Guidance and Lessons Learned for Canada's Marine Protected Area Networks

Proceedings of a national workshop held in Ottawa in January 2008

Fisheries and Oceans Canada
Pêches et Océans Canada
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DECLARATION

The views captured in this report represent those of the authors and presenters and do not necessarily reflect the views of Fisheries and Oceans Canada or the Government of Canada.

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Photo credits:

Bowie seamount underwater view (top): Neil McDaniel
Clown Nudibranch, Strait of Georgia: M. Heibert

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FOREWORD

In November 1994 the Minister of Fisheries and Oceans issued *A Vision for Ocean Management,* which highlighted the need for an oceans-management strategy and oceans legislation. Following an extensive period of consultation and parliamentary committee debate, the *Oceans Act* came into force on 31 January 1997. The Act established Canada as the first country with comprehensive oceans-management legislation. Canada has begun to implement its *Oceans Act* through a series of integrated management activities in priority areas, using area-based management tools such as marine protected areas.

Canada committed nationally and internationally to establish marine protected area networks. This commitment has been identified as a key deliverable under the federal Health of the Oceans initiative (2007) and Canada's Federal Marine Protected Areas Strategy (2005). Fisheries and Oceans Canada is the Government of Canada lead for the establishment of Canada's system of marine protected areas, working in cooperation with Parks Canada Agency, Environment Canada, and provincial and territorial agencies with a mandate to conserve and protect marine areas, as well as with First Nations and Aboriginal groups, industries, non-governmental organizations and other interest groups.

This workshop gave these Canadian federal, provincial, and territorial authorities, Aboriginal organizations and national level stakeholders an opportunity to jointly access and explore the growing body of international knowledge and experience in the planning of marine protected area networks. It represents the first of many steps to come in building Canada's marine protected area networks in an inclusive, coordinated, and complementary fashion.

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ABBREVIATIONS

BfN	German Federal Agency for Nature Conservation
CBD	Convention on Biological Diversity
COP	Conference of the Parties
DFO	Fisheries and Oceans Canada
EBSA	Ecologically and Biologically Significant Area
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GBRMP	Great Barrier Reef Marine Park
IUCN	International Union for the Conservation of Nature and Natural Resources (World Conservation Union)
LOMA	Large Ocean Management Area
MBS	Migratory Bird Sanctuary
MCPA	Marine and Coastal Protected Area
MEC	Marine Environment Classification
MLPA	*Marine Life Protection Act* (California)
MPA	Marine Protected Area*
MPPF	Marine Protection Planning Forum
MWA	Marine Wildlife Area
NGO	Non-governmental Organization
NMCA	National Marine Conservation Area†
NRSMPA	National Representative System of Marine Protected Areas
NWA	National Wildlife Area
NZBS	New Zealand Biodiversity Strategy
OSPAR	Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
POW	Program of Work
SAC	Special Area of Conservation
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCI	Site of Community Importance
SPA	Special Protection Area
WCPA	World Commission on Protected Areas

* In this document, the term “marine protected area (MPA)” is used in a generic sense and not to refer to any one specific legislative or regulatory mechanism – unless otherwise noted.

† While the Federal Marine Protected Areas Strategy applies to the ocean environment, it is recognized that Parks Canada Agency’s NMCA program also includes the Great Lakes.

SECTION 1 - Background

1.1 MPA Networks

Within the world maritime community, recognition is growing about the importance of networking marine protected areas (MPAs) as an effective means of protecting critical stages in the life cycle of migratory species. At the same time, a recognized need exists to achieve biodiversity conservation at ecologically relevant scales to ensure that ecosystem processes are preserved.

These needs have translated into the following definition of an MPA network, which is commonly used within the international MPA community:[1]

> *A collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone*.

Various definitions of an MPA network exist that emphasize the interconnectivity between individual MPAs as an effective way to fulfill ecological goals. The Government of Canada stresses the need to develop Canada's MPA networks within the context of integrated oceans management.

Planning MPA networks within a larger context of integrated management helps identify the *core areas* that need greatest protection, ensure sustainability, and create functionally connected MPA networks that are consistent with other management regimes already in place in the area (e.g., fisheries management, port and maritime transport management).

As the role and potential of MPAs and MPA networks become better understood and more sophisticated, their planning becomes increasingly more challenging. Continued expansion of existing activities (e.g., maritime transport and recreation) and the rise of new activities (e.g., offshore wind farms, wave energy fields, offshore aquaculture) in the ocean accelerate the challenge.

1.2 Canada's International Commitment to Establish MPA Networks

International calls for the creation of a global network of MPAs have existed for over 20 years. In 1988 the 17th International Union for the Conservation of Nature and Natural Resources (IUCN) General Assembly (San José, Costa Rica) adopted a recommendation that called on international bodies and all nations to establish a global representative system of MPAs to provide for the protection, restoration, wise use, understanding, and enjoyment of the marine heritage of the world in perpetuity. In 1992 delegates attending the IVth World Parks Congress (Caracas, Venezuela) adopted a recommendation that called for the establishment of a global network of MPAs. Canada was one of the first countries to commit to helping protect the world's marine biodiversity through the establishment of a national system of MPAs.

The following are some of the most important international agreements in which Canada has participated:[2]

- **United Nations General Assembly Resolution (2006),** which calls for immediate action to manage fish stocks sustainably and protect vulnerable marine ecosystems;

[1] IUCN. 2007. Establishing Networks of Marine Protected Areas: Making It Happen – a Guide for Developing National and Regional Capacity for Building MPA Networks. Non-technical summary report: http://cmsdata.iucn.org/downloads/nsmail.pdf.

[2] Adapted from Smith, J., K. Lewis and J. Laughren. 2006. A Policy and Planning Framework for Marine Protected Area Networks in Canada's Oceans. World Wildlife Fund Canada, Halifax.

- **Convention on Biological Diversity (2004),** including the Jakarta Mandate on Marine and Coastal Biological Diversity, in which a commitment was made to establish and maintain comprehensive, effectively managed, ecologically representative national and regional MPA networks by 2012;
- **IUCN–World Conservation Union World Parks Congress (2003),** in which the Durban Action Plan called on the international community to establish a global system of effectively managed, representative networks of MPAs across 20 percent to 30 percent of the world's oceans by 2012;
- **G8 Group of Nations Action Plan on the Marine Environment and Tanker Safety (2003),** in which Canada and other members of the G8 committed to establish ecological networks of MPAs in their own waters and regions by 2012, consistent with international law and based on scientific information;.
- **United Nations Convention on the Law of the Sea (2003),** under which Canada committed to conserve and manage resources under its national jurisdiction in a sustainable manner; and
- **World Summit on Sustainable Development (2002),** in which Canada committed to the Johannesburg Plan of Action that calls for the completion of a national representative MPA network by 2012.

1.3 Canada's National Commitment to Establish MPA Networks

At the national level, Canada has developed an extensive policy and legislative framework to provide national guidance and direction for ocean management, in general, and the development of MPA networks, in particular. The following are integral to that framework:

- ***Oceans Act*** **(1997)**
  The *Oceans Act* provides a framework for ocean management initiatives in Canada. Among other directives, it calls for the establishment of a national[3] system[4] of MPAs on behalf of the Government of Canada within the context of integrated management.[5]
- **Canada's Oceans Strategy (2002)**
  Canada's Oceans Strategy defines the vision, principles, and policy objectives for the future management of Canada's estuarine, coastal, and marine ecosystems. The strategy identifies three policy objectives or outcomes: (1) understanding and protecting the marine environment; (2) supporting sustainable economic opportunities; and (3) providing international leadership. It calls for a set of concrete activities, including the development of a strategy for a national MPA network.[6]
- **Canada's Oceans Action Plan (2005)**
  The Oceans Action Plan advances implementation of the *Oceans Act* and Strategy by providing a framework for coordinating and managing oceans activities to sustainably develop our oceans. The action plan rests on four interconnected pillars: (1) international leadership, sovereignty and security; (2) integrated oceans management for sustainable development; (3) health of the oceans; and (4) ocean science and technology.[7]
- **Federal Marine Protected Areas Strategy (2005)**
  The Federal MPAs Strategy was developed in response to the need for a cooperative and collaborative approach to the development of a federal MPA network in Canada (see table 1). The strategy was intended to clarify the roles and responsibilities of federal departments and agencies that have a mandate to establish MPAs, and to describe how these different but complementary programs can collectively contribute

[3] The word "national" in the *Oceans Act*, Canada's Oceans Strategy, and Canada's Oceans Action Plan refers to the federal government.
[4] The words "system" and "network" have been used interchangeably in the past, though a system is more inclusive and is often made up of networks, which are smaller in scale or scope.
[5] Government of Canada. 1997. *Oceans Act*.
[6] Government of Canada. 2002. Canada's Oceans Strategy. Our Oceans, Our Future.
[7] Government of Canada. 2005. Canada's Oceans Action Plan. For Present and Future Generations.

to a cohesive MPA network. The Federal MPAs Strategy has four objectives: (1) to establish a more systematic approach to MPA planning and establishment than has been used previously; (2) to enhance collaboration in managing and monitoring MPAs and, in doing so, create an environment of certainty for users; (3) to increase awareness, understanding, and participation of Canadians in the MPA network; and (4) to link Canada's MPA network to continental and global networks.[8]

- **Canada's Health of the Oceans plan (2007)**
  To further the goals of Canada's Oceans Strategy and Action Plan, the federal government funded a five-year Health of the Oceans plan in 2007. Under the plan, Canada committed to a number of activities, including the development of a national (federal-provincial-territorial) system of MPAs composed of at least three bioregional MPA networks to cover all three oceans, and implementation of the Federal MPAs Strategy led by Fisheries and Oceans Canada on behalf of the Government of Canada.

1.4 Establishing the National System of MPA Networks

The Federal MPAs Strategy, including the planning of a federal MPA network, is only one component of Canada's national system of MPAs. The Federal MPAs Strategy aims for greater collaboration between the three federal authorities mandated to establish MPAs, which have different but complementary legislation and program focuses for the establishment of individual MPAs (shown in table 1 below).

Table 1. Federal Agencies, Relevant Legislation, and Program Focus

Federal Mandate and Legislation	Program Focus
Fisheries and Oceans Canada (DFO) *Oceans Act* Type of MPA: Marine Protected Areas (MPAs)	To conserve and protect fish, marine mammals, and their habitats; unique areas; areas of high productivity or biological diversity
Parks Canada Agency (PCA) *Canada National Marine Conservation Areas Act* Type of MPA: National Marine Conservation Areas (NMCAs)	To conserve and protect representative examples of Canada's natural and cultural marine heritage and provide opportunities for public education and enjoyment
Environment Canada (EC) *Canada Wildlife Act* Type of MPA: Marine Wildlife Areas (MWAs); National Wildlife Areas (NWAs); Migratory Bird Sanctuaries (MBSs)	To conserve and protect habitat for a variety of wildlife, including migratory birds and species at risk

At the National MPA System level, a larger suite of organizations are involved. Canada's *Oceans Act* assigns the Minister of Fisheries and Oceans with the lead role in the development and implementation of a national system of MPAs in Canada. While the Act does not specifically address the involvement of provinces, territories, Aboriginal peoples, and others, such groups are recognized as having an important role to play.

The planning and implementation of the MPA system and bioregional networks in Canada's oceans will be undertaken collaboratively by:

- The three federal agencies with legislative authority to designate MPAs (DFO, PCA and EC);
- All provinces and territories that have or could have the authority to designate MPAs; and
- Other governmental agencies that have an interest in the establishment of MPA networks.

[8] Government of Canada. 2005. Canada's Federal Marine Protected Areas Strategy.

MPA network planning and implementation will also need to involve:

- First Nations, wildlife management boards and other Aboriginal organizations that have a strong interest in the establishment of MPA networks;
- Non-governmental stakeholders and conservation organizations; and
- International organizations that have or could have authority to recognize or designate MPAs.

1.5 Canada's Groundwork for Establishing a National System of MPA Networks

Canada has already undertaken a considerable amount of the necessary groundwork to establish a national system of MPA networks, including:

- Identification of marine ecoregions found in Canada's oceans;
- Development of a governance framework, ecological overview assessments, and conservation priorities, and identification of conservation objectives and associated indicators for five large-scale planning areas (Placentia Bay/Grand Banks, the Eastern Scotian Shelf, the Gulf of St. Lawrence, the Beaufort Sea, and the Pacific North Coast);
- Development of ecologically based criteria and guidance to identify potential *Oceans Act* MPAs (ecologically significant area, species, community properties). These criteria complement:
    - Selection criteria for MWAs, NWAs, and MBSs;
    - Identification and selection of candidate sites for NMCAs;
    - Provincial and territorial MPA selection processes;
- Experience in designating individual MPAs and situating them in large-scale planning areas; and
- Identification of key MPA network implementation considerations.

SECTION 2 - Purpose and Details of the Workshop

2.1 Purpose of workshop on establishing networks of MPAs

As discussed in section 1, Canada committed nationally and internationally to establish, by 2012, MPA networks comprising representative areas, as well as areas that protect ecologically significant habitats, species, and ecosystem components. Each of the Canadian authorities mandated to establish MPAs has different but complementary objectives for their designation (table 1). Without the necessary coordination and interaction among agencies working towards common ecological goals, there would be patchworks of individual MPAs instead of linked MPA networks, which is less effective from an ecological standpoint.

Cooperation, exchange of information, and commitment among authorities mandated to establish MPAs, as well as among relevant stakeholders, are at the heart of Canada's proposed approach.

The overall purpose of the workshop was to allow the federal, provincial, and territorial Canadian authorities and stakeholders involved in the design and implementation of MPA networks to jointly access, share, and explore the growing body of international knowledge and experience in the planning of MPA networks.

The workshop explored Canada's international commitments to establish MPA networks, the guidance that has been developed to help countries meet their international commitments, and the experiences of others in trying to act on this guidance in their own jurisdictions. The workshop was intended to create a common ground and create inspiration for what Canada's nascent national system of MPA networks might become.

2.2 Organization of the workshop

Because conservation of marine biodiversity is the primary goal of MPA networks, ecological considerations lie at the heart of designing them. Identifying what areas will be protected and what management regime various areas require will largely depend on the ecological criteria used to determine an MPA network. To get a clear idea of what these considerations encompass, the workshop was focused on identifying what ecological criteria and design processes are critical to establishing an MPA network. To achieve this objective, the workshop was organized to include the following:

- Identification and exchange of international guidance documents on MPA network design as developed by, among others, the Food and Agriculture Organization of the United Nations (FAO), the Convention on Biological Diversity (CBD), the European Union (EU), and the IUCN/World Commission on Protected Areas (WCPA);
- Identification and exchange of good practices that illustrate how MPA networks can be successfully designed and implemented. Good practices included experience in implementing MPA networks in Australia, New Zealand, California, and Germany in the context of the Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR);
- In-depth, small-group discussions on the ecological design criteria of MPA networks, derived from the IUCN/WCPA self-assessment checklist,[9] and their application to the Canadian context; and
- In-depth, small-group discussions on the lessons learned from international experience in MPA network design and implementation. Particular attention was paid to the lessons learned.

[9] IUCN/WCPA. (Day, J.C., and D.A. Laffoley). Self-assessment Checklist for Building Networks of MPAs: http://www.iucn.org/about/union/commissions/wcpa/wcpa_work/wcpa_biomes/wcpa_marine/wcpa_mpachecklist/index.cfm.

However, a range of other considerations needs to be taken into account to successfully design and implement MPA networks:[10]

- *Economic and social considerations:* MPA networks need to be integrated into the broader economic and socio-cultural setting. When implementing an MPA network, it is critical that the economic and social costs and benefits for people living in and around the MPA, or those dependent on the goods and services derived from the area, are identified and integrated in the MPA management process.
- *Spatial and temporal considerations:* The success of an MPA network is closely related to what is happening outside its boundaries. MPA networks therefore need to account for connectivity within and between networks, as well as for the impacts of activities outside network boundaries.
- *Scientific information and management considerations:* To successfully meet the objectives of an MPA network, its design and implementation depend on developing and employing appropriate scientific skills, tools, training, and partnerships.
- *Institutional and governance considerations:* Effective coordination and linkages across various agencies, governments, and jurisdictions are essential to ensure that MPA networks are sustainable over time.

Despite the focus of the workshop on ecological considerations, successful design and implementation of MPA networks needs to take these economic, social, and cultural considerations into account as well. The links between biological values and economic, social, and cultural values cannot be ignored and often play a critical role in the ultimate success and sustainability of any MPA network.

2.3 Participation

About 40 people attended the workshop, including scientists, MPA network planners, and decision makers from Canada and other parts of the world. Participants were invited on the basis of: (1) their practical experience in designing and implementing MPA networks; and (2) their involvement in establishing MPA networks in Canada.

A complete list of participants and their contact information is provided in Appendix C.

2.4 Workshop findings

Section 3 summarizes the presentations, panels, and small-group discussions relating to the current good practices guidance and reference materials that support countries in meeting their MPA network planning commitments. Section 4 summarizes what has been learned and achieved by those jurisdictions that were invited to share their respective initiatives. Section 5 presents some of the key findings from the core organizing committee.

[10] Adapted from IUCN. 2007. Establishing Networks of Marine Protected Areas: Making It Happen – a Guide for Developing National and Regional Capacity for Building MPA Networks. Non-technical summary report: http://cmsdata.iucn.org/downloads/nsmail.pdf.

SECTION 3 - Good Practices Guidance for Marine Protected Areas Network Planning

PRESENTATIONS

A growing body of guidance and reference materials is being developed to support countries in meeting their commitments with respect to MPA networks. Invited experts gave presentations on guidance tools and documentation that the IUCN/WCPA and CBD have developed. (A planned presentation on the recent guidance document from the FAO was cancelled when the presenter was unable to attend; however, the report was made available and helped inform the ensuing discussion).[11] The presentations, panels, and small-group discussions indicated that a clear consensus is now emerging on what constitutes good practice for MPA network design and planning.

3.1 Presentation Based on the IUCN/WCPA Marine Guidance

Establishing MPA Networks: Exploring Their Importance and Feasibility
Presenter: Tundi Agardy, Sound Seas, on behalf of IUCN

Agardy couched the IUCN/WCPA guidance in terms of her own reflections on the current state of marine conservation, noting the gulf between what needs to be done and what has been achieved thus far. This disconnect, she suggested, is partly a scaling problem: large-scale policy and priority setting occurs on a scale different from that of real conservation action on a local, site-based level. Small, opportunistic, vulnerable MPAs are often proving to be too little, too late. We know we have to think big, but our interventions are invariably too small to make a difference. One potentially powerful solution is the establishment of large-scale MPA networks.

Agardy made a distinction, however, between true ecologically designed *networks* of MPAs and administrative *systems* of sites. Networks offer magnified regional benefits, linkages, and economies of scale (perhaps accruing only once the full network is in place), but must be systematically and strategically designed from an ecological point of view.

These benefits may be crucial to:

- Achieving ecosystem-based fisheries management;
- Protecting threatened species, particularly those that are migratory;
- The high seas, where networks of MPAs can help to focus attention on key threats; and
- Linking MPAs effectively with coastal and upland management.

The questions of how best to design ecological networks – what species and habitats should be captured, what threats should be addressed, what role users should play, and how sites should be located – are the focus of the IUCN/WCPA guidelines.

To facilitate network establishment, the guidelines address several key aspects of building MPA networks (figure 1):

- The need for MPA networks;
- The ecological design criteria;
- Best practices for planning and implementation;
- The wider context for MPA networks; and
- Critical elements that need to be in place to "make it happen."

[11] Information on the FAO's MPA program can be found at: http://www.fao.org/fishery/mpas/en.

Figure 1. Key aspects of building MPA networks

Of particular interest to the workshop participants were the ecological design criteria, considered to be at the heart of the IUCN/WCPA framework. These criteria are:

- Representativeness, or representativity (capturing diversity);
- Replication (hedging bets);
- Viability (maintaining integrity);
- Precautionary design (moving ahead with the best available information);
- Permanence (establishing long-term protection);
- Maximum connectivity (maximizing linkages);
- Resilience (absorbing shocks); and
- Size and shape (creating effective protected area units).

Agardy asserted that MPA networks that embody these criteria and the other key elements of MPA network design described in the IUCN/WCPA guidance can overcome the aforementioned disconnect between scales, because they represent a hierarchy of priority setting. Thus large scale conservation is possible while at the same time local needs and conditions can dictate the form of management and governance in each individual MPA. This makes MPA networks a potentially important, powerful tool.

In conclusion, Agardy addressed the question of whether MPA networks are feasible. She cited increased awareness of the deterioration of the oceans and the impact of that deterioration on human well-being; gains in scientific understanding of ecological linkages at all scales; a growing number of demonstration models of MPA networks; and an increasing acceptance of ocean zoning. MPA networks are a logical starting point for ocean zoning, since they can point to the *core areas* that need greatest protection. The present need, Agardy suggested, is for guidance on the process of network design, particularly with regard to hierarchical scales and ecological linkages.

The IUCN report and accompanying material can be accessed at:
http://cmsdata.iucn.org/downloads/nsmail.pdf.

3.2 Presentation Based the CBD Guidance

Azores 2007: Update on the Development of the CBD's MPA Criteria

Presenters: Jake Rice, Fisheries and Oceans Canada, and Jeff Ardron, German Federal Agency for Nature Conservation

Rice and Ardron began by recapping the history of the CBD's involvement in MPA networks. The CBD signatories adopted the Jakarta Mandate on Marine and Coastal Biological diversity in 1995 and set out a multi-year Program of Work (POW) in 1998. Operational Objective 3.2b of this POW was "to assist in developing criteria for selection of marine and coastal protected areas."

The CBD Commitment to MPA Networks

> The establishment and maintenance – by 2010 for terrestrial areas and by 2012 for marine areas – of comprehensive, effectively managed, and ecologically representative national and regional systems of protected areas.
> *Decision VII/28, Protected areas (articles 8a to e)*
>
> Integrated networks of Marine and Coastal Protected Areas (MCPAs) consisting of: (a) MCPAs where threats are managed for the purpose of biodiversity conservation and/or sustainable use and where extractive uses may be allowed; and (b) representative MCPAs where extractive uses are excluded and other significant human pressures are removed or minimized to enable the integrity, structure, and functioning of ecosystems to be maintained or recovered.
> *Decision VII/5, Marine and coastal biological diversity (Paragraph 21)*

A series of meetings and workshops, beginning in 2004, is now nearing its conclusion following the drafting of a report by a group of experts at a meeting in the Azores in late 2007. Canada has played a leadership role in this process, including hosting a workshop in Ottawa in 2005 to provide advice on criteria for identifying and prioritizing ecologically or biologically significant areas beyond national jurisdiction. In Mexico City in January 2007, a group met to formulate guidance on the use of biogeographical classification systems. The final expert workshop, held in the Azores in October 2007, was tasked with refining and consolidating these two elements and compiling a set of scientific criteria for representative networks of MPAs, including in open ocean waters and deep-sea habitats.

The final report of the Azores expert workshop defines the objective of an MPA network as follows:

> *To maintain, protect and conserve global marine biodiversity through conservation and protection of its components in a biogeographically representative network of ecologically coherent sites. Using the best available scientific information, the precautionary approach and the ecosystem approach will be applied to help halt the losses in biodiversity.*

The site criteria for identification of ecologically and biologically sensitive areas (EBSAs) were finalized as:

- Uniqueness/rarity;
- Special importance for life history of species;
- Importance for threatened, endangered, or declining species/habitats;
- Vulnerability, fragility, sensitivity, or slow recovery;
- Biological productivity;
- Biological diversity; and

- Naturalness.

The overarching network criteria deemed critical to achieving "ecological coherence" (a term adapted from the OSPAR/Helsinki Commission network initiative) were finalized as:

- EBSAs;
- Representativity;
- Connectivity;
- Replication; and
- Adequacy/viability.

The guidance on global biogeographical classification, as developed in Mexico City, will go forward as a supplement to the Azores report. It advocates a taxonomic approach with a physiognomic approach as a validation step, that is, the use of biological information as far as possible, identifying groups of species with common distributions, supplemented by comparing biogeographical patterns to physical oceanographic features.

Finally, the Azores report suggests four initial steps to be followed in the design of MPA networks:

1. Scientific identification of an initial set of EBSAs;
2. Developing/choosing a biogeographical, habitat, and/or community classification system;
3. Drawing on steps 1 and 2 above, iteratively using qualitative and/or quantitative techniques to identify sites to include in a network; and
4. Assessing the adequacy and viability of the selected sites.

The report of the Azores expert workshop will go forward for acceptance by the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and, in turn, the ninth Conference of the Parties (COP) in Bonn, Germany, in May 2009. The presenters expressed their hope that Canada would continue to support this guidance as it moves through the final stages, and also consider the utility of the report in facilitating MPA network planning within Canadian waters.[12]

The report of the Azores expert workshop can be found at: http://www.cbd.int/doc/meetings/mar/ewsebm-01/official/ewsebm-01-02-en.doc.

3.3 Summary of Panel Discussions on Ecological Criteria (from the IUCN/WCPA checklist)

Following the plenary presentations on best practices guidance during the first day of the MPA networks workshop, participants met in three small groups to discuss the application of the ecological criteria to the challenge of establishing MPA networks in the Canadian context. The results of these three discussion groups are summarized below.

Discussion Group on Coherence and Adequacy

Most examples of practical applications of these two criteria – coherence and adequacy – were specific to individual MPAs rather than networks of MPAs. The working group tried to focus on specific characteristics that distinguished applications to MPA networks as opposed to individual MPAs. The *lack of a process* for fitting individual MPAs together into a network was pointed out as a current shortcoming. Instead, we rely on checklists of characteristics.

Much of the discussion focused on relating criteria to specific ecological objectives. How can individual parts contribute to protection of the whole while also meeting ecological objectives

[12] Since this workshop took place, the SBSTTA has met and recommended the report to the CBD COP 9. In Decision IX/20, the COP took note of the report. Decision IX/20 can be found at http://www.cbd.int/decisions/?m=COP-09&id=11663&lg=0.

such as protecting particular endangered species? Networks can provide connectivity among special areas that are important to species life histories, such as nesting areas, feeding grounds, and other key habitats that can be enhanced further by protecting migration routes. But how do we determine what is important to protect through a network? How do we determine what is required to address threats to the whole life history of marine species?

The question was raised about how much weight should be placed on coherence compared with other criteria. Several participants pointed out the problems of achieving coherence. Pushing for the whole at the beginning of the design process might jeopardize the entire process. Coherence is difficult to implement and achieve.

Participants were urged to differentiate the ideal outcome from the reality they work with and its associated limitations. While aiming for the ideal network, we need to prioritize first steps to achieve the desired outcome, as everything cannot be done at once.

Another question was raised about whether enough scientific information exists to design MPA networks in the Canadian context. Some participants suggested that the process could be accelerated by reducing the burden of data and justification required before designation, in accordance with the precautionary principle. For several places in Canada, the appropriate information is lacking, but we have to proceed with the information available at decision-making time. For any network, more information will permit better and more targeted planning and management measures

A network of MPAs was declared last year in Australia's South-east Marine Region, based on areas of suspected high value. The best available marine scientific information was used, but in reality very little was known. A precautionary approach was applied, and it may be decades before scientific information catches up with designations. There was a short-term cost to government in the form of structural adjustments (compensation to fishers), but long-term benefits are expected to outweigh short-term costs.

Some shortcuts for planning MPA networks were suggested. For example, planners may be able to move the identification process forward on the basis of regional information scientists and users know (e.g., the best known fishing grounds), including the level of certainty that can be attached to such information. Traditional knowledge and local knowledge are extremely important in the design process even when scientific information is available.

Most participants did not think that all ecological criteria have to be met to have an effective network. Coherence and connectivity should be part of the design framework but should be omitted from any "business plan" for network implementation, because coherence and connectivity will inevitably be low-scoring criteria.

MPAs were described as a doorway that, once entered, thrusts planners into ecosystem-based management. Networks can be coherent only within larger marine planning. That is, MPAs and networks cannot achieve their goals and objectives if treated as islands, because the marine environment is very interconnected and boundaries are easily crossed with the currents, which transport species and properties. We can designate MPAs haphazardly and later try to fill any gaps, or we can design networks strategically from the very beginning.

Some of the discussion focused on metrics: How can we measure coherence? Can indicator or umbrella species be used? Do we have enough ecological knowledge to identify true indicator species? In Australia, indicator species have been used to evaluate the effectiveness of MPAs, but most participants thought we had a long way to go in actually measuring the coherence of networks, even if this criterion could be better defined.

The discussion on adequacy began with questions about whether the term was being used to refer to the adequacy of individual MPA sites or of the entire network. Several participants suggested that adequacy applied to single sites; network adequacy should be evaluated as coherence.

Adequacy at the site level includes issues of size and shape. However, adequacy is also related to coherence and connectivity. These criteria are difficult to separate. Coherence should be seen as the overarching "umbrella." At the network level, adequacy relates to achieving the ecological objectives of the network.

That said, the adequacy of a network is difficult to measure in reality. The network should be up and running before attempts are made to measure its adequacy. We should be realistic about when benefits will be realized, and not raise expectations in the short term. In addition, as a general rule, a small number of large MPAs is better than a large number of small ones.

The point was raised that adequacy of management is another dimension. On an ecological level, adequacy concerns whether the network captures conservation values. On a management level, straight lines, simple features, simple shapes, and simple boundaries are important in MPA design, compliance, and enforcement.

Discussion Group on Selection: Representativeness, Replication, and Ecological Significance

Most of the group discussion focused on issues related to representativeness (or representativity) and replication. Representativity is captured in a network when it consists of areas representing the different biogeographical subdivisions that reasonably reflect the full range of ecosystems, including the biotic and habitat diversity of the marine region. Representativity depends on scale and on large-scale oceanographic processes that lend particular characteristics to a region.

In Canada, agencies working with different frameworks use separate legislation in establishing MPAs. The challenge is to bring all these efforts together and make planning of MPAs collaborative, transparent, and comprehensive.

Australia has a federal framework with 41 marine bioregions. The Australian provinces eachl have their own meso-scale regions and provincial planning frameworks.

Replication of ecological features means that more than one site will contain examples of a particular feature in the given biogeographical area. The term "features" means species, habitats, and ecological processes that naturally occur in the given biogeographical area. Replication refers to protecting two or more sites that have similar characteristics but that are spatially separate and isolated from each another. The objective is to not put the same sites at risk at the same time (i.e., the replicate sites should not be simultaneously at risk from the same pressure or stressor).

The working group expressed some confusion about the need for replication of all features. The group concluded that replication is probably necessary only for representative MPAs. For example, Australia has replication of MPAs within its regions. In the Canadian context, it would be desirable to protect two examples of features such as hydrothermal vents or submarine canyons.

New Zealand uses information on representative features where available, but also uses expert opinion and local knowledge to determine ecologically important areas.

Australia uses scientific information to prepare regional profiles and workshops to characterize the marine region on the basis of available information. Workshops are also used

to identify conservation values (e.g., threatened species, key ecological features, areas of high productivity). Australia uses an interdepartmental process at the federal level to gather best available information.

Canada has identified EBSAs within the five priority large ocean management areas (LOMAs). Additional workshops are planned to fine-tune this process. For generic integrated management approaches for specified management units, a four-step process is envisaged. Step 1 would be an integrated ecological assessment to apply EBSA criteria and identify critical areas. Step 2 would be a species assessment to determine the role that individual species play in the ecosystem. Step 3 would identify degraded areas, and Step 4, depleted species. The four lists these steps would generate would be the starting point for identifying MPAs.

How can different Canadian approaches to identifying bioregions be better integrated? While most of the panelists did not see this issue as important, a strong minority suggested that sharing a common approach is critical. Having all governmental agencies agree on bioregional units as a starting point would facilitate consultation with industry and other interested parties.

The group also concluded that the IUCN/WCPA checklist was not easily interpreted and needs clarification.

Discussion Group on Sound Planning: Sound Ecological Objectives, Information Management, and Precautionary Design

How much information is enough for moving forward? In many places, authorities have neither the time nor resources needed for large efforts to gather information. The discussion focused on using the best information available to put MPA sites and networks into place. The need for additional information may be clearer after initial implementation and better information can be added at a later time. This principle is consistent with the adaptive management approach.

Several participants stated that socio-economic information is particularly problematic; legislative or legal constraints often limit its collection. In comparison to socio-economic data, ecological data are relatively easy to collect and interpret. Ecological data are objective; socio-economic data and their translation into socio-economic objectives are matters of social choice. Socio-economic objectives are much more difficult to specify than ecological ones and are heavily dependent on process.

Who sets the standard for what information is enough? The amount of information needed often depends on the sense of urgency to establish MPA networks. California uses the “best readily available information” and does not have to develop new science in order to act. The state employs an adaptive management approach, including review time frames (every three years). California’s *Marine Life Protection Act* (MLPA) initiative has a dedicated scientific advisory team that informs the MPA design process. In California, the bar for best science for MPAs is much higher than that for fishery management. Canadian legislation generally directs the country to take action, so waiting for better science may not be possible.

Scale was highlighted as being a key determinant of the information needed to set sound ecological objectives. Setting clear and measurable objectives is easier in small-scale areas, such as bays and estuaries, than in large marine areas.

Combining science-based information and consultation with local users to gain traditional knowledge was emphasized as a good way to start. Presentations to communities should be

made by local residents if possible. The collection of local traditional knowledge in the western Arctic and California were pointed out as examples of good practice.

Everyone agreed on the need for clearly defined objectives, especially in Canada. Ecological objectives cannot be determined retrospectively. On the West Coast of Canada, provincial and federal agencies have agreed on high-level objectives as a starting point.

California's MLPA sets out broad goals and then fleshes out specific, scientifically measurable objectives, an approach that in the end leads to the creation of a more defensible system of MPAs than those systems without clear objectives. For example, setting aside 20 percent of marine areas as no-take reserves has been an agreed upon goal in recent years.

Politicians like concrete results. Historically, MPAs have been developed on an ad hoc basis and establishing an MPA has been enough, but now the situation is changing. Politicians today are asking about the outcome and effectiveness of the MPA in meeting its conservation objectives. The ability to show concrete results is a reason for having clearly defined objectives.

Clearly defined, measurable objectives are not reached in the short term. In many ecosystems, achieving anticipated ecological benefits will take a long time.

Finally, an MPA network should be one of the outcomes of integrated management. Several participants pointed out, however, that given the pace at which integrated management is being implemented in Canada, having integrated management in place should not be a prerequisite for the creation of an MPA network.

The group discussion ended on the topic of precautionary design, of which integrated management is one element. Scientifically, precaution can be built in to design by increasing the number of MPAs. Replication is a key consideration.

3.4 Summary of the Panel Discussion Following Small Group Discussions

A summary panel discussion followed the three small-group discussions. The first summary focused on the adequacy, size and shape, resilience, and coherence of MPA networks, as well as individual MPA sites. "Adequacy" is a difficult design criterion, easier to measure at the individual site level than at the network level. Network adequacy cannot be measured until the network is up and running. In the establishment of the Great Barrier Reef Marine Park (GBRMP), definitions of adequacy and comprehensiveness evolved over time. The Representative Areas Program was the first to zone the whole park, including non-coral habitats, as a unit. The GBRMP is rich in data compared with other areas in Australia. Despite this, zoning to protect representative areas across the whole park took lots of time and hard work. At the beginning of the planning process, we should aim for a good "skeleton," as an optimal network is a long-term goal.

In other bioregions of Australia, adequacy (of MPA boundaries) was opportunistic. Adequacy is difficult to define when implementing MPAs. In New Zealand, the decision was made to focus on representativeness and comprehensiveness, instead of adequacy, as key driving principles. Size and spacing as design criteria were also considered within the bioregions of New Zealand but have proven difficult to implement. It was pointed out that "big is beautiful" when it comes to MPAs. A small number of large MPAs is generally preferable to a large number of small MPAs. Large MPAs can reduce edge effects, the influence of external impacts, and uncertainty in design, and can increase the ease of management.

In the Canadian context, it is important that departments and ministries with different responsibilities for MPAs get together to develop a shared approach to MPA networks. An

integrated planning process should be more effective than the random combination of individual planning processes.

The size and shape of MPAs is important. Simple shapes, using existing boundaries where possible, are preferable. Straight-line boundaries promote public understanding, compliance, enforcement, and management. The complexity of the shapes of some of the marine reserves within the GBRMP was questioned, because their boundaries may make enforcement difficult.

The public consultation process must remain flexible and allow for changes in the shape and size of MPAs. Conservation objectives must always be kept in mind, however. The final proposal for marine reserves in the GBRMP was radically different from the original proposal. Nevertheless, the GBRMP was fairly successful in meeting the biophysical operating principles. In California's Channel Islands National Marine Sanctuary, on the other hand, protection of important features could have been 10 percent to 30 percent better than that achieved. Too much negotiation about the shape and size of sites tends to decrease overall efficiency in protecting the optimal ecological network. During negotiations about alternative sizes and shapes, scientists should check the alternative proposals to determine whether they would meet the conservation goals.

The discussion then moved to coherence as a criterion of network design. Many participants were not familiar with this concept, so they were hesitant to talk about ecological coherence and its value. Examining the overall coherence of an MPA network logically leads back to the selection of individual sites. Connectivity is often the first thing that comes to mind when considering coherence, but coherence is not only connectivity. Connectivity should cover the important life history areas for individual species, but in marine ecosystems thousands of species are involved, making connectivity complicated to define, measure, and assess.

The discussion then turned to indicators – indicator species or umbrella species. One way to achieve efficiency and economy of scale would be to look at meta-indicators, such as groups of birds. However, taking such a large-scale approach sometimes makes management difficult, for either a single large MPA or an MPA network.

The question was raised whether DFO can designate MPAs first and then develop management plans later, as has been done in Germany. The consensus was that this would not be possible. The identification of EBSAs, however, was considered to be a good first step in facilitating MPA planning and designation.

The importance of gathering local knowledge to fill gaps in scientific information was mentioned. The Dogger Bank in the North Sea was cited as an example. The United Kingdom is still trying to determine whether it really is a bank, even though fishers have been calling it a bank for three hundred years!

The benefits of ecological coherence may take a long time to emerge – the times scale may be decades or at least several generations for some species. Coherence benefits will grow as the network grows. When dealing with decision makers and the public, we must be realistic about the long time frame.

The lack of a fully developed planning process should not be an excuse for no action. We should take some action and remain flexible. Inevitably, our course will change as the process evolves.

A question was raised about targets for MPA networks. For example, New Zealand has defined a 10 percent target in its biodiversity strategy. This target provides a basis for determining progress; the target is now being reviewed and may be redefined. Australia does

not have a numerical target for determining the adequacy of its MPA network, despite the fact that conservation non-governmental organizations (NGOs) persistently ask what the conservation targets are. Setting targets that are too small might result in missed opportunities for the designation of large MPAs. For example, in Australia bioregional planners were considering the designation of about 50 percent of the Coral Sea as an MPA. Even though eventual designation of such a large area was unlikely, having a designation target of only 10 percent or 20 percent of the area would have been a constraint.

The advice of the scientific advisors in California was to have a minimum target of 30 percent and a precautionary target of 50 percent. Stakeholder discussions, however, tended to focus on percentages and not on where the MPAs should or should not be. Current scientific advice has focused on minimum size (range), shoreline length, and minimum and maximum spacing between MPAs. In Europe, the approach varies from country of country. Natura 2000 suggested protection of 20 percent to 60 percent of important habitats.

With respect to representativeness, replication, and ecological significance, the key issue was at what scale should they be determined and applied – the ecoregion scale or a small scale? Unique features and hot spots can be used to determine the ecological significance of an area. New Zealand seeks one example of each feature in a marine reserve; it also seeks representativeness within each of its bioregions. The suggestion was made that Parks Canada Agency focus on representativeness and other agencies focus on unique features, according to their mandates.

Replication of habitats or features within reserves is critical to insuring against catastrophic events or the negative results of making bad decisions. Spatial separation is also critical: replicates should not occur within the same feature, for example, a current or an upwelling area. Replication is particularly important and applicable to representative features; it does not necessarily apply to unique features that are specifically selected for their uniqueness.

When determining ecological significance (e.g., identifying uniqueness and hot spots), we should use a combination of scientific information and expert knowledge, including local knowledge. The question was raised whether EBSAs can be used as a first step in identifying uniqueness and hot spots, but dealing only with areas that meet EBSA criteria would leave representativity unaddressed.

With respect to regions and replication, it is important first to understand the scale at which replication should occur. If there are 29 regions, should replication occur within regions or among them? Are the regions biologically different? Are habitats the same? In defining habitats for replication, we must look beyond physical habitats and include oceanography, temperature, and other features. Replicating different features will require different levels of replication, based on the variability of each feature. A feature that is a “catchall category” will require more replicates, especially if it is a large one. More specific features will require fewer replicates.

Canada’s three federal authorities mandated to establish MPAs have different marine regional frameworks with varying purposes. How can we plan within a context of different regional frameworks? How can they be aligned? For simple reasons of governance, these frameworks might remain unchanged, but these authorities would do well to take one another’s frameworks into consideration. Participants also pointed out that even given the differences in the frameworks they share some common ground. It was noted, however, that the PCA framework, unlike those of EC and DFO, includes the Great Lakes as well as Canada’s oceans, and requires that Parks Canada Agency MPAs touch a coast to be available for public use and enjoyment.

Issues related to scientific information, integrated management, clear objectives, and precautionary design were addressed at the workshop, particularly with respect to their application in Canada. Good science will always be necessary. How should we present science to lay people, to constituents, to stakeholders? How can we obtain local and traditional knowledge? An explicit adaptive management process can gather information and form the basis for using new knowledge. We should move forward in areas for which we have extensive data, but lack of information is not a reason to do nothing or stop our efforts.

In Canada, many agencies have authority to designate MPAs. The discussion emphasized the importance of having an integrated management framework that takes into account national, provincial, and local interests. The New Brunswick Committee on Integrated Management looks at actions that could protect resources beyond MPAs. Moving a shipping lane, for example, could achieve multiple goals.

It is difficult for one agency to cover all threats to MPAs or MPA networks. Integrated management can deal with different threats, including protection from land-based threats.

Having clear objectives can facilitate political will to establish MPA networks. Politicians like clear objectives, not statements of lofty goals. Designating MPAs for which objectives are poorly defined may constrain the establishment of new MPAs. In establishing MPA networks, we must ensure that they have clearly defined and achievable objectives.

SECTION 4 - International Experiences in Marine Protected Areas Network Planning

PRESENTATIONS

Much has been learned in the past several years by those jurisdictions that have taken action to implement MPA networks, fulfill their CBD commitments, and slow the loss of biodiversity. Representatives from four such jurisdictions – New Zealand, Australia, Germany, and California –shared lessons learned in their respective initiatives. The presenters focused their contributions on ecological design criteria, but inevitably conveyed much contextual information about the factors affecting the success of the planning process. Each presenter also participated in small-group discussions about the relevance of each case study to the Canadian situation. The first part of section 4 provides a summary of each case study, based on the presentations given at the workshop. The second part of the section summarizes key points from the small-group and plenary discussions.

4.1 Presentation on New Zealand's MPA Policy and Implementation Plan

New Zealand's Marine Protected Areas Policy and Implementation Plan
Presenter: Simon Banks, New Zealand Department of Conservation

1. Policy Framework and Objectives

In 2006, the New Zealand government released its Marine Protected Areas Policy and Implementation Plan (MPA Policy). A key objective of the MPA Policy is "to protect marine biodiversity by establishing a network of MPAs that is comprehensive and representative of New Zealand's marine habitats and ecosystems."[13] The MPA Policy is intended to address the objectives and actions of the New Zealand Biodiversity Strategy (NZBS)[14] and to guide the development of a comprehensive MPA network, using a number of marine management tools.

Key objectives of the NZBS, released in 2000, include:[15]

- *A 2020 outcome:* A full range of marine habitats and ecosystems representative of New Zealand's indigenous marine biodiversity is to be protected.
- *A 10 percent target by 2010:* A target of 10 percent of New Zealand's marine environment is set to be achieved by 2010, with a view to establishing a network of representative MPAs.

Banks presented on four main components of the MPA Policy:

- A consistent approach to *classification* of marine habitats and ecosystems;
- Mechanisms to coordinate a range of management tools – a *protection standard* and planning process for nearshore and offshore;
- An *inventory* to identify areas where MPAs are required; and
- A nationally consistent basis for planning and establishing new MPAs – *community-based forums*.

2. Principles for MPA Network Design and Planning

New Zealand's MPA network design and planning are based on a set of key principles.

MPA network design principles:

- Protect examples of the full range of natural marine habitats and ecosystems;

[13] Department of Conservation and Ministry of Fisheries. 2005. Marine Protected Areas Policy and Implementation Plan. Wellington, New Zealand.
[14] New Zealand Biodiversity Strategy: http://www.biodiversity.govt.nz/picture/doing/nzbs/index.html.
[15] Department of Conservation and Ministry of Fisheries. 2005. Marine Protected Areas Policy and Implementation Plan. Wellington, New Zealand.

- Designate sites on the basis of a consistent approach to classification of habitats and ecosystems;
- Ensure that the network is viable;
- Set national priorities for additions to the MPA network and review them annually;
- Undertake an evaluation program; and
- Undertake a monitoring program.

MPA network planning principles:

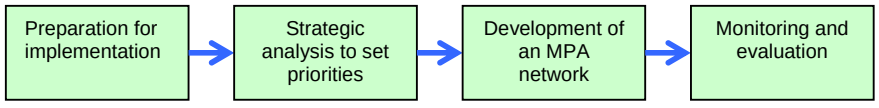
- Designate each site on the basis of its contribution to representation and consistency with the design principles;
- Ensure that management meets the protection standard;
- Provide for the special relationship between the Crown and the Maori, including treaty obligations and customary use;
- Ensure that the establishment of the MPA network is transparent, participatory, and timely;
- Minimize adverse impacts on users;
- Ensure that management tools provide long-term protection;
- Use the best available information in decision making;
- Use the precautionary approach in guiding management actions;
- Ensure that the management regime is enforceable; and
- Plan research effectively and in a coordinated manner.

3. Process for Developing an MPA Network

The process of planning and developing New Zealand's MPA network comprises four main stages (figure 2):

1. *Preparation for implementation:* Development of a consistent habitat classification approach, a protection standard, and a map of existing managed areas;
2. *Strategic analysis to set priorities:* Development of an MPA inventory and gap analysis, and prioritization of habitats and ecosystems for new MPAs;
3. *Development of an MPA network:* Identification of new MPAs on the basis of the priorities identified in stage 2 (through separate processes in near shore and offshore areas); and
4. *Monitoring and evaluation:* Measuring progress toward achieving the MPA network policy objective, and establishing new priorities for future implementation of MPAs.

Figure 2. Four main stages in developing an MPA network



The key aspects of this design process – the approach to classification and the development of the protection standard – are described below in more detail.

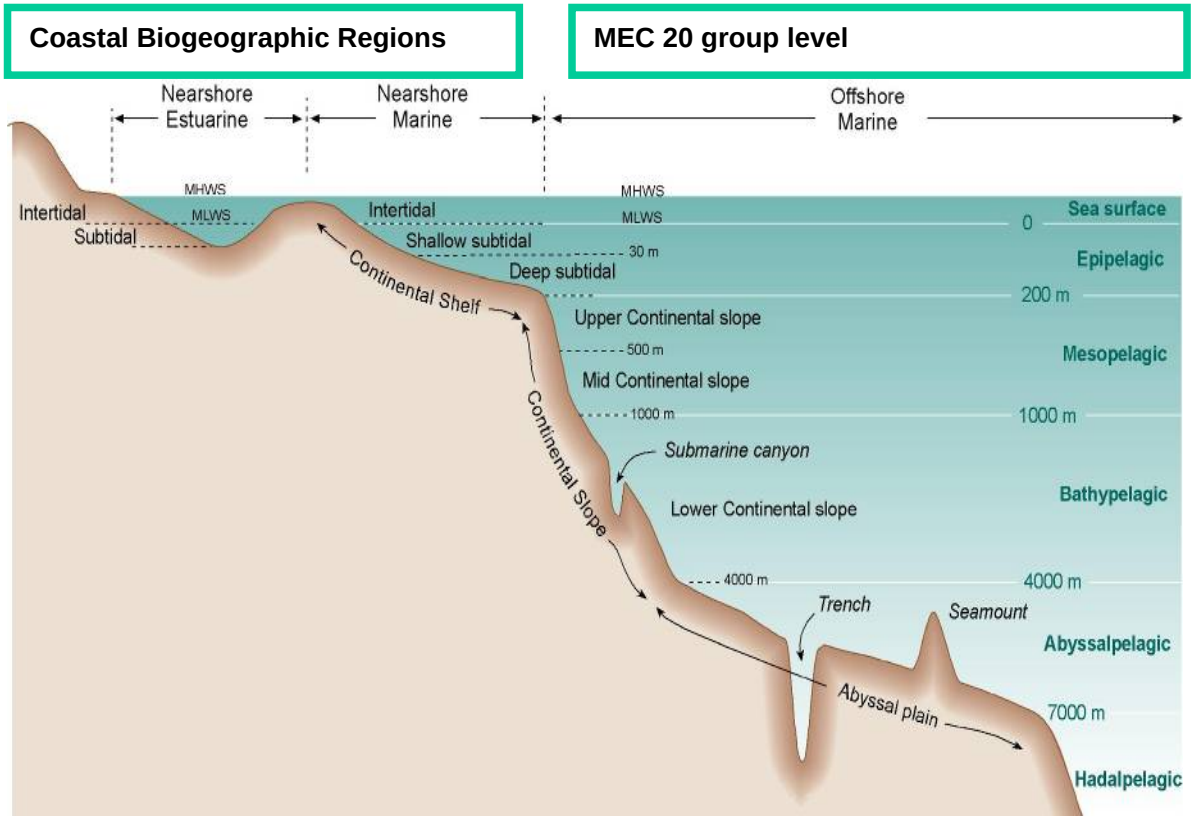
Development of a consistent approach to the classification of New Zealand's near shore and offshore habitats and ecosystems is based on the following main features (figure 3):[16]

- *Coastal and deepwater classification*: A different classification system is made for coastal and deepwater areas.

[16] Department of Conservation. 2008. Marine Protected Areas: Classification, Protection Standard and Implementation Guidelines. New Zealand.

- *Hierarchical structure*: The classification is based on a broad hierarchical structure and follows a progressive scale from large spatial units in the upper levels of the hierarchy (e.g., biogeographical regions and marine ecosystem classification classes) to smaller units in the lower levels (e.g., habitats and ecosystems).
- *Three-dimensional structure:* The classification system is three-dimensional, taking into account surface, water column, and benthic features.

Figure 3. Depth zones of New Zealand's Coastal and Deepwater Marine Environment Classifications[17]

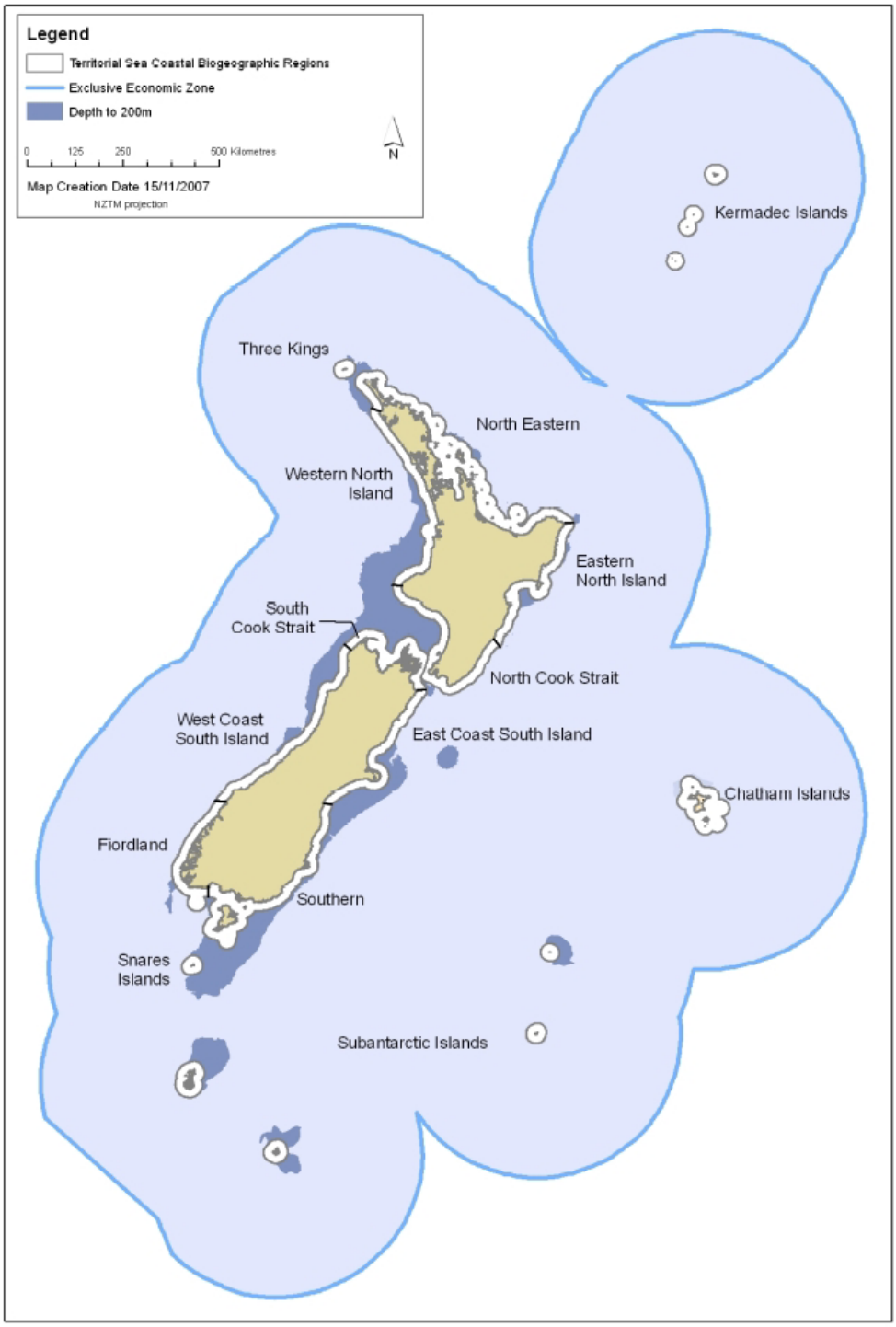


Implementation of the coastal classification system (< 200 metres [m] depth) has been guided at two spatial scales:

- *Biogeographical regions* defined at the meso scale (100s to 1000s of kilometres [km]): Thirteen coastal biogeographical regions have been identified on the basis of the premise that similar physical habitats and ecosystems, if separated by enough space (100s to 1000s of km), will contain different biological communities due to a combination of broad-scale factors, including oceanography, current dynamics, large-scale latitudinal gradients, climate, or barriers to dispersal (figure 4).
- *Habitats and ecosystems* defined at the micro scale (100s to 1000s of m): Nested within the 13 biogeographical regions, the hierarchical classification scheme is divided into two major environment types, estuarine environments and marine environments. This division is based on the premise that depth, substrate, and exposure (wave action, tidal action, and currents) are the main environmental factors that influence community structure.

[17] In figure 4.2, the abbreviations "MHWS" and "MLWS" stand for "mean high water surface" and "mean low water surface," respectively.

Figure 4. New Zealand's coastal biogeographical regions



Implementation of the deepwater marine classification (> 200 m depth) has been guided by the following spatial scales:

- Broad-scale variation at the meso-scale (100s to 1000s of km).
- Habitats and ecosystems at the local scale (10s to 100s of km). A Marine Environment Classification (MEC) with 20 class levels has been developed as a primary tool for classification in the deepwater marine environment. The MEC uses predominantly physical variables (e.g., depth, sea surface temperature, seabed slope, annual solar radiation) to create proxies for marine environments and groups them into broadly similar areas, referred to as "environmental classes" (figures 5 and 6).

Figure 5. New Zealand's Coastal Marine Environment Classification (< 200 m depth) – example habitat types

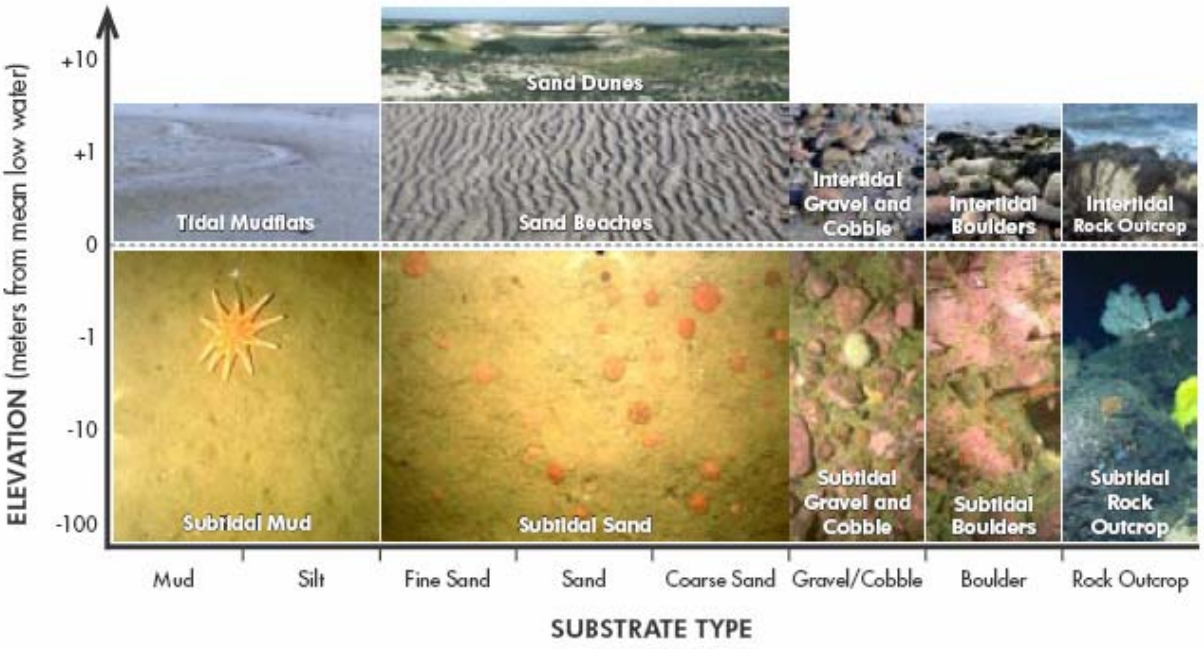
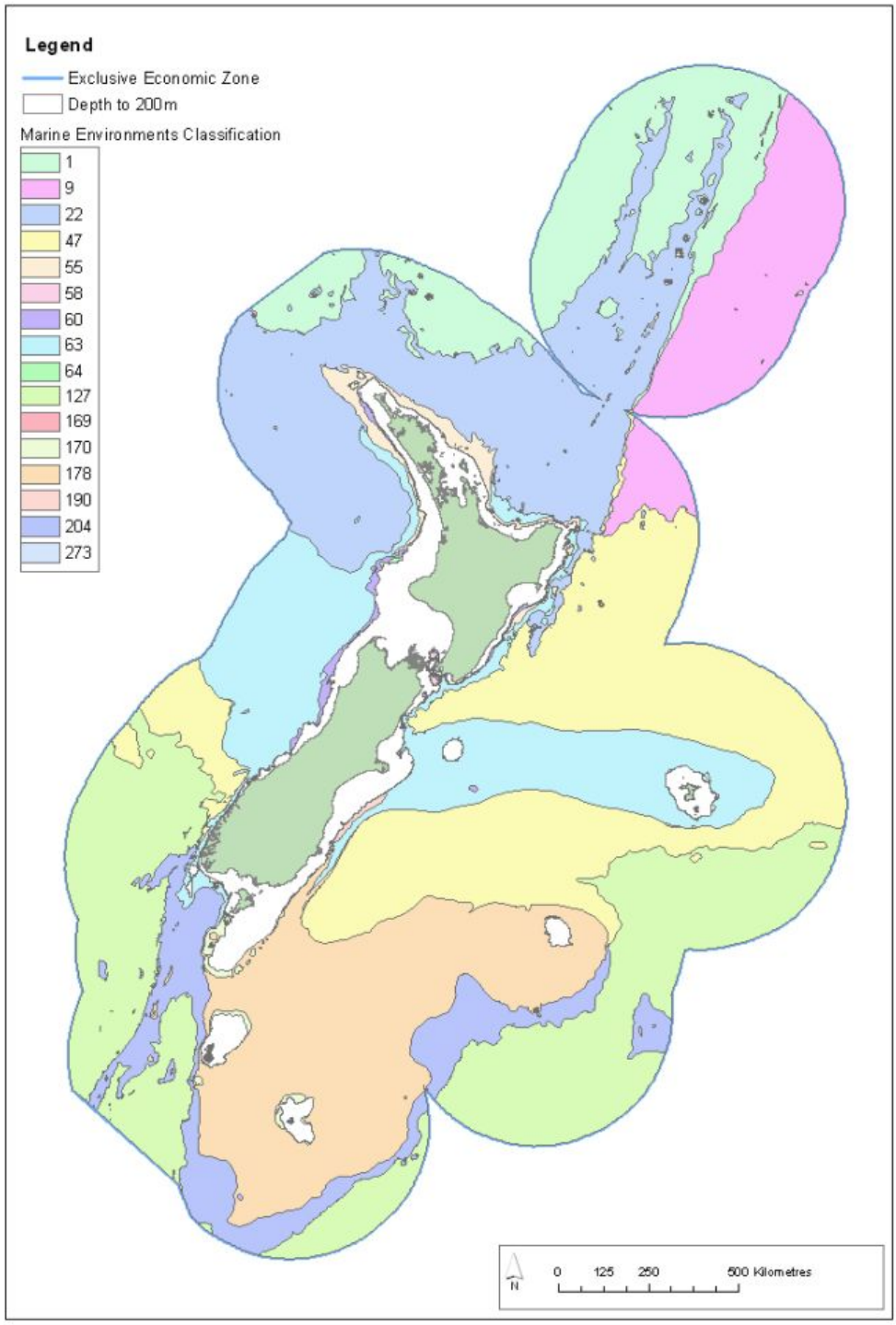


Figure 6. New Zealand's Deepwater Marine Environment Classification (> 200 m depth)



The setting of a suitable protection standard is also to be undertaken in stage 1. These are the key elements of the protection standard:

- Maintenance and recovery at the site of the physical feature and biogenic structures that support biodiversity;
- Maintenance and recovery at the site of ecological systems, natural species, composition (including all life history stages), and trophic linkages; and
- Potential for the biodiversity to adapt and recover in response to perturbation.

In theory, and ideally, information about the following is needed to inform decisions on these elements:

- How the marine habitats and ecosystems in need of protection function;
- Current and foreseeable human uses of the site; and
- The level of biological and physical disturbance that would result in not meeting the biodiversity outcome, and hence breach the protection standard.

In practice, however, understanding of marine habitats and ecosystem processes is limited, as is information on current uses and their effects on biodiversity. This means that, in exercising judgment, the best available information and a precautionary approach will be applied. Minimizing impacts on existing users of the environment when selecting areas for MPAs is a key principle.

Marine reserves will provide the highest level of protection, complemented by a range of MPAs that will include sustainable use. An additional level of protection will focus on benthic protection in particular.

Planning and implementation of the network

While coastal network planning has begun (within 12 nautical miles), the decision was made to defer offshore MPA network planning until 2013, as a result of a Benthic Protection Area proposal that industry put to the New Zealand government.

Coastal Marine Protection Planning Forums (MPPFs) have been established to provide recommendations on areas for protection to the ministers. All members of an MPPF have collective responsibility for its decisions and equal status in discussions. The Minister of the Department of Conservation will appoint a chair or facilitator, agencies will support and facilitate the process, and a range of stakeholders will participate in regional forums of approximately 14 members. These forums will make recommendations on sites for ministers' consideration and for advancement through statutory processes, including other forms of consultation. The forums will be empowered to make decisions, and will be charged with and focus on the establishment of an MPA network.

4. Key Considerations and Lessons Learned

These general lessons were learned in New Zealand:

- Planning and developing an MPA network should involve a range of central and local government agencies and marine users, indigenous people, and people with interest in the marine environment.
- MPA planning should be guided by the best information available and should not be delayed until perfect data are available.
- When implementing New Zealand's MPA Policy, the primary consideration should be achieving its purpose and objective, that is, a comprehensive and representative MPA network.

The following considerations relate specifically to the coastal and deepwater classification:

- The hierarchical, bioregional approach facilitates both planning at the regional scale and reporting at the national scale.
- The number and level of categories have been problematic. Some stakeholders prefer a smaller number of features (on the understanding that this would lead to fewer MPAs), while scientists may advise finer distinctions and more classes. The "splitting versus lumping" argument persists, but additional information about the values of recommended areas within the classes will be helpful.
- Taking a physical proxy approach may not be considered ideal, but that approach has been a pragmatic way to move forward in New Zealand by measuring and reporting on progress toward representativity. Biological data are being used as an important piece of supplementary information to assist in selection of the best representative sites.
- Recognition of pelagic habitats is not consistent with the powers the NZ *Fisheries Act* provides and restricts the ability to achieve pelagic representation.

These considerations relate to the protection standard:

- Establishing a clear threshold for the protection standard proved impossible, so a proxy approach was required.
- The establishment of the MPPFs and their role required retrofitting of the legislation. Alignment between the legislation and the policy is still a challenge.

These considerations relate to the implementation process:

- The 10 percent by 2010 target has been contentious, but it is helpful to keep in mind that the longer term goal is for a comprehensive system, which does not proscribe a specific target. Also, 10 percent of the marine environment can be more clearly communicated to stakeholders by specifying the design goal of 10 percent of each biogeographical region, which must include representative examples within marine reserves.
- The forums approach has presented challenges with regard to these issues:
  - Ensuring that ministers are not seen to be making predetermined decisions on issues;
  - Ensuring balance within each forum, and a good range of extractive interests and adequate representation of stakeholder and interest groups, including the diversity of fishing interests; and
  - Achieving consensus.

Questions and Discussion

A question was asked about the role of, relationship with, and obligations toward the Maori. Under the *Conservation Act*, the Department of Conservation has an obligation to the Maori, and this will be addressed in part by consultation and participation in the MPPFs. As well, separate dialogues will be held as required to consider information pertaining to territorial customary right over areas. Ongoing processes within government are dealing with these rights.

This initiative should complement and form part of the ocean zoning approach included within a previous New Zealand Ministry of Environment–led Oceans Policy. The Oceans Policy will be a tool to help fill the gaps in the offshore areas of New Zealand's exclusive economic zone (EEZ).

A question was asked about the status of the fishing industry proposal on no-trawl areas. This proposal on Benthic Protection Areas suggested closing about 31 percent of the EEZ to habitat-affecting fishing activities (trawling and dredging). These regulations under the *Fisheries Act* were implemented in November 2007. While these Benthic Protection Areas provide an element of habitat protection, they do not address other activities such as mid-

water trawling. The industry designed the proposal to be representative in relation to the MEC, but other factors need to be addressed on an ongoing basis, such as protection of representative areas in the water column. It was subsequently pointed out that these various offshore marine areas were scientifically contentious and raised concern about how such outside-of-the-process initiatives would affect MPA network planning. The delay to 2013 of offshore MPA planning is one example, and at that point it will be necessary to re-evaluate the degree to which those areas achieve representation. There is an expectation that these areas are a start, but work remains to be done, and it is hoped that marine reserves will encompass some of these areas and even add to them. Similar trawl-exclusion areas have been established in California, and the effective change was negligible – industry proposals were based on areas that had never been trawled. It was confirmed that the California approach was essentially the same as that used in New Zealand.

Questions were asked about budget and about land-based activities. When New Zealand's MPA Policy was endorsed, a small funding package was provided, but the Department of Conservation did not receive any additional funding. This has led to an approach of doing planning in four bioregions at a time, which is a limiting factor. The Ministry of Fisheries received some additional funding to assist with implementation. The department and the ministry will be providing the MPPFs with information to consider with regard to placement of marine reserves in relation to land-based activities, such as pollution sources or existing adjacent protection. The onus is also shifting to local authorities to manage their impacts on the coastal environment and in particular on marine reserves.

A question was asked about stakeholder balance on the MPPFs. The approach is to ensure that the MPPFs adequately consider extractive uses. Information about such uses is being gathered to ensure that the best decisions are being made to prevent affecting those uses, which may be seen as compromising the goal of conservation.

A question was asked about the practicalities of working in large bioregions. The North Eastern Region, for example, is so large that it is too costly and impractical to require stakeholders and officials to travel regularly within it.

Key Documents

For further information on the development of an MPA network in New Zealand, see the following:

- Workshop presentation by Simon Banks: http://www.wwf.ca/MPAWorkshop/; and
- Department of Conservation and Ministry of Fisheries. *Marine Protected Areas Policy and Implementation Plan,* and *Marine Protected Areas: Classification, Protection Standard and Implementation Guidelines*: http://www.biodiversity.govt.nz/seas/biodiversity/protected/mpa_policy.html.

4.2 Presentation on Establishing an MPA Network in Australia

Establishing an MPA Network in Australia
Presenters: Zoë Cozens and Robert McKelleher, Australian Department of Environment, Water, Heritage and the Arts

1. Policy Framework and Objectives

A key part of Australia's conservation strategy is to develop a National Representative System of Marine Protected Areas (NRSMPA) by 2012. The primary goal of the NRSMPA is "to establish and manage a comprehensive, adequate and representative system of MPAs that will contribute to the long-term ecological viability of marine and estuarine systems, maintain

ecological processes and systems and protect Australia's biological diversity at all levels."[18] This means the following:

- Each distinct bioregion in Australia will be represented in an MPA network.
- The design of the MPA network should be sufficient to achieve the conservation of all major ecosystem functions and features.
- The MPA network should properly represent the identified habitats and biotic characteristics of each bioregion.

The NRSMPA forms part of an integrated strategy for marine conservation and management and consists of MPAs in commonwealth, state, and territorial waters and some associated intertidal areas.

2. Principles for MPA Network Design and Planning

The development of the NRSMPA is based on the following principles[19]:

- *Comprehensiveness:* The NRSMPA will include the full range of ecosystems recognized at an appropriate scale within and across each bioregion.
- *Adequacy:* The NRSMPA will have the required level of reservation to ensure the ecological viability and integrity of populations, species, and communities.
- *Representativeness:* Those marine areas that are selected for inclusion in MPAs should reasonably reflect the biotic diversity of the marine ecosystems from which they derive.
- *Highly protected areas:* The NRSMPA will aim to include some highly protected areas (IUCN Categories I and II) in each bioregion.
- *Precautionary principle:* The absence of scientific certainty will not be a reason for postponing measures to establish MPAs to protect representative ecosystems.
- *Consultation:* The process of identification and selection of MPAs will include effective and high-quality public consultation with appropriate community and interest groups, to address current and future social, economic, and cultural issues.
- *Indigenous involvement:* The interests of Australia's indigenous people should be recognized and incorporated in decision making.
- *Decision making:* The decision-making processes should effectively integrate both long-term and short-term environmental, economic, social, and equity considerations.

Where different options that meet the goals exist, the following *selection principles* should be considered in selecting suitable areas for inclusion in the NRSMPA:[20]

- The capacity of an MPA to mitigate identified threats to conservation values;
- The occurrence of spatially defined habitats for and/or aggregations of threatened and/or migratory species;
- The occurrence of ecologically important pelagic features that have a consistent and definable spatial distribution;
- The occurrence of small-scale (10s of km) ecosystems associated with the benthic/demersal environment;
- Relevant available information about small-scale distribution of sediment types and sizes and other geo-oceanographic variables;
- The occurrence of listed heritage sites (where inclusion in the MPA network would improve administration of protection regime); and
- The minimization of socio-economic costs.

[18] ANZECC TFMPA. 1998. Guidelines for Establishing the National Representative System of Marine Protected Areas. Australian and New Zealand Environment and Conservation Council, Task Force on Marine Protected Areas. Environment Australia. Canberra.
[19] Adapted from ANZECC TFMPA. 1998. Guidelines for Establishing the National Representative System of Marine Protected Areas. Australian and New Zealand Environment and Conservation Council, Task Force on Marine Protected Areas. Environment Australia. Canberra.
[20] Australian Government. Department of the Environment and Water Resources. 2007. The South-west Marine Bioregional Plan Bioregional Profile. Australia.

Once the broad location of MPAs has been determined, the following *design principles* should be applied to further refine the size and shape of individual MPAs:

- Individual areas should, as far as practicable, include continuous depth transects (e.g., from the shelf to the abyss).
- Whole seafloor (geomorphic) features should be included.
- Features should be replicated (i.e., included more than once) wherever possible within the system of MPAs.
- Size and shape should be orientated to account for inclusion of connectivity corridors and biological dispersal patterns within and across MPAs.
- Boundary lines should be simple, as much as possible following straight latitudinal/longitudinal lines.
- Boundary lines should be easily identifiable where possible and coincide with existing regulatory boundaries.
- The size and shape of each area should be set to minimize socio-economic costs.

3. Process for Developing an MPA Network

A marine bioregional plan is used as a platform for the development of an MPA network. Areas suitable for inclusion in Australia's NRSMPA are identified during the marine bioregional planning process.

A marine bioregional plan has been or will be developed for each of Australia's five marine regions (figure 7).

The marine bioregional plan:

- Identifies the final regional MPA network, including its boundaries and zoning aspects;
- Describes the region's key habitats, plants and animals, natural processes, human uses and benefits, and threats to the long-term ecological sustainability of the region;
- Describes in detail the various statutory obligations under the *Environment Protection and Biodiversity Conservation Act* that apply in any region;
- Identifies the regional priorities for protection of conservation values on the basis of an appreciation of threats; and
- Identifies how environmental quality and the condition of the area will be monitored in the future.

Each marine region is divided into "bioregions" on the basis of their ecological similarities, species distribution, and oceanographic and seafloor characteristics. These bioregions reflect the understanding of the region's ecology and underpin the planning process (figure 8).[21]

[21] Australian Government. Department of the Environment and Water Resources. 2007. The South-west Marine Bioregional Plan Bioregional Profile. Australia.

Figure 7. Marine planning regions in Australia[22]

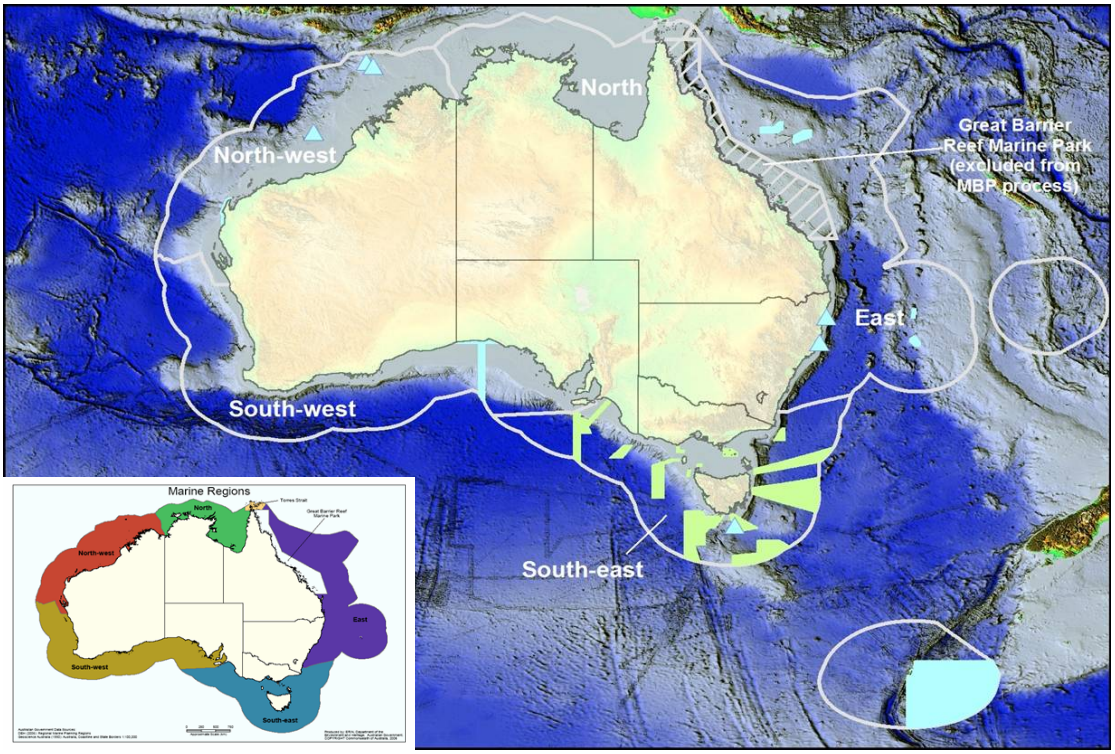
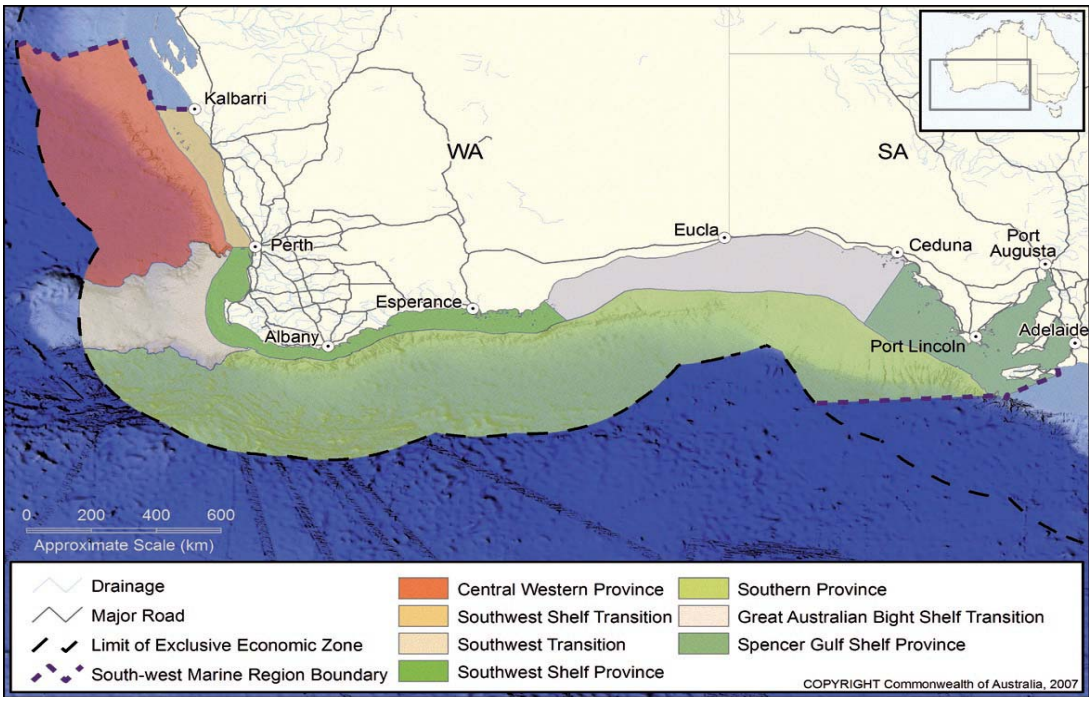


Figure 8. Bioregions of Australia's South-west Marine Region



[22] In figure 7, the abbreviation "MBP" stands for "marine bioregional plan."

The marine bioregional planning process has three main stages or components (figure 9):

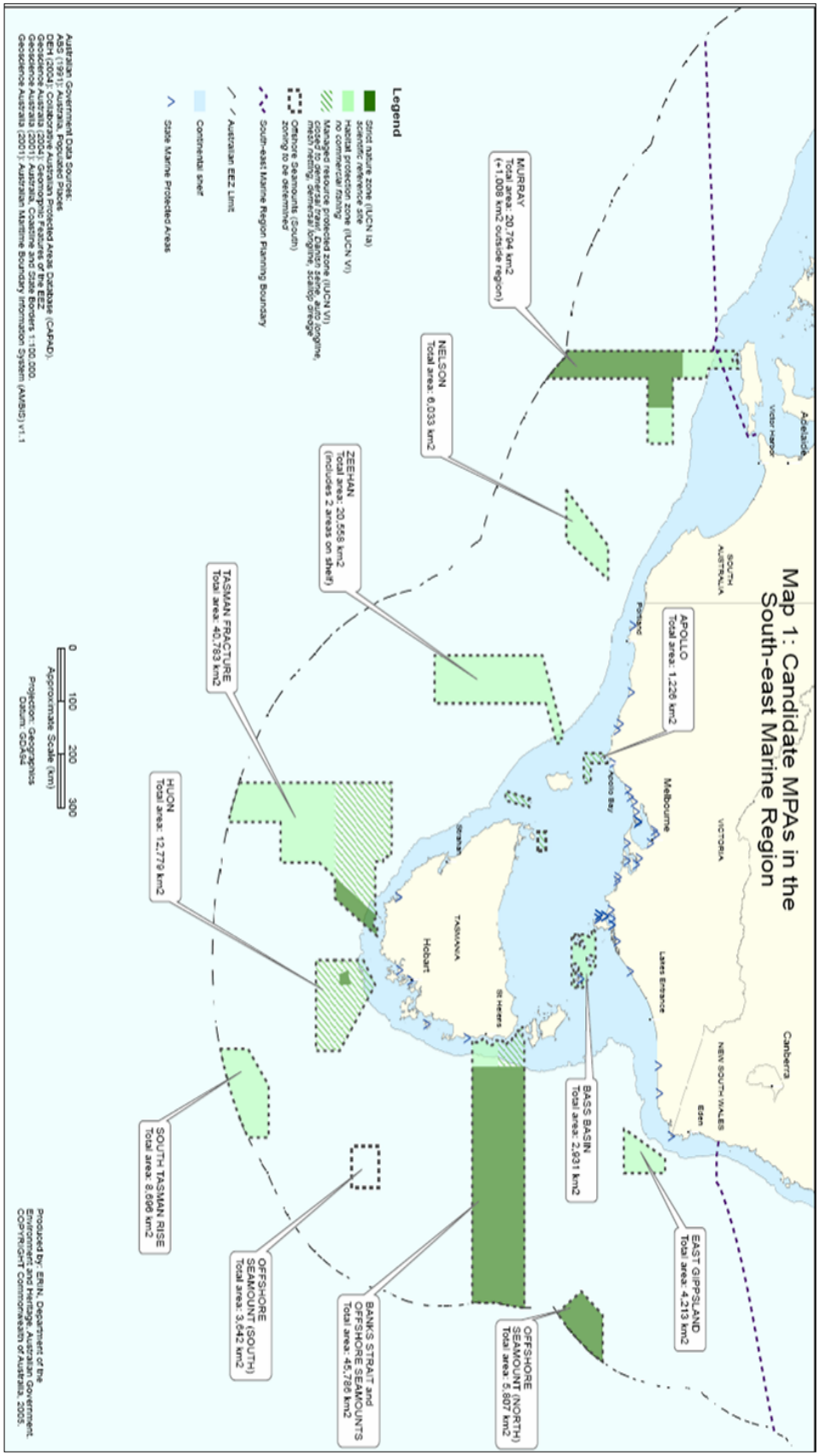
- *A marine bioregional profile*, in which the region's key habitats, natural processes, heritage values, and human uses and benefits are described. The profile also contains an overview of existing conservation measures and other marine spatial management measures such as closures for fisheries. The profile also sets out the objectives for subsequent work to identify an MPA network for the marine regions that will form part of the NRSMPA. The profile is released 12 months before the release of the draft plan.
- *A draft plan* containing a strategic regional assessment of conservation values and current and emerging pressures on the marine environment. The draft plan identifies key conservation and heritage priorities for each marine region and the range of legislative and administrative tools available to manage them. The draft plan is open for public consultation.
- *A marine bioregional plan* completed after public consultation. It identifies conservation values in the region, priorities and measures for the protection of these values, an MPA network, and a set of sustainability indicators that will be used to measure the health of the marine environment into the future.

Figure 9. Three main stages of Australia's bioregional planning process[23]

The bioregional plan for the South-east Marine Region has been completed (figure 10), and the other four plans are in development and will be completed by 2012. A bioregional profile has been completed for the South-west Marine Region.

[23] Australian Government. Department of the Environment and Water Resources. 2007. The South-west Marine Bioregional Plan Bioregional Profile. Australia.

Figure 10. Candidate MPA network in Australia's South-east Marine Region



4. Key Considerations and Lessons Learned

The following are some of the considerations or challenges relevant to the establishment of an MPA network in Australia:

- Limited data restrict the application of sophisticated MPA design rules at the scale of provinces.
- Benefits of MPAs are long-term and unquantifiable; however, immediate costs are evident and largely quantifiable.
- Tension exists between "iconic" and "representative" MPA concepts.
- Socio-economic considerations (constraints) should be integrated from the beginning of the design process rather than using them as a discrete filter at the end.

Lessons learned when establishing an MPA network in Australia include the following:

- Do not spend years trying to make everyone happy or get the science "perfect"; establish momentum and use political will to achieve the best possible outcome.
- Keep MPA "rules" simple, especially where information is poor.
- Integrate other measures with MPAs.
- Benefit from the existence of legislative authority for developing an MPA.

Key Documents

For further information on the development of MPA networks in Australia, see the following:

- Workshop presentations by Rob McKelleher and Zoë Cozens: http://www.wwf.ca/MPAWorkshop/;
- *Guidelines for Establishing the National Representative System of Marine Protected Areas*: http://www.environment.gov.au/coasts/mpa/publications/nrsmpa-guidelines.html; and
- South-east Marine Region planning process website: http://www.environment.gov.au/coasts/mpa/southeast/index.html.

4.3 Presentation on Establishing an MPA Network in Germany

Establishing an MPA Network in Germany in the context of OSPAR
Presenter: Jeff Ardron, German Federal Agency for Nature Conservation

1. Policy Framework and Objectives

Among the most important drivers for developing networks of MPAs in Europe is European legislation on nature conservation, part of the EU contribution to implement the 1992 CBD. The two most significant legislative tools are the Birds Directive that dates back to 1979 (Council of the European Communities Directive, 79/409/EEC), providing a framework for the identification and classification of Special Protection Areas (SPAs) for rare, vulnerable, or regularly occurring migratory species, and the 1991 Habitats Directive (Council of the European Communities Directive, 92/43/EEC), requiring member states to select, designate, and protect sites that support certain natural habitats or species of plants or animals as Special Areas of Conservation (SACs). Together SACs and SPAs will create a network of protected areas across the EU, known as Natura 2000. Natura 2000 forms the cornerstone of Europe's nature conservation policy.[24]

The need to fully apply the Habitats Directive and the Birds Directive to the offshore marine environment of the EU, especially with regard to the establishment of the Natura 2000 network, represents a key challenge for EU biodiversity policy in the coming years. The establishment of a marine network of conservation areas under Natura 2000 will significantly contribute not only to the goal of halting the loss of biodiversity in the EU, but also to broader

[24] European Commission. Nature and Biodiversity Homepage: http://ec.europa.eu/environment/nature/index_en.htm.

marine conservation and sustainable-use objectives. To date, relatively few Natura 2000 sites have been identified for the offshore marine environment, and this represents the most significant gap in the Natura 2000 network.

The EU Biodiversity Action Plan[25] calls for efforts to:

- Complete the Natura 2000 marine network of SPAs by 2008;
- Adopt lists of marine Sites of Community Importance (SCIs) by 2008;
- Designate marine SACs and establish management priorities and necessary conservation measures for them by 2012; and
- Establish similar management and conservation measures for marine SPAs by 2012.

The German Federal Agency for Nature Conservation (BfN) is a federal authority reporting to the German federal Ministry for the Environment, Nature Conservation, and Nuclear Safety. The BfN advises the ministry on all issues relating to national and international nature conservation, promotes nature conservation activities, supports research projects, and acts as, among other things, the authority to implement Natura 2000 in the German EEZ.

On the Isle of Vilm southeast of Rügen, the BfN maintains a branch office with the International Academy for Nature Conservation, the Biodiversity Unit, and the Marine and Coastal Nature Conservation Unit. The latter unit is responsible for all aspects of marine nature conservation in the German North Sea and Baltic Sea. Among its most recent tasks are the coordination of Natura 2000 research in the EEZ and development of the scientific basis for identifying marine conservation areas.

The BfN proposed 10 Natura 2000 sites that the Environment Ministry nominated to the EU in May 2004. The BfN administers the identified sites. Combined, the 10 areas (8 SACs and 2 SPAs) listed in the report cover about 30 percent of Germany's marine waters in its EEZ. The federal government designated the SPAs in the EEZ on 15 September 2005 as nature conservation areas under the *Federal Nature Conservation Act*.

2. Principles for MPA Network Design and Planning

The purpose of the Natura 2000 network is: "to preserve terrestrial, freshwater and marine biological diversity." Specific habitat types and species in need of special conservation efforts are outlined in the annexes to the Habitats Directive.

Based on these annexes, criteria applied in selecting appropriate protected areas include:

- The importance and density of species populations and habitat types that are present;
- Their degree of representativity; and
- Their conservation status.

The purpose of designating these protected areas and taking further measures is to maintain the habitats and species or restore them to a favourable conservation status. The competent authorities develop the precise protection and conservation goals for individual protected areas which are to be integrated in a coherent network, with due regard to the different ecological requirements of the species or habitat types concerned. Such conservation goals include, for instance:

- The safeguarding of undisturbed areas for resting seabirds, as well as for migrating and feeding marine mammals or for fish species;
- The preservation of resting and moulting areas for migratory birds; and
- The prevention of by-catch, for example, of harbour porpoise, in fisheries.

[25] European Commission. EU Biodiversity Action Plan: http://ec.europa.eu/environment/nature/biodiversity/comm2006/index_en.htm.

Annex I to the EU Habitats Directive lists the natural habitat types of "community interest" whose conservation requires the designation of SACs across Europe at a national level. In the German marine regions of the EEZ, two of these habitat types occur and have been protected: reefs and sandbanks (meaning permanently submerged sandbanks that are not exposed at the low water level).

According to Article 1(e) of the Habitats Directive, the natural habitats must be maintained at or restored to a favourable conservation status. Simply stated, this means the following:

- The habitat areas and their natural extent have lasted over many years and should remain unaffected by negative human influences, or even be allowed to expand.
- The typical elements (e.g., sediment, salinity, current) of these habitats and specific functions can continue in the long term according to their natural dynamics.
- The typical animal and plant populations of these habitats can survive in the long term or even increase.[26]

MPAs in Germany have been selected on the basis of these ecological criteria first. Economic factors are then considered in the development of the management plans for the MPAs.

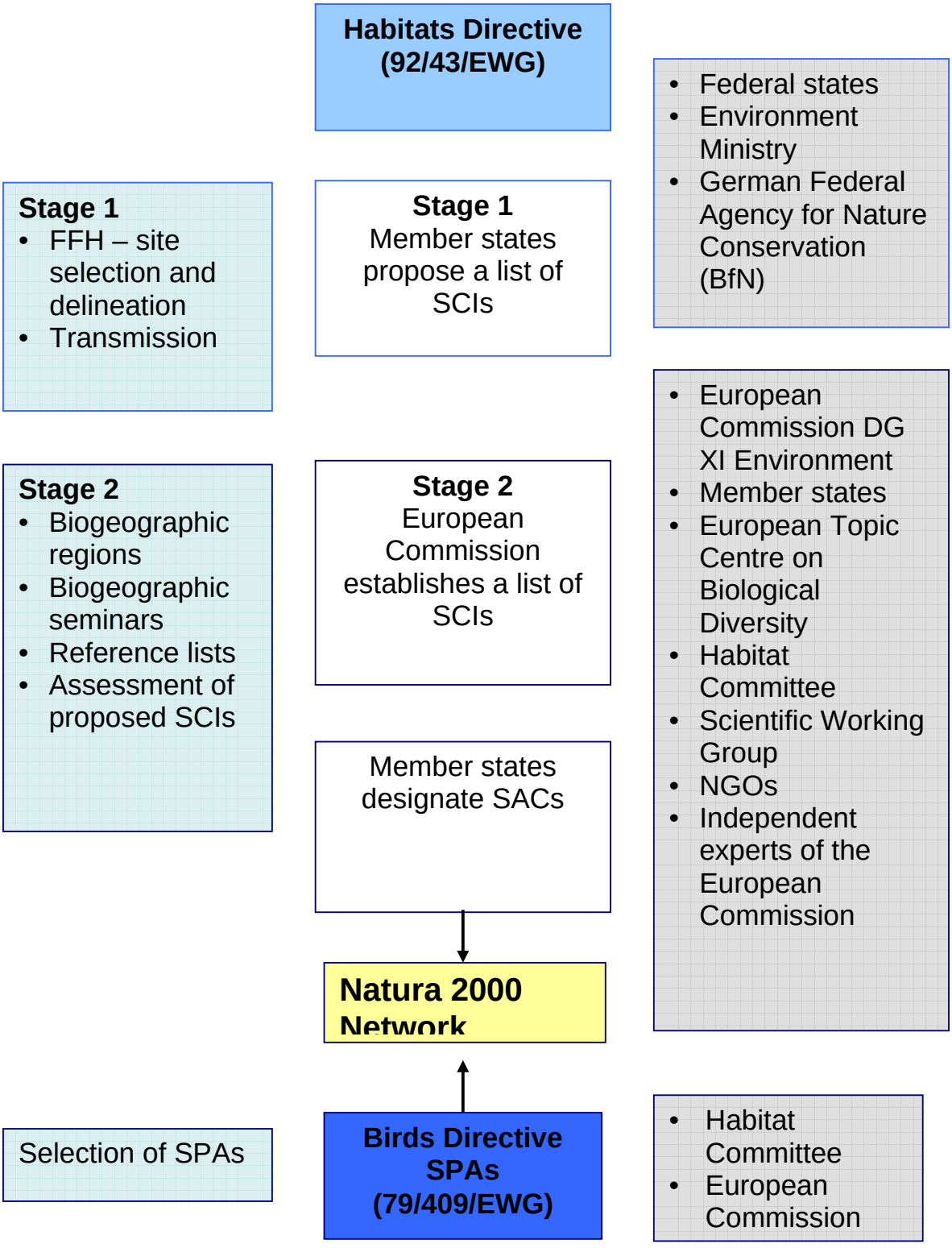
3. Process for Developing an MPA Network

In December 2002, the BfN submitted to the Environment Ministry, in the context of the Natura 2000 site proposal procedure, a catalogue of proposed SACs and SPAs within the German EEZ in the North and Baltic seas. Together with the BfN, the Environment Ministry undertook a consultation process with the other concerned ministries of the federal government and with the coastal Länder (states) whose territories adjoin the EEZ, and carried out the public participation process. Under the Birds Directive, the Environment Ministry can protect SPAs through appropriate regulations immediately after providing notification to the European Commission (figure 11). Under the Habitats Directive, SACs undergo an assessment process at the EU level after their proposal by a member state to the European Commission, to ensure the European coherence of the Natura 2000 network. In a second step, under European criteria and criteria of coherence, the member states concerned designate adopted sites as protected areas; for example, the German Environment Ministry has responsibility for German sites.

A detailed explanation of the procedures used to select individual MPA sites, based primarily on existing information, mapping, and expert judgment, is available from the BfN at: http://www.habitatmare.de/en/downloads/erlaeuterungstexte/Explanation_North_Sea.pdf.

[26] This section is adapted from the Habitat Mare website of the BfN: http://www.habitatmare.de.

Figure 11. Simplified overview of the Natura 2000 designation process[27]



[27] In figure 11,"FFH" stands for "Fauna-Flora-Habitat."

4. Key Considerations and Lessons Learned

The following are two elements of the German approach to planning MPA networks and meeting European commitments:

- MPAs are used as a catalyst for an ecosystem approach to marine management, recognizing that marine protection requires more than only MPAs; and
- Natura 2000 is used as a basis for broad-scale marine spatial planning (large areas with multiple management, rather than small areas with a feature-specific approach).

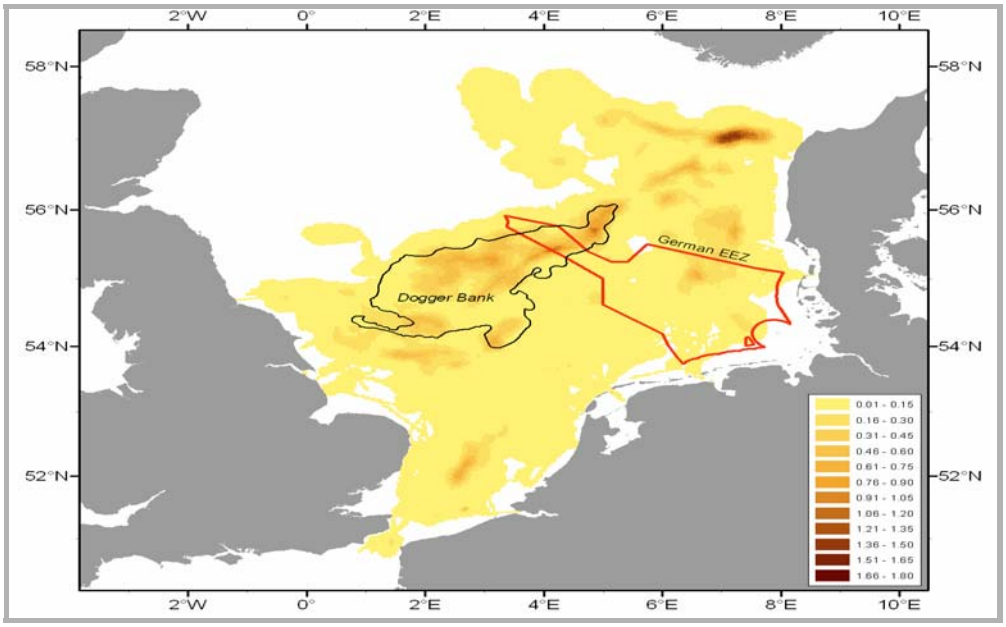
Implementing new MPA legislation requires the following:

- *Leadership:* Environmental laws are blunt tools sharpened only through use and precedent. This requires leadership.
- *Pragmatism:* Planning should be done with an eye to future legislation, but action should be taken on what is available now (with all its imperfections). This may mean a less than ideal beginning. Ideals and theory should be balanced with pragmatism and practice.
- *Realism:* "Hard laws" with teeth (e.g., Natura 2000 directives) indeed hasten action but also limit flexibility. "Soft laws" (e.g., international conventions) provide greater flexibility but often at the expense of urgency.
- *Knowledge:* It is important to know what legal instruments are available and be realistic about what can be achieved with them.

These other lessons were learned:

- Selecting MPAs for a few species and habitats is manageable using conventional tools and techniques, such as surveys, mapping, and selection, but this does not rule out using more advanced tools, for example, Marxan software,[28] when and where required.
- Imperfect solutions are (usually) better than nothing; sometimes you cannot protect all of an area (see figure 12).

Figure 12. German part of the Dogger Bank in the North Sea



[28] Marxan is software that delivers decision support for MPA system design. Marxan finds reasonably efficient solutions to the problem of selecting a system of spatially cohesive sites that meet a suite of biodiversity targets. See the University of Queensland's Marxan website at: http://www.ecology.uq.edu.au/index.html?page=27710.

Key Documents

For further information on the development of an MPA network in Germany, see the following:

- Workshop presentation by Jeff Ardron: http://www.wwf.ca/MPAWorkshop/;
- Habitat Mare website of the BfN: http://www.habitatmare.de;
- OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. *Guidance on Developing an Ecologically Coherent Network of OSPAR Marine Protected Areas* (Reference number: 2006-3): http://www.ospar.org/documents/DBASE/DECRECS/Agreements/06-03e_Guidance%20ecol%20coherence%20MPA%20network.doc;
- OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. *Guidelines for the Identification and Selection of Marine Protected Areas in the OSPAR Maritime Area* (Reference number: 2003-17): http://www.jncc.gov.uk/pdf/ANNEX10_Guidelines%20identification%20MPA.pdf; and
- Ardron, J.A. 2008. The challenge of assessing whether the OSPAR network of marine protected areas is ecologically coherent. *Hydrobiologia 606* (1).

4.4 Presentation on Implementing the Marine Life Protection Act in California

Implementing the Marine Life Protection Act *in California*
Presenter: John Ugoretz, California Department of Fish and Game

1. Policy Framework and Objectives[29]

In 1999, the legislature of the State of California enacted the MLPA, directing the state to re-examine and redesign California's system of MPAs through a comprehensive program and master plan. The legislature recognized the benefits of setting aside some areas under special protection and of ensuring that these MPAs are developed in a systematic manner, with clear goals and objectives, and management plans and programs for monitoring and evaluating their effectiveness. The primary goals of the MLPA are to protect marine life and habitats, marine ecosystems, and marine natural heritage, as well as improve recreational, educational, and study opportunities that marine ecosystems provide.

Rather than focusing on one use or value for MPAs, the MLPA recognizes a wide range of values, including the conservation of biological diversity. Between 1999 and 2004, two efforts were made to implement the MLPA. Both attempts suffered from a lack of adequate resources, and both failed to provide sufficient information to stakeholders, particularly regarding the potential socio-economic impacts of potential MPAs. In the first attempt, the California Department of Fish and Game and the MLPA master plan team developed a set of initial proposals for a statewide network of MPAs without significant stakeholder input, even though the intent was to revise these initial proposals on the basis of public comment, as required by the MLPA. The second attempt was more inclusive of stakeholders but suffered from a lack of staff and funding. After these unsuccessful attempts, state legislators and the department realized that this complex and controversial process required significant resources and time to implement and evaluate it successfully.

In August 2004, the California Resources Agency, the California Department of Fish and Game, and the Resources Legacy Fund Foundation launched another effort to implement the MLPA. The MLPA initiative established an MLPA Blue Ribbon Task Force, together with a Master Plan Science Advisory Team and a stakeholder advisory group, to oversee the

[29] Adapted from California Department of Fish and Game. 2008. Master Plan for Marine Protected Areas. Sacramento, CA. Revised Draft. January.

completion of several objectives. The first of these objectives was a master plan framework, which included guidance based on the MLPA, for the development of alternative proposals of MPAs statewide, beginning in an initial central coast "study region." The master plan is expected to be an evolving document, which will be modified on the basis of lessons learned in various regional processes and through monitoring and evaluation of MPAs throughout the state.

The MLPA requires review and improvement of California's existing array of MPAs, ensuring that they function as a network. Given California's 1770 km coastline and the varying ecological, social, and economic conditions along the coast, it was decided early in the process to implement the MLPA in a series of stages within geographic study regions. The goal is to establish MPAs in each of several study regions by 2011. The MLPA initiative identified five study regions: the north coast region, the north central coast region, the San Francisco Bay region, the central coast region, and the south coast region. The central coast was selected as the initial study region in which to implement the MLPA.

The MLPA identifies a set of goals for the Marine Life Protection Program, which includes the following:

- Conservation of biological diversity and the health of marine ecosystems
- Recovery of wildlife populations;
- Improvements to recreational and educational opportunities consistent with biodiversity conservation;
- Protection of representative and unique habitats for their intrinsic value;
- Ensuring that MPAs have defined objectives and effective management and enforcement, and are designed on the basis of sound science; and
- Ensuring that MPAs are managed, to the extent possible, as a network.

Although neither statute nor legislative history defines "network," dictionaries specify *interconnectedness* as a characteristic of a network. The first finding of the MLPA highlights the fact that California's MPAs "were established on a piecemeal basis rather than according to a coherent plan." The term "reserve network" has been defined as a group of reserves that is designed to meet objectives that single reserves cannot achieve on their own.[30] In general, this definition may infer some direct or indirect connection of MPAs through the dispersal of adult, juvenile, and/or larval organisms or other biological interactions. In most cases, larval and juvenile dispersal rates are not known, and oceanography or ocean current patterns may be combined with larval biology to help determine connectivity.

2. Principles for MPA Network Design and Planning

The MLPA notes that a variety of levels of protection may be included in MPAs and that Marine Life Protection Program shall include several elements, including:

- An "improved marine life reserve component";
- Specified objectives and management and enforcement measures;
- Provisions for monitoring and adaptive management;
- Provisions for educating the public and encouraging public participation; and
- A process for the establishment, modification, or abolishment of existing or future MPAs.

Each preferred regional alternative that the task force submits to the Fish and Game Commission must include recommended no-take areas that encompass a representative variety of marine habitat types and communities across a range of depths and conditions, and must prevent activities that upset the natural functions within reserves. Collectively, the

[30] Roberts, C.M., and J.P. Hawkins. 2000. Fully Protected Marine Reserves: A Guide. World Wildlife Fund United States. Washington, D.C., and University of York, York, UK.

regional alternatives must include replicates of similar types of habitats in each biogeographical region, to the extent possible.

The MLPA itself does not define a network. However, there are two common approaches to MPA networks: MPAs linked biologically and/or oceanographically, and MPAs linked through administrative function. Biological and oceanographic linkages are described in more detail in this section. At a minimum, the statewide network should function at an administrative level that reflects a consistent approach to design, funding, and management.

The science team for the MLPA initiative developed guidance regarding the design of MPA networks. This guidance, expressed in ranges for some aspects such as size and spacing of MPAs, is the starting point for regional discussions of alternative MPAs. Although this guidance is not prescriptive, any significant deviation from it should be consistent with both regional goals and objectives, and MLPA requirements.

The following guidelines are linked to specific objectives; not every MPA will necessarily comply with all guidelines:

- The diversity of species and habitats to be protected and the diversity of human uses of marine environments prevent a single optimum network design in all environments.
- To protect the diversity of species that live in different habitats and those that move among different habitats over their lifetime, every "key" marine habitat should be represented in the MPA network.
- To protect the diversity of species that live at different depths, and to accommodate the movement of individuals to and from shallow nursery or spawning grounds to adult habitats offshore, MPAs should extend from the intertidal zone to deep waters offshore.
- To best protect adult populations, based on adult neighborhood sizes and movement patterns, MPAs should have an alongshore extent of at least 5 km to 10 km of coastline, and preferably 10 km to 20 km.
- Larger MPAs should be established to fully protect marine birds, mammals, and migratory fish.
- To facilitate dispersal among MPAs for important bottom-dwelling fish and invertebrate groups, based on currently known scales of larval dispersal, MPAs should be placed within 50 km to 100 km of each other.
- To provide analytical power for management comparisons, and to buffer against catastrophic loss of an MPA, at least three to five replicate MPAs should be designed for each habitat type within each biogeographical region.
- To lessen negative impact while maintaining value, placement of MPAs should take into account local resource use and stakeholder activities.
- Placement of MPAs should take into account the adjacent terrestrial environment and associated human activities.
- To facilitate adaptive management of the MPA network into the future and the use of MPAs as natural scientific laboratories, the network design should account for the need to evaluate and monitor biological changes within MPAs.

The MLPA calls for protecting representative types of habitat in different depth zones and environmental conditions. The science team generally confirmed that all but one of the habitats identified in the MLPA occur within state waters: rocky reefs, intertidal zones, sandy or soft ocean bottoms, underwater pinnacles, kelp forests, submarine canyons, and seagrass beds. Seamounts do not occur within state waters. The science team also noted that rocky reefs, intertidal zones, and kelp forests are actually broad categories that include several types of habitat.

The science team identified five depth zones that reflect changes in species composition: intertidal, intertidal to 30 m, 30 m to 100 m, 100 m to 200 m, and deeper than 200 m. The science team also called for special delineation of estuaries as a critical California coastal habitat. Finally, the science team recommended expanding the habitat definitions to include ocean circulation features, principally upwelling centres, freshwater plumes from rivers, and larval retention areas.

The MLPA recognizes the role of different types of MPAs in achieving the objectives of the Marine Life Protection Program. The *Marine Managed Areas Improvement Act* defines three types of MPAs: state marine reserves (SMR), state marine parks (SMP), and state marine conservation areas (SMCA). Each designation provides authority for different levels of restriction on human uses and has various objectives.

3. Process for Developing an MPA Network

A four-step process is being used by the Master Plan Science Advisory Team and the regional stakeholder groups for designing alternative MPA proposals. The overall aim of this process is for the task force to select alternative proposals, including a preferred alternative, and for the Fish and Game Commission to adopt one of the proposals.

The four steps in the process are as follows:

1. Regional MPA planning: This step begins with the preparation of a regional profile, and continues with the convening of a regional planning stakeholder group and a science team, obtaining additional advice, and identifying alternative approaches to networks and potential MPA sites.
2. Assembling of draft regional alternative MPA proposals: The regional stakeholder group develops proposals for packages of MPAs, after evaluating existing and new MPAs and other management activities.
3. Evaluating alternative MPA proposals: The task force evaluates the proposals and forwards a preferred alternative and other alternatives to the Fish and Game Commission. The California Department of Fish and Game conducts a feasibility analysis, comments on alternatives, develops initial regulatory documents based on Fish and Game Commission direction, and forwards this information to the Commission for regulatory review.
4. Commission consideration and action on the MPA proposals: The Fish and Game Commission prepares regulatory analyses, including a review under the *California Environmental Quality Act*, and invites public testimony.

The process will be reviewed periodically and revised on the basis of lessons learned. This adaptive use of the master plan will help facilitate future regional processes and statewide implementation.

Figure 13 illustrates the planning process for the north central coast of California, and figure 14 shows the central coast MPA network.

Figure 13. California north central coast planning structure

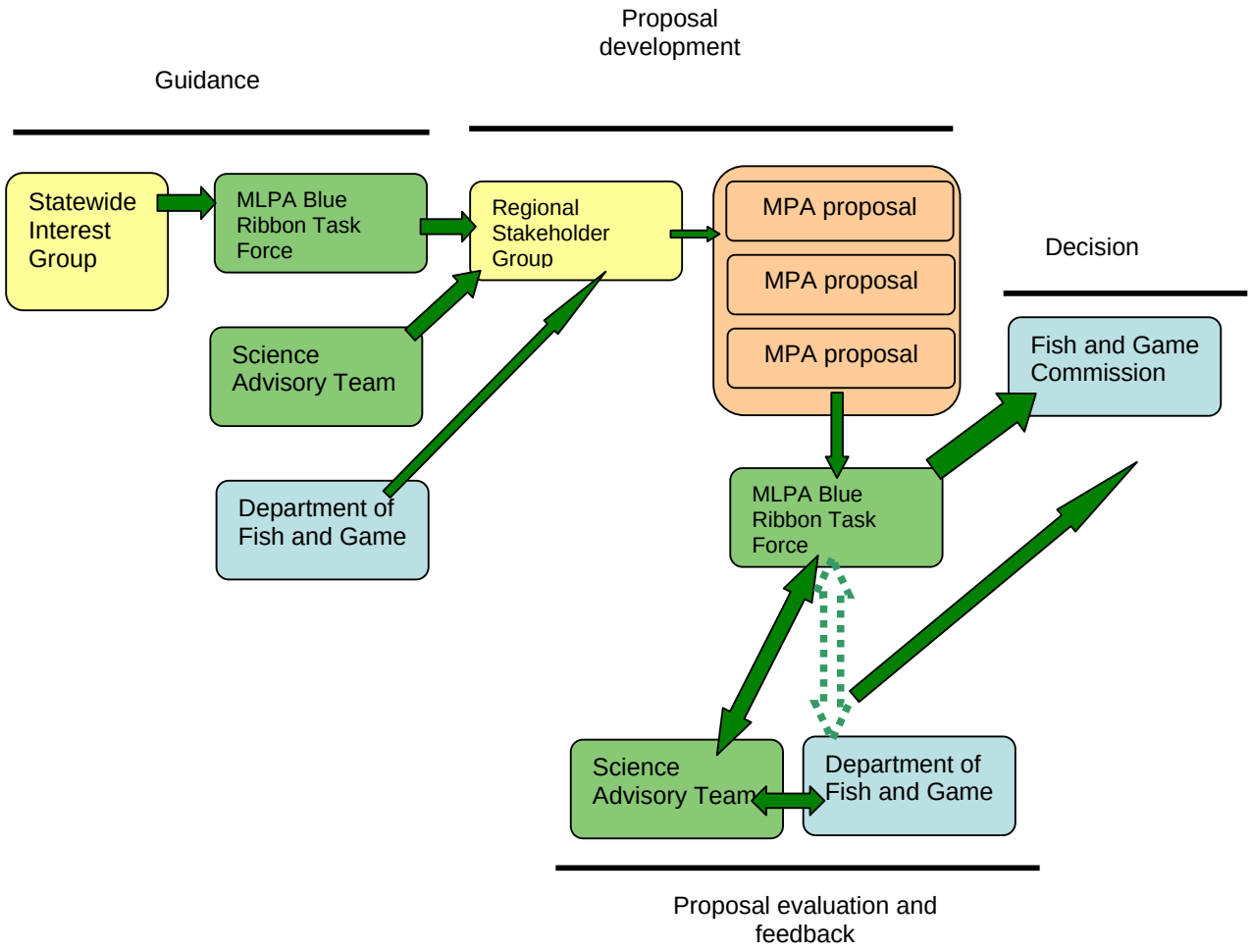


Figure 14. Central California coast MPA network

4. Key Considerations and Lessons Learned

These are some of the broad lessons learned from implementing an MPA network in the central coast region of California:

- A clear mandate is essential and a specific timeline is beneficial.
- Transparency and accuracy are critical for eliciting trust.
- Making data readily available is key for truly engaging stakeholders in planning.
- Commitment from stakeholders includes risks and huge staff and consultant workload.
- Private funds support independent staff and consultants who have a singular focus and an ability to adapt efficiently.
- Some concern exists about the lack of long-term commitment and internal capacity.
- Flexibility is important as the process evolves – adding to the "lessons learned" is worth the investment and builds credibility.

Key Documents

For further information on the development of MPA networks in California, see the following:

- Workshop presentation by John Ugoretz: http://www.wwf.ca/MPAWorkshop/; and

- California Department of Fish and Game. *Master Plan for Marine Protected Areas*: http://www.dfg.ca.gov/mlpa/masterplan.asp.

4.5 Summary of Small Group Discussions on International Case Studies

Following the plenary presentations of the four international examples of MPA network planning and implementation – for New Zealand, Australia, Germany, and California – participants met in small groups to discuss the application of lessons learned from those case studies to the Canadian context. This part of section 4 summarizes the results of these discussions.

New Zealand

New Zealand is applying clear national criteria for the design and selection of a representative system of MPAs in four marine regions, using a bioregional planning approach similar to Australia's. New Zealand is not attempting to implement integrated management of marine areas as Canada is trying to do through its LOMAs. Clearly, New Zealand's priority is representativeness, whereas Canada is applying multiple ecological criteria. New Zealand is using the best available information to design its network with a precautionary approach. Even when information is not readily available, particularly for deep marine waters, the process is moving ahead. A sense of urgency to implement a representative network of MPAs exists in New Zealand. In contrast, Canada has no specific targets, no milestones, and little political will to move the process forward at the same rate and in a similar fashion. Because of the complexity of jurisdictions and management responsibilities, and the advocacy of an integrated management approach, Canada is lagging behind all four countries for which case studies were presented at the workshop. Increased and more effective collaboration among federal agencies, provincial governments, Aboriginal organizations, and NGOs is critical to making progress in Canada.

Australia

Australia's approach to marine bioregional planning was described as being very similar to Canada's Integrated Management of Large Ocean Management Areas approach (the LOMA approach). Australia had very clear goals and principles (some participants noted that Canada needs similar clearly stated goals and principles). Its identification of conservation values was a good beginning and became the basis for moving Australia's representative MPA program forward.

Australia has implemented large marine planning processes and a representative MPA network, at least in its South-east Marine Region, because of a variety of factors. Australians love their oceans; most of the country's population lives near the coast. The GBRMP is a recognized success story that most Australians understand, and, as a result, they recognize the need for large MPAs. As well, Australia's Minister of the Environment is a strong advocate and has a high standing in the Cabinet. His leadership cannot be overstated.

The availability of scientific information was highlighted. Moving ahead with what is available, coupled with a precautionary approach, was described as Australia's general approach. Australia employed a national approach but also tried to involve state governments (although not all Australian state governments would agree with this assertion). First steps are often the most difficult, but movement becomes easier after some momentum is developed. The creation of controversy, that is, putting lines and boundaries on a map, is often a strategy for moving forward.

Australia's approach, unlike Canada's, considers socio-economic effects from the beginning of the process.

Germany

Germany's approach took a different tack. For example, Germany used the shorter list of CBD criteria instead of the IUCN/WCPA checklist. Germany's approach emphasized that "perfection" should not be the enemy of the good, and that the discussions should not be interpreted to be "ideal," that is, the only way possible within different national contexts. There are many ways to accomplish the same objective.

The small group discussions on the German case often focused on "process" and not on individual CBD criteria. While this fact might be humbling to ecologists, success is often dependent on a successful approach to process and not application of specific criteria.

EBSAs were highlighted as a good place to begin, however they were interpreted. In the German case, though, national legislation constrained Germany's approach. For example, in considering "representativity," Germany looked only at specific habitat types. The discussion emphasized that, depending on the approach to biogeographical classification, different systems will result in meeting representativity targets in different ways. Very often politics gets in the way of science. Different rules often apply to different places. In Canada, the Eastern Scotian Shelf Integrated Management approach to representativity, for example, may not be acceptable in Newfoundland and Labrador.

The application of the "replication" criterion should not be limited by jurisdiction or legislation. Good practice might be to consider the addition of a fishery closure site to an MPA. An approach similar to the LOMA approach might be the best way to obtain replication. Replication can also be achieved in one large area, as well as many small areas spread out over large distances.

Often the best way to measure "connectivity" is by using rules of thumb, for example, looking at gradients from nearshore to offshore, or following depth contours and features. OSPAR has already identified many such rules of thumb.

How do we know when an MPA network is "viable and adequate"? This judgment usually involves indicators, for example, species indicators. However, most measurements of species health are based on inshore environments. Experts can define an MPA network, but quantifying such a network is difficult. We may have to rely on expert opinion to say we have a viable and adequate MPA network. At the end of the day, effectiveness of the management regime may be the most important factor in achieving a viable network.

Finally, the issue of "consultation" or stakeholder involvement was pointed out to be dependent on cultural factors. The "sunshine laws" under which most US regulations are developed would be unusual in most other countries. For example, in Germany the public is used to being told what to do, and the government is expected to know what it is doing. This is neither good nor bad, but rather a reflection of culture.

California

The California experience has many similarities to and differences from the Canadian experience, especially in terms of complex jurisdictional issues. Canada should learn from mistakes made in California, such as the lack of a coordinated federal-state planning process. California had very clearly stated specific objectives for the design of its MPA network and divided its coastal waters into five manageable units. In the small-group discussion, it was pointed out that not all ecological criteria were applicable at all scales and that feasibility and costs should be factored into the design of MPA networks (these factors are not considered in the current Canadian approach). The question of what criteria should be used and at what scale was raised but not discussed further. The point was also made that certain criteria apply only to specific objectives. The new Marine Ecosystems and Management (MEAM) website

(http://depts.washington.edu/meam/) was identified as an important source of information on these issues.

As in the discussion of the New Zealand case, the importance of getting started was emphasized. Identifying obvious potential MPA sites from an ecological and feasibility perspective is a way to get started. Success can beget success. Knowledge gaps can be filled through the planning and implementation process. Several participants again emphasized the time required to implement an integrated management process and that the implementation of an MPA network in Canada cannot wait until the LOMA process is completed.

4.6 General Discussion

The issue of competing conservation interests in Canada was raised: some authorities and interest groups are focusing on MPAs, others on ecosystem-based management or integrated management, and all use different criteria and tools. In addition, unresolved rights and unclear ownership and responsibilities are problematic. An assertion was made that no single federal agency can take leadership in Canada while two other federal agencies have a mandate to complete their own networks – and provincial governments are at work designing and implementing their own MPA networks. A suggestion was made to create an ocean commission for Canada that might work at the regional level. The importance of DFO's role in providing leadership in identifying a vision for Canada was emphasized; other institutions could then identify more detailed visions for the regions and define goals and objectives relevant to particular places.

The session ended with a discussion of the benefits of MPA networks. If benefits do not start to accrue until the network is up and running, then politicians will be reluctant to support the idea of creating MPA networks. Expectations of different stakeholder groups will also be difficult to satisfy. Incremental benefits will have to be demonstrated and measured, but how? Existing MPA networks, for example, those in the United States, are expensive to manage and are not providing ecological benefits. Huge gaps exist in the spatial management of species, habitats, and ecological processes. A push should be made for complete, ecologically designed MPA networks. Single, small MPAs in California, however, have produced ecological benefits, such as bigger fish, larger populations, and healthier habitats. Even more benefits should be expected from larger networks.

Several observations were made that the "representative" objective or criterion was the most flexible one to apply to network design. Identifying representative areas and capturing them in a network should be relatively easy to do; iconic areas and features could then be added. Socio-economic costs should be minimized while the goals and objectives of the network are being achieved. On the other hand, one observer pointed out that Canada appeared to be "locked up" with the perception that Parks Canada Agency was the only agency that can apply a representative approach. Everyone was urged to step back and think about the implications of that perception and what it might mean to the future of a system of MPA networks in Canada.

A proposal was made for Canada to select one large marine area, such as a LOMA, that has ecological coherence, and design a regional MPA network through a partnership among the three federal agencies and a provincial government. Designing such a network at the regional level could begin to demonstrate the benefits of a network, as well as opening the door to collaborative planning. All of the pieces are in place for such a pilot project on the west coast of Canada, including the willingness of the province and NGOs to help advance the planning process.

SECTION 5 - Conclusions and Next Steps

5.1 Conclusions

A number of themes and areas of convergence had emerged by the conclusion of the workshop. The core organizing committee noted some of these in the following conclusions:

- There was a sense of agreement that clear ecological objectives and criteria enable progress toward the establishment of MPA networks.
- Participants expressed the view that a sound scientific basis is needed to achieve the objectives of MPA networks with openness, clarity, and credibility.
- It was recognized that MPA network initiatives can move ahead even without "perfect" data and when information is incomplete.
- Implementation can proceed over time, and a clear timeline was seen as beneficial in spurring progress toward the establishment of MPA networks.
- Experiences in other parts of the world have shown that MPA network design and implementation is complex but feasible.
- Many participants echoed the view that MPA network planning and design are a shared responsibility that requires a collectively developed vision. Both the shared responsibility and vision are important and achievable.

Other key findings that relate to Canada's development of a framework for MPA networks are:

- Different agencies use the term "representativeness" (or "representivity") differently. In some instances, the term is used differently in international versus domestic (national) contexts. Internationally, a representative MPA network is one that captures examples of the different biogeographical subdivisions that reasonably reflect the full range of ecosystems, including the biotic and habitat diversity of those ecosystems. In Canada, Parks Canada Agency is the only federal authority mandated to designate MPAs that has defined representativity as an objective: the agency seeks to preserve examples of Canada's "natural and cultural marine heritage."
- A distinction must be made between a true ecological network of MPAs and a collection or "system" of individual MPAs:
    - A network of MPAs comprises ecologically linked MPAs, strategically and systematically selected to address an ecological outcome that an individual MPA could not address.
    - A system of MPAs groups individual MPAs of a similar class (e.g., all parks or all unique areas whose conservation outcomes can be achieved without linkage to other MPAs).
- No example currently exists in the world of a network that effectively combines federal and state MPAs.
- Setting targets in policy or legislation seems to have accelerated progress in establishing MPA networks.
- The level of knowledge and information required for legislation and policy before establishment of federal MPAs in Canada is higher than elsewhere.
- Although benefits are derived from each MPA designated, full network benefits may not accrue until the network is completed.
- Not all network design criteria are applicable at all scales.

Defining MPA Networks

The beginnings of a collective vision for Canada's MPA networks may be found in some of the themes that emerged in discussions about the nature and definition of MPA networks:

- Participants noted that there is a critical difference between administrative systems of sites and true ecologically designed MPA networks:
    - Representativity on its own is only one design criterion, and a system selected only to achieve representation of the types of habitat or other biophysical characteristics in a specified area is not necessarily ecologically coherent and connected.
    - An ecologically designed MPA network should be developed through the application of a set of ecological criteria, including representivity, connectivity, replication, and adequacy/viability.
- A system has a functional sense in that, as well as describing geographical and physical relationships, it implies consistent institutional and managerial arrangements, with coordinated planning. It does not, however, imply that there should be a single management authority. An effective system could comprise a range of types of management areas under different governance regimes adapted to local conditions. In contrast, a network has a primarily geographical and physical sense, that is, it is a group of protected areas that collectively are ecologically coherent.
- Participants welcomed guidance on how to create networks that are ecologically coherent. Principles including representation, the inclusion of significant areas, connectivity, replication, and adequacy are important ingredients of ecological coherence.
- Ecological coherence will be most evident at the scale of regional networks in each ocean, rather than in a national network across three oceans.

5.2 Next Steps

This workshop represents one step toward a fully realized national approach to MPA network planning in Canada. The information and insights shared by expert presenters, and by Canadian practitioners in the discussion groups, provide a basis for the next steps, which include these:

- Bringing all relevant authorities at federal, provincial, and territorial levels together to agree on a common vision and ecological objectives, and accept the challenge to collectively define the ecological outcomes an MPA network, rather than individual MPAs; and
- Developing together an action plan to establish an MPA network in a timely fashion.

APPENDIX A: WORKSHOP PROGRAM

Wednesday, 9 January 2008

08:45–10:30 **Opening Remarks**
Michele Patterson, World Wildlife Fund Canada; Wayne Moore, Fisheries and Oceans Canada
The Canadian Context
Camille Mageau, Fisheries and Oceans Canada
Establishing MPA Networks: Exploring Their Importance and Feasibility
Tundi Agardy, Sound Seas, on behalf of the International Union for the Conservation of Nature and Natural Resources (World Conservation Union)

10:30–11:00 Coffee

11:00–12:30 **FAO Guidance on MPA Networks for Fisheries Management**
Thomas Hourigan, National Oceanic and Atmospheric Administration (cancelled)
Azores 2007: Update on the Development of the CBD's MPA Criteria
Jake Rice, Fisheries and Oceans Canada; Jeff Ardron, German Federal Agency for Nature Conservation

12:30–13:30 Lunch

13:30–15:00 **Discussion Groups: How can these guidance tools be used to help shape Canada's MPA network?**

15:00–15:30 Coffee

15:30–17:00 **Panel Discussion: Ecological criteria**
Moderator: Cheri Recchia, Marine Protected Areas Monitoring Enterprise, California Ocean Science Trust
Panelists: Simon Banks, New Zealand Department of Conservation; John Ugoretz, California Department of Fish and Game; Jeff Ardron, German Federal Agency for Nature Conservation; Robert McKelleher, Australian Department of Environment, Water, Heritage and the Arts

Thursday, 10 January 2008

8:45–10:30 **Development of the German and OSPAR Networks of MPAs and Some Lessons Learned**
Jeff Ardron, German Federal Agency for Nature Conservation
Lessons Learned from the California's Marine Protected Areas Processes
John Ugoretz, California Department of Fish and Game

10:30–11:00 Coffee

11:00–12:30 **New Zealand Marine Protected Areas Policy and Implementation Plan**
Simon Banks, New Zealand Department of Conservation
Marine Bioregional Planning in Australia: A Platform for MPA Networks
Zoë Cozens, Australian Department of Environment, Water, Heritage and the Arts
East Australia Marine Planning Region and South-east Marine Reserve Network
Robert McKelleher, Australian Department of Environment, Water, Heritage and the Arts

12:30–13:30 Lunch

13:30–15:00 **Discussion Groups: Benefiting from what worked and lessons learned**

15:00–15:30 Coffee

15:30–17:00 **Panel Discussion: Canada's commitments**
Moderator: Camille Mageau, Fisheries and Oceans Canada
Panelists: Zoë Cozens, Australian Department of Environment, Water, Heritage and the Arts; Tundi Agardy, Sound Seas; Cheri Recchia, Marine Protected Areas Monitoring Enterprise, California Ocean Science Trust

Closing Remarks and Next Steps for Canada
Martine Landry, Fisheries and Oceans Canada; Jennifer Smith, World Wildlife Fund Canada

APPENDIX B: ORGANIZING COMMITTEE

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Jennifer Smith, World Wildlife Fund Canada
Camille Mageau, Fisheries and Oceans Canada
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