecosystems and the photosynthetic ecosystems in the upper layers of the sea and on land. Had photosynthesis not evolved on earth, hydrothermal vents would only be populated by micro-organisms that do not require dissolved oxygen - such as methanogens that derive energy for growth by converting hydrogen into methane using CO_2 as an oxidant.

At vent openings, local ecosystems are nourished by microbial growth that is coupled to the oxidation of H_2S, CH_4, H_2, Fe, Mn and other reducing substances. A recent thermodynamic modeling study (McCollom and Shock 1997) identifies hydrogen sulphide (H_2S) as the most important potential energy source for microbial growth in seafloor hydrothermal systems. Since both H_2S and dissolved oxygen are usually available in the mixing zone around vent openings, it is not surprising that the most visibly dominant forms of microbial growth around vent openings are dependent on hydrogen sulphide oxidation. What is unusual is the diversity of sources and locations of chemosynthetic activity within the hydrothermal system.

At vent openings, some chemosynthetic microorganisms live in symbiotic associations within the tissues of giant worms and bivalves (Nelson and Fisher 1995), converting CO_2 into organic matter to nourish themselves and their hosts. Others grow freely as biofilms and filamentous mats on mineral and animal surfaces, providing food for grazing and deposit feeding animals. Predators and scavengers - some vent specialists, others attracted from the surrounding deep sea - complete the food web. It is likely that at least some biological productivity from seafloor vents is exported to the surrounding deep sea through predation and advection of organic detritus but this food pathway remains unquantified.

Microbial chemosynthesis also occurs in subsurface hydrothermal conduits (Deming and Baross 1993), and in the plumes of diluted vent fluids (Winn et al. 1995) that overlie vent fields, but faunal exploitation of microbial biomass produced in these two environments has

not been extensively examined. Interaction between biological and geochemical processes has been most clearly documented in hydrothermal plumes. For example, recent studies show that oxidation of dissolved manganese in hydrothermal plumes is mostly microbially mediated (Winn et al. 1995, Cowen and Li 1991). High concentrations of zooplankton at the upper boundary of hydrothermal plumes in the northeast Pacific indicate that plume productivity may feed plankton food chains in the water column (Burd and Thomson 1997); this remains to be quantified.

It is worth noting that meiofauna (animals smaller than 0.5mm) have rarely been sampled at hydrothermal vents, although data from several sites indicate that densities of meiofauna are high compared with the surrounding seafloor and that meiofauna species make a major contribution to total biological diversity at vents.

Seep Ecosystems

Although hydrothermal vents have attracted most interest, animal assemblages at least partly dependent on chemoautotrophic production have been found associated with a variety of continental margin “seeps”, where fluids diffuse from the seafloor. Compared to hydrothermal vents, seep flow rates are usually slow and temperatures are only slightly different from the surrounding seawater. Seep discharge is controlled by geological phenomena such as tectonically induced high pore fluid pressures, natural petroleum or natural gas leaks, artesian flow, and catastrophic erosion or submarine slope failures. Subduction zone seeps occur on geologically active (i.e. tectontic plate movement) continental margins. In this setting, the compression of oceanic sediments against the overriding continental plate creates deep overpressure zones where water within the sediment is forced out along faults. On passive continental margins, "salt tectonics" can create conduits for seeping fluids. For example, in the deep waters of the Gulf of Mexico, ancient salt deposits lie below sediments where hydrocarbons and methane have accumulated. Salt being lighter than compacting sediment, it tends to push upward as a salt dome, creating deep cracks in the sediments through which gasses and petroleum escape at the seafloor.

Seep fluids are rich in methane, produced by microbial or thermal degradation of organic matter in deep subsurface sediments. Migrating seep fluids can be enriched in hydrogen sulphide in near-surface sediments by microbial sulphate reduction coupled to methane oxidation (Martin et al. 1996)

Seeps exhibit a fauna taxonomically similar to that of hydrothermal vents – vestimentiferan tubeworms, vesicomyid and mytilid bivalves, and there is evidence of their use of carbon from methane, through symbiotic bacteria (Gage and Tyler 1991).

Cold-seep areas that have so far been studied are at depths ranging from 400 to 6000 m in the Atlantic and the Eastern and Western Pacific and in the Mediterranean Sea; they occur in different geological systems, some on active and some on passive margins. Sibuet and Olu (1998) review the biogeography, biodiversity and fluid dependence of the communities at 24 deep cold seeps. The dominant cold-seep species are large bivalves (families

Vesicomyidae and *Mytilidae*) but there are symbiont-containing species of other bivalve families, Pogonophoran worms, and sponges. Unlike hydrothermal vents, specialised carnivores have not been reported in high abundance. Most of the symbiont-containing cold seep species are new to science. A total of 211 species were listed by Sibuet and Olu (1998). Of these 147 are non-symbiont-containing species (and some of the symbiotic species retain functional digestive tracts, unlike some of their related species from hydrothermal vents). Many appear to be opportunistic scavengers, capable of living away from seeps. From the data they reviewed, only 13 species occur at both cold seeps and hydrothermal vents. The species richness of cold seep communities decreases with depth, but at several seep sites there is high diversity compared with hydrothermal vents; this may be explained by the greater longevity of seep habitats. It appears that some species are likely to be endemic to cold seeps but Sibuet and Olu (1998) caution that it is too soon to evaluate the endemicity or other aspects of biogeography in these little-studied systems.

As at hydrothermal vents, meiofauna have rarely been sampled at cold seeps, and there are preliminary indications that densities of meiofauna are high compared with seafloor away from the seeps.

Assemblages of animals similar to those of cold seeps have been recorded from the carcases of whales lying in deep water, and within the wood of shipwrecks (Tunnicliffe et al., in press).

Why Protect Vent and Seep Ecosystems?

Deep-sea hydrothermal vents and seeps not only contain a large number of endemic and unusual species but are also refuges for close relatives of ancient forms of life. Hydrothermal vents in particular show a unique range of habitat diversity such that adaptations of organisms to some niches are not, today, paralleled at other sites on the planet. Vent organisms have the genetic potential to grow and survive in an extreme range of conditions which were formerly present at various times on Earth over millions of years.

We still have only a basic knowledge of fundamental biological systems and physiological processes, including the early evolution of animal cells. A very wide range of life forms can be studied at hydrothermal vents and seeps, contributing to a better understanding of basic life processes. The study of these organisms is also opening our minds to previously overlooked biological phenomena elsewhere on the planet. For example, the realisation that many vent animals lived on chemo-synthesis via symbiotic relationships with bacteria directly led to the discovery of similar associations in near-shore sediments world-wide.

Vent ecosystems, because they are visually spectacular, extreme environments, have generated widespread public interest and so are a resource which can be used to inform the public about earth processes and the way in which scientists work.

Impact of Scientific Research

Hydrothermal vent science is now in its third decade of discovery. More than 100 vent fields have been documented along the 50,000 km global mid-ocean ridge system. Research focus is shifting to time series observations, and long term studies are being undertaken by organisations in several countries. These latter developments are resulting in the concentration of sampling, observation and instrumentation at a small number of fixed 'observatories'. Hydrothermal faunal communities occupy very small areas of the seafloor and many sites contain animal species found nowhere else. Already, effects of biological and geological sampling operations on vent faunal communities have been documented (Tunnicliffe 1990, Sarrazin *et al*. 1997), creating potential conflict with the needs of purely observational investigations. Concern about the impact of scientific research at vents goes beyond the resolution of conflicts between different styles of investigation. Species conservation and environmental stewardship are also issues of particular concern to vent scientists. As vent sites become the focus of intensive, long-term investigation, it will become essential to introduce mitigative measures to avoid significant loss of habitat or oversampling of populations.

Effects on intensive scientific research are not a present concern at seeps as few sites are subject to frequent visits, with the exception of those in the Gulf of Mexico where seep habitat occupies large areas of the seafloor and sampling effects or scientific use conflicts have not been reported.

Eco-Tourism

The spectacular nature of black smoker chimneys and abundant animal life under extreme conditions are draws for eco-tourism. In the summer of 1999, a Seattle-based tour operator, in collaboration with Russian scientists, staged a series of joint science-tourist dives to the Rainbow hydrothermal fields of the Mid-Atlantic Ridge using the Russian Mir submersibles. The dives were conducted in inter-national waters without need for clearance by any governing body concerned with the protection of vent habitat or biodiversity. More tourist dives (and souvenir collection) are likely to follow. Seep sites have yet to be the object of tourism.

Deep-Sea Mining

Currently 99% of extracted minerals come from the 29% of the world that is land. Reserves of many metals, such as copper, are being depleted at a greater rate than new reserves are being discovered and mining companies are now seriously investigating the possibility of mining marine metal sulphide deposits, including chalcopyrite ($CuFeS_2$) deposits which have been formed at hydrothermal vents. Marine technology has advanced to the point that engineers are now confident that mining machines can be constructed to work at several thousand metres water depth. There are some apparent environmental

advantages in mining on the seabed; for example there will be no acid mine drainage. There are also economic advantages - a large mining ship or barge would be mobile and could be moved from one ore deposit to another. This is not possible with the mining infrastructure on land. In addition, the legal problems of tenure are fewer and theoretically less complex than on land.

At present, Nautilus Mineral Corporation currently has a license, from Papua New Guinea, for the exploration of polymetallic sulphide deposits at all hydrothermal sites in the East Manus Basin. Neptune Resources have an exploration license in the Havre Trough in the New Zealand EEZ. Other sites of potential interest are the Woodlark Basin, the Okinawa Trough and the the Bonin area in the Western Pacific, the Atlantis II Deep in the Red Sea, and Middle Valley and the Explorer Ridge in the Northeast Pacific. The majority of sites of initial mining interest are likely to be in Back Arc areas. Initially massive sulphide mining is likely to occur within EEZs since regulations, under the Law of the Sea Convention, for claims and exploitation in The Area, the seafloor of the High Seas, are not in place. The International Seabed Authority has drawn up regulations for claims to recover manganese nodules and for their exploration, and held a workshop in June 2000 to consider regulations for polymetallic sulphides.

Mining activities in the coming decades are likely to be concentrated in very limited areas where polymetallic sulphide deposits of commercial size are known to occur. Extracting ore will result in removal of the substratum and production of a plume. Some organisms will be directly killed by mining machinery, while others nearby risk smothering by material settling from the plume. Individuals surviving these perturbations would be subject to a radical change in habitat conditions with hard substrata being replaced by soft particulates settling from the mining plume. These particulates could also clog hydrothermal conduits, depriving established vent communities of their vital fluid supply. Removal of sections of the sulphide deposits will also change the subsurface hydrology beneath the vent openings, possibly decreasing or stopping hydrothermal fluid flow to remaining vents. At sediment covered hydrothermal sites, where much of the ore body lies within a sediment overburden, digging out the deposit would produce a much more extensive plume that could completely eradicate the local vent fauna.

It is not currently possible to predict how rapidly sites may recover from mining operations. This will in part depend on the extent to which local sites of hydrothermal vent fauna have been destroyed and also on whether there are other sites within larval recruitment range to allow re-colonisation of suitable sites. It is important to realise that the long-lived vent fields that host the largest mineral deposits are likely to be the most ecologically stable and have the highest biodiversity. Such sites may be regional sites of species origin and dispersal.

Exploitation of subsea petroleum reservoirs in proximity to seeps is already underway in the Gulf of Mexico. The nature of platform-based oil exploration and production tends to limit disturbance to local and widely-spaced effects. A more widespread impact may come from the exploitation of subsurface gas hydrate deposits. These reserves of methane ice occupy significant volumes within the seabed of continental margins worldwide. Recent global estimates of gas hydrate reserves greatly surpass total known world petroleum reserves.

Although exploitation of subsea gas hydrates is probably many decades away, their extraction could involve large scale disturbance of the seabed and consequent effects on seep communities.

The Way Forward

There is no imminent threat to the global vent or seep faunae from science, tourism, mining or any other human activity. Concentration of activities at certain sites could, however, produce local and even regional effects on biological processes and organism abundance, to the point where the scientific value of the site could be compromised and, eventually, the survival of some species could become an issue. Management or protection of all of the world's marine hydrothermal and seep sites is an unrealistic goal. Discussions should focus instead on the criteria for identifying sites for future protection that are of critical importance, or particularly sensitive to disturbance, because of their scientific value or their significance for species survival.

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Unique Science and Reference Areas on the High Sea[1]

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Arguments for the protection of selected areas are generally based on endangered species, reduced biodiversity or disturbed communities. The contributions presented during this workshop on fish (Fonteneau, Gordon), deep-water corals (Grehan), birds (Johnston), seamount communities (Koslow) and hydrothermal vent communities (Juniper) all fall into these categories.

It is important to note that various high sea fisheries are the essential disturbing agents in all these cases except for the vent communities.

However, additional arguments exist for the establishment of reserved areas. Those areas may be termed collectively "monitoring and science areas". Their common purpose is their availabilty for long-term research activities.

Stable Reference or Monitoring Areas (SRAs)

The concept of SRAs was first suggested during an IUCN conference at Ashkhabad in 1978, and it was further discussed by the Ocean Policy Board of the National Research Council of the US National Academy of Sciences (NRC 1984). These discussions were stimulated by the development of polymetallic nodule mining from the deep sea, and it was concluded that two categories of SRAs should be established:

- The Preservational Reference Area (PRA) to serve as a reference area for the natural community development in undisturbed regions, and
- the Impact Reference Area (IRA) to monitor community development after severe disturbance by polymetallic nodule mining.

Both areas must be of sufficient size for a monitoring programme lasting about two decades. Ecologically they must be similar to mining areas in the wider vicinity, and this pertains to physical, sedimentological and topographical characteristics, and also to the seafloor community. The PRA should be undisturbed by all mining activities, and this is the same for the IRA following the primary disturbance by mining.

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For the last two decades the concept of SRAs has been dormant, since industrial nations stepped back from further developments in deep-sea mining. Certainly, they are not forgotten; now and then they re-appear in discussions. The concept and the need to establish them are known to the International Seabed Authority (ISA), however, the development of the mining code was restricted in its first phase to exploration activities of polymetallic nodule mining , and the code for commercial mining will be considered in the future. This must include discussions on PRAs and IRAs, where they should be established and to which extent the scientific and monitoring activities are to be conducted by the mining contractors. Debate on the number of SRAs is ongoing. One PRA and IRA each should be established in or close to the Indian and the German mining claims in the central Indian Ocean and the Peru Basin in the Southeast Pacific Ocean, respectively. In the North Pacific Ocean, where most of the claims are lined up in the Clarion Clipperton Fracture Zone, probably four PRAs and four IRAs are sufficient throughout this region.

SRAs can and will be established through regulations by the ISA, having the responsibilities for environmental protection of the Area in relation to seabed mining. The establishment of preservational areas outside the mining claims needs special regulations to result in internationally accepted protection measures.

Unique Science Priority Areas (USPAs)

Actual and potential uses of the deep sea, particularly in the Area are listed in Table 1. Dumping of low level radioactive wastes, sewage sludge and redundant munition occurred, and further final storage of waste products is being discussed e. g. for carbon dioxide. No ethical argument can be brought forward for land storage versus deep-sea disposal, and a weighted ecological evaluation may argue for further deep-sea dumping in the future, although regulations like the London (Dumping) Convention exist (comp. Thiel et al. 1998).

A decision for an area where ocean disposal should be conducted should be based on ecological arguments and the transport of dissolved waste products with the predominant currents. Economic considerations will be of importance in such decisions to limit the costs of these actions. Some regions of the Area are certainly not suitable for waste disposal, and these are the localities of hydrothermal vents, seamounts and fish spawning grounds.

However, I would like to introduce arguments for reserved regions independent from species, habitat or biological community considerations: the reservation of deep-sea science prioritiy areas. Deep-sea research developed with increasing intensity during the last 50 years, and progress has been made from descriptive to process and modelling studies. Whereas earlier investigations concentrated on mostly continental slope and rise regions, central oceanic habitats have been included during the last 20 years, and more importantly, long-term studies have been conducted to understand the natural processes of production and its variability within and between years.

Table 1: Seafloor Resources of the High Sea - Past, Present and Potential Uses

Living Resources
Demersal fish stocks
Non - Living Resources
Polymetallic nodules
Polymetallic crusts
Polymetallic sulphides:
metalliferous muds
consolidated sulphides
Phosphorites
Resource Space for Disposal of
Munitions
Radioactive wastes
Sewage sludge
Dredge spoil
Offshore installations
Carbon dioxide

Researchers from Great Britain have studied repeatedly the occurrence of organisms and the sedimentation of food resources in the region of the Porcupine Seabight (Rice et al. 1991), a wide indentation of the continental shelf in the Southwest of Ireland, and another long-term programme was conducted in the area of the Rockall Trough to the West of Ireland and Scotland (Mauchline 1986). Research of scientists from various European nations at a deep position in the Porcupine Abyssal Plain was funded by the European Community through several subsequent contracts (see Thiel and Rice 1995).

During the Eighties and Nineties, German activities concentrated some 500 nautical miles (nm) to the Southwest of Ireland around a central position of 47°N and 20°W. Physical and sedimentological investigations were related to the question of radioactive waste disposal (Mittelstaedt 1986), and ecological studies concentrated on the abundance and distribution of organisms on seasonally pulsed organic matter and energy income and dissipation on turnover and production processes (Thiel et al. 1989, Pfannkuche et al. 1995). The German Ministry for Education and Research and also the German Research Council funded together 25 cruises or cruise legs with various research ships to this research field. When the international Joint Global Ocean Flux Study (JGOFS) developed in the later Eighties, the 47°N, 20°W position became the central locality for many international studies, to supplement previous benthic studies with results obtained from the overlying water column.

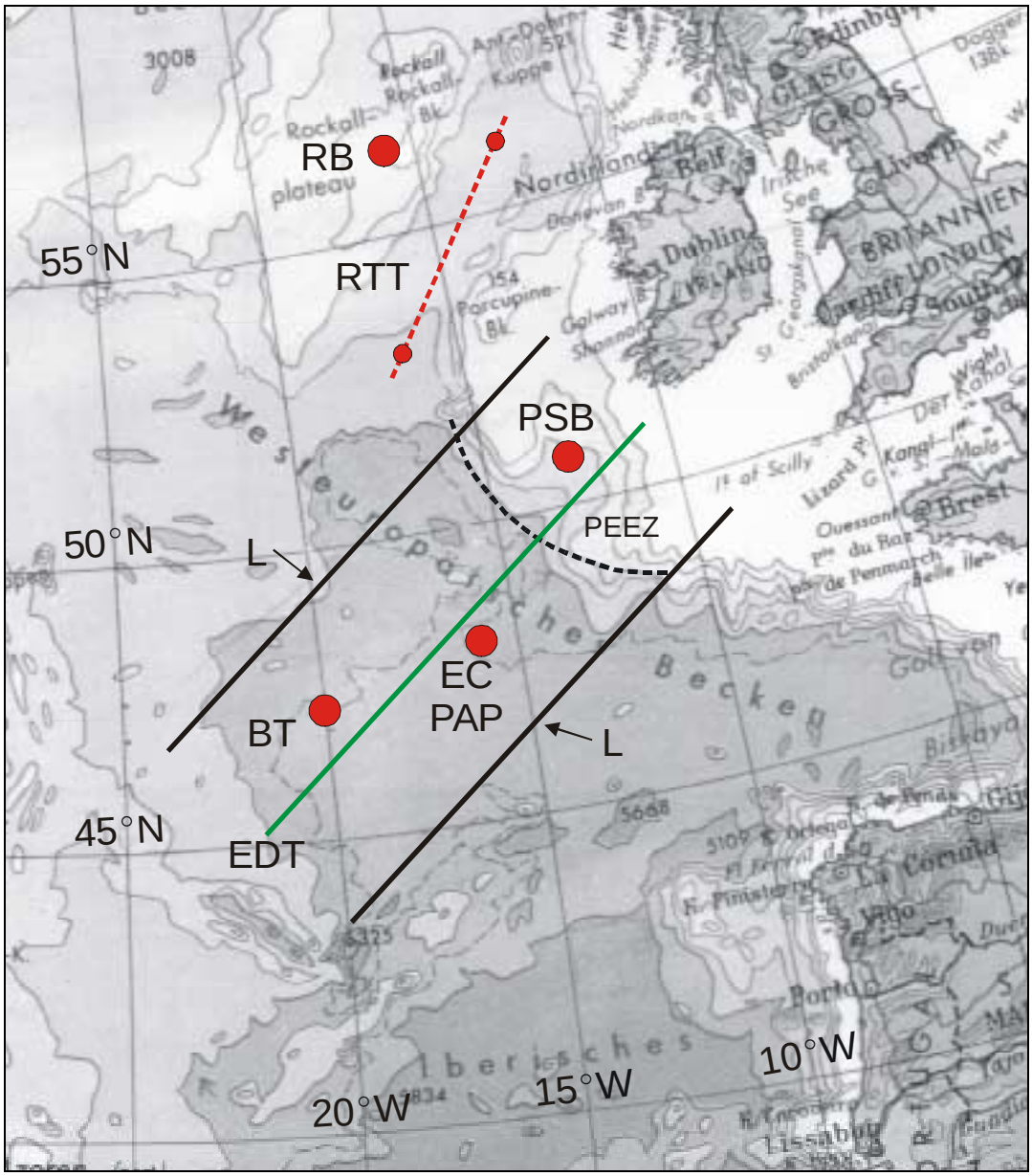
These and other deep-sea research activities of European scientists (e. g. Laubier and Monniot 1985) have led to a broad knowledge and understanding of deep-sea ecological processes. These studies must be continued whenever new questions arise or global change monitoring becomes an important issue, which should build on the database already established. It is difficult to overestimate the importance of these long-term study sites for future comparative purposes. Such long-term reference stations would likely never be re-established, if they were compromised, such as from ocean dumping. In the interest of society we have to take all measures necessary to protect these long-term study areas for future generations.

Proposal for a Unique Science Priority Area

The central positions of various long-term research programmes in the Northeast Atlantic are presented in Figure 1. Three of them constitute a rather straight line, earlier called the European Deep-sea Transect. These three areas should come under protection, and a buffer zone of 100 nm around their central position should mark them. However, for the demarcation of USPAs rectangular fields better fulfill the bordering function. Therefore, I propose straight lines in parallel to the central transect at a distance of 100 nm on both sides. This proposal needs to be discussed under various aspects. I do not give any coordinates for the corners of this rectangular field, because this needs to be negotiated, and because the two corners to the Northeast fall into an Irish or European Exclusive Economic Zone (EEZ).

A concerted action would be necessary to establish such an USPA, or the Northeast border would fall together with an EEZ. The total area would amount to 120000 nm^2 or 400 000 km^2, corresponding to the size of Germany. This may seem unrealistic, but why not ban potential uses of the deep sea, except scientific activities, from this region?

This European Deep-sea Transect USPA is one example for those areas in which scientific investigations were concentrated during the past two decades. Other such areas exist in the North Atlantic and the Pacific Oceans, and it is hoped that legal and organisational conditions will be developed to establish USPAs in the near future.



BT	-	BIOTRANS Station
EC = PAP	-	European Community Station = Porcupine Abyssal Plain Station
EDT	-	European Deep-sea Transect
L	-	Limit of proposed USPA
PEEZ	-	Potential Exclusive Economic Zone
PSB	-	Porcupine Seabight Station
RB	-	Rockall Bank Station
RTT	-	Rockall Trough Transect

Figure 1: Long-term Research Stations and Transects, and the Proposed Unique Scientific Priority Area (USPA) in the NE Atlantic Ocean

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Challenges to Conserving Marine Biodiversity on the High Seas Through the Use of Marine Protected Areas – An Australian Perspective[1]

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Abstract

In recent years Australia has been active in calling on the international community to explore a range of tools, including MPAs, with the objective of implementing effective protection of biological diversity and ecosystem processes on the high seas.

Most recently, Australia, with the support of New Zealand, tabled a resolution at the IUCN World Conservation Congress in Amman, Jordan, on this issue. The resolution was passed and calls upon national governments, international agencies and the non-governmental community to better integrate established multilateral agencies and existing legal mechanisms to identify areas of the high seas suitable for collaborative management action, and to reach agreement by consensus on regimes for their conservation and management.

This paper discusses challenges associated with implementing this resolution. It considers the urgent need to identify politically acceptable measures that both ensure protection of high seas biodiversity, and are consistent with the freedom of the seas provisions of the United Nations Convention on the Law of the Sea.

If high seas MPAs are to be successful not only in name but in practice, they must enjoy widespread support, particularly from those States with significant navies, distant water fishing fleets, and/or interests in mineral and petroleum exploration and extraction. There must be a willingness by these States to cooperate with the management regimes put in place to conserve high seas biodiversity.

Therefore, proponents of high seas MPAs have the considerable task of demonstrating

2) why they are needed – the benefits that they would confer,
3) what legal and/or institutional mechanisms are required, and
4) how they would actually work in practice.

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Proponents of high seas MPAs must be able to demonstrate to the international community how this particular tool can accommodate multiple values and interests, and achieve ecologically sustainable development on the high seas.

Reaching global agreement on conservation measures is problematic, given the complicated legal, institutional and resource access issues associated with the high seas. It may be more effective, as an interim measure, for like-minded States to reach a general consensus to cooperate with regard to MPAs on the high seas.

This consensus may include, but need not necessarily be limited to, broad objectives and guiding principles for high seas MPAs. Pilot or demonstration MPAs could also be developed for areas of the high seas. The objective of such an initiative would be to demonstrate to the international community how MPAs on the high seas can be developed and work in practice, and how such MPAs would fit into regional and global approaches to marine conservation.

Introduction

A cursory glance at a world map and it is immediately evident why Australia places great importance on the sustainable management of coastal and ocean resources. Our island continent comprises approximately 60,000 km of coastline, rich in resources, cultural history and natural beauty. Beyond the coastline, under the UN Convention on the Law of the Sea, Australia has rights and responsibilities over 16 million square kilometres of ocean and claimable continental shelf, an area more than twice that of the Australian continent.

These natural assets demand that Australia actively seek to ensure their continued existence in a condition that benefits not only Australians today, but for all future generations of Australians.

But why is Australia extending this responsibility to the high seas? Why is Australia calling on the international community to explore a range of tools, including MPAs, with the objective of implementing effective protection of biological diversity and ecosystem processes on the high seas?

Part of the answer to this question lies in *Australia's Oceans Policy*, launched during 1998, the International Year of the Ocean, by Australia's Federal Minister for the Environment and Heritage, Senator the Hon Robert Hill.

In this Policy the Australian government commits to a pro-active international agenda, stating:

> *"Australia must participate internationally in bilateral and multilateral arrangements to establish and implement international regimes that are effective in identifying and addressing issues in transboundary management"*[3]

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[3] Australia's Oceans Policy, Vol.2, Commonwealth of Australia 1998, p39

Further, the Policy suggests:

> *"Australia should provide leadership regionally and internationally in the management of our oceans, recognising the possibility that national activities may have effects on the marine jurisdictions of neighbouring countries"*[4]

While Australia may be an island, it is not immune to impacts of activities of neighbouring States or on the high seas. Similarly, Australia cannot assume that its own activities will not have deleterious impacts on the resources of its neighbours or the adjacent high seas.

At the beginning of the 21st Century, Australia enjoys a strong international reputation for oceans management. We are committed to maintaining that reputation and to leading the way in to the relatively uncharted waters of high seas conservation measures.

Since the launch of *Australia's Oceans Policy*, Australia has been active in progressing the development of integrated oceans planning and management.

During preparatory meetings for the 7th Session of the UN's Commission on Sustainable Development (CSD7), held early in 1999, Australia called for debate on the need for improved oceans governance mechanisms. Australia also suggested the UN General Assembly take a more active part in oceans governance to achieve the objectives of UNCLOS and Chapter 17 of Agenda 21.

At CSD7 Australia supported the development of marine protected areas, both nationally and on the high seas. At that meeting Senator Hill stated:

> *"We recognise that there is currently no international mechanism to allow the declaration of MPAs outside national jurisdictions. Nevertheless, on the basis of experience within our own jurisdiction, Australia considers that such measures will become essential if we are to achieve sustainable multiple use management of the resources of the high seas, their ecosystems and their natural productivity. Otherwise we could lose a great deal: both in terms of biodiversity and the industries which depend on it."*

Australia continued to call for MPAs on the high seas at the inaugural meeting of the UNICPO, held in May 2000. At that meeting Australia distributed a non-paper which expressed Australia's hope:

> *"that the international community will give serious consideration to the use of MPAs as a tool for integrated oceans management. More specifically, international commitment is needed to advance the global representative system of marine protected areas, originally proposed by the IUCN, and to identifying methods to establish and manage multiple use marine protected areas on the high seas."*

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4 ibid, Vol.1, p40

Most recently, Australia, with the support of New Zealand, tabled a resolution at the IUCN World Conservation Congress in Amman, Jordan, which again highlighted the need to conserve the biological diversity of the high seas. Amongst other things, the resolution called upon national governments, international agencies and the non-governmental community to better integrate established multilateral agencies and existing legal mechanisms to identify areas of the high seas suitable for collaborative management action, and to reach agreement by consensus on regimes for their conservation and management.

The resolution reflects Australia's view that an entirely new legal mechanism, multilateral agency or funding mechanism is not the preferred option for conserving high seas biodiversity.

This paper will discuss, from the perspective of the Australian government, issues associated with the resolution tabled in Amman. In particular, this paper considers challenges associated with

1) integrating existing legal mechanisms and multilateral agencies, and
2) achieving consensus on management regimes The solutions to these challenges may well be complementary and integrated.

Integrating Legal Mechanisms and Multilateral Agencies

It is generally accepted that the "marine realm provides a great abundance and diversity of foods, medicines and raw materials, and will undoubtedly provide important new ones as we learn more."[5] What is less accepted is that "the wealth of the sea is finite."[6] Obviously the risk to marine and coastal biodiversity is greatest in ecosystems where the effects of human activities are most intense, eg. estuaries and coastal waters adjacent to large population centres, however no place in the ocean is so remote that it has not been touched by human activities that have the potential to significantly degrade biodiversity.

This fact, coupled with an increasing awareness and understanding of biodiversity on the high seas, provides the international community with an opportunity. It is an opportunity to consider options that would lead to internationally acceptable arrangements to ensure appropriate levels of protection for high seas biodiversity and for maintaining ecosystem integrity. In fact, Article 197[7] of UNCLOS highlights this opportunity, but leaves the door wide open as to how it should be met.

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5 Norse, E.A. (Editor), *Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making*, (Island Press, Washington 1993)

6 ibid

7 UNCLOS Article 197 states: 'States shall cooperate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.'

However, in considering how to best utilise this opportunity, the international community must grapple with the fact that UNCLOS demands that freedom of the seas[8] be maintained in the same areas of the high seas requiring conservation, and that the high seas remain global commons.[9]

Anton observes that UNCLOS and customary international law make it "clear that high seas freedoms must be exercised by a state with reasonable or due regard to the interests of all other states in their exercise of freedom. However, in the case of conservation of marine biological diversity, reasonable or due regard for the rights of others tells us little about the allocation of limits between states necessary to ensure its sustainable use. Accordingly, in the competition for marine resources, which includes and affects marine biological diversity, states are thrown back upon the principle of freedom, and it becomes difficult to reconcile conflicting state interests even among those most concerned with conservation."[10]

The concurrent obligation to protect high seas biodiversity and the right of States to freedom of the high seas produce a significant political challenge. Even if the science clearly indicates that conservation measures are needed, and the legal feasibility of any number of conservation mechanisms is established, any suggested arrangement must be able to demonstrate at a political level that these *concurrent* demands are not necessarily *opposing* demands. That is, protection of high seas biodiversity is entirely compatible with the rights of sovereign States under UNCLOS.

Arrangements considered for high seas conservation should be 'all of the above' solutions that ensure protection of biodiversity, freedom of the high seas and common ownership. A number of options are conceptually feasible, and it would be presumptuous to suggest one over another at this point in time. Final arrangements may also differ depending on regional circumstances.

For the purpose of illustration only[11], one option may be the global or regional appointment, by consensus, of one or more States to manage respective areas of the high seas on behalf of the international community. This would not be an extension of sovereignty or sovereign rights for the respective States. Instead, the allocation of a special stewardship role to these States would be on the basis of maintaining freedom of the high seas while discouraging ecologically harmful activities. These States could observe, report and/or prevent activities such as pollution not in accordance with MARPOL; illegal, unregulated or unreported fishing; and dumping of certain wastes at sea. Similarly, the States with stewardship for respective areas of the high seas could coordinate pro-active international efforts aimed at protecting the biodiversity of that area. Such an approach would go a long way to preventing a 'tragedy of the commons' and would be entirely consistent with Articles 89 and 197 of UNCLOS.

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8 Article 87, United Nations Convention on the Law of the Sea.

9 Article 89, United Nations Convention on the Law of the Sea.

10 Anton, D.K., Law for the Sea's Biological Diversity, 1997 *CJTL* 36:34 p 361

11 This example is used only to illustrate the point made in the text. It does not reflect any solution proposed by the Government of Australia.

Whatever form a conservation arrangement might take, if it is to be successful in protecting biodiversity on the high seas, it must enjoy widespread support. In particular, it must enjoy support from those States with significant navigational interests, distant water fishing fleets, and/or interests in mineral and petroleum exploration and extraction. There must be a willingness by these States to cooperate with the management regimes put in place to protect high seas biodiversity.

Unfortunately, until international consensus on this matter is achieved, the discovery and reporting of areas on the high seas that are rich in biodiversity may result in exploitation that causes a reduction or degradation of biodiversity. In this context, research and publication of results may at times be counterproductive to the conservation of biodiversity, at least in the short term.

Australia believes that international consensus should build on past consensus. The concept and value of MPAs has already been endorsed by State Parties to the CBD[12]. Importantly, neither this Convention nor any subsequent decisions by State Parties to the Convention limit the use of MPAs to the territorial waters or exclusive economic zones of coastal States. It does not preclude the extension of MPAs to the high seas.

In addition to decisions of the CBD, in 1995 the Great Barrier Reef Marine Park Authority, the World Bank and the World Conservation Union (IUCN) produced a four volume report outlining a proposed Global Representative System of Marine Protected Areas. The report identified priorities for establishing new MPAs and improving management of existing ones in each of the world's 18 major coastal- marine regions.

The Preface to the report stated:

> *"With the completion of this report the next stage will be to develop and implement regional and national projects that aim to establish and manage on a priority basis a global representative system of marine protected areas."*

While Australia is among the first countries to make significant progress towards development and establishment of a National Representative System of MPAs, a regionally integrated approach is also necessary. And clearly a regional approach will be fundamentally flawed if it considers only national jurisdictions and omits areas of the high seas that are rich in biodiversity and/or have high levels of endemism.

Furthermore, work by the World Bank and IUCN shows that national and regional activity on MPAs is unevenly distributed. Given the current limited coverage of marine protected areas internationally, the international community cannot be certain of security for the full suite of marine biodiversity through existing on-reserve protection.

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[12] The CBD has already embraced the concept of MPAs in Decision IV/5 'Conservation and sustainable use of marine and coastal ecosystems, including a programme of work', and it would seem a logical approach to build on this work to accelerate global action on MPAs. SBSTTA has programmed major focus on this issue for 2003.

While organisations such as the World Bank and IUCN have been active in promoting MPAs, and national action has been endorsed through the CBD, the establishment of MPAs on the high seas, and/or a global representative system of MPAs, requires endorsement by the international community.

As mentioned earlier, an entirely new legal mechanism, multilateral agency or funding mechanism is not Australia's preferred option for protecting high seas biodiversity. While existing legal mechanisms may need to be elaborated on, the legal framework nonetheless exists.

What is also needed, is a higher level of integration between multilateral agencies to ensure that the interests of respective stakeholders are adequately incorporated into any management regime. Communication between relevant international conventions and organisations, as well as the generation of global support, will be fundamental to the success of high seas MPAs.

Australia does not pretend that such a task is a simple matter. It was for precisely the purpose of improving coordination and cooperation among multilateral agencies that the UN Informal Consultative Process on Oceans and the Law of the Sea was created. The task is substantial but the cost of doing nothing will be significant both in terms of our global environment and the economies of nations.

Achieving Consensus on Management Regimes

Referring to the creation of large multiple-use MPAs, the four volume report on the Global Representative System of MPAs, referred to above, states:

> *"Such integrated or 'bioregional' management requires sharing and coordinating the values and interests of a broad range of stakeholders when conceiving and implementing policies and programs. The concept involves combining, coordinating or integrating at a number of scales, values, interests and goals, many of which are in competition."*[13]

Sharing and coordinating the values and interests of a broad range of stakeholders is at the heart of the issue of consensus. Many of these values and interests could be viewed as being in competition. The challenge therefore becomes one of convincing opponents to high seas MPAs that this competition need not be direct, that is, resulting in a winner and a loser. Proponents of high seas MPAs must be able to demonstrate to the international community how this particular management tool can accommodate multiple values and interests, thus achieving ecologically sustainable development on the high seas.

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[13] Kelleher, G., Bleakley, C. and Wells, S (Eds) (1995). *A Global Representative System of Marine Protected Areas.* Great Barrier Reef Marine Park Authority, The World Bank, and IUCN, Washington, D.C. 4 vols.

To do this, we must overcome a number of misconceptions about MPAs. Proponents of MPAs on the high seas must be able to demonstrate that MPAs can range from a highly protected category to one that provides for multiple uses. Further, a single MPA can include a mosaic of management categories. In this regard Australia frequently suggests the Great Barrier Reef Marine Park as an example of a multiple-use MPA. There in the world's largest World Heritage site, careful planning and management succeeds in achieving a balance between conservation, scientific research and sustainable industries, such as fishing and tourism.

Another example is the Tasmanian Seamounts Marine Reserve. Covering an area of 370 square kilometres, the reserve includes about 15 seamounts arising from water depths of between 1000 and 2000 metres on the continental slope. Ranging from 20 to 500 metres high they support a distinct benthic community, much of which is endemic to the Tasmanian Seamounts. From a depth of 500 metres below the surface of the sea to 100 metres below the sea-bed, the reserve is managed to protect the integrity of the benthic ecosystem. This means that no method of fishing or petroleum and/or mineral exploration is permitted in this zone. However, a managed resource zone exists above this zone. The aim of such vertically stratified management zones is to ensure long term protection and maintenance of biological diversity while allowing the tuna long-line industry access to the surface waters.

Both the Great Barrier Reef Marine Park and the Tasmanian Seamounts Marine Reserve clearly demonstrates that MPAs do not necessarily have to be entirely 'no take' zones.

The need for awareness raising in relation to MPAs is widespread. Efforts must be aimed at governments, industry, NGOs and research bodies. In very simple terms, awareness raising needs to clearly demonstrate:

1) why MPAs on the high seas are needed;
2) how they might be constructed from a legal perspective, and
3) how they might work in practice.

Workshops such as the workshop hosted by Germany are an important step in demonstrating the first two points. Australia plans to host a similar workshop in September 2001 with the objective of continuing to engender international interest in this important issue.

The final point is more problematic. How do we demonstrate 'how' an MPA on the high seas would work in practice, without first creating an MPA on the high seas?

Before global consensus can be reached on a satisfactory legal arrangement to permit the establishment of MPAs on the high seas, a small group of like minded States may find it useful to explore informal or temporary options for demonstrating the 'how' of MPAs on the high seas. Such an interim arrangement may include, but not necessarily be limited to, broad objectives and guiding principles for high seas MPAs.

As a part of this process, demonstration high seas MPAs could be negotiated that incorporate management regimes designed to address specific threats to biodiversity in a

particular area. The objective of such an initiative would be to demonstrate to the international community that MPAs can be developed for the high seas and how such MPAs may fit into regional and/or global approaches to marine conservation.

Such an initiative would not be without its political opponents or persistent objectors. It would involve considerable negotiation amongst participating States, comprehensive scientific assessment and development of appropriate and consensual management regimes. A sensible approach may be to limit the complexity of such an initiative by negotiating a cooperative arrangement that addresses a specific conservation objective, eg. conservation of sea mounts on a specific ridge system. It would be expected that some States might oppose such an initiative on principle, not because a particular proposal might affect those States directly, but because of the fear of creating a precedent. Therefore, the importance of like-minded supportive States cooperating to achieve general agreement from other States, to follow voluntarily the protective regime embodied in the MPA, cannot be over-emphasised. Attempts to achieve mandatory international compliance with the demonstration MPAs are likely to be counter-productive.

Conclusion

The conundrum of ocean management is that the concept of the high seas being 'global commons' simultaneously enables open access to resources while requiring a collective stewardship for the commons. There is considerable difficulty in identifying a feasible approach to ensuring collective stewardship without generating inequalities among States.

Fortunately, as we enter the 21st century, increasingly the world's oceans are being thought of as large ecosystems requiring appropriately integrated management that embodies conservation, economic development and scientific research. We have realised that the health of marine ecosystems is as important to life on the planet as that of terrestrial systems, and that we must work cooperatively to ensure the ongoing integrity of marine ecosystems.

Ironically, while the drafters of UNCLOS were "Conscious that the problems of ocean space are closely interrelated and need to be considered as a whole,"[14] the convention proceeds to divide the ocean into areas of sovereignty, sovereign rights and global commons. That is, while UNCLOS requires the protection and preservation of the marine environment, the international community has in fact struggled to consider the ocean as a whole, promoting conservation measures in some areas and virtually nil in others, irrespective of the biodiversity values located in the latter.

The growing body of international marine environment law is far from comprehensive and in an era of rapid environmental degradation, there exists an urgent need to flesh out and expand on the fundamental and universal requirement to protect the natural world from irreversible damage.

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[14] UN Convention on the Law of the Sea, Preamble, Paragraph 3

To prevent a ‘tragedy of the commons’, the international community must move now. Article 192 of UNCLOS declares that “States have the *obligation* to protect and preserve the marine environment.”

Perhaps more than anytime in the world’s history, the marine environment needs a champion. That is, a group of States which, through concerted practice and political stamina, is prepared to pursue the idea of high seas MPAs, in order to better fulfil the obligation which all States have under UNCLOS “to protect and preserve the marine environment.”

Of course, this process is a long and complex one, fraught with as many political challenges as there are legal challenges. Can it be done? Australia is taking the positive view that it can. The costs of not taking action are too high.

A Strategic Approach to Protecting Areas on the High-Seas[1]

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Abstract

The value of creating Marine Protected Areas (MPAs) as a tool for conserving areas of high, valuable, sensitive or rare biodiversity that are potentially threatened is well established. WWF and IUCN have both adopted a strategy of facilitating the establishment of networks of representative coastal, offshore and high-seas MPAs. WWF's experience from managing MPAs around the world indicates that political will, legal security and stakeholder support is necessary to establish, manage and enforce the protected area status. As a necessity, such MPAs have been located close to the coasts of nations where there is political will and where they can be nested within the legislation of those states. As an operational aim based on the IUCN/WWF joint marine strategy, WWF have a goal of: "the establishment and implementation of a network of effectively managed, ecologically representative MPAs covering at least 10% of the world's oceans by the year 2010". Information is being collated to determine if there is a case to justify the inclusion of HSMPAs in this goal.

There is though a lack of knowledge of the biodiversity, natural resources and threats present away from the coastal zone. Nevertheless it appears that HSMPAs could fill a gap as a valuable component of ecologically representative MPA networks. The case for the protection of high-seas areas may rest on evidence of the presence of 'valuable' or vulnerable resources that are being, or are likely to be, threatened. There are though considerations outside of this anthropocentric view. The precautionary principle must be applied, and it should be noted that estimates of what is valued or threatened today will probably change in the future with changing conditions or greater knowledge. A more holistic approach that recognises the interconnectivity of marine ecosystems must be prioritised in any evaluation. Several types of resources or habitats can be identified as occurring beyond national jurisdiction and all of these would appear to be threatened to varying extents. These resources may form just an element of the total high-seas eco-system at any one location and so legal protection may need to be targeted on that element. In formulating transparent mechanisms for protection, the rights of legitimate users of the high-seas must be respected, so that the protected status has a chance of being respected. Management and enforcement structures will be required at some point if areas

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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of the high-seas are to be adequately and appropriately protected. WWF is currently co-sponsoring a study of high-seas habitats, resources and threats, as well as participating at many fora where varying types of HSMPAs are discussed, established or managed.

WWF's MPA Strategy

MPAs

The value of creating MPAs as a tool for conserving areas of high, valuable, or rare biodiversity that are threatened or potentially threatened is well established. WWF and IUCN have both adopted a strategy of facilitating the establishment of networks of representative coastal, offshore and high-seas MPAs (WWF/IUCN, 1998). As a necessity, such MPAs have been located close to the coasts of nations where there is political will and nested within the legislation of those states. Experience from managing MPAs around the world indicates that without this will, legal security and potential support, it would be difficult or impossible to establish, manage and enforce the protected area status.

Traditional types of MPAs designed to protect coastal habitats range in size from the 340,000 km^2 Great Barrier Reef Marine Park to as little as 3 km^2. Away from coastlines MPAs set up for specific purposes or species groups can be far larger, e.g. the Southern Ocean whale sanctuary. Assuming recent threats by the Norwegian government do not lead to a collapse of IMO agreements, the whole of the Indian Ocean is currently considered a whale sanctuary.

So the size of an MPA is at least partly dependant on its use, in addition to other aspects such as legal jurisdiction and geographical features. MPAs have been established for a variety of reasons for many centuries, e.g. to protect habitats, liveli-hoods, species, or breeding areas. They may also be established for limited periods such as during bird nesting periods or fish spawning.

As an operational aim, based on the IUCN/WWF joint marine strategy, WWF have set a goal of: "the establishment and implementation of a network of effectively managed, ecologically representative MPAs covering at least 10 % of the world's oceans by the year 2010".

This is a bold target that will require much work and a wide range of habitat types. Key words in the goal are 'effectively managed', 'ecologically representative' and 'network'. All three of these phrases are pertinent to the discussion of HSMPAs.

Prioritising

Implicit in the aim of obtaining ecologically representative protected areas is the appreciation that only limited parts of the world can realistically be protected, given our current global environmental ethic. Given that the footprint of man's activities is continuing to rise (WWF, 2001), it is imperative that the most 'important' sites are protected. But what criteria determine 'important'? In order to maximise the conservation benefits with limited

capacity and funding, WWF has made an attempt to determine focal regions: the Global 200 ecoregions.

This method attempts to combine the concepts of importance and represen-tativeness at a scale that is most realistic for conservation. Based on a review of literature, 5 major marine habitat types were determined from 4 marine geographic realms. This approach also builds on the UN's Regional Seas Programme. The method results in a map showing the science-based global ranking of the Earth's most biologically outstanding habitats and provides a critical blueprint for biodiversity conservation at a global scale (WWF, 2000).

It should be noted that whilst the system is comprehensive and includes several offshore areas, there are few regions on the high-seas. Rather than indicating that these areas are either not representative or important, this absence is symptomatic of a lack of knowledge of the biodiversity, natural resources and threats present away from the coastal zone. The Global 200 methodology may though be applicable to the identification of areas on the high seas that justify protection.

Networks

Whilst there are currently many thousands of MPAs around the world, they tend to be in scattered locations. This is often a consequence of their establishment by individual states following their own priorities or those of other organisations such as NGOs (e.g. WWF), GOs (e.g. IUCN / Ramsar) or other groups (e.g. ICES). Enshrined in the principles of terrestrial park management is the need for con-nectivity. For various reasons, including the risk of maintaining small, localised populations susceptible to natural and man-made threats and the lack of genetic exchange, it is important to maintain networks of protected areas, not just individual sites. This is particularly important to marine systems which are rarely strictly delineated, and are fluid in nature, connected by a flux of species, recruits, nutrients and pollutants, etc., from outside of an area. As a result of this an MPA, such as the Galapogos Islands, may be influenced by an 'upstream' area such as the Ecuadorian coast, which provides recruits to a fish stock, or pollutants. A full discussion of the benefits of network creation is outside of the scope of this paper.

It was stated above that the vast majority of the number of protected areas, espe-cially fully protected areas (as opposed to whale sanctuaries for example), are linearly located around coasts. Network continuity and security would be greatly enhanced by extending networks away from the coasts into the high-seas and ultimately linking up with networks on other coasts.

Management effectiveness

Based on several parameters including political will, available governance structures, infrastructure development, the capacity of authorities and degree of isolation, the effectiveness with which MPAs are managed varies considerably. The establishment of a protected area, especially marine, does not guarantee that it will operate as anything other than a 'paper park'. The proportion of MPAs that are effectively, or even actually, managed varies with location, but may be less than 30% on average.

HSMPAs would present a particular challenge in this respect. In order for them to make any valuable contribution to protecting the resource they were created to protect, and to form a node of a network of MPAs, then they would need to be adequately managed. This will be discussed in greater detail by de Fontaubert (this meeting).

Critical Habitats, Resources and Threats

A definition of the resources, either biodiversity and/or exploitable reserves, that occur beyond national jurisdiction, and potential for any threats to these resources has two main benefits: the need for, and extent of, protection can be better estimated; the types of legislation and governance that would be required to afford real protection and/or management can be determined and focused. It would be expected for example that a HSMPA established to protect albatross from particular fishing practices, could be covered under a regional fisheries agreement, whilst the protection of deep-sea benthic habitat may require more fundamental enabling legislation. It is expected that there will not be a single solution suitable for all potential HSMPAs, so it is important to determine what it is that requires protection.

Further, the case for protection should not only be based on the presence and importance of resources, but also on the potential for the resource to be threatened in some way, for example by destructive practices or over-exploitation. Intuitively, a correlation would be expected between resource 'value' and its vulnerability, so the very presence of a resource could be an indication of its need for some degree of protection. As with the nature of the resource, the type of threat will also be a factor determining the type of legislative protection or management required. Table 1 indicates a generic summary of the resources and their potential associated threats. This list is currently being revised and augmented (see Current Work section below).

A classic example of a newly discovered resource that is currently under threat is the deep-sea fishery of the N.E. Atlantic, where profound ecosystem changes are occurring due to removal of top predators. Deep-water fish species like orange roughy are long-lived. They reproduce slowly and with irregular success. Hence, the exploitable yield may only be 1 - 2 % per year. Their stocks are as vulnerable as the many deep-water habitats and communities on which they rely, such as cold water corals. Indicating a real breakthrough, ICES in its latest response to the European Commission request for advice on deep sea fisheries management (November 2000), not only called for drastic reductions in deep-water catches, but also raised the issue of area closure in referring to WWF’s proposals for potential offshore Marine Protected Areas such as the Rockall Trough and Channel Northwest off the British Isles.

Table 1: Overview of the Habitats Present Within High Seas Areas Outside of the Jurisdiction of Individual States, the Potential Threats to those Resources, and Zonal Extent of Protection at which Legislation May be Aimed.

Critical habitats	Human impacts	Protection zone
Hydrothermal vents	Sea-bed mineral extraction	Benthic
Cold-water seeps	Petroleum exploitation	Benthic
Deep-sea trenches	Litter / dumping (also in a variety of habitats)	Shipping lanes
Seabird protection areas - e.g. albatrosses and breeding areas	Fishing / pollution	Pelagic fisheries
Cetacean hotspots	Fishing by-catches / shipping / whaling / seismic testing	Pelagic fisheries /shipping lanes / geological features
Sea mounts	Over-fishing / habitat destruction	Benthic / pelagic fisheries
Cold water corals	Destructive fishing techniques	Demersal fisheries / benthic
Manganese nodules	Deep-sea quarrying	Benthic
Gas hydrate zones	Methane exploitation	Geological features / benthic
Trans-boundary stock breeding/juvenile areas	Fishing / pollution / petroleum exploration and production	Benthic / demersal / pelagic

Current Work

Internationally

WWF attends several international and national fora to advocate the implementation and management of MPAs in general and HSMPAs in particular. For example WWF is an active participant at the International Maritime Organisation (IMO), International Whaling Commission (IWC), OSPAR, FAO fisheries, ICES, UNCLOS and the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). In the context of HSMPAs or offshore MPAs WWF has been advocating for Particularly Sensitive Sea Areas at IMO, whaling sanctuaries at IWC and CCAMLR, habitat protection at OSPAR and sustainable fisheries through a suite of measures including protected areas, at FAO, ICES, the EU and various regional fisheries commissions.

In particular, WWF intervened at the first UNICPO meeting in May 2000 to back the position of the Australian government mission to support a process that could lead to the creation of HSMPAs.

In collaboration with IUCN, WWF have commissioned an independent, scientific study into the conservation value and current legal status of HSMPAs (Baker and de Fontaubert, in prep.). Ecological work is being conducted at the Southampton Oceanography Centre, UK (Baker, Bett, Billett and Rogers) and the legal work by an IUCN consultant (de Fontaubert). It is expected that this study will contribute to:

- a listing of the natural resources, primarily biodiversity related, that occur in areas outside of the jurisdiction of coastal states;
- identification of the types of threats or potential threats that are, or may, impact on those resources;
- an indication of the types of areas, if any, that would have seemed to be potential candidates because of location, natural resource, or biodiversity, but that would in practice be unlikely, perhaps for reasons of politics, biodiversity or legislation;
- an informed opinion as to the current legal status of HSMPAs;
- interpretation of the potential for adapting current legal institutional arrangements to afford HSMPAs protection.

The NE Atlantic example

In November 2000, more than 2 years after its signature by the NE Atlantic Environmental Ministers, the new Annex V to the OSPAR Convention came into force. This Annex transcribes the obligations arising from the Biodiversity Convention to the frame of this regional seas convention. Therefore, the contracting parties to OSPAR now have to develop programmes and measures, including the establishment of a network of MPAs, to safeguard individually and jointly habitats and species in their territorial waters, their Exclusive Economic Zones and in the high-seas included in the OSPAR maritime area. WWF´s N.E. Atlantic Programme particularly emphasises the importance of protection for species and habitats in offshore and high-seas areas as part of an overall network of representative MPAs. Specific protection in cases of human interventions is also needed. In submissions to the North Sea Conference (CONSSO) and OSPAR (Biodiversity Committee), WWF called for an ecosystem approach including integrated regional management of human activities and conservation interests. An inventory of so-called "existent" MPAs in the OSPAR maritime area, summarising the existence of any kind of area under any kind of management measure, revealed that even under the wide definition used, in total only three areas exist which are created for the protection of species and habitats beyond 3 nm offshore (http://ngo.grida.no/ wwfneap/ Publication/subm.htm).

In order to illustrate some of the challenges, a briefing series was initiated in 1998 which depicts potential offshore MPAs under OSPAR. The latest tranche, launched in June 2000, included a hydrothermal vent field (Lucky Strike), a sea-mount in Portugal´s EEZ (Banco Gorringe) and a well known research area in international waters (BIOTRANS). It extended the scope of the previous briefings in 1998 which included the Celtic Shelf Break, Rockall Bank, Rockall Trough & Channel, Western Irish Sea Front and Dogger Bank and 1999

(Sula Ridge Waters west of Sylt). These briefings include offshore/deep water locations, required management actions and legal status (http://ngo.grida.no/wwfneap/ Publication/ briefings). It is intended to continue this series and complement it with two case studies developing an MPA network concept and a management scheme in cooperation with ACES and InterRidge (Lucky Strike).

In a first attempt to evaluate the conservation requirements in the offshore N.E. Atlantic, WWF launched an "Offshore Directory": a review of a selection of habitats, communities and species of the N.E. Atlantic. WWF has been advocating offshore habitats to be protected under the European Habitats Directive in the 200 nm zone of member states. WWF is about to compile a report identifying sandbanks and reefs, as defined by the Interpretation Manual of EU Habitats in the Northeast Atlantic, based on the scientific opinion given by the Southampton Oceanography Centre (SOC). The report will be available in March. Based on this information, an ecologically defensible network concept can be developed.

A Strategy for Legal Protection

A strategy that would lead to the protection of areas of the high-seas can be described in a series of questions. Firstly, is there anything worth protecting on the high-seas? Though a fundamental and anthropocentric question, evidence to support the assumption that there are resources requiring protection may in practice be critical to the justification for the need for legislative mechanisms and the competition for management resources. There are though other considerations. The precautionary principle must be applied, and it should be noted that estimates of what is valued or threatened today will probably change in the future with changing conditions or greater knowledge. The Jakarta Mandate (recommended actions to parties) states that any "conservation measures related to MPAs should emphasise the protection of ecosystem functioning in addition to protecting specific stocks". Such functioning must then be taken into account in any evaluation protocol and may be taken as an argument in favour of creating representative HSMPAs.

Secondly, are these resources currently vulnerable, or are likely to be threatened in the foreseeable future? If there is no likelihood of the resource being threatened it becomes harder to justify the time and resources required to enact legislation and implement a management plan. A less pragmatic and more holistic approach would be to ask: is there any actual or potential human impact on the open ocean ecosystems and parts thereof that will irrevocably alter its natural state/variability? The CBD though not legally applicable to the high-seas states that nations should prevent damage to areas outside national jurisdiction and cooperate for conservation and the sustainable use of biodiversity. This is a strong argument for applying the concept of the precautionary principle to high-seas habitats and resources. A comprehensive list of resources/habitats and their associated threats will nevertheless assist in targeting relevant legislation.

Thirdly, is there currently adequate legislation or precedent to protect the types of HSMPAs that have been proposed? It is expected that the current meeting will identify existing

mechanisms and gaps, and hence form the basis on which to develop adequate mechanisms and possibly coordinate those that may currently exist. It will probably be necessary to focus protection on specific resources or threats so that the rights of other legitimate users of the same areas, but possibly different zones/realms, are not compromised, e.g. shipping passage may not be restricted in a demersal fishing-free zone.

Fourthly, how will the protection be enforced, and by whom? Legislation or some form of protection mechanism that is implemented without a mechanism for enforcement or governance will be largely ineffectual. Again the rights of maritime stakeholders and coastal states will need to be protected. Enforcement should not be used as cover for expansion of sovereignty or influence, otherwise support for conservation will be lost within a protectionist response.

Fifthly, what management plans are required and who is responsible for preparing and implementing those plans? Effective management is required to ensure that resource protection goals are being achieved, threats are being addressed and stakeholders are concurrent with the process.

Conclusions

1. There is a lack of knowledge of the biodiversity, natural resources and threats present away from the coastal zone.
2. HSMPAs could fill a gap as a valuable component of ecologically representative MPA networks.
3. The case for the protection of high-seas areas could rest on evidence of the presence of 'valuable' or sensitive resources that are being or are likely to be threatened. A more holistic approach that recognises the interconnectivity of marine ecosystems must however be prioritised in any evaluation.
4. Several types of resources or habitats can be identified as occurring beyond national jurisdiction and all of these would appear to be vulnerable to some extent.
5. These resources or habitats may form just a component of the total high-seas ecosystem at any site and so legal protection may need to be targeted on that component.
6. The rights of legitimate users of the high-seas must be respected.
7. Management and enforcement structures will be required at some point if areas of the high-seas are to be adequately and appropriately protected.
8. WWF is active within the field, sponsoring a study of high-seas resources and threats, as well as participating at many fora where varying types of high-seas and offshore MPAs are discussed and implemented.

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Protecting Particularly Sensitive Sea Areas From Shipping: A Review of IMO's New PSSA Guidelines[1]

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Introduction

This presentation will analyze the new (2001) Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas which are expected to be approved by the International Maritime Organization's (IMO) Marine Environment Protection Committee in April 2001, and adopted by IMO's Assembly at the end of 2001. The analysis will be from the perspective of a coastal manager desiring to protect sensitive marine areas from shipping impacts, but will also briefly address the issue of PSSAs on the high seas.

A Particularly Sensitive Sea Areas (PSSA) is defined in the PSSA Guidelines as "an area that needs special protection through action by IMO because of its significance for recognized ecological, socio-economic or scientific reasons and which may be vulnerable to damage by international shipping activities." While PSSA designation is not necessary to regulate international shipping activities in a given area, desi-gnation of an area as a PSSA has at least three added benefits. It provides international recognition of the special importance of a designated area; informs mariners of the importance of taking extra care when navigating through the region; and gives coastal States the opportunity to adopt special protective measures that best address the particular risks associated with international shipping in the area. (See Report of the Third International Meeting of Legal Experts on Particularly Sensitive Sea Areas, Marine Environment Protection Committee - MEPC 36/21/4, 4 August 1994; and Particularly Sensitive Sea Areas - An Important Environmental Concept at a Turning-point, special issue of the International Journal of Marine and Coastal Law, edited by K. Gjerde and D. Freestone, vol. 9, no. 4, Nov. 1994)

Whereas the original Guidelines adopted in 1991 (Guidelines for the Designation of Special Areas and Identification of Particularly Sensitive Sea Areas (IMO Res. A. 720(17)) aimed to assist IMO and national governments to identify, manage and protect sensitive sea areas in general, the new Guidelines are geared towards maritime agencies that are familiar with other IMO instruments and guidelines. For example, the new Guidelines delete the explanatory material about marine protected areas, international environmental law, the impact of shipping on the marine environment, types of protective measures that are

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1 This paper is based on an abstract submitted to Coastal Zone 2001 and was prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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available through IMO, and the requirements for applying for those measures. As described below, these have been replaced by more rigorous evidentiary and procedural requirements, updated criteria, and a clearer legal basis for protective measures.

Updated Criteria for PSSAS

To be identified as a PSSA, a proposed area must meet at least one of the ecological, socio-economic or scientific criteria listed in section 4 of the Guidelines (see Annex I). The new Guidelines have amended some of the criteria and added others to reflect current priorities in international instruments such as the Biodiversity Convention. The original ecological criteria focused on the significance of the area for its: uniqueness, dependency, representativeness, diversity, productivity, naturalness, integrity or vulnerability. The uniqueness criterion has been expanded to include the concept of rare ecosystems or habitats. The diversity criterion now incorporates genetic diversity, not just species diversity (it already included highly varied ecosystems, habitats, or communities.) Three new criteria have been added: critical habitat; spawning and breeding grounds, and biogeographic importance. The criterion for historical/archeological significance has been deleted in light of ongoing discussions at the UNESCO concerning the protection of underwater cultural heritage. It will be revisited once the discussions are concluded.

Expanded Requirements for Vulnerability to Shipping Impacts

The criteria for PSSAs now contain an explicit requirement that an area be at risk from international shipping activities. This makes explicit what was implicit in the definition of a PSSA, i.e. that an area must be

1) of special significance and

2) threatened by international shipping activities.

The required link to risk from international shipping activities is now emphasized through a section detailing additional information to be supplied. This includes: vessel traffic characteristics in the area (operational factors, vessel types, traffic characteristics and harmful substances carried); and natural factors (hydrographic, meteorological and oceanographic). It also suggests providing information on:

- Evidence of damage from international shipping activities
- History of groundings, collisions or spills in the area and their consequences
- Foreseeable circumstances under which significant damage might occur
- Stresses from other environmental sources
- Measures already in effect and their actual or anticipated beneficial impact.

These informational requirements, while understandable from the view of preventing the submission of unfounded PSSA proposals, could present a real stumbling block to countries with limited technical capacities or financial capabilities. Potential applicants should be aware however, that there is some recognition of special needs and limited financial capacity. A paragraph close to the end of the document provides: “IMO should, in assessing applications for designation of PSSAs and their associated protective measures, take into account the technical and financial resources available to developing Member Governments and those with economies in transition.”

Clarified Legal Basis for Associated Protective Measures

Applications for designation of a PSSA are normally to include a proposal for at least one measure to protect the area from shipping. Associated protective measures can include a wide range of actions, but they are limited to actions within the purview of IMO, and must relate to international shipping activities.

The new PSSA Guidelines explicitly state that associated protective measures may include:

1. Any measure that is already available under an existing [IMO] instrument; or
2. Any measure that does not yet exist but that should be available as a generally applicable measure and that falls within the competence of IMO; or
3. Any measure proposed for adoption in the territorial sea or pursuant to Article 211(6) of UNCLOS [which refers to “special areas” in the Exclusive Economic Zone].

Measures that are already available through IMO instruments include ships’ routeing systems such as areas to be avoided and designated shipping lanes (General Provisions on Ships Routeing A.572(14), as amended), vessel reporting systems (Guidelines and Criteria for Ship Reporting Systems (Res. MSC .43(64)), vessel traffic services (Guidelines for Vessel Traffic Services Res. 857 (20)) and special area discharge standards for ships’ wastes (under the annexes to MARPOL 73/78). These instruments also detail the conditions for making routeing and reporting systems mandatory.

Measures that should be available generally could include such things as compulsory pilotage, tug escorts or as the US has recently proposed, no anchoring areas. It is within the competence of IMO to amend or draft a new instrument to detail the conditions under which such measures may be implemented.

The real benefits of PSSA designation come into play in the third category above that refers to measures proposed for adoption in the territorial sea or pursuant to Article 211(6) in the EEZ. While many measures in the territorial sea can be enacted by the coastal State without the need for IMO authorization, a coastal State may not enact provisions that would either impair or deny innocent passage or require changes in design, construction, equipment or manning of foreign vessels. This category should answer the theoretical question of what happens if a coastal State wants to adopt in its territorial sea a measure

that may push the limits of its permissible authority for the purposes of protecting an internationally recognized sensitive area. IMO approval and endorsement of a measure, based on the criteria and procedures in the PSSA Guidelines, should provide the necessary legal basis for such a measure. For measures in the Exclusive Economic Zone, Article 211(6) of UNCLOS contains as yet unused authority for coastal States to adopt with IMO approval special mandatory measures that go beyond existing IMO measures. Thus, this third category may prove to be a vital outlet for the otherwise growing frustration of coastal States over UNCLOS's limitations on coastal State jurisdiction.

The one outstanding issue to be resolved at the April 2001 MEPC meeting is whether a list of indicative measures that would explain some of these options should be annexed to the PSSA Guidelines. Alternatively, a "Guide to the Guidelines" would be prepared containing the indicative list as well as some of the background material from the original Guidelines.

Elaborated Procedure

The new PSSA Guidelines make it clear that only IMO member states can submit proposals for identification and that governments with a common interest in an area should submit a coordinated proposal. The application itself must contain three parts:

1. A summary of the objectives of the proposed PSSA identification, its location, the need for protection and proposal for associated protective measures.
2. A detailed description of the area, together with a chart, an explanation of the significance of the area based on the recognized criteria; and an explanation of the vulnerability of the area to damage from international shipping activities, noting the factors regarding maritime activities listed in the criteria.
3. A description of the proposed measures showing how they will provide the needed protection from threats of shipping damage.

According to the Guidelines, the application is to address all relevant considerations and criteria in the new Guidelines, and is to include relevant supporting information for each item. The application must also include a review of the possible impact of any proposed measures on the safety and efficiency of navigation. This section at one time included a reference to the need for information on the financial implications for shipowners, but this was finally deleted at the insistence of the environmental NGOs.

An entirely new section details the criteria for MEPC to use when assessing applications for the designation of PSSAs and the adoption of associated protective measures. These include not just ensuring that the criteria are met, but evaluating whether the chosen protective measures are the most appropriate for the assessed risk, and that the proposed size is appropriate to the identified risk.

Despite the difficulties that arise from the process of applying to the IMO for a PSSA, it should be noted the new Guidelines now refer to the end product as "designation of a PSSA". The term "identification" of a PSSA will still be used to describe the process of

gathering and presenting the information necessary to determine whether an area meets the PSSA criteria. The change in terminology is important as “designation of a PSSA” signifies a legal act whereby IMO confers a special status on an area that can be marked on nautical charts. This should result in greater awareness of and compliance with the associated protective areas.

PSSAS on the High Seas?

It is clear that the criteria for PSSAs relate to areas within and beyond the limits of the territorial sea. The Guidelines explicitly state that the criteria “can be used by IMO to identify PSSAs beyond the territorial sea with a view to the adoption of international protective measures regarding pollution and other damage caused by ships.” Under the General Provisions on Ships’ Routeing, coastal States that have not declared their EEZ’s may propose routeing measures for adoption beyond their twelve mile territorial sea i.e. in areas that would still be considered the high seas. It would thus seem that IMO has the competence to designate PSSAs on the high seas.

The Guidelines do allow for joint submission of proposals for areas where two or more Governments “have a common interest”. However, they also state that the “proposal should contain integrated measures and procedures for cooperation between the jurisdictions of the proposing member governments”. This may suggest that the area should be within the jurisdiction of the two states, but it could be read more broadly.

It might be useful if the Guidelines contained an explicit provision authorizing the creation of special IMO measures for discrete areas of the high seas based on the particular threats presented by shipping activities in the area. This would be similar to the options recognized under the new Guidelines for the territorial sea and the EEZ. Perhaps this is an issue that might be presented for consideration by UNICPOLOS 2001? It does seem clear, to this reader at least, that PSSAs may be designated on the high seas and protected by existing IMO measures or by measures that should be available through IMO as a generally applicable measure.

Conclusion

Why should a State go through the complicated process of preparing a proposal for PSSA status when it takes a fraction of the work to simply propose and adopt the preferred protective measure? It may be fine to opt for only a protective measure when the desired measure exists under an IMO instrument, or is some-thing within the power of the coastal State to do on its own in the territorial sea. But when a State desires to impose some extraordinary measure in the EEZ, or desires IMO’s endorsement of an unorthodox measure in the territorial sea (or elsewhere), or simply sees an advantage in the international and national publicity that designation assures, then PSSA status may be worth the effort. But the new PSSA Guidelines do make the process more difficult.

ANNEX

Criteria for Identification of a Particularly Sensitive Sea Area (from MEPC 45/WP6)

4.4 In order to be identified as a Particularly Sensitive Sea Area, the area should meet at least one of the criteria listed below and should be at risk from international shipping activities, taking into consideration the factors listed in section 5:

Ecological criteria

Uniqueness or rarity -An ecosystem can be unique or rare. An area or ecosystem is unique if it is "the only one of its kind". Habitats of rare, threatened, or endangered species that occur only in one area are an example. An area or ecosystem is rare if it only occurs in a few locations or has been seriously depleted across its range. An ecosystem may extend beyond country borders, assuming regional or international significance. Nurseries or certain feeding areas may also be rare or unique.

Critical Habitat - A sea area may be a critical habitat for fish stocks or rare or endangered marine species, or an area of critical importance for the support of large marine ecosystems.

Dependency - Ecological processes of such areas are highly dependent on biotically structured systems (e.g. coral reefs, kelp forests, mangrove forests, seagrass beds). Such biotically structured ecosystems often have high diversity, which is dependent on the structuring organisms. Dependency also embraces areas representing the migratory routes of marine fish, reptiles, birds and mammals.

Representativeness - These areas have highly representative ecological processes, or community or habitat types or other natural characteristics. Representativeness is the degree to which an area represents a habitat type, ecological process, biological community, physiographic feature or other natural characteristic.

Diversity - These areas have a high variety of species or genetic diversity or include highly varied ecosystems, habitats, and communities. However, this criterion may not apply to some simplified ecosystems, such as pioneer or climax communities, or areas subject to disruptive forces, such as shores exposed to high energy wave action.

Productivity - The area has a high natural biological productivity. Production is the net result of biological and physical processes which result in an increase in biomass in areas of high natural productivity such as oceanic fronts, upwelling areas and some gyres.

Spawning or Breeding Grounds - The area may be a critical spawning or breeding ground or nursery area for marine species which may spend the rest of their life-cycle elsewhere, or may be a migratory route for sea-birds or marine mammals.

Naturalness - The area has a high degree of naturalness, as a result of the lack of human-induced disturbance or degradation.

Integrity - The area is a biologically functional unit, an effective, self-sustaining ecological entity. The more ecologically self-contained the area is the more likely it is that its values can be effectively protected.

Vulnerability - The area is highly susceptible to degradation by natural events or the activities of people. Biotic communities associated with coastal habitats may have a low tolerance to changes in environmental conditions, or they may exist close to the limits of their tolerance (defined by water temperature, salinity, turbidity or depth). They may suffer such natural stresses as storms or prolonged emersion that determine the extent of their development. Additional stress (such as domestic or industrial pollution, excessive reduction in salinity, and increases in turbidity from watershed mismanagement) may determine whether there is total, partial, or no recovery from natural stress, or the area is totally destroyed. Certain oceanographic and meteorological factors could cause an area to be vulnerable or increase its vulnerability, for example by causing the concentration or retention of harmful substances in the waters or in the sediment of the area, or by otherwise exposing the area to harmful substances. These conditions include circulation patterns such as convergence zones, oceanic fronts and gyres, long residence times caused by low flushing rates, the occurrence of seasonal or permanent density stratification which can result in oxygen depletion in the bottom layer, as well as adverse ice states and wind conditions. An area already subject to environmental stresses owing to human activities or natural phenomena (e.g. natural oil seepage) may be in need of special protection from further stress, including stress arising from maritime activities.

Bio-geographic importance – An area that either: contains rare biogeographic qualities or is representative of a biogeographic “type” or “types”; or contains unique or unusual geological features

Social, cultural and economic criteria

Economic benefit - The area is of particular importance to utilization of living marine resources.

Recreation - The area has special significance for recreation and tourism.

Human dependency - The area is of particular importance for the support of traditional subsistence and/or cultural needs of the local human population.

Scientific and educational criteria

Research - The area has high scientific interest.

Baseline and monitoring studies - The area provides suitable baseline conditions with regard to biota or environmental characteristics.

Education - The area offers opportunity to demonstrate particular natural phenomena.

[Historical value - The area has historical and/or archaeological significance; for example, it may contain historic shipwrecks or cultural sites. Deleted in final draft]

5. Other Considerations for the Identification of a PSSA

5.1 In addition to meeting at least one of the criteria listed in 4.4, the area should be at risk from international shipping activities. This involves consideration of the following factors:

Vessel Traffic Characteristics

Operational Factors - Types of maritime activities (e.g. small fishing boats, small pleasure craft; oil and gas rigs) activities in the proposed area that may increase risk to the safety of navigation.

Vessel types - Types of vessels passing through or adjacent to the area, e.g., high speed vessels; large tankers, or bulk carriers with small under-keel clearance.

Traffic characteristics - Volume or concentration of traffic, vessel interaction, distance offshore or other dangers to navigation, are such as to involve greater risk of collision or grounding

Harmful substances carried - Type and quantity of substances on board, whether cargo, fuel or stores, that would be harmful if released into the sea.

Natural Factors

Hydrographical - Water depth, bottom and coastline topography, lack of proximate safe anchorages and other factors which call for increased navigational caution.

Meteorological - Prevailing weather, wind strength and direction, atmospheric visibility and other factors which increase the risk of collision and grounding and also the risk of damage to the sea area in the event of spillage.

Oceanographic - Tidal streams, ocean currents, ice, and other factors which increase the risk of collision and grounding and also the risk of damage to the sea area in the event of spillage.

5.2 In proposing an area as a particularly sensitive sea area and in considering what associated protective measures should be taken, other information that might be helpful include the following:

- Any evidence that international shipping activities are causing damage and whether damage is of a recurring or cumulative nature;
- Any history of groundings, collisions, or spills in the area and any consequences of such incident;
- Any foreseeable circumstances or scenarios under which significant damage could occur;
- Stresses from other environmental sources; and
- Any measures already in effect and their actual or anticipated beneficial impact.

The UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS) - Current Status[1]

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Background to the Development of the Consultative Process

1. The consultative process is an attempt to bring together two separate strands of thinking about the protection of the marine environment:

a. the legal approach, which is, of course, embodied in the UN Convention on the Law of the Sea (UNCLOS), with thinking developed over at least a generation from 1958 to 1993; and

b. the policy approach, which has roots in national policies which are much older, but which only really started to be debated internationally in the early 1970s; it finds its most authoritative statement in Chapter 17 of Agenda 21.

2. UNCLOS is noteworthy that, unlike many international conventions concerned with policies that are bound to develop, it contains no provisions for meetings of the States Parties to consider issues generally. It provides for the UN Secretary-General to summon meetings of the States Parties, but, to the extent that it is explicit, specifies only limited, essentially administrative tasks for those meetings.

3. This is largely because many of those negotiating the Convention intended the UN General Assembly to fulfil the role of the general forum for UNCLOS issues. This expectation was largely fulfilled by the way in which the General Assembly took up the task of pursuing the entry into force of the Convention, and in 1996 (when that had been achieved) converted the annual agenda item on UNCLOS into a more general item on the oceans and the law of the sea.

4. Since 1992, the policy aspects have had their own periodic forum in the shape of the Commission on Sustainable Development (CSD), which, as with other policy areas,

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cyclically reviews the commitments relating to "oceans and all seas". Such reviews have so far taken place in 1996 and 1999.

5. Chapter 17 was noteworthy that it contained a strong plea for national governments to integrate their policies towards the oceans, but said nothing about international cooperation. It was clear that there was a general fear of demands for new institutions, and a consequent consensus against opening issues that might lead to the demand for them.

6. A significant element in the development of the UN consultative process has been experience with the 1995 Washington Global Programme of Action to Protect the Marine Environment from Land-Based Activities (GPA). Among other things, this drew clear attention to the range of international bodies, global and regional, that needed to work together to produce effective action on the oceans.

7. In preparation for the 1996 CSD review, the United Kingdom (UK) government hosted the First London Oceans Workshop. This discussed questions of global oceans governance, but it was clear that there could be no consensus on the question. CSD 4 (1996) therefore contented itself with a plea for coordination and cooperation and a commitment itself to keep oceans issues under review.

8. At the same time, CSD 4 attempted to urge the various international bodies to cooperate on the GPA. This proved to be very ineffective.

9. In 1999, CSD 7 was due to review oceans issues again. The UK held the Second London Oceans Workshop, at which governance issues (although not formally a focus) were much discussed, and the conclusions pointed to the need for a more specialised preparation of General Assembly's oceans debates, and the need to bring together the legal and policy aspects in order to achieve the implementation of UNCLOS. The consensus on this was easier to achieve because of the experience with UNCLOS.

Putting it Together

10. CSD 7 eventually achieved a decision, which (as well as identifying and dealing with a number of major policy priorities) recommended the General Assembly to set up a mechanism to provide for more detailed and expert preparation of the Assembly's ocean debates. This decision effectively required bringing together the legal and policy aspects, particularly in the form of those in the UN missions in New York who followed the Second and Sixth Committees.

11. In the negotiations in CSD and in the development of what became General Assembly resolution 54/33, there were many stumbling blocks. Solutions were found, but they have

shaped, and will continue to shape, the nature of the consultative process. Among the more significant:

a. the need to avoid creating anything that might appear to be a new institution;
b. the need to avoid anything that might appear to compromise the independence of the UN's specialised agencies and their governing bodies; States (or perhaps more accurately their representatives) who felt particularly close to certain agencies were worried by what more General Assembly consideration might mean for "their" agency;
c. the need to avoid anything that might appear to undermine, or to call in question, the rules codified in UNCLOS; this concern particularly reflected the belief that a balanced package had more or less been achieved in UNCLOS and that anything which appeared to re-open any element might lead to other elements unravelling;
d. the relationship with the meeting of the States Parties to the Law of the Sea Convention (SPLOSC); this concern was twofold: some States believed that SPLOSC should consider substantive issue relating to the implementation of UNCLOS and others that SPLOSC was best confined to the necessary administrative questions;
e. the wish of many States to see non-governmental organisations (NGOs) play a role in the process;
f. the countervailing suspicion of many other States of what that might mean, especially in a process that clearly had to be linked to the General Assembly;
g. the wish of many States to avoid pre-empting the negotiations each autumn on the general resolutions on oceans and the law of the sea and on fisheries; this led to a tension between those who wanted the output of the consultative process to be only in broad terms, and those who wanted it to be sufficiently detailed to lay down clear lines of action.

12. Underlying all this was the problem that the process had to bring together both the legal and policy aspects, in the form of the New York personnel of the Second (economic and social) and Sixth (legal) Committees of the General Assembly. These two communities have developed over the years markedly different habits and working practices. As a small example, the European Union Member States are accustomed in the Second Committee to agree a common position that is presented by the Presidency, while in the Sixth Committee each Member State speaks for itself.

How did the First Meeting Work?

13. A co-chair is probably not the most objective person to comment on the success, or otherwise, of what he has presided over. Nevertheless, the following points seem to capture the feed-back that we have had:

a. in spite of losing a day to a public holiday, the meeting managed to cover the fairly ambitious agenda that we had set;

b. we were probably over-ambitious in the range of issues, and related elements for consideration by the General Assembly, that we put into the draft on which we sought consensus; the result was that the session ran over by 2 hours after interpretation ceased; in consequence, this year we shall probably be less ambitious;

c. there was a high quality of debate, which brought a number of notable ideas (for example, China's intervention on piracy);

d. the process gave useful support to some important activates in process in other forums, and has started some other useful activities (for example, on investment in fisheries management);

e. the report ensured a significantly higher involvement by delegations in the negotiation of the General Assembly resolutions on oceans and the law of the sea and on fisheries, and raised the level of debate in those negotiations.

14. The subjects of the first meeting of the process had already been relatively thoroughly discussed in international meetings (especially CSD), and in consequence the structure of the issues was generally well understood. It remains to be seen whether the second meeting of the process will be able to be as successful with, on the one hand, a much wider and less structured subject such as "marine science and technology" and, on the other, a rather more technical and narrow issue such as "piracy and armed robbery at sea".

The United Nations Convention on the Law of the Sea and Marine Protected Areas on the High Seas[1]

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The United Nations Convention on the Law of the Sea is a basic, comprehensive legal instrument, more or less generally accepted and is, even 19 years after its adoption, still lacking universal participation. Although the Convention is the result of enormous efforts of many generations of government officials and intellectuals, the Convention does not offer an ultimate solution to all traditional and future problems of the seas and oceans. The drafters of the Convention were quite aware of this situation, and consequently, reference is made, either explicitly or indirectly, to other international instruments, to inter-national organisations enjoying competence in the field of marine matters, and to customary international law. Besides that, the 1994 Part IX Agreement, the 1995 Fish Stock Agreement, as well as the recently established United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS) provide vivid evidence to this end.

Against this background, the introduction of new ideas and concepts, such as the designation or establishment of marine protected areas on the high seas, might appear as a rather promising undertaking. As shown in various publications, the Convention devotes a number of provisions to the study, protection and preser-vation of the marine environment, and to the conservation and management of living resources, however, the term “marine protected areas” or any similar ex-pression does not appear in the text. The Convention contains only two provisions on special areas: article 234 on ice-covered areas, and article 25, paragraph 3 on specified areas for the protection of coastal state security. The legislative history of article 234 shows that the notion of special areas did not meet much enthusiasm. This provision was finally and reluctantly included in the Convention to satisfy Canada and Norway arguing that otherwise irreparable damage would be done to the Arctic environment. Article 234 is the only special area recognized by the Convention beyond the territorial sea, applies only within the limits of the exclusive economic zone, and is strictly limited to coastal state laws and regulations on ship-generated pollution. Even in the territorial sea, where the coastal State exercises sovereignty, the coastal State may only identify one type of a special area, namely specified areas essential for the protection of its

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security, and may therein suspend temporarily innocent passage of foreign ships (article 25, paragraph 3). The rationale is here that special areas cause restrictions to users of the sea and are likely to spread, if not treated as exceptional measures.

In this context, it should also be noted that the Convention gives rather priority to the utilization of marine resources than to their protection, preservation and conservation. Consequently, utilization of marine resources is only restricted to a certain extent. The living resources, both within the exclusive economic sea and on the high seas, are subject to specified conservation and management mea-sures. In article 56, the provision on the rights, jurisdiction and duties of the coastal State in the exclusive economic zone, the protection and preservation of the marine environment of this zone falls within the jurisdiction of State. However, it has to be kept in mind that the Convention does not offer a definition of the marine environment, and it is not clear at all, whether the resources of the seas and oceans are meant to form part of it. With regard to the natural resources of the continental shelf, no specific measures for protection and conservation are foreseen, and in the Area, which is the seafloor beyond national jurisdiction, the International Seabed Authority is entrusted with limited powers and functions, and the activities in the Area are restricted to exploration for and exploitation of the mineral resources, as defined in article 133. With respect to the protection and conservation of the natural resources of the Area, the Authority may only adopt such measures which shall prevent harmful effects from mining activities. It should be recalled that the resource-questions, namely fish, oil, gas and manganese nodules were instrumental to the Third United Nations Conference on the Law of the Sea. All States wanted their share in the riches of the seas and oceans, and wanted to benefit from the exploitation of the deep-seabed.

In other words, the Convention does not really provide a legally safe basis for marine protected areas, neither in zones where the coastal State exercises sovereignty, sovereign rights and jurisdiction, nor on the high seas or in the Area.

Having said this, the question arises, whether marine protected areas on the high seas, as demanded by scientists and others, and to be considered by the Vilm Workshop could be brought in line with the Convention, for instance, by way of interpretation. The answer will be derived from Part VII of the Convention, which is entitled “High Seas”. First of all, it should be mentioned that the regime of the high seas is customary international law since time immemorial, and was codified by the Geneva United Nations Conference on the Law of the Sea in 1958. Most provisions of Part VII of the Convention were taken from the 1958 Geneva Con-vention on the High Seas, and must be considered as hard rocks of international law. The cornerstones of the regime of the high sea, as formulated in 1982, are the following:

First, the high seas are open to all States;

second, all States enjoy the freedoms of the high seas;

third, the list of freedoms of the high seas contained in article 87 (navigation, overflight, laying of submarine cables and pipelines, construction of artificial islands and other installations, fishing, and scientific research) is not exhaustive;

fourth, the freedom of the high seas is exercised under the conditions laid down by the Convention and by other rules of international law;

fifth, the freedoms of the high seas shall be exercised by all States with due regard for the interests of other States in their freedom of the high seas, and also with due regard for the rights under the Convention with respect to activities in the Area;

sixth, claims of sovereignty over the high seas are invalid; and

seventh, the high seas are subject to flag state jurisdiction, and warships have complete immunity from the jurisdiction of any State other than the flag State.

In addition, it should be mentioned that the Convention does not provide a definition of the high seas. It was carefully avoided to declare a specific area of the seas and oceans as high seas. Article 86 on application of Part VII expressly states, that several freedoms of the high seas, namely navigation and overflight and of the laying of submarine cables and pipelines, including other internationally lawful uses of the sea, are also enjoyed by all States within the exclusive economic zone.

To bring the matter to the point, the establishment or designation of marine protected areas is prima vista a substantial interference with the regime of the high seas, unless proven to the contrary or tolerated by all States.

To make the matter even more difficult, attention shall be drawn to article 311 of the Convention on relation to other conventions and international agreements. The provisions of this article stipulate in sum, that the Convention prevails over the Geneva Conventions on the Law of the Sea of 1958, and other international legal instruments shall be compatible with the Convention.

It follows from all this, that any considerations on marine protected areas should begin with a discussion of the objective, scope and intend of such areas. In reading a paper presented to this workshop, I am quite puzzled by a proposal on a strategy to establish a network of protected areas comprising 10 per cent of the oceans. It appears to me that such idea is not only aimed at conservation and preservation of certain marine features and activities but to initiate a new process of creeping coastal state jurisdiction, and to deprive other States of the resources of the high seas, such as the highly-migratory species. However, if it were the case to the contrary, and it were possible to prove that the establishment or designation of such areas would not deprive any State of the freedom of the high seas and of the rights with respect to deep seabed mining, or States could be convinced that any possible interference would be kept to the minimum, a pro-posal on marine protected areas might

have a chance to receive support by all States. And yet, another major problem would have to be overcome. Due to the lack of any authority on the high seas but flag state jurisdiction, and also due to the limited powers and functions of the International Seabed Authority, a generally accepted procedure must be developed for the establishment or designation of marine protected areas on the high seas. Speaking of the Authority, proposals were put forward by Non-Governmental Organisations to extend its powers and functions, for instance, by the International Ocean Institute. Obviously, the idea is here to keep the Authority busy and alive since deep-seabed-mining is not really around the corner. Naturally, the Authority may take up the issue on marine protected areas in the Area. Depending on the scope, location, size, duration of individual protected areas, the Authority might be able to take appropriate decisions under its mining code or an addition to it. Otherwise, the Convention would have to be amended in accordance with article 314. Such amendment procedure may be instituted at any time.

If the scientific community would be prepared to have patience for quite some time until the legal issues at stake might be settled, one might suggest to initiate a formal proposal for submission to an amendment procedure of the Convention as provided for in article 313. Another option would be to strive for an im-plementation agreement on marine protected areas. Unfortunately, such ideas are quite likely not to bear desired fruits. First of all, the interest on marine protected areas on the high seas might not be sufficient to generate universal acceptance. And then, fears might be stirred up that once again the “Pandora’s box” of law of the sea problems will be opened leading to a revision conference of the Convention (article 312) or to a fourth United Nations Conference on the Law of the Sea. It seems to me that UNICPOLOS was instituted to avoid such nightmare. Of course, new generations of government officials and intellectuals want to engage in adventures, find out by themselves, how far they can get to change the law of the sea, and impose their political thinking and aspirations on the ocean regime.

On my part, being less adventurous but more realistic, it is suggested to introduce a viable concept for marine protected areas on the high seas to UNICPOLOS.

At the outset, it should be stated that requests for marine protected areas on the high seas are considered as ultimate means to protect certain features and activities, and shall be requested only, if other measures, such as fisheries management, pollution control, rules, regulations and procedures adopted by the International Seabed Authority, or an envisaged Code of Conduct for Marine Scientific Research, would be ineffective or would not serve the purpose otherwise.

It is therefore proposed that other main elements of such concept are to be elaborated:

First, purpose of marine protected areas in general;

second, marine protected areas serving specific purposes;

third, categories of marine protected areas, i.e., areas to protect certain living resources, certain non-living resources, habitats of the water column and of the seabed; areas to protect scientific research activities (stable reference or monitoring areas, science priority areas);

fourth, specific threats to each category of marine protected areas; and

fifth, procedure for the establishment or designation of marine protected areas.

Such procedure could be developed along the following lines:

The issue shall be submitted as a draft resolution to the United Nations General Assembly for adoption. Attached to such resolution are Guidelines for Designation of Marine Protected Areas on the High Seas. The resolution shall request the Secretary-General to give effect to the Guidelines and will call upon all States to respect the marine protected areas established thereby.

The Guidelines could look as follows:

- States or group of States may file an application for designation of a marine protected area on the high seas with the Secretary-General;
- The application shall contain relevant information, including a supportive statement by a competent national, regional or global institution or organisation;
- Upon receipt of an application, the Secretary-General shall notify all States and competent international organisations, and shall invite all States and competent international organisations for comments;
- Upon request, the applicant shall provide further information;
- A list of marine protected areas shall be drawn up, maintained and circulated by the Secretary-General;
- Any marine protected area shall be included in the list, if no objection by States is received by the Secretary-General within 12 months after the date the application was submitted;
- In cases, where objections are submitted, the Secretary-General shall invite the States to find mutually acceptable solutions;
- If such objections will not be withdrawn within 12 months, the Secretary-General shall request the States concerned to provide him with a statement on the situation for inclusion in his Annual Report on Oceans and the law of the sea to the General-Assembly; he shall invite the competent international organisations for comments;

- The applicant may revise his original application taking account of prevailing objections and relevant comments. If the revised application still raises objections, the requested marine protected area will be included in the list provisionally for a period of five years;
- The Secretary-General shall request the parties concerned to report on the situation, and if need be, request the State or States to identify the reasons for not withdrawing such objections;
- If objections are not withdrawn within 10 years, the marine protected area provisionally designated shall be withdrawn from the list;
- The unsuccessful applicant may file a new request at any time.

To sum up, this discussion paper was not prepared to complicate matters. It should be understood as a contribution to find ways and means for the establishment or designation of marine protected areas on the high seas in conformity with the law of the sea as codified in the 1982 UN Convention on the Law of the Sea. Of course, different approaches to the issue might lead also to satisfactory solutions. However, much more will have to be done by the science community and its supporters than stating and restating dangers and threats to the marine environment. It is simply not enough to develop tactics and strategies for demanding not reasonable but excessive means for its protection. In my view, the safest road to success is to define clear and honest objectives, to hammer out truly convincing arguments, and to translate all of that into legal language for submission to competent international fora.

Marine Protected Areas on the High Seas (Some Legal Aspects)[1]

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1. For the time being establishment of MPAs on the high seas – i.e. outside national jurisdiction – which, as I understand, is being advanced mostly by IUCN and WWF and supported in a general way by some states is largely an idea, not even a detailed concept. Nobody has presented as yet specific proposals on the matter, and nobody knows how this idea will work out, including its supporters.

2. So far as areas under national jurisdiction are concerned, a state may already now under the 1982 UNCLOS take unilaterally any measure it wishes to protect and manage its marine resources in the EEZ and on the continental shelf, e.g. by establishing a MPA, with one exception, however, - namely, it cannot unilaterally restrict international shipping. If a state wishes to protect an area or species in its EEZ from shipping activities, it has first to seek approval from the International Maritime Organization (IMO). Otherwise, so far as shipping is concerned, the jurisdiction of coastal states is limited to the right to adopt laws and regulations for the prevention, reduction and control of pollution from vessels conforming to and giving effect to generally accepted international rules and standards (Article 211 (5), UNCLOS).

3. However, in ice-covered areas within the limits of the EEZ coastal states have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels without prior consultations with IMO (Article 234, UNCLOS).

4. **As to the areas outside national jurisdiction**, it is international organisations who have competence to introduce limitations and rules of human activities there. In those areas states have much more limited possibilities for unilateral actions, except exercising their jurisdiction over their own citizens or vessels under their flags.

5. In the field of **shipping and navigation** it is IMO which is recognized as the only body with responsibility to limit shipping activities through a variety of measures like

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establishing and recommending ships' routeing measures such as areas to be avoided, traffic separation schemes, precautionary areas and deep-water routes, as well as special areas with special mandatory methods for the prevention of sea pollution by oil and particularly sensitive sea areas (PSSAs) both within and beyond territorial waters with stricter discharge restrictions from vessels, special routeing measures, compulsory pilotage schemes or vessel traffic management systems.

6. So far as the activities **within the international sea-bed area** are concerned, it is the International Sea-Bed Authority (ISBA) which has responsibility to adopt rules and regulations for the purpose of prevention, reduction and control of pollution and other hazards to marine environment and of interference with the ecological balance of the marine environment resulting from such activities.

7. In regulating **international fishing beyond the limits of the EEZs** states depend on either direct co-operation between them or on international conventions and organisation s to adopt measures for management and conservation of living resources.

The 1995 Straddling Fish Stock Agreement obliges coastal states and states fishing on the high seas for straddling and highly migratory fish species to co-operate to ensure conservation and optimum utilization of fish resources **both within and beyond EEZs.** It also contains a notable addition to the norms of LOS **limiting the access to the freedom of fishing on the high seas** only to those states which are members of sub-regional or regional fisheries organisations or participants in conservation and management organisations, or which agree to apply measures established by such organisation s or arrangements to that effect.

There are also a number of bilateral agreements regulating management of straddling and highly migratory fish stocks. For example Russia has such an agreement on Alaska pollock with the USA.

The FAO Committee on Fisheries (COFI) and especially a number of regional fisheries organisation s establish rules and regulations for fishing, conservation and management of fish stocks. The North-East Atlantic Fisheries Commission, the North Atlantic Salmon Conservation Organization, the International Commission for the Conservation of Atlantic Tunas, International Whaling Organization etc. could be mentioned in this regard.

Finally, conservation and management of marine living resources and protection of marine areas from pollution has been pursued for years within the framework of the Antarctic Treaty, and a number of measures including establishment of special areas have been adopted by international bodies established under the Treaty, especially by the Commission for the Conservation of Antarctic Marine Living Resources.

8. This present global system of protection of the high seas and their resources has been functioning effectively enough although, of course, there is always room for improvement. Moreover, it is firmly based on the existing norms of LOS and fully conforms to the UNCLOS.

But now we face a very energetic and active drive to establish something entirely new and to do so without any readable blueprint.

Thus, during the discussion on oceans and seas at the VII session of the Commission on Sustainable Development some delegations proposed the development of **"a global representative system of MPAs within and across national jurisdictions",** and the Secretariat of that Commission has since duly reported that criteria for the establishment and management of marine and coastal protected areas will be presented in a document to the 5-th meeting of the Conference of Contracting Parties.

IUCN and WWF have gone further and have submitted their views on **"the broad, comprehensive and integrated concept of the developing international law regarding MPAs".** By the way, I am not at all sure that LOS is actually developing but it is certainly being very hard pushed in that direction. On its part WWF proposed the addition of new criteria for identifying a PSSA – namely, biogeographic criteria and international, regional or national significance, to reflect priorities identified by the Convention on Biological Diversity and the World Heritage Convention and the initiative to establish a global representative system of MPAs.

9. To do the UN Secretariat justice, its Division on Ocean Affairs and LOS did try to channel this drive closer to UNCLOS. It pointed out that IMO, when dealing with the PSSAs Guidelines, had gone further than Article 211(6) of UNCLOS allowed. The UN Secretariat quite correctly drew the attention of IMO to the fact that, unlike the PSSAs Guidelines, Article 211(6) required **all criteria mentioned therein** to be met and, furthermore, that the criteria of scientific and educational and cultural value and/or archaeological significance might not be consistent with Article 211(6). Yet the WWF disagreed and insisted on a "broad approach" to the subject.

10. It has to be pointed out that some states are already now using the criteria proposed by NGOs and not yet approved by the competent intergovernmental organisations, in their practical policy on the high seas. Thus, Australia informed MEPC (IMO) at its 44-th session of an Australian project on how it used the IMO criteria **together with those of IUCN** for identifying PSSAs **as a first step in the process of identifying Australian marine areas** qualifying for the status of marine environment high risk areas. During the First Meeting of the UN Open-ended Informal Consultative Process on Oceans and Seas (UNICPO) in May 2000 Australia explained that its determination was motivated by the illegal, unreported and unregulated fishing of Patagonian toothfish – **which, by the way, were under the management of the Commission for the Conservation of Antarctic Marine Living Resources** – as

well as unregulated fishing of orange **roughly in the area adjacent to the EEZ and on the high seas in the Indian Ocean.**

11. Another example which is characteristic of the suggested “broad, comprehensive and integrated approach” and which actually takes this trend across all reasonable limits is the Colombian proposal submitted to the MEPC at its 44-th session, to designate Malpelo Island as a PSSA to be avoided by shipping, with a TSS. The proposal is unique in that it requests IMO to designate a PSSA in order to essentially protect the marine area around Malpelo Island (500 miles off the coast) from illegal fishing. This time IMO did not wait for a rebuke from the UN Secretariat and, since the IMO Guidelines did not appear to address the establishment of a PSSA for such purposes, MEPC requested Colombia to supply additional information to be considered at its next session.

12. Thus the trend is clear and it has already resulted in the inclusion of item “Marine Protected Areas” into the agenda of the coming UNICPOLOS meeting this spring.

I am not against the idea of taking additional measures to protect the high seas. After all, the Report of the UN Secretary-General to the Millenium Assembly quite correctly identified marine and coastal areas among the five major ecosystems on which human life depended. But I doubt very much that the establishment of MPAs on the high seas is the right way to achieve this aim and I would suggest that – to use a popular term – a highly precautionary approach be taken on the matter for at least three reasons.

13. First, this trend creates a serious risk of taking UNCLOS apart in that it in fact aims at a review of the UNCLOS provisions on the legal regime of the high seas. The rebuke that the UN Secretariat addressed to IMO for digressing from UNCLOS, relates to even greater extent to those states and NGOs who are behind this drive. And we should not let ourselves be convinced by assurances that UNCLOS will be strictly followed or that everything will be done in full conformity with it. The true value of those assurances was well illustrated by the discussion on the Underwater Cultural Heritage Convention at UNESCO where all the speakers on the matter without exception would start their statements with such assurances but then many of them would in fact suggest a review of the UNCLOS provisions on the jurisdiction of states in the EEZs and/or on the continental shelf.

14. Second, there are no sound scientific reasons behind the idea of the establishment of MPAs on the high seas. One can hear nowadays all kind of arguments in support of this idea including the one that its realization will be an effective way to stop global warming and such phenomena as coral bleaching or El-Ninjo. However, scientists continue to disagree whether the present wave of global warming signifies indeed **a permanent trend**. It is suggested that we may well have a stage of a natural cyclic

temperature change – like the similar global warming period we had in 1920-1930s which was in turn followed by over three decades of lower temperatures. Furthermore, there is no proof that natural phenomena like El-Ninjo occur more frequently now because of the global warming which, I understand, is today characterized by higher temperatures of the air, not of the water mass of the World Ocean globally. What the scientific community agrees on is that the main reason for the global warming is higher temperatures over continents as a result of intensive industrial production of gases like carbondioxide or phreon.

So far as coral bleaching is concerned, there is a view that it is being provoked not only by El-Ninjo alone – to the same, if not to a greater extent, it is the consequence of land-based pollution which still remains the main source of pollution of the World Ocean.

So we have to realize quite clearly that the establishment of "a global integrated system of MPAs" will reduce neither the global warming, nor land-based pollution, nor coral bleaching.

15. Third, in our hurry to protect marine species we should not lose sight of the need to protect human species which is at the very least no less imperative. The establishment of "a global integrated system of MPAs on the high seas", while having doubtful ecological value, might, on the contrary, quite tangibly affect vital economic interests and well-being of millions of people through limiting their economic activities.

The point is that the establishment of MPAs on the high seas will not achieve anything in the way of protecting marine living resources or marine environment that the present system – coupled with additional national efforts - cannot achieve.

So far as pollution from vessels is concerned, IMO is doing already now a good job. If someone thinks that more should be done, nothing prevents that someone from submitting specific proposals, and they can be effectively implemented within the framework of present IMO conventions. But again let us not forget that by far the main threat of pollution of the World Ocean comes from land-based pollution, and here many of those who insist on the idea of MPAs on the high seas lag far behind their obligations.

So far as conservation of marine living resources is concerned, some 90% of them are to be found within EEZs, not on the high seas. As to the remaining 10%, let us not forget that all the present fishing areas and areas of mammals' catch are within the spheres of competence of international fisheries, whaling etc. organisations. Already now, without MPAs on the high seas, they are doing everything that the proposed system is supposed to do. Thus, they are monitoring marine living resources, regulate national quotas; when necessary they limit fishing efforts, close whole areas or prohibit fishing and catching mammals during certain periods. Generally, the status of majority of marine species and mammals is far from being critical, and those stocks which have been depleted are being protected by present arrangements.

As to the unreported, unregulated and illegal fishing, MPAs on the high seas will not stop it but much more active efforts of flag, port and coastal states will.

16. For all those reasons we need to follow a highly precautionary approach on this matter.

Marine Protected Areas Beyond National Jurisdiction - Existing Legal Principles and Future Legal Frameworks[1]

Robin Warner[2]

Royal Australian Navy/Environment Australia

Introduction

International lawyers face a challenge in further developing the current international law framework to provide essential protections for the deep sea environment beyond national jurisdiction. With the growth in scientific knowledge of the marine environment in the latter decades of the twentieth century, protected areas were increasingly utilised as a major conservation technique in coastal and offshore areas. The first marine protected areas were declared as an adjunct to terrestrial reserves within national jurisdiction. They were often coastal or freshwater sites within or adjacent to protected areas on land.[3] Initially, coastal states exercised complete discretion with regard to governing legislation for these areas in the absence of guiding principles at the global and regional levels. As international environmental issues ascended the political agenda in the late twentieth century, global and regional political fora began to address the issue of environmental protection and the applicable legal regimes. These deliberations generated a range of soft law principles and conventional international law provisions which contain general and specific obligations to protect and preserve the marine environment both within and beyond national jurisdiction. States have implemented these principles at the national level using a wide variety of tools including the establishment of marine protected areas within their own jurisdictions. These areas are governed by diverse national management regimes and legislative models.[4] There are also regional examples of marine protected areas within adjacent national jurisdictions which are supported by specific multilateral conventions and action plans.[5] At the global level, however, there is no framework instrument or implementing agreement which provides an international law basis for declaring marine protected

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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3 Gubbay S., (ed.) Marine Protected Areas, Principles and Techniques for Management, (1995), Chapman & Hall, London, p.1.

4 Salm R.V. & Clark J.R., Marine and Coastal Protected Areas: A Guide for Planners and Managers, (1984), IUCN, Gland, Switzerland, pp 36-37; Kelleher G. & Kenchington R., Guidelines for Establishing Marine Protected Areas, (1991), Great Barrier Reef Marine Park Authority & IUCN, p. 7.

5 Examples of regional conventions which provide for the creation of marine protected areas in sea areas within national jurisdiction include the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (Barcelona, 1995), the Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region (Nairobi, 1985), 1989 Protocol Concerning Protected Areas to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena de Indias, 1983) and the Protocol Concerning Specially Protected Areas to the Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific (Lima 1981).

areas which extend beyond national jurisdiction or lie wholly beyond national jurisdiction. The wealth of deep sea biodiversity now being discovered within these areas and the attendant threats to deep sea resources suggests that international lawyers should be in the vanguard of those promoting a legal framework and management regime for marine protected areas beyond national jurisdiction.

The Political Impetus and Scientific Rationale for Conserving Deep Sea Environments

The need for multiple use marine protected areas on the high seas to conserve marine biodiversity was identified in the Australian Delegation's address to both the 7th Session of the UN Commission on Sustainable Development in early 1999 and the inaugural session of the United Nations Open-ended Informal Consultative Process on Oceans and Law of the Sea Affairs (UNICPOLOS) in June 2000.[6] The UNICPOLOS address emphasised that while our knowledge of the biodiversity and resources of the high seas is limited, increasingly areas are being identified that would benefit from a conservation and sustainable use approach, or at least from a precautionary approach to their initial exploration and use. Areas include deep ocean trenches, sea mounts and hydro thermal vents and examples abound in the Asia-Pacific region. To demonstrate an example was given of a survey of 14 sea mounts off southern Tasmania in 1998 which recorded 266 species of macro invertebrate of which at least 24-43 per cent were new to science and 16-33 per cent were believed to be sea mount endemics. Multiple use marine protected areas were advocated as a tool for providing an integrated management regime that can incorporate biodiversity conservation, fisheries, mineral exploration and extraction, tourism, military activities and research in a sustainable manner. The international community was urged to better integrate established multilateral bodies and existing legal mechanisms to identify areas suitable for collaborative management and action and to reach agreement by consensus on regimes for their conservation and management.[7]

The threats faced by deep sea habitats are starkly illustrated in a paper by P. Keith Probert, a New Zealand scientist, which addresses the need to conserve deep sea environments[8]:

> "The open ocean beyond national jurisdiction is under intense pressure especially from fishing and fishing related activities. Many deeper water fishing grounds have been exploited as a result of the depletion of many inshore stocks and the

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6 Burgess P. & Osborn D., "Oceans Governance – Some Regional Issues", Paper presented at the Australia/ Canada Ocean Research Network Meeting, Dec 10-12, 2000, Vancouver, p.9.

7 International and regional interest in the establishment of marine protected areas beyond national jurisdiction is growing. In February /March 2001 the Federal Agency for Nature Conservation of the German Government held an Expert Workshop on "Marine Protected Areas on the High Seas – Scientific Requirements and Legal Aspects" and in late 2001 Environment Australia, an agency of the Australian Government plans to hold an Expert Workshop on "Protection of the High Seas Marine Biodiversity in the South West Pacific – the Role of Marine Protected Areas."

8 Probert P. Keith, "Seamounts, Sanctuaries and Sustainability; Moving Towards Deep Sea Conservation" in Aquatic Conservation: Marine and Freshwater Ecosystems Vol. 9, (1999), John Wiley & Sons, Ltd., pp.601-605.

> improvements in fishing technology. There is also growing concern over the wider impacts of fishing including the disturbance of the sea bed and benthos by bottom trawling. The effects of bottom trawling on the seabed have been likened to the effects of forest clear cutting on shore resulting in a sharp reduction in structural diversity and dependent biota.
>
> Some deep sea habitats are especially vulnerable to bottom trawling disturbance, sea mounts being a striking example. Sea mounts are biologically distinctive habitats of the open ocean exhibiting a number of unique features. As submerged inactive volcanoes they rise steeply from the deep sea floor and often occur in chains or clusters. It has long been known that fish aggregate on sea mounts. Many sea mount associated fish species, in addition to forming dense aggregations have very low productivity and extreme longevity – characteristics that render them especially vulnerable to over-fishing - such that populations are likely to need decades or centuries to recover. Fisheries stocks on sea mounts appear to have been consistently over-exploited, in particular within the Asia Pacific region, those of the pelagic armour head in the northern Hawaiian ridge, sea bass on the Norfolk sea mount in the South Pacific, and orange roughy off southern Australia and New Zealand."

The threat to seamount biotas is currently from overfishing and destructive fisheries practices, however other threats to valuable deep sea resources loom. Hundreds of new species have now been discovered in hydrothermal vent communities and ocean trenches which represent beneficial genetic resources for mankind. These resources are vulnerable to proposals for deep sea bed disposal of pharmaceuticals, toxic industrial wastes and intermediate and high level radioactive wastes. The designation of marine protected areas is a major tactic in marine conservation within national jurisdiction and would be particularly appropriate in the case of deep sea environments that are small in extent, host endemic species and could be readily changed by human activities such as fishing and mining.

Existing International Law Principles Concerning Marine Protected Areas Beyond National Jurisdiction

A complex array of influences have contributed to the development of international law principles concerning marine protected areas. Provisions concerning areas of ocean space in which special environmental protection measures apply, appear in a wide variety of global and regional instruments dating from the 1940s. As well as conventional international law provisions, support for the establishment of such areas has often been expressed in resolutions and other documents of governmental and non governmental organisations at the global and regional level. There is also a growing body of emergent customary international law concerning environmental protection which has application to

marine protected areas.[9] The term “soft law” is used to refer to the statements and documents of intergovernmental and non governmental organisations which do not have treaty status. This section of the article will analyse some of the disparate sources of conventional international law and soft law principles which lend support to the creation of marine protected areas focussing specifically on the establishment of such areas beyond national jurisdiction.

Conventional International Law and Soft Law Principles

The first references to specially protected areas of marine space occur in global instruments designed to conserve particular species and their habitat such as the 1946 International Convention for the Regulation of Whaling.[10] Other multilateral conventions such as MARPOL 73/78[11] have addressed specific sources of pollution such as vessel discharges and imposed discharge restrictions on vessels transiting vulnerable marine areas. These conventions have been succeeded by more comprehensive instruments which recognise the need to conserve whole marine ecosystems in coastal and offshore environments employing conservation methods such as specially protected areas. [12] Still other conventions such as the 1982 UN Law of the Sea Convention (LOSC)[13] provide general support for the protection and preservation of the marine environment including the maintenance of rare and fragile ecosystems. My analysis will focus on those global instruments which can be interpreted as applying both within and beyond national jurisdiction. Selected global and regional instruments and soft law principles will be examined to determine the extent and location of the marine areas defined, the purpose of their definition, the protective measures imposed and enforcement mechanisms provided. The interrelationship of the subject provisions with the LOSC framework of oceans jurisdiction and use will also be reviewed. For the purpose of this analysis instruments and principles are grouped in the following categories:

- Framework Documents
- Regional Implementation
- Species and Habitat Protection

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9 This article does not address the customary international law basis for the establishment of marine protected areas beyond national jurisdiction but many of the conventional international instruments and soft law principles analysed in this article codify or refer to emergent customary international law principles such as the precautionary approach and intergenerational equity viz., Agenda 21 and the 1992 Biodiversity Convention.

10 161 U.N.T.S. 72 (United Nations Treaty Series)

11 International Convention for the Prevention of Pollution from Ships, London, 2 November 1973. 12 ILM 1391 (1973).

12 Convention on Biological Diversity, 5 June 1992, Rio de Janeiro. 31ILM 822 (1992) (International Legel Material); Conventions and Protocols under the UNEP (United Nations Environment Program) Regional Seas Programme, supra note 3.

13 21 ILM 1261.

Framework Documents

World Conservation Union (IUCN) Principles

At the global level, the establishment of marine protected areas both within and beyond national jurisdiction has been addressed principally by mixed governmental and non governmental organisations such as the IUCN and non governmental organisations such as the World Wide Fund for Nature (WWF). A series of international conservation meetings dating from the World Congress on National Parks in 1962 have considered the issue of marine protected areas and developed a definition and specific objectives for a global representative system for such areas.[14] The following definition for marine protected areas was developed by the 4th World Wilderness Conference in 1987 and adopted by the International Union for the Conservation of Nature (IUCN) at its 17th General Assembly in 1988:

> "Any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment."

At the same IUCN General Assembly meeting in 1988, a resolution was passed adopting the following specific objectives for a global representative system for marine protected areas:

- "To protect and manage substantial examples of marine and estuarine systems to ensure their long term viability and to maintain genetic diversity;
- To protect depleted, threatened, rare or endangered species and populations and, in particular, to preserve habitats considered critical for the survival of such species;
- To protect and manage areas of significance to the life cycles of economically important species;
- To prevent outside activities from detrimentally affecting the marine protected areas;
- To provide for the continued welfare of people affected by the creation of marine protected areas; to preserve, protect, and manage historical and cultural sites and natural aesthetic values of marine and estuarine areas, for present and future generations;
- To facilitate the interpretation of marine and estuarine systems for the purposes of conservation, education and tourism;

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[14] Gubbay, supra note 1, pp.1-5.

- To accommodate with appropriate management regimes a broad spectrum of human activities compatible with the primary goal in marine and estuarine settings;
- To provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development and adjacent land practices".

As part of its Global Representative System of protected areas in the land and marine environment, IUCN has developed a list of categories for protected areas which reflect the differing levels of protection and the diverse range of purposes for which protected areas are declared.[15] The IUCN definition is not limited to marine areas within national jurisdiction, however, to date, the IUCN list of protected areas only includes marine areas within national jurisdiction. The establishment of marine protected areas beyond national jurisdiction was foreshadowed at the IUCN World Conservation Congress in October 2000 where Australia successfully tabled in cooperation with New Zealand, a resolution which calls upon:

1. "The Director General to work with IUCN members and multilateral agencies to explore an appropriate range of tools, including high seas Marine Protected Areas, with the objective of implementing effective protection of biological diversity and ecosystem processes on the high seas; and
2. National governments, international agencies and the non-governmental community to better integrate established multilateral agencies and existing legal mechanisms to identify areas of the high seas suitable for collaborative management action, and to reach agreement by consensus on regimes for their conservation and management".[16]

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[15] Ibid., p.3; 1997 United Nations List of Protected Areas, World Conservation Monitoring Centre and the IUCN World Commission on Protected Areas, (1998), Gland, p. xviii lists the following protected Area Management Categories:

Category Ia – Strict Nature Reserve: protected area managed mainly for science.
Category Ib – Wilderness Area: protected area managed mainly for wilderness protection.
Category II – National Park: protected area managed mainly for ecosystem protection and recreation.
Category III – Natural Monument: protected area managed mainly for conservation of specific natural features.
Category IV – Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.
Category V – Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation.
Category VI – Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

[16] "The Conservation of Marine Biodiversity on the High Seas and in the Area using Marine Protected Areas", Australian Commonwealth Government Discussion Paper (Environment Australia), October 2000, p. 5.

LOSC Provisions

Support for creating marine protected areas on the high seas can be inferred from a number of articles in the LOSC. Article 192 of the LOSC provides that “States have the obligation to protect and preserve the marine environment.” The term “marine environment” is not confined to those parts of the marine environment that are within States Parties national jurisdiction. Article 194(1) elaborates on this general obligation and provides:

> “States shall take, individually or jointly as appropriate, all measuresconsistent with this Convention, that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities and they shall endeavour to harmonize their policies in this connection.”

Measures to be taken are to include those necessary to protect “rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life” under Article 194(5) and in Article 196(1) measures to prevent reduce and control pollution of the marine environment resulting from the use of technologies under States Parties jurisdiction or control or the introduction of alien or new species to a particular part of the marine environment, which may cause significant harm to that part of the environment. The LOSC provisions do not limit such measures to areas of the marine environment within national jurisdiction.

The global and regional cooperation necessary to fulfil States Parties obligations under Part XII of the LOSC is recognised in Article 197 of the Convention which provides:

> “States shall cooperate on a global basis, directly or through competent international organisations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.”

The international rules, standards and recommended practices and procedures to be developed are not limited in their application to the protection and preservation of the marine environment within national jurisdiction and must necessarily extend to the high seas if the general obligation of States Parties in Article 192 is to be fulfilled.

Other articles of the LOSC lend support to the creation of marine protected areas beyond national jurisdiction for specific purposes such as conservation and management of living resources in Article 61, exploration of the continental shelf and management of its resources in Article 77, the promotion of marine scientific research in Article 239, the

assessment and monitoring of environmental impacts in Article 204(2) and the protection of archaeological and historical objects in Article 303(1)[17].

The need for pollution prevention measures to be consistent with other ocean uses permitted under the LOSC is reinforced in Article 194(4) which provides:

> "In taking measures to prevent, reduce or control pollution of the marine environment, States shall refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in pursuance of their duties in conformity with this Convention."

Report of the United Nations Conference on Environment and Development (UNCED) – Agenda 21

The general obligation of States to protect and preserve the marine environment, codified in Article 192 of the LOSC was further developed in Chapter 17 (the Oceans Chapter) of the Report of UNCED (Agenda 21).[18] In paragraph 17.22 of Chapter 17 States are exhorted to:

> "in accordance with the provisions of the United Nations Convention on the Law of the Sea on protection and preservation of the marine environment, commit themselves, in accordance with their policies, priorities and resources, to prevent , reduce and control degradation of the marine environment so as to maintain and improve its life support and productive capacities."

Paragraph 17.21 emphasises that "a precautionary and anticipatory rather than a reactive approach is necessary to prevent the degradation of the marine environment." In implementing their obligations to protect and preserve the marine environment, paragraph 17.30 specifies that:

> "States, acting individually, bilaterally, regionally or multilaterally and within the framework of IMO and other relevant international organisations should assess the need for additional measures to address the degradation of the marine environment."

In relation to shipping, States are recommended in paragraph 17.30(a)(iv) to

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[17] The Draft Convention on the Protection of the Underwater Cultural Heritage being negotiated under the auspices of UNESCO (CLT-96/Conf.202/5 Rev. 2) can also be cited as providing support for the general concept of marine protected areas beyond national jurisdiction as it applies to underwater cultural heritage found at sea irrespective of its location (Art. 1 in above cited draft). Article 10(3) of the above cited draft provides that:

"Where UNESCO designates as requiring special protection underwater cultural heritage in the Area, each State Party shall take all necessary measures to ensure that vessels flying its flag do not undertake activities that adversely affect such underwater cultural heritage."

[18] Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, UN Doc. A/Conf.151/26 (Vol. II).

> "Assess the state of pollution caused by ships in particularly sensitive sea areas identified by IMO and to take action to implement applicable measures, where necessary, within such areas to ensure compliance with generally accepted international regulations."

This particular measure is not limited to particularly sensitive sea areas (PSSAs) which lie within national jurisdiction although to date the only PSSAs designated by IMO lie within national jurisdiction.[19]

In paragraph 17.46 States commit themselves to the conservation and sustainable use of marine living resources of the high seas including the preservation of habitats and other ecologically sensitive areas. The objectives and activities recommended in Chapter 17 in connection with the conservation of living resources of the high seas culminated in the conclusion of the United Nations Straddling Stocks Agreement[20] which has precedential value for further implementation of the LOSC Part XII obligation to protect and preserve the marine environment in Article 192 and related articles.

In Programme Area D of Chapter 17, which relates to the Sustainable Use and Conservation of Marine Living Resources under National Jurisdiction, the designation of protected areas is endorsed as a management related activity. Paragraph 17.85 provides:

> "States should identify marine ecosystems exhibiting high levels of biodiversity and productivity and other critical habitat areas and should provide necessary limitations on use in these areas, through, inter alia, designation of protected areas."

States are urged to promote marine scientific research and systematic observation of the marine environment within the limits of national jurisdiction and high seas in Programme Area E of Chapter 17 which addresses critical uncertainties for the management of the marine environment.

Finally, Programme Area F of Chapter 17 advocates the strengthening of international, including regional cooperation and coordination in relation to marine issues. Paragraph 17.115 identifies the need to improve coordination and strengthen links between national, regional and international institutions with competence in marine issues both within and outside the United Nations System. In addition, Article 17.118 recognises that

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[19] The Great Barrier Reef was designated as a Particularly Sensitive Sea Area in November 1990 by the International Maritime Organisation (IMO) (Marine Environmental Protection Committee 44 (30)). The area extends approximately 2300 km along the eastern coast of Queensland, Australia from just north of Fraser Island in the south (24 30'S) to the latitude of Cape York in the north (10 41'S) and covers an area of 348,000 sq km on the continental shelf of Australia. The second PSSA designated was the Sabana-Camaguey Archipelago in September 1997 (MEPC.74(40)). It is located in the north central portion of the Republic of Cuba, extending for 465 km between the Hicacos Peninsula and the Bay of Nuevitas.

[20] The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, UN Doc. A/Conf.164/37, 8 September 1995 (the Straddling Stocks Agreement).

environmental measures addressing international environmental problems should, as far as possible, be based on an international consensus. To achieve practical implementation of marine protected areas on the high seas, cooperation between international organisations with competence in marine issues beyond national jurisdiction such as the IMO and the International Seabed Authority and their regional affiliates[21] will be essential.

Convention on Biological Diversity (CBD), 1992, Rio de Janeiro

The objective of the Biodiversity Convention[22], which was concluded at UNCED, is the conservation and sustainable use of biological diversity for the benefit of present and future generations (Preamble and Art. 1). Contracting Parties have responsibility, under the Convention, for components of biological diversity within the limits of national jurisdiction and for processes and activities carried out under their jurisdiction and control both within and beyond national jurisdiction (Article 4(a) and and (b)). In respect of areas beyond national jurisdiction, Contracting Parties are urged to cooperate with other Contracting Parties directly or where appropriate, through competent international organisations for the conservation and sustainable use of biological diversity (Article 5). Article 8 of the Convention provides the following specific responsibilities for Contracting Parties in relation to protected areas, ecosystems and natural habitats within national jurisdiction:

> "(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
>
> (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or where special measures need to be taken to conserve biological diversity;
>
> (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation or sustainable use;
>
> (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;
>
> (e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas."

For the purposes of the Convention "protected area" is defined in Article 2 as:

> "'*Protected area'* means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives."

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21 Regional Fisheries Management Organisations may have a role in implementing protective measures relevant to their main functions of protecting and managing fisheries stocks in marine protected areas beyond national jurisdiction.

22 31 ILM 822 (1992).

Although there is no specific obligation in the Convention for Contracting Parties to establish a system of marine protected areas beyond national jurisdiction, this is one area in which the Convention could be amended to provide for multilateral cooperation between interested States Parties and international organisations in establishing and overseeing such areas.

The relationship of the Convention with other international agreements and the need to reconcile its implementation in relation to the marine environment with the LOSC is covered in Article 22 which provides:

> "1. The provisions of this Convention shall not affect the rights and obligations of any Contracting Party deriving from any existing international agreement, except where the exercise of those rights and obligations would cause a serious damage or threat to biological diversity.
> 2. Contracting Parties shall implement this Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea."

IMO Guidelines for the Designation of Special Areas and the Identification of Particularly Sensitive Sea Areas

The "particularly sensitive sea area" concept is a unique soft law concept devised by the IMO to provide protection for environmentally sensitive sea areas, both within and beyond national jurisdiction, from the harmful effects of international shipping activities. The concept originated with a resolution adopted by the International Conference on Tanker Safety and Pollution Prevention (TSPP) in 1978 entitled "Protection of Particularly Sensitive Sea Areas (TSPP Resolution 9) which invited the IMO:

> "(b) to initiate, as a matter of priority and in addition to the work under way, studies, in collaboration with other relevant international organisations and expert bodies, with a view to:
>
> (i) making an inventory of sea areas around the world which are in special need of protection against marine pollution from ships and dumping, on account of the areas' particular sensitivity in respect of their renewable resources or in respect of their importance for scientific purposes;
>
> (ii) assessing, inasmuch as possible, the extent of the need of protection, as well as the measures which might be considered appropriate, in order to achieve a reasonable degree of protection, taking into account also other legitimate uses of the seas;
>
> (c) to consider, on the basis of the studies carried out accordingly and the results of other work undertaken, what action will be needed in order

to enhance the protection of the marine environment from pollution from ships and dumping of wastes;

(d) to take action, when appropriate, in accordance with the established procedure, with a view to incorporating any necessary provisions, within the framework of relevant conventions, as may be identified as a result of the above studies."

Particularly sensitive sea areas were defined as:

> "areas which need special protection through action by IMO because of their significance for recognized ecological or socio-economic or scientific reasons and which may be vulnerable to damage by maritime activities."

Guidelines for the Designation of Special Areas (under the International Convention for the Prevention of Pollution from Ships as modified by the Protocol of 1978 (MARPOL 73/78)) and the Identification of Particularly Sensitive Sea Areas[23] were adopted by the Assembly of IMO at its seventeenth regular session. For an area to be identified as a PSSA, it must meet criteria[24] in one of the following groups:

"(a) Ecological Criteria
- (i) Uniqueness
- (ii) Dependency
- (iii) Representativeness
- (iv) Diversity
- (v) Productivity
- (vi) Naturalness
- (vii) Integrity
- (viii) Vulnerability

(b) Social, cultural and economic criteria
- (i) Economic benefit
- (ii) Recreation
- (iii) Human Dependency

(c) Scientific and educational criteria

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[23] IMO Doc. A 17/Res.720 of 9 January 1992.

[24] Ibid., paragraph 3.3.4-7.

(i) Research

(ii) Baseline and Monitoring Studies

(iii) Education

(iv) Historical Value"

Member States of the IMO, either individually or jointly, may submit proposals to designate particularly sensitive sea areas to the Marine Environment Protection Committee (MEPC).[25] The criteria relate to particularly sensitive sea areas within and beyond the limits of the territorial sea and may straddle different states zones of jurisdiction.[26]

In PSSAs, special protective measures within the competence of IMO under the International Convention on the Safety of Life at Sea, 1974 (SOLAS 1974) may be proposed for adoption by the Maritime Safety Committee of IMO.[27] These include `areas to be avoided´ designations, traffic separation schemes, voluntary or compulsory pilotage and vessel traffic services. With the exception of traffic separation schemes and compulsory pilotage, these protective measures are voluntary and designed to accommodate rather than prohibit safe navigation of the areas by international shipping. These measures do not affect other uses of the areas such as resource exploitation, marine scientific research, military activities or tourism.

A PSSA may lie within a broader "special area" designated under one of the Annexes to MARPOL 73/78.[28] If this is the case, the relevant vessel discharge restrictions will also apply within the particularly sensitive sea area.

The PSSA concept is currently narrower than the marine protected area concept envisaged in Agenda 21, Chapter 17 and the Biodiversity Convention. The marine protected area concept is designed to provide comprehensive protection for environmentally sensitive marine areas[29] both within and beyond national jurisdiction[30] whereas the PSSA protections relate specifically to harm caused by the activities of international shipping. MEPC is currently revising the IMO Guidelines for Designation of Special Areas and the Identification of PSSAs.[31] The terms of reference for the Correspondence Group revising the Guidelines included reviewing relevant provisions of other international instruments such as the

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25 Ibid., paragraph 3.2.4-5.

26 Ibid., paragraph 3.3.3.

27 Ibid., paragraph 3.4.

28 Ibid., paragraph 3.3.9.

29 Ibid., paragraph 1.1.5 notes: "Marine protected areas have been established on the basis of a wide variety of objectives. These include the protection of ecologically or biologically important areas, the protection of specific marine organisms, the protection of important geological or geomorphological processes, the protection of beautiful seascapes, the protection of cultural or historic sites, as well as in the interest of recreation or certain forms of fisheries."

30 Ibid., paragraph 1.3.13 acknowledges that marine protected areas may involve different types of jurisdiction and notes that "such areas can be located in internal waters, territorial waters, or even in international waters." The need to accommodate other uses in such areas is noted in paragraph 1.3.14 which notes that "principles such as freedom of navigation (in international waters) and the right of innocent passage (in territorial waters) may be applicable in cases where measures regarding shipping are considered for specific marine areas."

31 Resolution A.885(21) of the IMO Assembly (A21/Res.885 of 4 February 2000) requested the MEPC and the Maritime Safety Committee to keep the Guidelines and the annexed procedures under review.

Biodiversity Convention, Agenda 21 and the 1972 World Heritage Convention as well as the consistency of the current Guidelines with the provisions of LOSC.[32] The terms of reference also included direction to the Correspondence Group to keep in mind the MEPC Guidelines on Application of the Precautionary Approach.[33] Revision of the Guidelines offered potential for broadening the scope of the particularly sensitive sea area concept to incorporate some of the additional objectives and measures related to the marine protected area concept such as conservation of biodiversity and protection of underwater cultural heritage. The Correspondence Group's Report to MEPC, however, identified a number of areas on which agreement could not be reached including clarification of the relationship between marine protected areas and PSSAs and the inclusion of a bio-geographic criterion as one of the factors to be taken into account in identifying a PSSA.[34] The proposed revision of the Guidelines for Identification of PSSAs attached to the Correspondence Group's Report still acknowledges that the criteria relate to particularly sensitive sea areas within and beyond the limits of the territorial sea[35] and has bracketed text providing that "a PSSA can complement a Marine Protected Area, or it can stand on its own,"[36] but does not represent a significant expansion of the PSSA concept in terms of criteria for identification or protective measures available. For areas beyond national jurisdiction, the particularly sensitive sea area identification process offers an existing mechanism of international endorsement for environmental protection measures which could be implemented beyond national jurisdiction. The current identification process, however, is bedevilled by a lack of clarity in its relationship with key conventional international law instruments such as the LOSC and the Biodiversity Convention and would need to be supplemented by implementation mechanisms operating at the regional level.

Regional Implementation

UNEP Regional Seas Agreements

Under the UNEP, multilateral conventions have been adopted for eight regions with the objective of protecting the marine environment.[37] Additional protocols dealing with specially protected marine areas have been concluded for the Mediterranean, the East African region, the South-East Pacific and the Wider Caribbean.[38] The South Pacific Convention[39] also contains an article[40] recommending the designation of such areas but

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32 MEPC 44/WP.4 of 9 March 2000, paras 6 & 8.

33 Ibid., para 7.

34 MEPC 45/20 of 2000, paras 5-11.

35 Ibid., Annex 3, para 4.3.

36 Ibid., Annex 3, para 1.3.

37 Gubbay, supra note 1, p.40.

38 Ibid.

39 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, (Noumea, 1986), Rummel-Bulska I. & Osafo S. (eds.), Selected Multilateral Treaties in the Field of the Environment, Vol. 2, United Nations Environment Programme, Cambridge University Press, 1994, p.372

40 Ibid., Art. 14.

does not specify the extent of the areas or the measures to be taken. The Protocols are only framework documents which rely on States Parties to implement their provisions in national legislation.

The Protocols have a number of similarities in their objectives and recommended measures but also vary in their areas of application and the recommended degree of control over navigation in the designated areas.[41] Article 4 of the 1995 Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean provides a comprehensive statement of the objective of marine protected areas with strong antecedents in the Biodiversity Convention. Article 4 provides:

> "The objective of specially protected areas is to safeguard:
>
> (a) representative types of coastal and marine ecosystems of adequate size to ensure their long term viability and to maintain their biological diversity;
>
> (b) habitats which are in danger of disappearing in their natural area of distribution in the Mediterranean or which have a reduced natural area of distribution as a consequence of their regression or on account of their intrinsically restricted area;
>
> (c) habitats critical to the survival, reproduction and recovery of endangered, threatened or endemic species of flora or fauna;
>
> (d) sites of particular importance because of their scientific, aesthetic, cultural or educational interest.
>
> (e) sites of biological and ecological value:
>
> - the genetic diversity, as well as satisfactory population levels, of species, and their breeding grounds and habitats
> - representative types of ecosystems, as well as ecological processes;
>
> (f) sites of particular importance because of their scientific, aesthetic, historical, archaeological, cultural or educational interest."

All four Protocols recommend that Parties regulate activities such as the passage of ships, the dumping or discharge of wastes, fishing and hunting, the exploration or exploitation of the sea bed or any activity involving the modification of the sea bed profile, the removal of archaeological objects and trade in animals, plants, parts of plants and archaeological objects which originate in protected areas.[42]

The Protocols differ in their areas of application but none apply in areas beyond national jurisdiction. The Mediterranean Protocol confines the establishment of specially protected

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41 Gubbay, supra note 1, p.40.

42 Ibid.

areas to the marine and coastal zones subject to States Parties' sovereignty or jurisdiction[43] and the East African Protocol similarly includes all the marine and coastal environment under States Parties' jurisdiction.[44] The Wider Caribbean Protocol applies within 200 nautical miles of the coast whereas the South East Pacific Protocol covers not only the 200 nautical mile offshore zones of Contracting Parties but also their continental shelves where the Contracting Parties have claimed continental shelves beyond the 200 nautical mile limit.[45] All four Protocols provide for the creation of buffer zones around specially protected areas, international cooperation over the boundaries of adjacent protected areas and the publication of information.[46]

The Mediterranean Protocol recommends the regulation of passage by ships including any stopping or anchoring but specifies that nothing in the Protocol shall prejudice freedom of navigation on the high seas, the right and the modalities of passage through straits used for international navigation and the right of innocent passage in the territorial seas.[47] By contrast, the Eastern African Protocol provides only for the regulation of pleasure craft activities, while the South East Pacific Protocol does not expressly specify controls over vessels except in relation to pollution and the transport of hazardous substances.[48]

The principal value of the Protocols lies in their elaboration of the objectives of specially protected marine areas and examples of the protective measures to be applied within such areas. All four Protocols accord some recognition to the principle that the implementation of marine protected areas, even within national jurisdiction, should be consistent with the LOSC and accommodate ocean uses such as navigation.

Species and Habitat Protection

International Convention for the Regulation of Whaling, 2 December 1946, Washington

The objectives of the International Convention for the Regulation of Whaling[49] are described in its preamble as being to provide for "the proper conservation of whale stocks" and "the orderly development of the whaling industry." The Convention established the International Whaling Commission with a range of powers including the power to adopt regulations relating to the conservation and utilization of whale resources. The Commission is empowered to adopt regulations fixing "open and closed waters, including the designation

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43 Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, (Barcelona, 1995), Art. 5(1).

44 Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, (Nairobi, 1985), Art. 2; Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region, (Nairobi, 1985), Art. 8.

45 Gubbay, supra note 1, p.40.

46 Ibid.

47 Supra note 40, Arts. 2(2) and 6(c).

48 Gubbay, supra note 1, p.40.

49 161 U.N.T.S. 72.

of sanctuary areas."[50] In conjunction with its power to classify particular areas of ocean space, the Commission may fix protected and unprotected species, open and closed seasons, size limits for each species, time methods and intensity of whaling, types and specifications of gear and apparatus and appliances which may be used, methods of measurement, catch returns and other statistical and biological records.[51] The Commission's power to classify particular areas of ocean space for the purposes of the regulation of whaling applies to all waters in which whaling is prosecuted by factory ships, land stations and whale catchers.[52] There are no limitations on the size of sanctuaries or closed waters in which protection measures apply.

The Schedule to the Whaling Convention which is regularly amended by annual meetings of the International Whaling Commission defines the limits of open and closed waters and sanctuaries as well as prescribing seasons, catch limits and prohibited methods of capture for particular whale species in these areas.[53] Contracting Governments have the obligation to enforce the Commission's regulations in relation to operations carried out by persons and vessels under their jurisdiction.[54] Not surprisingly,in view of its age, the Convention does not address the interaction of its provisions with other international law principles concerning the offshore jurisdiction of coastal states and ocean uses such as navigation, resource exploitation, marine scientific research or military activities. The Whaling Con-vention, while it covers extensive areas of ocean space, is a relatively underdeveloped antecedent of the marine protected area concept since it relates to only one order, relies on traditional flag state jurisdiction for enforcement and does not address links between the Convention's provisions and other conventional or customary international law principles applicable to ocean space.

Trends in Conventional International Law and Soft Law Principles on Marine Protected Areas

Although the development of conventional international law provisions and soft law principles which provide general support for the creation of marine protected areas or actually establish such areas both within and beyond national jurisdiction has been decidedly random,[55] some common features among the disparate sources of international

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50 Ibid., Art V(1).

51 Ibid.

52 Ibid., Art. I(2).

53 Ibid., Art V(1).

54 Ibid., Art IX(1).

55 Gjerde K. & Freestone D. in "Particularly Sensitive Sea Areas – An Important Environmental Concept at a Turning-point", The International Journal of Marine and Coastal Law, Vol 9, No. 4, (1994), p.435, comment:

"The protected area in its many manifestations, is now perceived as a key device in the battle for sustainable development. Protection of areas for a wide variety of specific environmental and resource purposes and from an equally wide variety of threats is now envisaged by a growing number of national, regional and global instruments. The majority of these instruments develop distinctive terminology for the areas which they seek to protect, many using different terms to describe identical concepts, sometimes for identical areas. While diversity and flexibility is to be welcomed, there is perhaps a risk that if the original objectives for designating or identifying areas for protection become obscured or confused, the chances of practical realization of those objectives may be diminished."

law relating to marine protected areas can be discerned. Notwith-standing the diverse content of the conventional international law instruments and soft law principles examined in this brief review, there is ample support for the general concept of marine protected areas offering comprehensive protection for designated areas of ocean space both within and beyond national jurisdiction. The protection of marine areas beyond national jurisdiction by means of international cooperation is clearly contemplated in Chapter 17 of Agenda 21. The Biodiversity Convention endorses the employment of protected areas as the principal measure for conserving biodiversity within national jurisdiction. Although the Convention does not specifically obligate Contracting Parties with cooperating to establish such areas beyond national jurisdiction, multilateral cooperation between Contracting Parties for this purpose would be consistent with their obligation under Article 5 of the Convention, to cooperate for the conservation and sustainable use of biological diversity in areas beyond national jurisdiction. Regional and national implementation of marine protected areas offers precedents for relevant protective measures and the accommodation of such measures with other ocean uses such as navigation, fisheries, mining, leisure and military activities. The IMO Guidelines for the Identification of Particularly Sensitive Sea Areas provide an existing template for international consideration and endorsement of specially protected areas of ocean space. Although the IMO procedure has never been tested with a proposal for designation of an area beyond national jurisdiction, the application of the criteria is not limited to areas within national jurisdiction. A common feature of the instruments and principles reviewed is the requirement that designation of marine protected areas should be consistent with the Law of the Sea as codified in the LOSC. Any proposal for the designation of a marine protected area beyond national jurisdiction would need to demonstrate the potential for accommodating previously untrammelled high seas uses and future high seas activities such as deep sea bed mining in an equitable manner.

An International Law Framework for Marine Protected Areas Beyond National Jurisdiction

In offshore areas within national jurisdiction, domestic and international law regulation is beginning to redress the balance between unrestricted ocean uses and the customary international law obligation to protect and preserve the marine environment codified in Article 192 of the 1982 LOSC. Beyond national jurisdiction, the balance is still skewed in favour of unfettered use of ocean areas, with limited measures to conserve living resources of the high seas, but no specific measures to provide integrated protection and preservation for whole marine ecosystems. An international law framework to facilitate the designation of multiple use marine protected areas beyond national jurisdiction would redress the balance between the improvident exercise of high seas freedoms and the international community's general obligation under Article 192 of the LOSC to protect and preserve the marine environment.

The inconsistencies and ambiguities exposed in this brief review of conventional international law and soft law principles concerning marine protected areas suggests that a

comprehensive global instrument which implements the relevant provisions of framework documents such as the LOSC, Chapter 17 of Agenda 21 and the Biodiversity Convention is required to rationalize the international law basis for marine protected areas. Despite the proliferation of instruments and principles concerning marine protected areas, only limited analysis of their potential interaction and their reconciliation with the LOSC scheme of offshore jurisdiction has occurred. At present there is no single conventional law instrument or set of soft law principles which defines the international law basis for declaring marine protected areas beyond national jurisdiction, provides a system for global identification for such areas and mechanisms to implement their protection. To achieve this objective, elements from disparate international law sources which pertain to protected areas of the sea will need to be drawn together and amplified to produce a global agreement which implements the relevant provisions of the Biodiversity Convention and is consistent with the overarching framework of the LOSC. A global agreement may provide for a network of subsidiary agreements in which groupings of states working within regional organisations are appointed to manage particular areas beyond national jurisdiction with the oversight of an international management body composed of representatives from international organisations with competencies in marine areas beyond national jurisdiction.

An existing soft law document which could arguably be expanded and incorporated as vehicle for implementing such an instrument is the IMO Guidelines for the Designation of Special Areas and the Identification of PSSAs. To date areas designated have been confined to marine areas within national jurisdiction which are proposed for designation by Member States of the IMO and meet recognized ecological, socio-economic and scientific criteria specified in the IMO's guidelines. Associated protective measures within IMO's competence under the MARPOL and SOLAS Conventions include the imposition of traffic separation schemes, areas to be avoided, compulsory pilotage and vessel discharge restrictions. The current guidelines allow for two or more Governments having a common interest in a particular area to formulate a coordinated proposal containing integrated measures and procedures for cooperation between the jurisdictions of the Proposing Member Governments. As measures imposed under the MARPOL and SOLAS Conventions are not confined to areas within national jurisdiction, the Guidelines for Special Areas and PSSA designation could conceivably be extended to areas beyond national jurisdiction in the future with regional governments proximate to environmentally sensitive areas beyond national jurisdiction proposing those areas for identification by IMO and enforcing protective measures at the regional level. As an incremental measure, a joint proposal for identification of a PSSA under the current IMO Guidelines for PSSAs in an area of overlapping exclusive economic zone or continental shelf jurisdiction may demonstrate the possibilities for accommodating high seas uses such as freedom of navigation, military activities and marine scientific research within a regime of protective measures. The possibilities for collaboration between IMO and other international and regional organisations with competence in ocean areas beyond national jurisdiction such as the International Seabed Authority, the International Whaling Commission and FAO, should be examined with a view to expanding the protective measures available following a PSSA designation.

Considerable experience has been gained in equitably accommodating a variety of ocean uses in marine protected areas within national jurisdiction such as the Great Barrier Reef. In high seas areas proposed for designation as marine protected areas a similar process of accommodating ocean uses such as navigation, military activities, fisheries and mineral resource extraction would need to occur. Marine protected areas beyond national jurisdiction would not equate to closed areas of ocean space but would incorporate a wide range of ocean uses such as navigation, overflight, fisheries and mineral resource extraction conducted in an environmentally sustainable manner.

Clearly the first priority for coastal states to date, has been the protection of living resources and biodiversity within national jurisdiction. The declaration of MPAs has been one of the principal tools used to achieve such protection within national jurisdiction. Scientific evidence demonstrates that the great natural reserves of marine biodiversity in areas beyond national jurisdiction are also being affected by human activities that have the potential to significantly degrade this precious resource. To conserve this treasure chest of the deep and prevent a tragedy of the commons the international community should enhance the integration of existing legal instruments and soft law principles to provide an effective international law framework which protects the deep sea environment beyond national jurisdiction.

The Convention on Biological Diversity (CBD) and Marine Protected Areas on the High Seas[1]

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The Role of Protected Areas Within the Convention

The term "Protected Area" is defined in Article 2 as "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives". Paragraphs (a), (b), (c) and (e) of Article 8 contain specific references to protected areas and provide that Parties should:

(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

(b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;

(c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use; and

(e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas;

The Conference of the Parties (COP) to CBD at its second meeting, in 1995, endorsed marine and coastal protected areas (MCPAs) as one of the five thematic issues and areas for action under decision II/10. At that meeting, the Ministerial Segment reached a consensus on the importance of the conservation and sustainable use of marine and coastal biological diversity. This consensus is commonly referred to as the "Jakarta Mandate on Marine and Coastal Biological Diversity." The other priority issues identified by COP at its second meeting were: integrated marine and coastal area management (IMCAM); Marine and coastal Living Resources; Mariculture; and Alien Species.

Two operational objectives (3.1 and 3.2) under Programme Element 3 of the Jakarta Mandate are concerned with protected areas (Decision IV/5 C, Programme Element 3).

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[1] Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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Operational Objective 3.1 is to facilitate research and monitoring activities, related to the value and the effects of marine and coastal protected areas or similarly restricted management areas, on sustainable use of marine and coastal living resources. A series of activities is envisaged to be undertaken by the Executive Secretary involving collaboration with relevant organisation s and agencies in the preparation of projects to be undertaken by Parties, as well as the conducting of a desk study to gather information (Decision IV/5 C, Programme Element 3, Op Obj 3.1).

Operational Objective 3.2 is to develop criteria for the establishment of, and for management aspects of, marine and coastal protected areas. This activity entails the Executive Secretary, under guidance from the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), to collaborate with relevant international, national and non-governmental organisation s, possibly through the creation of a taskforce (Decision IV/5 C, Programme Element 3, Op Obj 3.2).

The COP also noted that protected areas should be integrated into wider strategies for preventing adverse effects to marine and coastal ecosystems from external activities (Decision IV/5, Annex, paragraph 1 and Part C, Programme element 3).

Most importantly, however, Parties themselves have consistently identified that their efforts to develop and maintain their national protected area systems is the central element of their strategy to implement the Convention.

Scope of the Convention

Article 4 defines the jurisdictional limits of the Convention, which in the case of components of biological diversity only applies to areas within the limits of national jurisdiction. This would include a country's Exclusive Economic Zone (EEZ), where the EEZ has been declared within the framework of the United Nations Convention on the Law of the Sea (UNCLOS). If a country has no EEZ, the territorial sea is considered to be the limit of national jurisdiction. The Convention does not apply to components of biological diversity in areas that are outside the limits of national jurisdiction.

However, part (b) of Article 4 states that in the case of the effects of processes and activities carried out under the jurisdiction or control of a Contracting Party, the Convention applies everywhere (both in areas within the limits of national jurisdiction and those outside) and would therefore be applicable in the high seas areas. One example of such a process covered by the Convention is pollution originating from land affecting high seas areas. The impact of pollution on components of biological diversity located in the high seas would be covered by the Convention. The Convention would however not cover the conservation and sustainable use of components of biological diversity located outside national jurisdiction.

Article 5 also has relevance to the high seas. It states that each Contracting Party shall, as far as possible and appropriate, cooperate with other Contracting Parties, either directly or through competent international organisation s in respect of areas beyond national jurisdiction or control, for the conservation and sustainable use of biological diversity. Such

cooperation could, among many other things, cover the establishment of protected areas in the high seas.

Finally, Article 22 requires Contracting Parties to implement the Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea. This requirement means that measures to implement the Convention may not contradict or undermine national rights and obligations deriving from the law of the sea as defined by international customary and treaty law. It also implicitly means that the law of the sea can be used to support the implementation of the Convention. As a related activity, COP 2 requested the Executive Secretary, in consultation with the UN Office for Ocean Affairs and the Law of the Sea, to undertake a study on the relationship between the Convention and UNCLOS with regard to the conservation and sustainable use of genetic resources of the deep seabed (Decision II/10, paragraph 12). This study will likely be concluded by the end of the year 2001.

Ecosystem Approach

The commitment in Article 8(a) to "establish a system of protected areas" needs to be interpreted in light of the ecosystem approach adopted by the COP. Consequently, the commitment in Article 8(a) can also be understood to require Parties to consider the establishment and management of their protected area systems not simply in national terms, but where the relevant ecosystem extends beyond national boundaries, in ecosystem or bioregional terms as well.

The Parties recognize the ecosystem approach as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (decision V/6). In the management of marine and coastal resources within the framework of the ecosystem approach, several tools could be applied: the use of small highly protected MCPAs within wider coastal zone management plans; the use of larger multiple-use MCPAs; or networks of MCPAs. Additionally, the ecosystem approach could provide a basis for Parties to cooperate in designating and managing protected areas that partially extend into a high seas area and that form an integral part of the same ecosystem. Such cooperation is provided for under Article 5.

Paragraph 3 of the annex to decision IV/5 further states that protected areas should be integrated into wider strategies for preventing adverse effects on marine and coastal ecosystems from external activities. This clearly indicates the Parties recognition that conservation and sustainable use are complementary objectives under a marine and coastal area management strategy, and that protected areas may serve as a tool to accomplish this.

Sustainable Use of Biological Diversity

Article 8 of the Convention calls upon Parties to regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use; and to promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.

As one of the principal objectives of the Convention, sustainable use of biological diversity in and around protected areas is a critical aspect of the approach embodied by the Convention. Sustainable use of biological resources is defined in the Convention as "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations".

The concept is elaborated in more detail in many other Articles. The central commitments are found in Article 10, where integration and mainstreaming, measures to minimize adverse impacts, protection of traditional uses, decentralized governance and promotion of the role of the private sector, are emphasized.

Collectively, these can be understood as providing a subtle and sophisticated framework which requires Parties to apply the concept of sustainable use in a legal, social, economic and ecological sense, to the wide variety of situations in which biological resources are used.

Design of Marine Protected Areas

There is no specific guidance from the Convention with regard to criteria for selection of sites for marine protected areas, except paragraph (iv), annex I to decision II/10, which identifies critical habitats for marine living resources as an important criterion for selection of MCPAs within the framework of integrated marine and coastal area management. This is reiterated in Annex B of decision IV/5, concerning the programme of work on marine and coastal biological diversity.

The Convention on Biological Diversity in its Annex I provides an indicative list of categories on which in accordance to Article 7(a) of CBD (on identification and monitoring), Contracting Party shall, in particular for the purposes of Articles 8 to 10, identify components of biological diversity important for its conservation and sustainable use. To this end, Annex I could be used as an indicative list of criteria for the purpose of assisting Parties in developing criteria for the selection of sites for MCPAs. This indicative list also covers the need to pay special attention to the critical habitats for marine living resources as an important criterion for selection, as called for in operational objective 3.2 of the marine and coastal programme of work.

Current activities

Protected areas will be one of three priority issues to be considered in depth at the seventh meeting of the COP, likely to be held in 2004. As a result, protected areas will be a major focus of the work of the Convention in the period between the sixth meeting of the COP, to be held in 2002, and its seventh meeting. This means, for instance, that a meeting of the SBSTTA during this period will focus on protected areas, and that the clearing-house mechanism will be concentrating on developing new products to enhance information dissemination regarding protected areas. The major activity concerning marine protected areas during the upcoming year will be the establishment and subsequent meeting of the ad hoc technical expert group on marine and coastal protected areas. The experts will discuss the value and effects of marine and coastal protected areas; linkages between protected areas and sustainable use; pilot research and monitoring projects; and criteria for selection of marine and coastal protected areas. Other relevant activities include on-going collaboration with regional seas programmes and action plans and the Global Programme for Action.

The Convention on the Protection of the Marine Environment of the North-East Atlantic[1]

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The Convention on the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) which was done in Paris on 22 September 1992 replaced, according to its Article 31 para. 1, with its entry into force on 25 March 1998, the Convention on the Prevention of Marine Pollution by Dumping from Ships and Aircraft[3] (Oslo Convention) and the Convention on the Prevention of Marine Pollution from Land-based Sources[4] (Paris Convention).

I. The OSPAR Convention in the Context of International Law

1. The OSPAR Convention within the Legal Framework of the Law of the Sea Convention

The Contracting Parties of the OSPAR Convention aimed at adopting, on a regional level, more stringent measures with respect to the prevention and elimination of pollution of the marine environment or with respect to the protection of the marine environment against the adverse effects of human activities than are provided for in international conventions and agreements with a global scope (OSPAR Convention, Preamble). Such measures have to be consistent with the United Nations Convention on the Law of the Sea[5] (UNCLOS) which lays down – as an umbrella Convention – a comprehensive regime of law and order in the world's oceans and seas by establishing rules governing their uses as well as their protection and preservation.

The Law of the Sea Convention – strictly speaking its Part XII – obliges States generally to protect and preserve the marine environment (Article 192 UNCLOS). Especially, States have to adopt, individually or jointly as appropriate, all measures that are necessary to prevent, reduce and control pollution of the marine environment from any source (Article 194 para. 1 UNCLOS). However, protective measures may not be limited to mere pollution

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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3 Oslo, 15 February 1972.

4 Paris, 4 June 1974.

5 Adopted in New York on 30 April 1982; concluded at Montego Bay on 10 December 1982; entry into force: 16 November 1994.

prevention. Rather, pursuant to Article 194 para. 5 UNCLOS, the measures taken in accordance with Part XII of UNCLOS shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of *marine life*. This provision is clearly an ecosystem approach and the basis on which one may argue that the Law of the Sea Convention encourages the designation and the establishment of marine protected areas (MPAs). Actually, Article 1 para. 1 No. 4 UNCLOS already widens the classical term of "pollution of the marine environment": it explicitly includes harmful effects on *marine life*. Article 1 lit. d) OSPAR Convention defines "pollution" correspondingly as "the introduction by man, directly or indirectly, of substances or energy into the maritime area which results, or is likely to result, in hazards to human health, harm to *living resources* and *marine ecosystems*...".

Furthermore, Article 197 UNCLOS obliges States to co-operate on a global and regional basis in formulating and elaborating international rules, standards and recommended practices and procedures for the protection and preservation of the marine environment. This provision is the basis on which a wide range of regional agreements dealing with the prevention and elimination of pollution of the marine environment as well as the protection and preservation of the marine ecosystems and habitats has been adopted, e.g. the Convention on the Protection of the Marine Environment of the Baltic Sea of 9 April 1992 (Helsinki Convention), the Convention on the Protection of the Mediterranean Sea against Pollution of 16 February 1976 (Barcelona Convention) or the OSPAR Convention being under discussion here. These modern agreements fill the legal frame of the Law of the Sea Convention and further its general principles which is expressively intended by Article 237 para. 1 UNCLOS. Altogether, marine environmental law-making is a dynamic process showing a strong tendency towards regionalization.

2. The OSPAR Convention and the Convention on Biological Diversity

Not only marine environmental conventions deal with the protection and preservation of marine ecosystems, habitats and species, but also other global and regional instruments focused on the conservation of ecosystems, species and their natural habitats or – generally speaking – the conservation of biological diversity. The most important global instrument in this context is the Convention on Biological Diversity (CBD) of 5 June 1992. It entered into force on 29 December 1993.

In the opinion of the Contracting Parties, the fundamental requirement for the conservation of biological diversity is the in-situ conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings (CBD, Preamble). Thus, the Contracting Parties are obliged to establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity (Article 8 lit. a) CBD). A "protected area" is defined as a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives (Article 2 CBD).

The Convention on Biological Diversity applies to terrestrial as well as marine and other aquatic ecosystems (Article 2 CBD). Consequently, Article 8 lit. a) CBD requires also the establishment of marine protected areas or areas where special measures need to be taken to conserve the marine biological diversity. In this respect, it corresponds with Articles 192, 194 para. 5 UNCLOS. Concerning this matter, the UN Secretary-General points out in his annual report "Oceans and the law of the sea": "The duties of States under UNCLOS to conserve and manage their natural resources, including, for example... the obligation of States under 194(5)... have been further strengthened by the requirement of parties under the Convention on Biological Diversity to establish marine protected areas within zones of national jurisdiction..."[6].

Moreover, according to Article 4 CBD, the jurisdictional scope of the Convention on Biological Diversity is not limited to areas under national jurisdiction. Rather, the provisions of the CBD apply in the cases of processes and activities, regardless where their effects occur, carried out under its jurisdiction or control, within the area of its national jurisdiction (including the exclusive economic zone – EEZ – and the continental shelf) or *beyond* (high seas and the so-called "Area"). Nevertheless, the Convention on Biological Diversity does not grant to the States more rights referring to the conservation of the marine biological diversity than those provided for in the Law of the Sea Convention. In this sense, Article 22 para. 2 CBD provides that the Contracting Parties shall implement the Convention on Biological Diversity in the marine environment consistent with the rights and obligations under the law of the sea.[7] In particular, States have to take into consideration the principle of the freedom of the high seas as laid down in Article 87 UNCLOS, the invalidity of claims of sovereignty over the high seas (Article 89 UNCLOS) and the deep sea-bed (the "Area") or any part of it (Article 137 para. 1 UNCLOS) and the powers and functions of the International Sea-Bed Authority (ISBA) relating to the "Area".

II. The Provisions of the OSPAR Convention with Relevance for High Seas MPAs

The OSPAR Convention consists of a "core convention" including 34 articles, five annexes and three appendices. According to its Art. 1 lit. a), the OSPAR Convention refers to the internal waters and the territorial sea of the Contracting Parties, the exclusive economic zone (EEZ) of the coastal State to the extent recognized by the international law of the sea and the high seas, including the bed of all those waters and its subsoil, situated within the following limits:

- those parts of the Atlantic and Arctic Oceans and their dependent seas which lie north of 36 north latitude and between 42 west longitude and 51 east longitude, but on the

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6 Report of the Secretary-General "Oceans and the law of the sea" of 30 September 1999, UN-Doc. A/54/429, para. 493.

7 As to the relationship of the Law of the Sea Convention and the Convention on Biological Diversity see *R. Wolfrum/ N. Matz*, The Interplay of the United Nations Convention on the Law of the Sea and the Convention on Biological Diversity, in: J. A. Frowein/ R. Wolfrum (eds.), Max Planck Yearbook of United Nations Law, Volume 4, 2000, pp. 445 et seq.

whole excluding the Baltic Sea, the Belts and the Mediterranean Sea and its dependent seas;

- that part of the Atlantic Ocean north of 59 north latitude and between 44 west longitude and 42 west longitude.

Referring to this maritime area, the Contracting Parties are obliged to take, individually and jointly, all possible steps to prevent and eliminate pollution, in particular

- from land-based sources (Art. 3 in connection with Annex I OSPAR Convention),
- by dumping or incineration (Art. 4 in connection with Annex II OSPAR Convention) and
- from offshore sources (Art. 5 in connection with Annex III OSPAR Convention).

However, in contrast to the Oslo Convention and the Paris Convention the scope of application has been widened from mere pollution prevention to the protection of the maritime area against the adverse effects of human activities on human health and marine ecosystems (Article 2 para. 1 lit. a) OSPAR Convention). Furthermore,

- the precautionary principle (Article 2 para. 2 lit. a) OSPAR Convention),
- the polluter-pays-principle (Article 2 para. 2 lit. b) OSPAR Convention) and
- the concepts of best available techniques (BAT) and best environmental practice (BEP), including clean technology (Article 2 para. 3 OSPAR Convention),

were formally adopted[8].

The Contracting Parties have to undertake and publish at regular intervals joint assessments of the quality status of the marine environment and of its development, for the maritime area or for the sub-regions thereof (Article 6 lit. a) in connection with Annex IV of the OSPAR Convention). Article 7 OSPAR Convention requires the Contracting Parties to co-operate with a view to adopting additional annexes prescribing measures, procedures and standards to protect the maritime area against pollution from other sources, to the extent that such pollution is not already the subject of effective measures agreed by other international organizations or prescribed by other international conventions. This provision is an example for a comparatively new trend in international environmental law which may be designated as "step-by-step approach to regime building": General provisions are formally separated from the more technical Annexes which may be amended and adopted in a more simple procedure[9].

Based on Article 10 et seq. OSPAR Convention, a commission, made up of representatives of each of the Contracting Parties, has been established. Article 10 para. 2 OSPAR Convention imposes on the OSPAR Commission certain duties, among which are:

- the duty to supervise the implementation of the OSPAR Convention;

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8 Compare *J. Hilf*, The Convention for the Protection of the Marine Environment of the North-East Atlantic – New Approaches to an Old Problem?, ZaöRV 55 (1995), pp. 580 et seq. (582).

9 *J. Hilf* (supra 6), p. 584.

- the duty generally to review the condition of the maritime area, the effectiveness of the measures being adopted, the priorities and the need for any additional or different measures; and
- the duty to draw up, in accordance with the general obligations of the OSPAR Convention, programs and measures for the prevention and elimination of pollution and for the control of activities which may, directly or indirectly, adversely affect the maritime area.

Article 10 para. 3 and Article 13 OSPAR Convention provide as legal instruments for the OSPAR Commission non-binding recommendations and binding decisions.

At the ministerial meeting of the OSPAR Commission in 1998, Annex V "On the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area" was adopted which extended the OSPAR Convention in favor of nature conservation provisions. In accordance with Article 15 para. 5 OSPAR Convention, Annex V and Appendix 3 have entered into force on 30 August 2000 for Finland, Spain, Switzerland, Luxembourg, European Community, United Kingdom and Denmark and on 5 October 2000 for Sweden.[10]

The Contracting Parties are obliged by Article 2 of Annex V in order to perform their obligations under the OSPAR Convention and the Convention on Biological Diversity:

- to take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected; and
- to co-operate in adopting programs and measures for those purposes for the control of the human activities identified by the application of the criteria in Appendix 3.

As to the definitions of "biological diversity", "ecosystem" and "habitat", Article 1 of Annex V refers to the those contained in the Convention on Biological Diversity.

Measures according to Annex V may include the designation and the establishment of marine areas or rather a system of marine areas which need to be protected by means of appropriate programs and measures against the adverse effects of human activities. At present, the establishment of MPAs in the OSPAR maritime area is at the stage of pre-selecting marine areas under nature conservation aspects. This process is similar to the one under the Helsinki Convention. The Helsinki Commission (HELCOM) has recommended a system of so-called Baltic Sea Protected Areas (BSPAs). However, within the scope of the Helsinki Convention there are no problems faced regarding the high seas, because all parts of the Baltic Sea are included in the exclusive economic zones, in the territorial seas or in the in internal waters of the coastal States.

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[10] Pursuant to Article 15 para. 5 OSPAR Convention, Annex 5 and Appendix 3 will enter into force for any other Contracting Party on the thirtieth day after that Contracting Party has deposited its instruments of ratification, acceptance or approval.

ANNEX

(presentation at the workshop)

The Different Legal Approaches to the Protection and Preservation of the Marine Environment

I. Traditional Approaches and the Modern Ecosystem Approach

First of all, I should like to point out that the OSPAR Convention[1] covers the maritime area westwards to the east coast of Greenland, eastwards to the continental North Sea coast, south to the Straits of Gibraltar and northwards to the North Pole. However, this area does not include the Baltic Sea and the Mediterranean Sea; as regards these sea areas the Helsinki Convention[2] and the Barcelona Convention[3] apply respectively. Please, find a more precise definition of the OSPAR maritime area in the paper (sub I, page 3).

The first paragraph of the paper (sub I, page 1) deals with the relationship between the international law of the sea, that is the United Nations Convention on the Law of the Sea (UNCLOS or LOSC), and the newer and modern regional agreements on the protection and preservation of the marine environment, especially the OSPAR Convention.

While describing the legal framework of UNCLOS, I paid special attention to its Art. 192 and 194 para. 5. These provisions of Part XII of UNCLOS ("Protection and Preservation of the Marine Environment") apply to all parts of the sea including the high seas.

Art. 194 para. 5 UNCLOS provides that "the measures taken in accordance with this Part [i.e. Part XII] shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms [!] of marine life." This provision is very important because you may notice here that the international law encourages the **ecosystem approach** relating to the protection of marine life. Thus, the traditional approach in international law, i.e. the use or the exploitation and – at the same time – the "conservation" of the living and non-living resources (the biologist would say: the "single-species approach"), can no longer be regarded as the only way of protection. However, I do not want to withhold that – according to a strong legal opinion – Part XI of UNCLOS dealing with the deep sea-bed (the "Area") and its resources does not contain any provisions concerning marine living resources and, moreover, that the "general provisions" of Part XII of UNCLOS are quite weak[4]. This opinion could be relevant for the protection of faunal communities near hydrothermal vents.

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1 Convention of 22 September 1992 on the Protection of the North-East Atlantic.

2 Convention of 9 April 1992 on the Protection of the Marine Environment of the Baltic Sea Area.

3 Convention of 16 February 1976 on the Protection of the Mediterranean Sea Against Pollution.

4 Compare *R. Wolfrum/ N. Matz*, The Interplay of the United Nations Convention on the Law of the Sea and the Convention on Biological Diversity, in: J. A. Frohwein/ R. Wolfrum (eds.), Max Planck Yearbook of United Nations Law, Volume 4, 2000, p. 445 et seq. (454 and 455).

Along a second line of reasoning in the paper (sub I, page 2), the umbrella Convention of 5 June 1992 on Biological Diversity (CBD) requires in a sense the establishment of a system of marine protected areas. The in-situ conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings have to be regarded as the fundamental requirements for the conservation of biological diversity (CBD, preamble). Art. 8 lit. a) CBD corresponds with Art. 192, Art. 194 para. 5 UNCLOS. In this context, it is of high importance that the Secretary-General of the United Nations in his 1999 report "Oceans and the law of the sea" declares: "The duties of States under UNCLOS to conserve and manage their natural resources, including, for example... the obligation of States under 194(5)... have been further strengthened by the requirement of parties under the Convention on Biological Diversity to establish marine protected areas within zones of national jurisdiction, and by a number of regional conventions and protocols which also provide, inter alia, for the establishment of protected areas by the parties"[5]. As you all know, the State practice is highly relevant for the emergence of customary international law.

Moreover, the Commission on Sustainable Development (CSD) in its decision 7/1 encouraged States to establish and manage marine protected areas consistent with the Jakarta Mandate on Marine and Coastal Biological Diversity[6]. In his 2000 report "Oceans and the law of the sea", the UN Secretary-General stresses that it would be useful for the implementation of the Jakarta Mandate to facilitate research and monitoring activities in these areas[7]. This is another approach to MPAs, which is connected with the traditional one of "**use and conservation**".

Thus, we have three legal approaches to the protection and preservation of marine life (Table 1, 1-3).

As you can read in the paper, the jurisdictional scope of the CBD is not limited to areas under national jurisdiction. The UN Secretary-General considers regional conventions as appropriate instruments for the establishment of MPAs; one of these instruments is the OSPAR Convention. Please, let me make one last remark on the CBD. This convention possibly has been underestimated: Although it is clearly understood that any measures beyond the limits of national jurisdiction must be carried out within the framework of the legal regime of UNCLOS (Art. 22 CBD) the CBD has stimulated the perception of ecosystems, habitats (and "areas") in the marine environment.

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5 Report of the Secretary-General of 30 September 1999, UN-Doc. A/54/429, para. 493.

6 Report 1999 (supra 5), para. 495.

7 Report of the Secretary-General of 20 March 2000, UN-Doc. A 55/61, para. 210.

II. Regional Approach: the OSPAR Convention

The second paragraph of the paper refers to the OSPAR Convention[8]. The title of the convention indicates the forth possible legal approach to MPAs. I call it the "environmental" (anti-pollution) approach (Table 1,4).

Table 1: Different Legal Approaches to the Protection and Preservation of the Marine Environment

1. Use (exploration and exploitation) and conservation of the natural resources. (Art. 56 para. 1 lit. (a), Art. 61 et seq. LOSC)
   Single-species approach, protection against capture and killing
   (CITES, ASCOBANS)
2. Sustainable use of resources or components
   (Ramsar Convention; Art. 6, 10 and 14 CBD)
3. Habitat and ecosystem approach, in-situ conservation
   (Art. 194 para. 5 LOSC; Art. 8 CBD; Annex V of the OSPAR Convention; EU Habitats Directive)
4. Environmental approach, anti-pollution-policy MARPOL 73/78; Art. 211 LOSC including para. 6 (PSSAs); as to the relationship between 3 and 4 ➜ Art. 1 para. 1 no. 4 LOSC: "pollution" includes harm to *marine life*.

This approach to the protection and preservation of the marine environment has been very well known in public international law for 20 or 30 years. It concerns dumping and waste, the polluter-pays principle, the concepts of best available technique, clean technology etc. However, the OSPAR Convention has widened its scope of application from mere pollution prevention to the protection and conservation of ecosystems (see Art. 2 para. 1 lit. a) OSPAR Convention) and the biological diversity, especially by adopting a new Annex V and a new Appendix 3 in July 1998, which entered into force for most of the Contracting Parties in autumn 2000.

As to the definitions of "biological diversity", "ecosystem" and "habitat", Art. 1 of Annex V refers to those contained in the CBD. The process of identifying marine areas under nature conservation criteria is similar to the one under the Helsinki Convention. The Helsinki Commission has recommended a system of so-called Baltic Sea Protected Areas (BSPAs); however, there are no problems regarding the high seas, since all parts of the Baltic Sea are included in the EEZ, in the territorial sea or in internal waters of the coastal States. The system of BSPAs shows a great similarity to the approach under the Habitats Directive[9]

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8 As to the OSPAR Convention see *J. Hilf*, The Convention on the Protection of the Marine Environment of the North-East Atlantic – New Approaches to an Old Problem, in: ZaöRV 55 (1995), p. 580 et seq.

9 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; Official Journal L 206, 22/07/1992 p. 7.

(and in a less stringent sense the Birds Directive[10]) of the European Community (EC). It is at least of political importance that the Habitats Directive understands itself as an implementation of Art. 8 CBD (in-situ conservation). The Habitats Directive applies in the EEZ of the EC Member States with the consequence that reefs with *Lophelia pertusa* are protected by the Directive; the most appropriate and representative reefs have to be protected by national legislation. The decision of the London High Court of 5 November 1999[11] is correct and will have consequences for all Member States[12]. Thus, the problem of deep water coral conservation in the EEZ of Ireland may be solved by EC law (pp 67-74) report of *Anthony Grehan*). For me, it seems to be the right way to modify the selection criteria of the Birds and the Habitats Directives slightly in order to provide the implementation mechanism for the OSPAR process. This procedure might serve as a model for the high sea areas in the North-East Atlantic, too. Along these lines a regional convention may establish MPAs including binding provisions for the parties who may – in their turn – translate these provisions into municipal law and give effect to them in relation to their respective citizens and vessels flying their flag. However, the problems of other States and warships still remain.

Please, let me finally say one word about the so-called Particularly Sensitive Sea Areas (PSSAs): Shipping activities do not necessarily cause threats to MPAs; it depends on the MPA's objective. As I have noticed, the International Maritime Organisation (IMO) is very open to new propositions of PSSAs in favour of nature conservation. By the way, PSSAs are a typical instrument of the "environmental" or anti-pollution approach.

III. Definition of Marine Protected Areas (MPAs)

The definition (Tab. 2) is based on Art. 192, 194 para. 5 UNCLOS, and Art. 6 and 8 CBD as well as on the corresponding provisions in the respective regional environmental agreements (here Art. 2 para. 1 in connection with Annex V of the OSPAR Convention). In conformity with Art. 87 UNCLOS (freedom of the high seas) the definition does not enable any State to create a marine protected area on the high seas unilaterally. Besides, it is true that marine protected areas have a very different appearance depending on their protection provisions, measures, instruments and management objectives.

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[10] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds; Official Journal L 103, 25/04/1979 p. 1.

[11] File number: CO 1336/1999. The London High Court ordered the United Kingdom Government to apply the Habitats Directive throughout its 200-mile fishing zone and to the continental shelf (the UK officially has not proclaimed an EEZ) before granting offshore oil or gas exploration licenses.

[12] See *D. Czybulka*, Geltung der FFH-Richtlinie in der Ausschließlichen Wirtschaftszone. Ein Urteil aus London und seine Folgen für das deutsche Naturschutzrecht, in: Natur und Recht 2001, p. 19 et seq.

Table 2: Marine Protected Areas (MPAs)

MPAs are geographically defined (the temporal and geographical complexity of boundaries in some cases has to be taken into account) marine areas of which the ecosystems, natural habitats and species must be protected • because of their biological diversity, rareness and/or fragility • by means of the appropriate and necessary measures • against damages and deterioration due to the adverse effects of human activities • to achieve specific conservation objectives.

MPAs have to be designated and may be regulated, managed and/or supervised by national or international authorities.

"Marine protected areas provide useful and important management tools for different levels of conservation, management and the sustainable use of marine and coastal biological diversity and resources. They can be small or vast in size and can be established for a variety of management objectives, ranging from strict protection to multiple uses."[13] The extremes are "No-Take-Areas" in a comprehensive sense on the one hand and the prohibition of killing certain species of waterfowls or marine mammals on the other. Both extremes have not been taken into consideration by creating the present definition because a strict "No-Take-Area" is hardly imaginable on the high seas at present. In the second case, one do not need a geographically defined marine area because here a treaty or agreement will be the adequate measure. In this context, I doubt with *Greg Donovan* whether whale sanctuaries are MPAs in this strict sense.

Lastly, I should like to give a short comment on yesterday's discussion: In my opinion, it is quite clear what we should protect against: Law can only protect against human activities and it depends on the area and its objectives which activities should be restricted, reduced or even encouraged. The system of international law also apparently directs as to what activity may be regulated.

The present definition has not yet taken into consideration the concept of *Hjalmar Thiel* (Unique Science and Reference Areas on the High Sea, pp 97-102). There are some provisions for marine scientific research in UNCLOS (e.g. Art. 256) that may be helpful for this project. However, I am not sure whether this is not a question of the objective or even the management category of the MPA concerned. As you all heard today, the World Conservation Union (IUCN) has made proposals to this end.

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[13] Report 1999 (supra 5), para. 494.

New Instruments for Marine Specially Protected Areas in the Mediterranean[1]

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The 1995 Barcelona Protocol

The importance of marine specially protected areas (MSPAs) as an instrument for the preservation of the marine environment, is confirmed by the number of multilateral treaties which encourage the parties to create such zones. Some treaties envisage the establishment of specially protected areas as one of the means for reaching their broader environmental objectives. Other treaties are specially devoted to the establishment of MSPAs in certain regional seas. This paper will consider the developments that have recently taken place in the Mediterranean Sea.

In order to improve the regional regime for MSPAs in the Mediterranean a new Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean was opened to signature in Barcelona on 10 June 1995 within the framework of the so called "Barcelona system" for the protection of the Mediterranean Sea against pollution. It entered into force on 12 December 1999 and replaces the previous Protocol Concerning Mediterranean Specially Protected Areas (Geneva, 3 April 1982)[3].

Unlike the previous instrument, whose application was limited to the territorial sea of the parties, the new protocol applies to all the marine waters of the Mediterranean, irrespective of their legal conditions, as well as to the seabed, its subsoil and to the terrestrial coastal areas designated by each party, including wetlands. The extension of the geographical coverage of the protocol was necessary to protect also those highly migratory marine species (such as marine mammals) which, by definition, do not respect the artificial boundaries drawn by man on the sea.

The purpose to "go into the high seas" gave rise to some difficult legal problems which are peculiar of the present political and legal condition of the Mediterranean. The Mediterranean States have not yet established exclusive economic zones and there are large extents of waters located beyond the 12-mile limit which still have the status of high seas. Moreover, in

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

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3 On the new Protocol see SCOVAZZI, *The Recent Developments in the "Barcelona System" for the Protection of the Mediterranean Sea against Pollution*, in *International Journal of Marine and Coastal Law*, 1996, p. 95; BOU FRANCH & BADENES CASINO, *La protección internacional de zonas y especies en la región mediterránea*, in *Anuario de Derecho Internacional*, 1997, p. 33; SCOVAZZI, *Marine Specially Protected Areas - The General Aspects and the Mediterranean Regional System*, The Hague, 1999.

the Mediterranean many maritime boundaries have yet to be agreed upon by the interested countries, including several cases where delimitation is particularly difficult because of the geographic characteristics.

In order to overcome these difficulties, the new protocol includes two provisions whose precedents are to be found in instruments drafted for a very different region of the world. While very few similarities exist between the Antarctic and the Mediterranean, from the legal point of view the two regions share some common aspects: the presence of large extents of high seas and the existence of difficult and unsettled issues on sovereignty over coastal zones. This explains why the new protocol includes some very elaborate disclaimer clauses (Art. 2, paras. 2 and 3), which recall the legal devices used for the instruments of the Antarctic system[4]. The idea behind such a display of juridical complications is simple. On the one hand, the establishment of intergovernmental cooperation in the field of the marine environment shall not prejudice all the legal questions which have a different nature; but, on the other hand, the very existence of such legal questions (whose settlement is not likely to be achieved in the short term) should not jeopardize or delay the adoption of measures necessary for the preservation of the ecological balance of the Mediterranean.

The new protocol provides for the establishment of a List of specially protected areas of Mediterranean interest (SPAMI List)[5]. The SPAMI List may include sites which "are of importance for conserving the components of biological diversity in the Mediterranean; contain ecosystems specific to the Mediterranean area or the habitats of endangered species; are of special interest at the scientific, aesthetic, cultural or educational levels" (Art. 8, para. 2). The procedures for the establishment and listing of SPAMIs are described in detail in Art. 9. For instance, as regards the areas located partly or wholly on the high seas, the proposal must be made "by two or more neighbouring parties concerned"[6] and the decision to include the area in the SPAMI List is taken by consensus by the contracting parties during their periodical meetings.

Once the areas are included in the SPAMI List, all the parties agree "to recognize the particular importance of these areas for the Mediterranean" and - what is even more important -"to comply with the measures applicable to the SPAMIs and not to authorize nor undertake any activities that might be contrary to the objectives for which the SPAMIs were established" (Art. 8, para. 3). This gives to the SPAMIs and to the measures adopted for their protection an *erga omnes* effect, at least as far as the parties to the protocol are concerned.

With respect to the relationship with third countries, the parties shall "invite States that are not Parties to the Protocol and international organisation to cooperate in the implementation" of the Protocol (Art. 28, para. 2). It is also provided that the parties "undertake to adopt appropriate measures, consistent with international law, to ensure that no one engages in any activity contrary to the principles and purposes" of the Protocol (Art. 28, para. 2). Is this provision - which is also shaped on the precedent of the Antarctic system - a prelude to a "prime

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4 The model is Art. IV of the Convention on the Conservation of Antarctic Marine Living Resources (Canberra, 1980).

5 The existence of the SPAMI List does not exclude the right of each party to create protected areas which are not intended to be listed as SPAMI.

6 The determination of who are the neighbouring parties concerned is open to a certain degree of flexibility.

responsibility" of the Mediterranean countries for their common sea, as the Antarctic treaty consultative parties claim to exercise for the Antarctic waters[7]?

The new protocol is completed by three annexes, which were adopted in Monaco on 24 November 1996. They are the common criteria for the choice of protected marine and coastal areas that could be included in the SPAMI List (Annex I), the list of endangered or threatened species (Annex II), and the list of species whose exploitation is regulated (Annex III).

The 1999 Sanctuary for Marine Mammals

On 25 November 1999 France, Italy and Monaco signed an Agreement on the creation of a sanctuary for marine mammals in the Mediterranean Sea[8], followed by a declaration. This is the outcome of a slow-paced negotiation which made its first step with a trilateral declaration signed on 22 March 1993[9].

The area covered by the sanctuary, which extends over 96,000 km², is inhabited by the eight cetacean species regularly found in the Mediterranean, namely the fin whale (*Balaenoptera physalus*), the sperm whale (*Physeter catodon*), Cuvier's beaked whale (*Ziphius cavirostris*), the long-finned pilot whale (*Globicephala melas*), the striped dolphin (*Stenella coeruleoalba*), the common dolphin (*Delphinus delphis*), the bottlenose dolphin (*Tursiops truncatus*) and Risso's dolphin (*Grampus griseus*)[10]. The water currents create conditions favouring phytoplankton growth and abundance of krill (*Meganyctiphanes norvegica*, a small pelagic shrimp that is preyed upon by pelagic vertebrates.

The Mediterranean sanctuary is a major achievement, being the first instance that an international agreement has been adopted with the specific objective to establish a sanctuary for marine mammals[11]. However the text of the Sanctuary Agreement could have been clearer and more protective for marine mammals. The main provisions of the Sanctuary Agreement, which comprises some preambular statements and 22 articles, may be summarized as follows.

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7 "Recognizing the prime responsibilities of the Antarctic Treaty Consultative Parties for the protection and preservation of the Antarctic environment (...)": preambular paragraph of the already quoted Canberra convention.

8 Hereinafter quoted as the Sanctuary Agreement. It will enter into force on the thirtieth day following the date of deposit with the Government of Monaco of the instruments of ratification by the signatory parties (Art. 19). The parties may invite any other State or any international organisation to accede to the Agreement (Art. 20). On the Agreement see SCOVAZZI, *The Mediterranean Marine Mammals Sanctuary*, in *International Journal of Marine and Coastal Law*, 2001, p. 132.

9 See SCOVAZZI, *The Declaration of a Sanctuary for the Protection of Marine Mammals in the Mediterranean*, in *International Journal of Marine and Coastal Law*, 1993, p. 510.

10 Killer whale (*Orcinus orca*), Rough-toothed dolphin (*Steno bredanensis*), false killer whale (*Pseudorca crassidens*) and minke whale (*Balaenoptera acutorostrata*) can occasionally be found in the Mediterranean. Harbour porpoise (*Phocoena phocoena*) is found in the Black Sea.

11 Under the International Convention for the Regulation of Whaling (Washington, 1946), the International Whaling Commission may adopt regulations with respect to the conservation and utilization of whale resources, fixing *inter alia* "open and closed waters, including the designation of sanctuary areas" (Art. V, para. 1 c). Two vast areas were designated as sanctuaries, namely the Indian Ocean Sanctuary in 1979 and the Southern Ocean Sancturay in 1994 (with an objection lodged by Japan to the extent that it applies to the Antarctic minke whale stock). These sanctuaries however are limited to a prohibition of commercial whaling, whether by pelagic operations or from land stations.

The parties establish a marine sanctuary in an area of the Mediterranean Sea delimited by the two lines joining Pointe Escampobariou (on the continental coast of France) to Capo Falcone (on the North-West coast of the island of Sardinia, Italy), and Capo Ferro (on the North-East coast of Sardinia) to Fosso Chiarone (on the continental coast of Italy)[12]. The area in question includes waters which have the legal status of maritime internal waters, territorial seas and high seas. The parties undertake to adopt measures to ensure a favourable state of conservation for every species of marine mammals and to protect them and their habitat from negative impacts, both direct and indirect (Art. 4)[13]. They prohibit in the sanctuary any deliberate taking[14] or disturbance of mammals. Non-lethal catches may be authorized in urgent situations or for *in-situ* scientific research purposes (Art. 7, a).

As regards the crucial question of driftnet fishing, the parties merely undertake to comply with the relevant international and European Community regimes (Art. 7, b)[15]. This seems to be an implicit reference to European Community Regulation No. 345/92 of 22 January 1992, laying down technical measures for the conservation of fishery resources[16], which prohibits the use of driftnets longer than 2.5 km. This also seems to be an implicit reference to the subsequent European Council Regulation No. 1239/98 of 8 June 1998[17] which from 1 January 2002 will prohibit the keeping on board, or the use for fishing, of one or more driftnets used for the catching of the species listed in an annex[18].

The lack of an absolute ban on the use of driftnets is a weak point for the Sanctuary Agreement. It is a step backward from the 1993 declaration which very clearly prohibits the use and keeping on board of driftnets. The subordination to the European Community regime on driftnets, irrespective of the fact that one of the parties (Monaco) is not a member of this international organisation , introduces an element of uncertainty into the Agreement. What will happen in the (albeit unlikely) instance of a change in the European Community rules relating to driftnets? Is the Sanctuary Agreement aimed at the protection of marine mammals in a special area or is it directed towards the preservation, at any cost, of the general European Community regime on fisheries? Were France and Italy too shy in avoiding any derogation to a Community regime which, in reality, allows member States with a Mediterranean coastline to adopt measures supplementary to, or going beyond the minimum requirements of the system,

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12 The coordinates of the relevant points are specified in Art. 3. The area has been enlarged with respect to the area envisaged by the 1993 declaration, which did not include the waters between the French island of Corsica and the Italian region of Tuscany.

13 The level of conservation is deemed to be "favourable" if the knowledge of the populations shows that the marine mammals in the region constitute a vital element of the ecosystems to which they belong (Art. 1, a). The term "habitat" means “any part of the range area of marine mammals, temporarily or permanently occupied by them, and utilised in particular for reproductive, birthing, feeding activities as well as migration route” (Art. 1, b).

14 "Taking" is defined as "hunting, catching, killing or harassing of marine mammals, as well as the attempting of such actions" (Art. 1, c).

15 On the problems of driftnet fishing in the Mediterranean see SCOVAZZI, *The Enforcement in the Mediterranean of United Nations Resolutions on Large-Scale Driftnet Fishing*, in *Max Planck Yearbook of United Nations Law*, 1998, p. 365.

16 *Official Journal of the European Communities* No. L 42 of 18 February 1992.

17 *Official Journal of the European Communities* No. L 171 of 17 June 1998.

18 Strangely enough, the preamble of the Sanctuary Agreement explicitly mentions European Community Regulation No. 1626/94 (*Official Journal of the European Community* No. L 171 of 6 July 1994), which, while laying down certain technical measures for the conservation of fishery resources in the Mediterranean, does not relate to driftnets.

provided that such measures are compatible with Community law and conform with the common fisheries policy (Art. 1, para. 2, of Regulation 1626/94)[19]? Perhaps, instead of giving the impression of being excessively concerned with the European Community's fisheries' regime, France and Italy could have invited the European Community, which is entitled to an exclusive competence in the field of fisheries[20], to join them in the negotiations and subscribe to, as a party to the Sanctuary Agreement, a full ban of driftnets in the waters of the sanctuary[21].

The parties undertake to exchange their views, if appropriate, in order to promote, in the competent fora and after scientific evaluation, the adoption of regulations concerning the use of new fishing methods that could involve the incidental catch of marine mammals or endanger their food resources, taking into account the risk of loss or discard of fishing instruments at sea (Art. 7 c). The parties undertake to exchange their views with the objective to regulate and, if appropriate, prohibit high-speed offshore races in the sanctuary (Art. 9)[22].

The parties will also regulate whale watching activities for purposes of tourism (Art. 8). Whale watching for commercial purposes is presently carried out in the sanctuary by a limited number of vessels. There are promising prospects for the development in the sanctuary of whale watching, which can be considered a benign way of exploiting marine mammals[23].

In the declaration annexed to the Sanctuary Agreement the parties express their desire to carry out, in conformity with the precautionary principle, studies on a certain number of issues that could improve the substance of the Sanctuary Agreement. These include considering the consequences for marine mammals of the use of seismic and acoustic means of prospecting and detection, the possible exploitation of non-living natural resources, and the noise and speed of vessels.

The parties will hold regular meetings to ensure the application of and follow up to the Sanctuary Agreement (Art. 12, para. 1). In this framework they will encourage national and international research programmes, as well as public awareness campaigns directed at professional and other users of the sea and non governmental organisations, relating *inter alia* to the prevention of collisions between vessels and marine mammals and communication to the competent authorities of the presence of dead or distressed marine mammals (Art. 12, para. 2).

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19 Art. 1, para. 2, also provides that “when adopting such measures, Member States shall pay attention of the conservation of fragile or endangered species or environments”.

20 The fisheries regime of the European Community is applicable to all vessels operating in waters under the sovereignty or jurisdiction of member States or registered in a member State.

21 However, the European Community was fully informed by France and Italy of the negotiations on the sanctuary.

22 The wording of this provision has been somehow softened with respect to what was said in Art. 8 of the 1993 declaration (“Les signataires réglementent et, le cas échéant, interdisent les compétitions off-shore dans les sanctuaire”). The present text of Art. 9 of the Sanctuary Agreement provides as follows: “Les Parties se concertent en vue de réglementer et, le cas échéant, interdire dans le sanctuaire les compétitions d'engins à moteur rapides”.

23 On whale watching see the reports edited by IFAW (International Fund for Animal Welfare) and relating respectively to the scientific (1995), educational (1997), legal (1997) and socioeconomic (1997) aspects. See also GILLESPIE, *Whale-Watching and the Precautionary Principle: The Difficulties of the New Zealand Domestic Response in the Whaling Debate*, in *New Zealand University Law Review*, 1997, p. 254.

The Sanctuary Agreement does not establish a specific institutional framework for the management of the sanctuary[24]. It provides that the periodical meetings of the parties are organised taking into account the already existing structures (Art. 12, para. 1). The declaration annexed to the Sanctuary Agreement explicitly mentions the experience acquired under the 1976 RAMOGE agreement[25] framework as a factor that can positively contribute to the application of the Sanctuary Agreement and the management of the sanctuary.

The Sanctuary Agreement includes a provision on the sovereign immunity of warships and other ships owned or operated by a State and used on government non-commercial service (Art. 15). The parties must however ensure that vessels and aircraft, entitled to sovereign immunity under international law, act in a manner consistent with the Sanctuary Agreement.

From the legal point of view, the most critical aspect of the Sanctuary Agreement is the provision on the enforcement on the high seas of the measures agreed upon by the parties. Art. 14 provides as follows:

> " 1. Dans la partie du sanctuaire située dans les eaux placées sous sa souveraineté ou juridiction, chacun des Etats Parties au présent accord est compétent pour assurer l'application des dispositions y prévues.
>
> 2. Dans les autres parties du sanctuaire, chacun des Etats Parties est compétent pour assurer l'application des dispositions du présent accord à l'égard des navires battant son pavillon, ainsi que, dans les limites prévues par les règles de droit international, à l'égard des navires battant le pavillon d'Etats tiers"[26].

It is well known that coastal States have so far been reluctant to establish exclusive economic zones in the Mediterranean. The absence of such zones makes the Mediterranean an old-fashioned sea, as the high seas begins just beyond the 12-mile limit of the territorial sea and is much closer to the coast than it is elsewhere[27]. Of the three parties to the Sanctuary Agreement, Italy and Monaco have not yet claimed an exclusive economic zone, while France has established it only for its non-Mediterranean waters. Had exclusive economic zones been established, the measures provided for in the Sanctuary Agreement would fall under Art. 65 of

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[24] Under the 1993 declaration an Authority should have been established in order to coordinate the management of the sanctuary (Art. 3).

[25] That is the agreement between France, Italy and Monaco on the protection of the waters of the Mediterranean shore (Monaco, 10 May 1976), known as the RAMOGE agreement from the names of three cities in the area to which the agreement applies (St. Raphael, Monaco, Genua). The RAMOGE agreement applies only to the territorial seas and marine internal waters of the continental shore located between two meridians whose coordinates are specified in Art. 2. The high seas waters beyond the 12-mile territorial seas of the parties and the territorial sea around the islands are thus excluded from the scope of the RAMOGE agreement. However, Art. 2, para. 2, allows the RAMOGE Commission, deciding by unanimity, to extend the geographical limits of application of the RAMOGE agreement.

[26] "1. In the part of the sanctuary located in the waters subject to its sovereignty or jurisdiction, any of the States Parties to the present agreement is entitled to ensure the enforcement of the provisions set forth by it. 2. In the other parts of the sanctuary, any of the States Parties is entitled to ensure the enforcement of the provisions of the present agreement with respect to ships flying its flag, as well as, within the limits established by the rules of international law, with respect to ships flying the flag of third States" (unofficial translation).

[27] In this respect, the Mediterranean has also been called an "absential sea", as coastal States, which are entitled to claim their exclusive economic zones, prefer "to be absent" and refrain from establishing such zones.

the 1982 United Nations Convention on the Law of the Sea which allows coastal States to prohibit, limit or regulate the exploitation of marine mammals and promotes international cooperation with a view to their conservation.

Art. 14, para. 2, gives the parties the right to enforce on the high seas the provisions of the Sanctuary Agreement with respect to ships flying the flag of third States "within the limits established by the rules of international law". This wording brings an element of ambiguity into the picture, as it can be intrepreted in two different ways.

Under the first interpretation, the parties cannot enforce the provisions of the Sanctuary Agreement in respect of foreign ships as this action would be an encroachment upon the freedom of the high seas.

The second interpretation is based on the fact that all the waters included in the sanctuary would fall within the exclusive economic zones of one or another of the three parties if they decided to establish such zones[28]. With the establishment of the sanctuary the parties have limited themselves to the exercise of only one of the rights which are included in the broad concept of the exclusive economic zone[29]. However, the simple but sound argument that those who can do more can also do less seems sufficient in order to conclude that the parties can enforce the rules applying in the sanctuary also in respect of foreign ships which are found within its boundaries.

If for the time being the Mediterranean is an old-fashioned sea, it is not necessarily destined to remain as such forever. If one State makes the first move towards proclaiming and effectively implementing an exclusive economic zone, several other countries are likely to follow suit. The fact that sooner or later things may change introduces an element of instability into the whole picture of the legal regime of the Mediterranean. However the sanctuary itself does not seem to be substantially affected by a future establishment (if any) of exclusive economic zones. In this event, Art. 14, para. 2, of the Sanctuary Agreement would no longer apply and the matter of enforcement could be fully covered by Art. 14, para. 1.

Under a broader perspective, the Sanctuary Agreement can be seen as an element of the trend towards a closer cooperation among Mediterranean States in the preservation of their common natural heritage. There is a direct connection between the Sanctuary Agreement and the 1995 Barcelona Protocol, as provided for in Art. 16 of the former instrument:

> “As soon as the Protocol concerning specially protected areas and biological diversity in the Mediterranean enters into force for them, the Parties will present a joint proposal for inclusion of the sanctuary in the list of specially protected areas of Mediterranean importance”.

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[28] In other words, the Mediterranean high seas (that is the waters beyond 12 n.m.) is different from the high seas located somewhere else in the world's ocean and seas (that is the waters beyond 200 n.m.), as it will disappear when exclusive economic are proclaimed.

[29] A similar attitude is taken by those States which limit themselves to the establishment of a fishing zone, instead of an exclusive economic zone.

Protecting the Oceanic Gardens of Eden: International Law Issues in Deep-sea Vent Resource Conservation and Management[1]

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Even while marine fortune hunters prowling the oceans for precious metals and archeological treasures entombed in shipwrecks on the seabed capture inter-national headlines, activities surrounding more valuable, and in many ways more ancient, seabed treasures are increasingly thrusting their way onto the global agenda. Those seabed treasures are the remote deep-sea vent communities scattered across the ocean basins. One such vent field – the *Garden of Eden* – located on the equatorial Eastern Pacific seabed, suggests the pristine and almost mythical quality of these deep-sea communities. The field takes its name from the spectacular gardenlike display of sinuous white tubeworms adorned by crimson, gill-like crowns, which marveled its first aquanaut visitors. Yet the value of the deep-sea vent resources plainly transcends the aesthetics of the Eden-like displays of tubeworms. Early estimates of the commercial value of the hydrothermal vent genetic resources were in the range of $3 billion/year. The value of the mineral resources at some hydrothermal vent fields may be much higher. The non-market value to global biological diversity and the research community is incalculable.

The discovery of rich biological communities and strategic mineral deposits at these seabed vents has generated keen interest on the part of marine scientific researchers, the biotechnology industry, mining companies and at least one deep-sea submersible operator hoping to develop interest within the high-end eco-tourist market. The shared, yet inevitably conflicting, interests in these undersea oases will present a significant challenge for marine policy analysts and law specialists in the twenty-first century. While science and technology, in their capacity to induce change, often evolve with dizzying speed, legal and policy regimes tend to lag behind. The gap is particularly evident in the deep ocean. Though it must be acknowledged that the global legal paradigms are progressively evolving, through innovations such as the common heritage principle, the emerging precautionary approach and the mandate for sustainability and conservation of the planet's rapidly shrinking pool of biological diversity, the existing international legal regime still fails to address adequately the conservation and management needs of the newly-discovered deep-sea vent fields in the coming decades.

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects.

2 Associate Professor of Law, University of Washington School of Law, 1100 N.E. Campus Parkway, Seattle, WA 98105-6617 USA Research for this Article was supported by the National Oceanic & Atmospheric Administration, National College Sea Grant Program, under grant NA76RG0119, through the Washington Sea Grant Program, project number R/MS-48 and the University of Washington Law School Foundation.

The response to a legal regime that remains uncertain, incomplete and fractured ranges from the modest to the revolutionary. Some international law scholars recommend a fundamentally different approach to the law of the sea and its treatment of the seas' natural resources. A 1998 report by the Independent World Commission on the Oceans recommended that ocean areas beyond national jurisdiction and their resources be placed under a public trust for the benefit of all humanity, perhaps to be managed by the United Nations Trusteeship Council. A prominent ocean policy analyst advocates broadening Part XI of the 1982 Law of the Sea Convention to include certain living and genetic marine resources within the convention's "common heritage" of humankind regime and bringing their management within the International Seabed Authority's regulatory ambit. A few vent scientists have, more modestly, proposed that selected vent fields be designated as self-imposed "reserves," where access would be governed by consensus decision making for the common good. Charting still another course, Canada has designated a pilot marine protected area for a frequently visited vent field within its jurisdiction. Exporting the Canadian approach from national waters to the international commons, an advisory body for the Convention on Biological Diversity advocates that consideration be given to designating selected vent fields on the deep-seabed as marine protected areas, an approach advocated by some international law scholars, environmentalists, and the Marine Section of the IUCN World Commission on Protected Areas. The stakes are high, and other approaches will no doubt be suggested.

This Article seeks to stimulate the nascent discussion on legal questions presented by access to and use of deep-sea hydrothermal vent sites and resources, to help guide ocean policy analysts in their efforts to formulate and implement appropriate conservation and management measures adapted to the unique multiple-use conflicts posed by the vent phenomena. The inquiry is timely and important for the vent communities, some of which are already showing signs of the human footprint – a footprint that may in the not too distant future include the tracks of submarine bulldozers as they set about the job of seabed mining. The Article begins with a brief description of the nature of the vents in Part II and their existing and expected uses in Part III. Part IV of the Article then provides an overview of the components of the legal regime applicable to vents on the outer continental shelf or deep seabed, focusing primarily on the 1982 U.N. Convention on the Law of the Sea (LOSC) and the 1992 Convention on Biological Diversity (CBD). Parts V and VI focus on the legal issues that are likely to arise in the context of the seabed hydrothermal vents and their living and genetic resources under the LOSC and CBD respectively. The Article then closes with some preliminary conclusions and an assessment of the implications of those conclusions for seabed vent conservation and management options.

Note: The full article will be published in the Winter 2001 issue of the Georgetown International Environmental Law Review.

Testing the Waters: Establishing the Legal Basis to Conserve and Sustainably Use Hydrothermal Vents and their Biological Communities [1]

***Lyle Glowka*[2]**

Biodiversity Strategies International

Undersea biological discoveries since 1977 have helped to alter our view of the deep seabed as a "biological desert."[3] The sediments and seeps of the deep seabed are subjected to some of the most extreme environmental conditions on the planet, yet they harbor some of the planet's most diverse biological communities.[4]

Hydrothermal vents are the best known of the seeps. They are driven by volcanic activity. The most expansive region of oceanic volcanic activity is associated with a single, continuous 50,000 kilometer long undersea mountain range which runs through the Atlantic, Pacific, Indian, and Arctic Oceans like the stitches on a baseball.[5] Hydrothermal vents are widespread, but the vast majority has yet to be discovered and explored.[6]

Those that are most accessible are increasingly threatened by human activities. The activities most likely to involve hydrothermal vents and their biological communities are seabed mining, marine scientific research, biological sampling, and bioprospecting. The following is a brief survey of the threats to hydrothermal vents and how the 1982 United

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1 Prepared for the Workshop on Managing Risks to Biodiversity and the Environment on the High Sea, Including such Tools as Marine Protected Areas – Scientific Requirements and Legal Aspects: Adapted from Glowka L. (1999). Testing the Waters: Establishing the Legal Basis to Conserve and Sustainably Use Hydrothermal Vents and Their Biological Communities, in: 8 InterRidge News (Fall 1999) and Glowka L. (2000). Bioprospecting, Alien Invasive Species, and Hydrothermal Vents: Three Emerging Legal Issues in the Conservation and Sustainable Use of Biodiversity, in: 13 Tulane Environmental Law Journal 329. Tulane Law School. New Orleans.

2 Agnesstraße 41, 53225 Bonn, Germany, e-mail:lglowka@csi.com

3 See W.J. Broad, The World's Deep Cold Ocean Floors Harbor a Riotous Diversity of Life, N.Y. Times, Oct. 17, 1995, at C1; Fred Pearce, Rockall Mud Richer Than Rainforest, New Scientist, Sept. 16, 1995, at 8.

4 See Elliott A. Norse et al., Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making 6, 7, 11 (1993). Three examples are petroleum seeps (areas where petroleum naturally discharges from the ocean-floor), sediment pore-water seeps (areas on the ocean-floor where large volumes of cool water and dissolved hydrogen sulfide and methane gas percolate up through deep sediments and discharge from the sea-bed into the superjacent waters) and hydrothermal vents (underwater hot springs associated with tectonically active portions of the deep seabed whose fluid is a mixture of seawater, dissolved minerals and chemicals such as hydrogen sulfide). See id. at 7, 11. Hydrothermal areas are rich sources of macro- and micro-organisms. Norse provides one example where 223 of 236 vent species were found to be new to science. See id. at 7. These represented 100 new genera and perhaps 22 families. Thus far micro-organisms, fish, crustacea, polychaetes, echinoderms, coelenterates, and mollusks have been discovered in vent areas. See id. at 41. Scientists now understand that micro-organisms provide the biological interface between the vents' physical and chemical environments. Scientists have also established that microbes support the biological communities associated with hydrothermal vents. See id. at 7. In addition, a seabed microbe has been used to confirm the existence of a third major branch of life on Earth: the Archaea. See V. Morell, Life's Last Domain, 272 Science 1043 (1996).

5 *See* M.D. Lemonick, *The Last Frontier*, TIME (INT'L), Aug. 14, 1995, at 52.

6 *See* Carl Franklin, *'Black Smokers' Multiply on Ocean Floor*, NEW SCIENTIST, Oct. 22, 1994, at 20.

Nations Convention on the Law of the Sea (UNCLOS) and the Convention on Biological Diversity (CBD) may apply.

Seabed Mining

Mining for polymetallic sulphide deposits poses the greatest potential physical threat to hydrothermal vents and their biological communities. Direct adverse impacts may include physical damage and destruction; indirect adverse impacts may include sedimentation and disrupted water circulation systems.

Mining in areas of national jurisdiction, where vents with potentially valuable associated minerals lie close to shore, is the most immediate threat. Potentially rich in gold and other valuable metals, these vents offer the possibility of reasonable extraction and processing costs because of their accessibility. The best example is the plans of a mining consortium to explore the feasibility of mining polymetallic sulphide deposits from a vent system located in the Manus Basin of the Bismarck Sea.[7] The site is located within the Exclusive Economic Zone (EEZ) of Papua New Guinea. Papua New Guinea is a Contracting Party to UNCLOS and the CBD.[8]

The international legal basis to conserve and sustainably use hydrothermal vent areas within areas of national jurisdiction is fairly clear and national environmental regulatory processes may already exist. As a principle of international environmental law, a state has the sovereign right to exploit its natural resources provided it does not damage the environment of other states and areas beyond national jurisdiction. The extent to which it must account for the environmental impacts of actions within its own territory depends on its other international environmental obligations and its domestic national environmental laws.

As a Contracting Party to UNCLOS, Papua New Guinea has the very general obligations to:

(1) “protect and preserve the marine environment” and

(2) “protect and preserve rare or fragile ecosystems.”[9]

As a Contracting Party to the CBD it has a range of explicit obligations to conserve biological diversity and use its components sustainably. In order to ensure fulfillment of these obligations, Papua New Guinea should:

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7 W.J. Broad, *First Move Made to Mine Mineral Riches of Seabed*, N.Y. TIMES, Dec. 21, 1997, at 1.

8 *See* 21 I.L.M 1477 (UNCLOS list of signatories); 31 I.L.M. 1004 (CBD list of signatories).

9 UNCLOS, arts. 192, 194(5). The general obligation to protect and preserve rare or fragile ecosystems under Article 194(5) appears in a section entitled: “Measures to prevent, reduce and control pollution of the marine environment.” Id. The intent is to ensure that UNCLOS Contracting Parties take into consideration the protection of rare or fragile ecosystems when they take measures to prevent, reduce, and control pollution. See id. There is some difficulty reading this as a stand alone obligation to protect rare or fragile ecosystems for reasons other than pollution prevention, reduction, and control. Notwithstanding this limitation, the CBD can be interpreted to provide a gap-filling function when a state is a party to both instruments.

(1) identify any biological communities associated with the target vent system and

(2) regulate or manage the activity to eliminate or minimize impacts on biodiversity.

Therefore, an environmental impact assessment should be required.

In addition, public participation should be allowed in Papua New Guinea's regulatory oversight and environmental impact assessment processes. This would allow marine scientific researchers to offer the best available information on the particular sites under review to help determine what the proposal's potential impacts would be. They might also be able to steer proposed activities away from rare or fragile sites or those of particular scientific interest.

In the area beyond the limits of national jurisdiction, polymetallic sulphide deposits are part of the common heritage of humankind.[10] In effect, they are international property. The right to explore and exploit them rests solely with the international community.[11] Like polymetallic nodules, the deposits are not currently economically exploitable. They are very expensive to recover and process. As a result, it is unclear when such mining will actually occur.

Pursuant to UNCLOS, the International Seabed Authority (ISA) needs to develop a mining code for sulphide deposits before any mining takes place. In 1998, the Russian delegation to the ISA brought an initiative to establish this code.[12] Unfortunately, it is still too early to determine the scope of the code. It will likely be modeled after the draft code for manganese nodule mining that the ISA has been working on for a number of years.

The forthcoming ISA polymetallic sulphide deposits code should include strong environmental impact assessment procedures. These procedures are not well developed in the draft nodule code. This would help to fulfill the stipulation in UNCLOS that the codes protect and conserve the area's natural resources and prevent damage to the flora and fauna of the marine environment.[13] The intergovernmental process to develop such a code would surely benefit from and could be influenced by available marine scientific research.

Marine Scientific Research

The most immediate threat to hydrothermal vent systems and their associated biological communities is marine scientific research. As a "use," marine scientific research needs to be sustainable just like any other natural resource-based activity.

The CBD defines "sustainable use" as using the "components of biological diversity in a way and at a rate that does not lead to the long term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of future generations."[14] This

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10 See UNCLOS, pt. XI, § 2, art. 136.

11 See id. pt. XI, § 2, art. 137.

12 See Oceans and the Law of the Sea: Report by the Secretary-General, U.N. GAOR, 53rd Sess., Agenda Item 38(a), at 8, U.N. Doc. A/53/456 (1998).

13 See UNCLOS, art. 145(b).

14 CBD, art. 2.

definition recognizes that biological diversity conservation cannot be separated from the sustainable use of its components: genomes, populations of species, and ecosystems. In other words, to conserve biological diversity, its tangible manifestations must be conserved and sustainably used.[15]

Commentators have noted that one aspect of the threat posed by marine scientific research originates from a shift in research priorities from exploration and discovery to those emphasizing temporal processes.[16] Consequently, the "concentration of sampling, observation and instrumentation at a small number of well known hydrothermal sites" has led to the discovery "that certain activities are incompatible, and that even more cooperation and coordination will be required to resolve potential conflict."[17]

The main problem is a conflict between observational monitoring activities that depend upon an undisturbed state and those activities that involve manipulating or collecting biological or geological samples from a particular area. Commentators have asserted that "disturbance by researchers can have a substantial impact on vent systems" and that "anthropogenic changes in distribution and occurrence of vent fluid flows and of associated vent communities have been well documented at vents along the East Pacific Rise, on the Juan de Fuca Ridge and at the TAG field on the Mid-Atlantic Ridge."[18]

In areas of national jurisdiction, managing physical access to sites of scientific interest or of importance for biodiversity conservation may be a viable solution. At a minimum, the overseeing agency for marine scientific research within a coastal state's EEZ and on the continental shelf could provide a screening or clearing-house type function.

When a permit application to undertake research is first submitted, the agency could identify potential conflicts and make prospective researchers aware of them before they occur. If the state is particularly advanced, granting permission to undertake activities in an area might be informed by a management plan and an environmental impact assessment, particularly if the hydrothermal vent area has already been established as a protected area. This seems to be the approach that Canada will ultimately take with regard to the Endeavour Hot Vents site, a designated "pilot marine protected area" located on the Juan de Fuca Ridge within Canada's EEZ.[19]

Canada has not ratified UNCLOS and thus is not a Contracting Party that must implement the treaty's obligations. The Endeavour proposal would be a step towards implementing the spirit of the UNCLOS provisions to protect and preserve the marine environment and to protect rare and fragile ecosystems. It would also be a step towards implementing the various conservation obligations Canada has accepted as a Contracting Party to the CBD.

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15 See Glowka et al., A Guide to the Convention On Biological Diversity (IUCN, 1994).

16 See Lauren Mullineaux et al., Deep-sea Sanctuaries at Hydrothermal Vents: A Position Paper, InterRidge News, Apr. 1998, at 15-16

17 Id.

18 Id.

19 See Canadian Ministry of Fisheries and Oceans, Minister of Fisheries and Oceans Announces Two Offshore Pilot Marine Protected Areas (visited June 10, 2000) <http://www.oceansconservation.com/mpa/docs/dec8.htm>.

In this or other areas, zoning a vent system according to the UNESCO Biosphere Reserve approach could be envisioned. Although currently this approach is limited to terrestrial use, UNESCO is exploring how the concept can be applied to marine areas.[20]

Zoning entails delineating an area into zones to be managed to achieve particular objectives. These objectives might include:

(1) a core area or areas devoted to strict protection where the possibility might exist for non-invasive observational research,

(2) a delineated buffer zone where only research and other activities compatible with specified objectives could take place and, possibly,

(3) a transition zone where more invasive activities such as seabed mining could take place.

Such an approach would certainly be in keeping with the general UNCLOS provisions on protecting and preserving the marine environment and protecting fragile or unique ecosystems. Proper zoning would also support the CBD objectives to conserve biodiversity and sustainably use its components by identifying and managing threats to biodiversity and creating protected areas.[21]

As one might imagine, the situation is considerably less structured in areas beyond the limits of national jurisdiction. At this time there is no agency with a mandate to oversee marine scientific research activities or biological resources on the seabed.

The ISA's mandate is limited to the seabed's mineral resources.[22] ISA addresses marine scientific research and the seabed's biological communities only when seabed mining is involved.[23] Without

(1) direct measures taken by researching states to regulate the conduct of their marine scientific researchers in the area,

(2) a new international treaty, or

(3) voluntary oversight by the scientific community itself,

there is very little that UNCLOS or the CBD can directly offer at present to minimize the potential use conflicts and threats that marine scientific research may pose to a hydrothermal system. Although a new international treaty is unlikely, direct measures by an individual or a group of researching states are possible, especially pursuant treaty obligations under UNCLOS and the CBD.

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[20] UNESCO's official website is located at <www.unseco.org.>. See also Personal Communication with Mirielle Jardin, UNESCO Man and Biosphere Programme, Paris (Mar. 30, 2000).

[21] See CBD, arts. 7(c), 8(a), (l).

[22] See UNCLOS, Annex III.

[23] See id.

The outstanding problem is motivating states to act in the first place. A related problem may involve coordinating and harmonizing disparate approaches states may take if they act individually. Both issues could be taken up by UNESCO's Intergovernmental Oceanographic Commission (IOC) whose mandate, among other things, includes marine scientific research. Intergovernmental processes, however, tend to be time consuming and slow.

Voluntary approaches, such as self-policing, initiated by marine scientific researchers may be the most expeditious way to minimize the conflicts and environmental impacts marine scientific research activities may pose. While such voluntary actions have been proposed,[24] coordination and collaboration between marine scientific researchers would be required for success. A coordinating body, such as a consortium of developed and developing states undertaking research on hydrothermal vents, would be needed.[25]

A step towards voluntary action is already being taken as a result of a 1995 recommendation by the InterRidge Biological Studies *Ad Hoc* Committee to demarcate "seabed sanctuaries."[26] This was subsequently elaborated further in a position paper, which proposed a "research reserve system . . . regulated entirely by consensus."[27] It was proposed that InterRidge would disseminate information and summarize controversies.[28] Researchers would be encouraged to devote dive time to explore new sites to alleviate collecting pressure at the most popular sites. Thus far, two sites in the area have been proposed, one on the East Pacific Rise, the other on the Mid-Atlantic Ridge.

Without state action, voluntary actions by marine researchers would support the spirit of UNCLOS since it applies to marine scientific research beyond the areas of national jurisdiction. The legal status of marine scientific research is determined by where the research takes place when the research is undertaken beyond the limits of any national jurisdiction.

On the high seas and in the area, all states and competent international organisations have the right to conduct marine scientific research.[29] Unlike the high seas, all marine scientific research within the area "shall be carried out . . . for the benefit of [hu]mankind as a whole . . . ."[30] Unfortunately, UNCLOS defines neither "marine scientific research" nor "benefit of [hu]mankind as a whole."

Arguably, the scientific community's voluntary actions would contribute to the conservation and sustainable use of hydrothermal vents and their associated biodiversity, thereby benefiting humankind as a whole. This also would support the spirit of the CBD's international cooperation provisions and its declaration that biodiversity conservation is a "common concern of humankind."[31]

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24 See Mullineaux et al., supra note 16, at 15-16.

25 InterRidge is an example of such a consortium. See (visited June 10, 2000) <www.lgs.jussieu.fr>.

26 See Daniel Desbruyeres et al., Biological Studies Ad Hoc Committee Workshop Summary (visited June 10, 2000) <http://www.lgs.jussieu.fr/~intridge/ws-bio95.htm>.

27 Mullineaux et al., supra note 16, at 15-16.

28 See id.

29 See UNCLOS, art. 256.

30 Id. art. 143(1).

31 CBD, pmbl., para. 3.

With any voluntary system the participants must know the principles upon which it is based. In lieu of regulatory oversight, the scientific community could undertake to develop a professional code of conduct for activities involving hydrothermal vents to guide researchers. The code could provide a reference point against which they could judge their own conduct and the conduct of their peers.

Furthermore, the ultimate success of any voluntary system or instrument, such as a professional code of conduct, is intimately related to the process by which it is developed. It is a well-established principle in modern conservation circles that the key stakeholders must be involved in any process whose result may have an impact upon their activities.

Incentives may need to be provided to encourage compliance. For example, national funding institutions could agree to conditionally grant money upon the demonstrable application of the code of conduct by the grantee. Peer pressure may also play a role in the ultimate success of any voluntary system. To fully ensure the codes' application, and to give it added weight, it may need to be solidified further by an intergovernmental body such as the UNESCO International Oceanic Com-mission. This would ensure oversight of its implementation at the global level and may encourage its voluntary application by states.

Biological Sampling

Biological sampling of macro- and microorganisms is a primary goal of many marine scientific research activities both within and beyond the limits of national jurisdiction. Depending on the circumstances, sampling activities may put pressure on hydrothermal biological communities causing adverse impacts. Consequently, sampling may not be sustainable, especially for sampling involving invertebrates.

Direct impacts associated with sampling a limited population of organisms are clearly possible. Possible indirect impacts are less discernable. For example, sampling in unique environments may be an unsustainable use absent precautions to minimize the introduction of alien species from one site to another.

For such reasons, in areas of national jurisdiction, there are clear intersections between these activities, the UNCLOS provision on rare and fragile ecosystems previously described, and the CBD's sustainable use provisions.

As with seabed mining, a CBD Contracting Party is to identify actual or potential threats to biodiversity, and thereafter regulate or manage them to minimize those threats.[32] A complementary provision requires the coastal state to adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity.[33] Intersections with environmental impact assessment are apparent.[34] Finally, a Contracting Party is required to regulate and manage the collection of biological resources from natural

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[32] See id. arts. 7(c), 8(l).

[33] See id. art. 10(b).

[34] See id. art. 14.

habitats for ex-situ conservation purposes so as not to threaten ecosystems and in-situ populations of species.[35]

Beyond national jurisdiction, the situation is similar to that for general marine scientific research. Under UNCLOS, unsustainable collecting for research purposes could be interpreted as inconsistent with the requirement that marine scientific research is to be undertaken for the benefit of humankind as a whole. As suggested above, voluntary action by the marine scientific research community could suffice in the absence of a new treaty or until other state action takes place.

In 1995, the InterRidge Biological Studies *Ad Hoc* Committee recommended that the Member States of InterRidge establish a voluntary international specimen or sample exchange agreement whose "aim is to avoid duplication of sampling which is costly not only in monetary terms but also in terms of environmental impact."[36] The idea was further elaborated by a group of scientists in 1997 at the First International Hydrothermal Vent Biology Symposium in Madeira, Portugal.

The exchange agreement would augment existing international specimen exchanges. Support would be provided by an internet-based database with information on existing biological samples. In addition, nonbiology research cruises would be provided with "bio-boxes" for collecting and preserving biological samples and making them available for exchange.

The draft agreement has yet to be officially endorsed by InterRidge Member States. National corresponding curators have been asked to draw on its terms and conditions, including its prohibitions on redistributing exchanged samples and using the samples for commercially-oriented research. The initiative would contribute to one aspect of the sustainable use of vent organisms.

Bioprospecting

Marine scientific research activities, particularly those related to biological and geological sampling, are becoming increasingly linked to onshore commercial bioprospecting activities.[37] The true extent of marine bioprospecting at hydrothermal vent sites within and beyond areas of national jurisdiction is unknown. These activities probably do not pose an immediate threat to biological communities associated with hydrothermal vents.

Sustainability may need to be considered where bioprospectors need large quantities of a macro-organism to obtain useful quantities of a secondary metabolite produced by a mutualistic micro-organism. If the secondary metabolite is not readily synthesizable and the

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35 See id. art. 9(d).

36 Desbruyeres et al., supra note 26.

37 See W.J. Broad, The Universe Below: Discovering the Secrets of the Deep Sea (1997); N. Gross, Extreme Enzymes: Science is Commercializing Nature's Diehard Proteins, Business Wk., Apr. 1, 1996.

micro-organism is not culturable, then harvesting the macro-organism at unsustainable levels could threaten both the micro-organism, as well as the particular ecosystem.[38]

Beyond environmental impacts, biological sampling at hydrothermal vents within the limits of national jurisdiction may have implications for marine scientific researchers and bioprospectors. There may be a need to seek prior informed consent (PIC) and negotiate mutually agreed terms (MATs) and ultimately share benefits for the use of genetic resources.

The CBD's genetic resources provisions only apply to marine areas within the areas of national jurisdiction.[39] These provisions require marine scientific researchers and bioprospectors to obtain the government's PIC before accessing the area.[40] PIC will be subject to mutually agreed upon terms, including benefit sharing. Similarly, within the limits of national jurisdiction, UNCLOS requires that consent first be acquired for marine scientific research.[41]

Under UNCLOS, consent is presumed unless the coastal state has reason to be believe the proposed research is "directly significant" to commercial exploration and exploitation of natural resources, whether living or nonliving.[42] Where the marine scientific research is for noncommercial purposes, the researching state is to:

(1) ensure the participation of the scientists from the coastal state,

(2) provide preliminary reports and final results upon request,

(3) provide access to samples and data collected upon request,

(4) provide sample and data assessment, and

(5) research results upon request; and ensure international availability of the research results.[43]

Beyond the limits of national jurisdiction, the CBD's provisions on genetic resources access and benefit sharing are not applicable.[44] Nevertheless, the CBD COP has called upon the CBD Secretariat to study the conservation and sustainable use of deep seabed genetic resources in relation to bioprospecting.[45] The U.N. Secretary General has highlighted the

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38 See Lyle Glowka, The Convention on Biological Diversity: Issues of Interest to the Microbial Scientist and Microbial Culture Collections, in Culture Collections To Improve The Quality Of Life, 8 Int'l Congress for Culture Collections 36, 51 (R.A. Sampson et al. eds., 1996).

39 See CBD, art. 15.

40 See id.

41 See UNCLOS, art. 246(2).

42 See id. arts. 246(3), (5)(a).

43 See id. art. 249.

44 See CBD, art. 4(a).

45 See Report of the Second Meeting of the COP, at 60, para. 12. In 1995, the CBD COP directed the CBD Secretariat as follows:

[I]n consultation with the United Nations Office for Ocean Affairs and the Law of the Sea, . . . undertake a study of the relationship between the Convention on Biological Diversity and the United Nations Convention on the Law of the Sea with regard to the conservation and sustainable use of genetic resources on the deep seabed.

Id. This would "[enable] the [SBSTTA] to address, at future meetings, the scientific, technical and technological issues related to bio-prospecting of genetic resources on the deep seabed." Id. As of December

importance of the CBD study.[46] The Independent World Commission on Oceans has also called for a study.[47]

Even though UNCLOS and the CBD do not squarely address hydrothermal vents, they can still be used as the international legal basis to ensure conservation and sustainable use. The clearest applications exist in areas of national jurisdiction. The CBD study of seabed genetic resources could leverage a wider treatment of other deep seabed biodiversity issues, including those associated with hydrothermal vents.

1999, the study has yet to be undertaken. For a general overview of the issue see Lyle Glowka, Genetic Resources, Marine Scientific Research and the International Seabed Area, in 8 Review of European Community and International Environmental Law 56 (1999); and Lyle Glowka, The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area, 12 Ocean Y.B. 154 (1996).

46 The general subject of marine and coastal biodiversity, as well as the specific issue of access to the genetic resources of the deep seabed, raise important questions. The topic touches not only on the protection and preservation of the marine environment, including that of the international seabed area, but also on such other matters as the application of the consent regime for marine scientific research, . . . the duties of conservation and management of the living resources of the high seas, and the sustainable development of living marine resources generally. The specific issue of access points to the need for the rational and orderly development of activities relating to the utilization of genetic resources derived from the deep seabed area beyond the limits of national jurisdiction. The study to be prepared for Parties to the Biodiversity Convention will be of equal, or possibly greater importance to States Parties to the United Nations Convention on the Law of the Sea, as well as Member States in the General Assembly . . . . Law of the Sea: Report of the Secretary General, U.N. General Assembly, 51st Sess., Agenda Item 24(a), at 59, U.N. Doc. A/51/645 (1996).

47 See Independent World Comm'n on the Oceans, The Ocean Our Future, The Report of the Independent World Comm'n on the Oceans (1998). "The potentials of the genetic resources of the seabed should become the subject of urgent study, focusing on their legal, environmental and economic implications, and negotiation leading to their inclusion within an appropriate international regulatory regime." Id.

Annex I

List of Participants

Organizing Committee

Prof. Dr. Detlef Czybulka, University of Rostock, Germany

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Dr. J. Anthony Koslow, Commonwealth Scientific and Industrial Research Organisation, Australia

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Participants

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28	**John Tanzer**, World Commission on Protected Areas (High Sea MPA task force leader), Great Barrier Reef Marine Park Authority, Executive Director PO Box 1379, Townsville QLD 4810, Australia Tel: +61 7 4750 0820 Fax: +61 7 4721 3445 e-mail: j.tanzer@gbrmpa.gov.au Area of Expertise: Fisheries management, Environmental law, Management of marine protected areas, Protection of marine ecosystems
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Annex 2

Agenda

EXPERT WORKSHOP ON MANAGING RISKS TO BIODIVERSITY AND THE ENVIRONMENT ON THE HIGH SEA, INCLUDING TOOLS SUCH AS MARINE PROTECTED AREAS

- Scientific Requirements and Legal Aspects -

27 February - 4 March 2001

27 February 2001 Arrival

18.30 Welcome

HENNING VON NORDHEIM, German Federal Agency for Nature Conservation & THOMAS BORCHERS, Federal Ministry of the Environment, Nature Conservation and Nuclear Safety Germany

19.00 Dinner

20.00 Introductory Remarks (HJALMAR THIEL, ANTHONY KOSLOW)

28 February 2001 Scientific Arguments for High Sea MPAs

9.00 Chair: HJALMAR THIEL

9.05 Deep Water Fish and Fisheries (JOHN GORDON)

9.25 ICES Activities Related to Deep Water Fisheries (JOHN GORDON on behalf of CORNELIUS HAMMER)

9.45 Fish Stocks and Benthos of Seamounts (ANTHONY KOSLOW)

10.05 Potential Use of Marine Protected Areas Applied to Tuna Fisheries and Offshore Pelagic Ecosystems (ANTHONY KOSLOW on behalf of ALAIN FONTENEAU)

10.25 Coffee Break

10.55 Chair: LYLE GLOWKA

11.00 Deep Water Coral Conservation (ANTHONY GREHAN)

11.20 Scientific Challenges in Determining the Need for and Scope of Marine Protected Areas for Whales, Dolphins and Porpoises (GREG DONOVAN)

11.40 Conservation Status and Needs of High Sea Birds: Consideration from the UK Perspective (CHARLOTTE JOHNSTON)

12.00 Some Information on Albatros Conservation (HJALMAR THIEL)

12.30 Lunch

13.30 Guided Tour through the Nature Reserve Isle of Vilm

15.00 Coffee Break

15.30 Chair: HENNING VON NORDHEIM

15.35 Hydrothermal Vents (KIM JUNIPER)

15.55 MPAs for Monitoring and Scientific Reference on the High Seas (HJALMAR THIEL)

16.15 General Discussion

18.30 Dinner

20.30 The Cultural History of the Isle of Vilm (REINHARD PIECHOCKI)

1 March 2001 Reports by Organisations on Their Respective Activities Concerning High Sea MPAs

9.00 Chair: JOHN TANZER

9.05 Challenges to Conserving Marine Biodiversity on the High Seas through the Use of Marine Protected Areas - An Australian Perspective (DAVID OSBORN)

9.30 A Marine Protected Area System under OSPAR (HENNING VON NORDHEIM)

9.55 Legal Aspects of Sanctuaries (Marine Protected Areas) and the International Whaling Commission (IWC) (GREG DONOVAN)

10.20 Coffee Break

10.45 Chair: LOUISE DE LA FAYETTE

10.45 A Strategic Approach to Protecting Areas on the High Seas – The WWF Perspective (SIMON CRIPPS)

11.10 High Seas MPAs: Legal, Political and Institutional Considerations by IUCN (CHARLOTTE DE FONTAUBERT)

11.35 General Discussion

Legal Aspects of High Sea MPAs

12.00 Chair: CRAIG H. ALLEN

12.05 Marine Protected Areas Beyond National Jurisdiction - Existing Legal Principles and a Future International Law Framework (ROBIN WARNER)

12.30 Lunch

14.00 The United Nations Convention on the Law of the Sea and the Regime of the High Seas (RENATE PLATZÖDER)

14.30 Legal Aspects of High Sea MPAs (VLADIMIR KOTLIAR)

15.00 The Convention on Biodiversity and High Sea Related Activities (MARJO VIERROS)

15.30 Coffee Break

16.00 Chair: BERNARD H. OXMAN

16.05 The Convention for the Protection of the Marine Environment of the North- East Atlantic (OSPAR) (DETLEF CZYBULKA)

16.30 MARPOL Special Areas and IMO Particularly Sensitive Sea Areas as a Model to be Applied on the High Seas (LOUISE DE LA FAYETTE & KRISTINA GJERDE)

16.55 Coffee Break

17.15 General Discussion

18.30 Reception at the invitation of the Federal Ministry of the Environment

20.30 Cello Concert in the Gallery

Videos of the high sea world (optional)

2 March 2001 **All Day Excursion**

9.00 Departure from Vilm

National Park Jasmund with its famous chalk cliffs on the Island of Ruegen

12.30 Packed Lunch

Guided tour through the Hanseatic Town of Stralsund, Visit to the German Museum for Marine Research and Fisheries

18.00 Dinner in the Hanseatic Cellar in the Old Guild House of Stralsund

22.00 Estimated time of arrival on Vilm

3 March 2001 **Legal Aspects of MPAs on the High Seas**

9.00 Chair: RENATE PLATZOEDER

9.05 The UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS) - Current Status (ALAN SIMCOCK)

9.25 General Discussion

10.30 Coffee Break

10.50 Discussion contd.

12.30 Lunch

Discussion, Conclusions and Future Activities

14.00 Chair: ALAN SIMCOCK

14.00 Discussion contd.

16.00 Coffee Break

16.30 Discussion contd

18.30 Dinner

20.00 *Social Event*: *Participants are invited to present their home country and region*

4 March 2001 **Workshop Report, Publication and Dissemination**

9.00 Chair: HENNING VON NORDHEIM

9.05 Discussion and Approval of Workshop Report

11.15 Departure