

## Before the Ice Melts: Experts Discuss Proactive Protection of the Arctic Ocean in Anticipation of Climate Change

Conservation of ocean resources is typically a reactive exercise. Managers respond to the degradation of ecosystems or depletion of species by taking steps to try to restore what was there before. Most MPAs are, in essence, an attempt to re-establish a more “natural” state where human activity has already had an impact.

Ecologically, the ideal conservation method would be proactive: protecting a natural state before it is significantly impacted by human activity. Opportunities for proactive management are relatively rare, however. More and more of the global ocean is the site of human activity — fishing, shipping, oil and gas drilling, etc. — even, increasingly, the deep sea. Once such activity is underway in a particular region, it becomes politically difficult for managers to place limits on it.

The Arctic Ocean presents an unusual opportunity for proactive conservation on a grand scale. With climate change, the ice-covered Arctic is melting. According to simulations of ice decline based on Intergovernmental Panel on Climate Change scenarios, the region could be free of summer ice by 2040 in the worst-case scenario of warming. This development is expected to open up lucrative opportunities for industry: virgin fishing grounds; a shorter shipping route (the Northwest

Passage) between the Pacific Ocean and Europe; and major new drilling fields for petroleum. In fact, the petroleum fields — totaling as much as 25% of global undiscovered reserves, according to some estimates — are a primary driver behind Russia’s recent claim of jurisdiction over much of the Arctic Ocean [see box below].

Is there an opportunity to establish a management regime across the Arctic Ocean before these activities commence? If so, what would such a regime look like? In recognition of the ongoing International Polar Year, *MPA News* asked experts this month for their views, including on the idea of designating an MPA across the entire Arctic Ocean. Their responses are below.

### **Voluntary moratorium on resource exploitation in the Arctic: David Hik**

David Hik is professor and Canada research chair in Northern Ecology at the University of Alberta, Canada. He is also executive director of the Canadian International Polar Year Secretariat.


“A single, enormous protected area is unlikely. I expect each country will keep jurisdiction over its EEZ, but will enter into co-management agreements with other Arctic Ocean rim nations (and other nations with Arctic

### **National claims to the Arctic seabed**

In July 2007, the voyage of a Russian icebreaker and two submersibles to plant a Russian flag on the seabed of the North Pole attracted global media attention. It was a high-profile way for Russia to assert sovereignty over much of the Arctic Ocean. What portion of the Arctic is eventually judged to be inside national jurisdictions, and what portion is judged to remain on the high seas, will play an important role in eventual management of the region.

Coastal states generally claim a 200-nm limit for their Exclusive Economic Zones, within which they hold jurisdiction over all natural resources. However, the UN Convention on the Law of the Sea (UNCLOS) allows claims beyond that if the natural prolongation of an adjoining continental shelf extends farther than 200 nm.

In 2001, Russia filed a claim with the UN that its continental shelf extended over a majority of the Arctic Ocean — encroaching on areas that Canada, the U.S., and Denmark (Greenland) anticipated claiming for themselves. The latter nations filed protests, and the UN instructed Russia to submit a revised claim with more scientific data to justify its case. Russia’s July expedition was part of that revision effort.

It will be up to a UN commission (the Commission on the Limits of the Continental Shelf, or CLCS) to judge each nation’s eventual claims. That adjudication process is expected to last the next decade or more, as countries still have to submit scientifically complete claims, based in part on the depth and shape of the seabed and the thickness of underlying sediments. The CLCS website is [http://www.un.org/Depts/los/clcs\\_new/clcs\\_home.htm](http://www.un.org/Depts/los/clcs_new/clcs_home.htm). 

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interests). Issues of enforcement and regulation will probably need to be managed through an international body created for this purpose. Whether this could be done as part of a comprehensive Arctic treaty or through a regional resource management organization is unresolved, but some creative solutions may surface during negotiations.

“What is required first of all is the commitment to protect Arctic marine environments and resources. This commitment needs to be adopted by Arctic rim and other nations. The Arctic Council [an existing intergovernmental forum for Arctic governments and peoples — <http://www.arctic-council.org>] could possibly play an important role in securing this commitment. Perhaps the first step would be a voluntary moratorium on resource exploitation in the Arctic Ocean until (a) the UN Convention on the Law of the Sea (UNCLOS) claim adjudication process is completed, and (b) a framework for discussion, protection, and development can be reached.

“The outcome of UNCLOS claims is a risk and an opportunity. If the territorial claims are handled as an opportunity simply for nations to extend their jurisdiction, then the entire conservation process may not get

very far. However, the complex nature of the UNCLOS claims may also provide a catalyst for rim nations to agree that co-management is a preferable outcome. The Arctic Council, including the increasing number of observer states, may be in a position to help reach a consensus.

“My guess is that the best opportunity to negotiate such a regime will be during the period of UNCLOS assessment as claims are evaluated. The issues surrounding territorial claims and management of resources will be magnified, and it might be possible to reach a more comprehensive agreement, one that would embrace the concept of sustainable management through a cooperative international regime. This would allow some regime to be put into place within 10 years. By that time we should have substantially better knowledge about Arctic marine resources, and the viability of shipping and resource exploration in the Arctic basin will have been more comprehensively assessed.

“An undesirable outcome would be an escalating and competitive race to divide the spoils of the Arctic Ocean. This would be a disaster for the entire region.”

### **Large MPAs in the Russian Arctic: Konstantin Zgurovsky and Vassily Spiridonov**

Konstantin Zgurovsky is marine program coordinator for WWF-Russia, and Vassily Spiridonov oversees marine biodiversity conservation projects for the same organization. They manage a project to address several issues of relevance to the Russian Arctic as a response to climate change, including MPAs and sustainable fisheries.

“The idea of designating the Russian Arctic as one large protected area is unrealistic due to a variety of conditions. When speaking about Russia, one should always bear in mind that internally there is a very strong bureaucracy but a lack of interdepartmental links and cooperation. Thus, a single institution may block any initiative if it does not fit its particular interests.”

“However, WWF-Russia is thinking about developing a series of specially protected nature areas associated with sensitive biotopes — such as offshore polynyas (semipermanent areas of open water in sea ice), and estuaries and *laidas* (saltmarshes) inshore. In these cases, the resulting protected areas could still be quite large. For example, an area with a special shipping regime in the Great Siberian Polynya or a national park in the Novosibirskie Islands [northern Siberia] might each be as large as the Great Barrier Reef Marine Park.

“WWF-Russia is working with different governmental structures — the Ministry of Natural Resources and the Ministry of Agriculture — on creation of a new system of protected areas across Russia, including MPAs, Particularly Sensitive Sea Areas (*MPA News* 3:8), fisheries refuges, ‘no-go zones’, etc. But in cases of

### **A new natural state for the Arctic**

A melted Arctic Ocean will represent a new natural state for the region beyond its simply becoming ice-free. As it stands, much of the ice-covered Arctic “is barren in terms of fish populations,” says Alf Håken Hoel of the University of Tromsø, Norway. He notes that the Arctic coast of Russia presently has no major offshore commercial fisheries. With warming waters, fish species from the north Atlantic and north Pacific would be expected over time to establish populations in the Arctic Ocean, thus opening up new fishing grounds. In this light, proactive management of the Arctic Ocean would involve management of what the Arctic ecosystem is expected to become, not necessarily what it is today.

For the high seas of the Arctic Ocean, Hoel notes an eventual fisheries management regime would need to be based on the provisions of the UN Convention on the Law of the Sea (UNCLOS) and the UN Fish Stocks Agreement. Coastal states in the region (Canada, Denmark, Norway, Russia, and the U.S.) would retain sovereign rights over resources within their Exclusive Economic Zones.

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overlap of these areas with oil and gas fields, it would be very hard to convince government to limit any human activities there.

“Ideally, something like the Antarctic Treaty system would be desirable to tackle emerging environmental and resources issues across the Arctic Ocean as whole. [Editor’s note: This reference is to the Convention on the Conservation of Antarctic Marine Living Resources, or CCAMLR, which features an intergovernmental body to manage resources of the Southern Ocean. *MPA News* reported on CCAMLR in October 2006 (“Examining the Role of MPAs in Ecosystem-Based Management”, *MPA News* 8:4).] However, politically it is not achievable in the near future, considering the contradictory interests of different countries in the Arctic. The CCAMLR model unfortunately will not work there. But the Arctic Council should be made stronger, and cooperation between countries, international bodies, and NGOs should be considerably intensified.”

### Entire Canadian Arctic Ocean should be an MPA: Louis Fortier


Louis Fortier is professor of Biology at Laval University in Canada, and is scientific director of ArcticNet, a network of Arctic scientists (<http://www.arcticnet-ulaval.ca>).

“The area encompassed by the Canadian Arctic Ocean is enormous and still inaccessible, and much of it — like the waters of the Canadian Archipelago and the coastal Arctic Ocean including Northern Baffin Bay and Hudson Bay — is under the jurisdiction of different Inuit (aboriginal) governance bodies. A regional resource management organization would be essential,

and whatever is done will require the involvement of the Inuit and land-claim organizations.

“Given that the Canadian Arctic Ocean has been relatively little-used before except for traditional Inuit use and oil/gas exploration, you do not have to kick out any well-established fishing or shipping industry. Hence, instead of delineating MPAs within the Canadian Arctic Ocean, I would make it an enormous MPA, within which I would delineate less protected areas. First of all, you would need to protect, as much as possible, the traditional rights of the Inuit and limit the harvesting of wildlife for them only in blatant cases of overexploitation and with their negotiated agreement (as is done with the polar bear and the beluga in some regions of the Canadian North). Then some areas would be opened to some activities — for example, the Northwest Passage to navigation; different regions for tourism; some sectors of the western Arctic for oil and gas exploration/exploitation.

“The Canadian Arctic Ocean at this time is an immense desert with some hotspots or oases: the North Water, Coburg Island, the region of Cape Bathurst, etc. Hence, within this large MPA, some regions of particular importance to biology and to Inuit culture would get special additional protection. It would be of the utmost importance to convince the communities and governance bodies of the North of the importance, benefits, and power that an MPA scheme would provide to them.

“The Arctic world will become much more accessible to shipping and exploitation within the next 30 years. We need to start thinking about protecting it now.” 

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## Additional sources of information on Arctic issues

Arctic Council  
<http://www.arctic-council.org>

International Arctic Science Committee  
<http://www.iasc.se>

Arctic Climate Impact Assessment (2004)  
<http://www.acia.uaf.edu>

Intergovernmental Panel on Climate Change  
Working Group Reports (2007) and Fourth  
Assessment Report (forthcoming; November 2007)  
<http://www.ipcc.ch>

Arctic Calendar of Events (conference list)  
<http://calendar.arcus.org/upcomingevents.html>

Scientific Workshop: *Arctic Coastal Zones at Risk*  
<http://coast.gkss.de/events/arctic07>

WWF Arctic Programme and its quarterly  
publication *Arctic Bulletin*  
<http://www.panda.org/arctic>

International Polar Year (IPY)  
<http://www.ipy.org>

Government of Canada Program for IPY  
<http://www.ipy-api.gc.ca>

Danish Polar Center  
<http://www.dpc.dk/sw494.asp>

Norwegian Polar Institute  
<http://npiweb.npolar.no>

U.S. National Oceanic and Atmospheric Adminis-  
tration (NOAA) Arctic Theme Page  
<http://www.arctic.noaa.gov/about.html>

Jennifer Brown is a Sanctuary Integrated Monitoring Network (SIMoN) ecosystem scientist at the Monterey Bay National Marine Sanctuary in the U.S. Lisa Wooninck is a research fisheries biologist for the (U.S.) National Marine Fisheries Service and the National Marine Protected Areas Center.

## MPA Perspective Developing Design Guidance for Offshore MPAs

By Jennifer A. Brown and Lisa Wooninck

As human impacts on offshore ecosystems intensify, there is increasing interest in creating MPA networks for spatial protection of offshore resources. However, most of the scientific guidance for designing MPA networks — such as recommendations on size, number, and configuration of MPAs — has been developed for networks located nearshore, in shallow-water habitats like coral reefs and kelp forests. As managers consider network design for deeper, offshore habitats, it is important to consider whether recommendations developed for nearshore MPAs are appropriate for offshore sites.

To address this issue, the Monterey Bay National Marine Sanctuary (MBNMS) co-hosted a workshop in December 2006 of marine ecologists and fisheries biologists, in partnership with the National Marine Protected Areas Center. The workshop asked participants for preliminary guidance on designing zones in offshore habitats (deeper than 100 m) of the 13,783-km<sup>2</sup> MBNMS. These zones, which are theoretical thus far, would focus on enhancing habitat/biodiversity conservation and research opportunities in the multiple-use sanctuary. They could feature a range of regulations, from allowing some extractive activities to a full ban on extraction.

Although these guidelines were developed specifically for an MBNMS stakeholder group that is considering the utility of offshore MPAs, they may also be useful to stakeholders and scientists in other regions. The workshop conclusions are summarized below.

1. Habitats should be used as proxies for species, and areas with high habitat heterogeneity may indicate areas of high species diversity. According to workshop participants, the distribution and abundance of deepwater benthic habitats is relatively well-known, including large topographic features (e.g., submarine canyons) and smaller features such as sediment type, rock type, relief, and depth. Comparatively less is known about deepwater species — especially adult movements and larval dispersal patterns — although some information on general habitat-species associations is available, particularly on how species assemblages vary with substrate type and depth. Consequently, benthic habitats were recommended as proxies for the location of species assemblages. For example, if the goal of an offshore MPA is protection of species diversity, then targeting areas with high diversity of benthic habitats (i.e., “habitat mosaics”) may be a good way to achieve this goal.


2. Increased species diversity may be achieved by overlaying benthic mosaics with persistent pelagic features or processes. In addition to evaluating heterogeneity of benthic habitats for site selection, called a primary habitat consideration, participants discussed a

variety of oceanographic processes and features that were termed secondary habitat considerations. Some oceanographic features, for example (upwelling shadows, retention zones, and frontal waters), are associated with increased diversity and abundance because they aggregate plankton and attract pelagic animals. In some cases, these pelagic habitats are persistent because they are associated with fixed topographic features.

3. Offshore MPAs may need to be larger compared to nearshore MPAs to capture adequate, suitable habitat and species abundances. On the U.S. west coast, hard-bottom habitats tend to be more abundant nearshore, becoming sparser as depth increases. Densities of macrofauna tend to be lower in the more homogeneous soft-bottom habitats that dominate offshore ecosystems. In addition, fishes in offshore waters tend to have larger ranges of movement, possibly due to the need to forage over homogeneous soft bottom habitat.

4. Compared to the many, smaller MPAs of nearshore networks, offshore networks should contain fewer, larger MPAs (see above) that are distributed widely. This type of configuration incorporates latitudinal variation in species distribution, habitat characteristics, and oceanographic processes. Fish and bird assemblages, for example, tend to vary biogeographically according to latitude. Geology and submarine canyon type also vary north and south of the Monterey Canyon in the MBNMS.

5. Consider continuity of offshore MPAs with existing nearshore MPAs to capture age-related and seasonal migratory patterns of species. MPAs can be networked through two processes: continuity and connectivity. Networking through continuity is based on active movement of juveniles and adults from one MPA to another, while connectivity is based on dispersal of larvae. Maximum continuity for juvenile rockfish (*Sebastes* spp.), for example, could be achieved using nearshore and offshore MPAs that are contiguous (sharing a common boundary), thus providing uninterrupted protection as the fish migrate to deeper water as adults. For an offshore network of fewer, larger MPAs, effective networking via larval dispersal will likely be achieved given the following criteria: the size of the managed area is not disproportionately large relative to MPA sizes within the network; offshore species have larvae with large dispersal distances; and MPAs in the network contain representative habitats.

6. When appropriate, protect unique or rare habitats (such as seamounts and canyons with endemic species) regardless of the feasibility of networking such potentially remote areas. Not all MPAs are easily connected within a network. 

### For more information

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## Notes & News

### Australia formally designates MPA network for Southeast region

On 5 July, Australia formally designated a network of 13 new MPAs in its Southeast marine region, in waters off southern New South Wales, Victoria, Tasmania, and eastern South Australia. The network covers 226,000 km<sup>2</sup> and will come into effect on 3 September 2007.

In June 2006, *MPA News* reported stakeholder views on the Government's final plan for the Southeast MPA network (*MPA News* 7:11). The Southeast region is Australia's first to undergo an MPA network planning process as part of a nationwide effort to designate a representative system of MPAs by 2012. The new Southeast MPAs comprise several different levels of protection, from no-take zones, to recreational use zones, to special purpose zones for oil and gas activities.

Some fishing methods, such as bottom trawling, are banned throughout the network. However, the Government says the MPAs will have a 90% lower adverse impact on the fishing industry compared to an earlier proposed network plan, released in December 2005. Fishing industry associations responded favorably in general to the final plan and recent designation.

Conservationists and some scientists have criticized the new network for protecting relatively little of the continental shelf in no-take zones — less than 1%. Graham Edgar, a senior research fellow at the University of Tasmania who also works for Conservation International (an NGO), led a group of marine scientists who critiqued the final plan last year. "The planning process received no significant input from the scientific community, and generated badly flawed outcomes," he says. "It is depressing that following the zoning of 33% of the Great Barrier Reef Marine Park as no-take conservation zones [*MPA News* 5:10], the Australian Government announces this network that includes 0.4% of the continental shelf as no-take conservation zones."

Information on the network and its planning process is available at <http://www.environment.gov.au/coasts/mpa/southeast/index.html>.

#### For more information

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### Mexico designates MPA in Gulf of California

The government of Mexico has designated a 3880-km<sup>2</sup> MPA along the eastern coast of the Baja California peninsula. The Bahía de los Angeles y Canales de Ballenas y Salsipuedes Biosphere Reserve includes the peninsular and island coastlines, the waters surrounding the Bahía de los Angeles and Angel de la Guarda archipelagos, and the channels separating the archipelagos from the peninsula.

"This biosphere reserve is designed as a laboratory for fisheries management," says Gustavo Danemann of Pronatura Noroeste AC, a Mexican NGO that led the public consultation process to plan the reserve. "As a result of fisheries research conducted in the area since 1998, this is the first Mexican MPA to have a complete baseline on the status of its fisheries and natural resources from the moment of its designation." The baseline information will support the design of management plans for individual fisheries, and help evaluate plan performance, says Danemann.

Only a small percentage of the reserve consists of no-take "core zones" — just 0.05% of the total area. However, the reserve is adjacent to the San Lorenzo Archipelago National Park, an MPA that shares the same ecosystem and includes an 88-km<sup>2</sup> no-take area. "That no-take area will serve as a control site for fisheries management at Bahía de los Angeles," says Danemann. Designation of the new MPA expands a continuous network of five terrestrial and marine protected areas, covering 55,600 km<sup>2</sup> and extending from the Pacific Ocean across the central portion of the Baja California Peninsula to the Gulf of California.

#### For more information

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### Guidebook: Choosing and installing the right moorings for your MPA

A new publication offers guidance for MPA managers on how to choose the right moorings and install them in the most ecologically sustainable manner. Co-published by the Université de Nice-Sophia Antipolis and Parc National de Port-Cros in Nice (France), the report describes which mooring types are appropriate for various ecosystems (coral reefs, seagrass beds, sandy bottoms, etc.) and lists suppliers of each type. Installation techniques are described in detail. "This guide will help in the choice of the most adapted ecological solution, depending on the environment in question," states the report. The 70-page *Management Guide for Marine Protected Areas: Permanent Ecological Moorings* is available in PDF format at [http://medpan.org/\\_upload/916.pdf](http://medpan.org/_upload/916.pdf).

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### Report describes economic aspects of MPAs

A new report documents and explains the economic aspects of MPAs: from methods for estimating MPA benefits, to the financial importance of managing sustainable sites, to "market failures" of MPAs, and more. "This book was devoted to introduce the reader to the concept of economics, how it is implemented in natural resources management, and especially how it could be applied to MPAs," state co-authors Nir Becker and Yael Chosh, both of Haifa University (Israel). The 68-page report *Economic Aspects of Marine Protected Areas* was published by the Tunisia-based Regional Activity Centre for Specially Protected Areas (RAC/SPA), which advises and assists Mediterranean countries in protecting biodiversity. It is available in PDF format at <http://rac-spa.org/telechargement/ASPIM/ev2006.pdf>.

### New information tools on coral reef MPAs

Information on MPAs with coral reefs in East Asia and Micronesia is available on a new DVD and associated website, launched in June 2007 at the 21<sup>st</sup> Pacific Science Congress in Okinawa, Japan. The DVD and website ("Coral Reef MPAs of East Asia and Micronesia") provide site data on MPAs in 16 countries, as well as country and region summary reports and a GIS map. The materials are the product of a collaborative project between The WorldFish Center and the Japan Wildlife Research Center, and funded by the Japanese Ministry of the Environment as part of the Japan-Palau joint ICRI Secretariat Plan of Action 2005-2007. For more information, go to <http://www.reefbase.org/mpa/mpa-database.html>.

Members of the International Coral Reef Initiative (ICRI) approved a recommendation in April 2007 on developing MPA networks. The statement urges ICRI members to establish and effectively manage MPAs, recognizing that approaches to MPAs vary considerably among ICRI member countries and regions. ICRI is a partnership among governments, international organizations, and NGOs. The recommendation document is available in PDF format at [http://icriforum.org/library/Reco\\_MPA\\_Tokyo\\_0407.pdf](http://icriforum.org/library/Reco_MPA_Tokyo_0407.pdf).

### Spanish-language "Training of Trainers" course available in September

A course to instruct MPA managers from the Caribbean on how to train local personnel in MPA management will be held 9-23 September in Tulum, Mexico. Facilitated by the UNEP-Caribbean Environment Programme (UNEP-CEP), this "Training of Trainers" course will be in Spanish only. UNEP-CEP has offered Spanish- or English-language versions of the course each year since 1999 (*MPA News* 2:2). Training modules

will cover the subjects of biology, impacts of use, participative planning, research and monitoring, and communications, among other subjects. For more information, go to <http://cep.unep.org/meetings/2007/convocatoria-al-curso-capacitacion-de-capacitadores-en-el-manejo-de-amps-en-el-caribe>.

### Article available on development of pelagic MPAs

A recent article in *Marine and Freshwater Research* journal (Vol. 58, pp. 558-569) uses MARXAN spatial planning software to model marine reserve networks on the open ocean, including how large these would need to be to be effective. Three distinct management approaches were evaluated for the networks: fisheries priority, conservation priority, and equal fisheries-conservation priority. Co-authors Jane Alpine and Alistair Hobday of Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) concluded that setting aside from 7%-26% of the open ocean in no-take reserves would enable any of the three management scenarios to be effective, despite the dynamism of open ocean ecosystems and the high mobility of pelagic species. "Although a first step, the study provides an encouraging result, firmly indicating that the notion of pelagic protected areas [holds] as yet untapped protection possibilities," write the authors. For an electronic copy of the article, e-mail Jane Alpine at [jane.alpine@csiro.au](mailto:jane.alpine@csiro.au).

### Paper discusses cold-water coral disease in MPA

A new paper in the journal *Diseases of Aquatic Organisms* (Vol. 76, pp. 87-97) describes the first recorded incidence of disease in cold-water corals. The disease, discovered in 2002 in the UK's no-take Lundy Marine Nature Reserve, causes death in *Eunicella verrucosa*, a coral species on the international "red list" of threatened species. "We found an outbreak of disease that has since been recorded all around southwest England," says Jason Hall-Spencer, a biologist at the University of Plymouth who co-authored the paper with James Pike and Colin Munn. "This is a worry since a highly protected species in a highly protected area has been dying off."

Munn, a microbiologist, says it appears that environmental stress has altered the normal balance of microbes populating the coral species (a type of sea fan), allowing disease-producing bacteria to take over. "Nutrient enrichment and temperature increases have been shown to be responsible for other coral diseases, but what triggered this outbreak is still unclear," says Munn. For a copy of the paper, e-mail Jason Hall-Spencer at [jason.hall-spencer@plymouth.ac.uk](mailto:jason.hall-spencer@plymouth.ac.uk).