

John Davis:

All right everybody, my name is John Davis. I'm the editor of MPA News, the good global newsletter on marine protected areas. For more information on MPA News, including past issues of the newsletter and instructions on how to subscribe, please visit our Web site at www.mpanews.org.

MPA News is co-presenting this webinar with the EBM Tools Network, a voluntary alliance of leading tool users, developers, and training providers. Their Web site is www.ebmtools.org.

We welcome all of you. This is the fourth webinar co-presented by MPA News and the EBM Tools Network, and we look forward to hearing from you afterward with your feedback on it. There will soon be a poll question on screen that we'd like for you to answer as best you can to give us a sense of the make-up of our audience. Thank you for doing that.

This is how the webinar will work. Our four panelists will each provide an audio/visual presentation. Those of you in the audience will actually see each speaker's PowerPoint presentation on your own computer screen. Then we will open the floor to questions from the audience for the remainder of the webinar. We will conclude it about an hour-and-a-half from now.

Our panelists are Kristina Gjerde of the Global Ocean Biodiversity Initiative, Jeff Ardron of the Marine Conservation Biology Institute, and Pat Halpin and Daniel Dunn of Duke University. I'll describe them in a bit more detail in a couple minutes. I'll turn it over now to Sarah Carr of the EBM Tools Network to provide instructions on how you can deliver your questions to our panelists.

Sarah Carr:

Okay, thanks everybody. There's two ways to ask questions during the webinar, and we encourage you to send in questions throughout the webinar, even while the presenters are speaking, although we may hold most questions until the "Question and Answer" period.

There's two ways to send in questions. First of all, you can type them into the "Question Panel" of the user interface, and then John and I will read them out to the speakers to answer. Or, you could raise your virtual hand to be unmuted, but please only choose this option—and we do highly encourage you to be unmuted and ask your questions directly of the speakers—but only choose this option if you actually have a microphone or are using your telephone and have entered the pin number, otherwise we won't be able to hear you.

John Davis:

Great, thanks, Sarah. Did the poll already go up on screen? Excellent! All right, we ask that folks in the audience respond to the poll as we can get a sense of what your interests are in this topic. Before we get started, we'll give you some time... About half of you have voted so far, and still going up... About three-quarters... That's good enough. So close the poll.

Let's see, nearly half are involved in MPA policy development. About a third involved in open ocean or deep sea conservation. "Other" is a third, and maybe we'll find out what that "Other" entails from you in your questions if you care to mention what you're involved in, in asking your questions. That's great. Thank you very much for participating in the poll, and we will get started right now.

Our first speaker is Kristina Gjerde. Kristina is High Seas Policy Advisor for IUCN, and acting coordinator of the Global Ocean Biodiversity Initiative, which she will be describing.

She is a graduate of New York University School of Law, where she specialized in International Law. After practicing shipping law on Wall Street for several years, Kristina transitioned to the policy world via a fellowship at the Woods Hole Oceanographic Institution. In 2003 she was awarded a Pew Fellowship in Marine Conservation for spearheading a global initiative to improve high seas governance.

Kristina is an avid diver with a fascination for the deep sea. Here is Kristina Gjerde.

Kristina Gjerde:

Well, thank you very much, John. It is indeed a pleasure to be virtually there, in your living rooms or your offices. It is a novel experience for me, but I hope we'll all adapt and evolve together.

What I'm going to be talking about today is the international legal context for identifying MPAs beyond national jurisdiction. But first what I thought I'd try to do is to discuss definitions—open ocean, deep sea, high seas, the seabed Area—what we mean when we use these terms, sometimes interchangeably, though they have quite different meanings. Then some of the international legal background; I'll try not to go too in-depth, but I'm hoping you will ask questions later.

We'll talk about protective spatial measures that are already in place in areas beyond national jurisdiction. We'll talk about some

of the barriers and obstacles to obtaining more, and describe what we're doing to address one of the key barriers, which is scientific information and data, through the Global Ocean Biodiversity Initiative.

So with that, I'll let you see the open ocean rather than having to describe it (photo of seabird skimming blue water). It's basically areas beyond the geological continental shelf; ocean areas (in red in the map on top) beyond the natural extension of continents—generally out to about 200 nautical miles from shore. While in some areas the open ocean can start close to shore (if you have a submarine canyon or other steep dropoff), in areas with broad continental shelves it can start beyond 200 nautical miles.

The deep sea generally starts at around 200 meters below sea level, the average depth to which light penetrates. The deep sea in fact covers 95 percent of the global biosphere, containing a significant part of the world's biological diversity, particularly on the deep seafloor. Its capacity to absorb and store heat and carbon dioxide make the deep sea a very important provider of the ecosystem service of regulating climate and climate change.

Then you have the light blue area on the map below—the high seas, which is the roughly 64 percent of the ocean that is beyond the jurisdiction of any individual state. The "high seas" is a legal term, an artificial boundary set generally at 200 nautical miles from shore. The seabed "Area", as shown in the next chart, starts at the outer limits of the legal continental shelf (as defined in the UN Convention on the Law of the Sea), or 200 nm from shore, whichever is furthest.

As we know, the pressures of intensifying human uses, climate change and ocean acidification are impacting the oceans as a whole. But it is more difficult to protect areas beyond national jurisdiction because no one state has sole responsibility for maintaining, conserving, or even consuming the resources of the high seas or deep seabed Area. Instead biodiversity conservation is subject to, and dependent upon, the cooperation of all.

What we're here to talk about today is marine protected areas and the targets that states have adopted through the Convention on Biological Diversity and the World Summit on Sustainable Development, which call for representative networks of MPAs by 2012, with the additional CBD target of 10 percent of habitat types by 2012—10 percent and beyond.

Here's a chart showing where we are with respect to meeting the 2012 MPA targets in various jurisdictional areas. As you can see, we've covered maybe 12 percent within territorial sea, areas close to shore, primarily coral reefs. But the further you get out into Exclusive Economic Zones (200 nautical mile area), you have much less coverage—up to 1.91 percent, which isn't very great—that's still less than 2 percent. Once you reach beyond 200 nautical miles, into the high seas, very little has, in fact, been protected. I will show you some areas that have been protected, but it still does not accumulate to anything near what is required to meet the targets, or near what many scientists claim is required to preserve vital ecosystem services for the planet.

So the international context is that, while species and biodiversity do not recognize political boundaries, the laws are quite different if you're dealing with areas within or beyond national jurisdictions.

The U.N. Convention on the Law of the Sea is the most comprehensive treaty we have to-date. It covers activities and rights both within and beyond national jurisdiction. But in areas beyond national jurisdiction, states have what are termed, "the freedom of the seas." These freedoms include fishing, navigation, conducting marine scientific research, and even authorizing vessels to fly your flag. But what is sometimes forgotten in the rush to fish is that there are very specific duties elaborated—contained—in the Law of the Sea Convention, including the duty to conserve living marine resources, protect the marine environment, and to control your vessels and citizens that you do authorize to conduct activities beyond national jurisdiction.

What the Law of the Sea Convention lacks is a specific mandate, or duty, to establish marine protected areas beyond national jurisdiction. But it does provide a framework within which you can operate (and co-operate).

Because nations have realized that more needs to be done to protect the ocean, both within and beyond national jurisdiction, they committed themselves politically to further action and targets at the World Summit on Sustainable Development, including the famed 2012 target for establishing representative protected areas networks.

So even though the WSSD targets are not legally binding on any particular state, they do show an international commitment to take action. This commitment has been developed through parties to the Convention on Biological Diversity, which currently has 192

state members—almost the entire universe of states other, unfortunately, than the United States. I think even Iraq has joined. But the U.S. is a very active participant in the CBD discussions, and has been supportive of much of the conservation work done under the convention.

The parties to the CBD, in 2006, agreed to encourage everyone to establish marine protected areas beyond national jurisdiction, and called on the United Nations—which is the legal body with the most comprehensive authority to adopt new instruments regarding areas beyond national jurisdiction—to take action to facilitate the establishment of effective and enforceable MPAs and networks.

In May of 2008, the Conference of Parties to the CBD adopted scientific criteria for identifying ecologically or biologically significant areas in need of protection in the open ocean or deep sea. These criteria specifically refer to the open ocean and deep sea, rather than the high seas and seabed Area, because the CBD parties wanted to promote action on an ecosystem basis regardless of legal boundaries. They also didn't want to deal with the politics of having to say these criteria were specific to the high seas.

The CBD parties also adopted scientific guidance for designing representative networks of MPAs. You may ask: Why was new guidance needed, when there's plenty of MPA manuals out there already? But this Guidance was developed specifically to deal with the lack of information, the lack of data, and the lack of experience in designing MPA networks in the more remote oceans.

As I said, the United Nations is the focal point for the Law of the Sea Convention, as well as for some other treaties that control activities beyond national jurisdiction. The United Nations General Assembly has established an ad hoc open-ended working group to address issues relating to conservation and sustainable use of biodiversity beyond national jurisdiction. This working group met in 2006, as well as 2008, and will be meeting again in February 2010. This is an informal meeting of the whole General Assembly; basically all the countries who are members of the United Nations send their ocean experts, their legal experts, their fisheries experts, and such, to discuss issues of common concern.

What came out of the previous two working group meetings was strong agreement that we need to better enforce and implement our existing instruments. Many countries also agreed on the need to develop area-based management tools that would enable the designation, management, and enforcement of MPAs, as well as

other types of closures, and to encourage marine scientific research to learn more about what we're trying to protect.

An example of the type of protective measures that the United Nations can take to protect biodiversity beyond national jurisdiction is United Nations General Assembly Resolution 61/105 that was adopted in 2006. This resolution was adopted because there was a huge gap in international law with respect to high seas bottom fishing, and there were vessels fishing in the high seas without any regulations to control bottom fishing or its impacts on deep sea biodiversity. There were, in fact, many areas of the ocean where you had no competent authority to adopt these regulations.

So the U.N. General Assembly took the issue under its remit and actually called on states and regional fisheries management organizations to adopt (by 2007 and 2008) concrete measures to protect vulnerable marine ecosystems from the adverse impacts of high seas bottom fishing activities. In specific, they called on states and RFMOs to prevent significant adverse impacts to vulnerable coral reefs and other fragile deep sea habitats through closures, through prior impact assessments, through scientific research and through the adoption of other measures, so they can predict and prevent significant adverse impacts before fishing is allowed to proceed. Just recently, in December of 2009, this resolution was affirmed, clarified, and even strengthened in many ways.

International commitment to MPA networks was recently reaffirmed in the Manado Ocean Declaration, which demonstrates that countries continue to see the need for marine protected area networks particularly in the context of climate change and all the various cumulative and synergistic threats that are occurring to the ocean within and beyond national jurisdiction.

With respect to protective measures in place for high seas areas, the United Nations Environment Program World Conservation Monitoring Center has put together a map that shows some of the areas where measures are in force. For example, the Pelagos Sanctuary in the Mediterranean Sea was designated in 1999 as the first largely high seas marine protected area. There is now a specific regional agreement—the Barcelona Convention—that has provisions for the designation of specially protected areas of Mediterranean importance (SPAMIs) both within and beyond national jurisdiction. This Pelagos Sanctuary was designated as a

SPAMI in 2002 because of its importance for a very large number of Mediterranean marine mammals.

Unfortunately, the Pelagos Sanctuary is not such a grand example of a high seas marine protected area, because like with too many MPAs closer to shore, they've never adopted a management plan, and few regulations have actually been put into place. But it is an example of how international cooperation can work, and the relevant parties are now intent on making it work.

In the Northeast Atlantic, the Charlie Gibbs Fracture Zone has been approved as a high seas MPA in principle by the OSPAR (Oslo-Paris) Commission, which has the conservation of the Northeast Atlantic under its remit. They're hoping this will be formally adopted as an MPA in early 2010. The OSPAR Commission is one of the few regional organizations with a specific remit to promote the adoption of an ecologically coherent and well-managed network of marine protected areas by 2010, including in areas beyond national jurisdiction

The area south of the South Orkneys in the Antarctic was just adopted in November 2009 as a high seas MPA by the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR), which has a fairly broad remit with respect to marine living resources. Unlike most RFMOs, it focuses on the entire ecosystem, as opposed to focusing just solely on tuna or tuna-like species, or other fishery resources. So CCAMLR members have taken their conservation obligation to heart and have established this huge area—practically 94,000 square kilometers—where they will make sure no fishing activities occur, and that no fishing vessels will discharge waste. The closure goes into effect in May 2010. It's a rather nice example of the way protective measures can be quickly brought into force.

There is also activity in other regions. In the Pacific, the Central and Western Pacific Fisheries Management Commission has closed two of the four what are called "donut holes"—areas that are surrounded by Exclusive Economic Zones, to pelagic fisheries activities. Some organizations, for example, Greenpeace, are trying to put together management plans to see how these areas can be better conserved and organized.

The OSPAR Commission of the Northeast Atlantic has a further six areas under consideration, which have unfortunately run into a slight obstacle that needs to be worked out regarding overlapping claims by states for extended continental shelves. But as you

would have in open ocean areas straddling the boundary between national jurisdiction and the high seas, there's potential for international and state cooperation in order to develop a management regime. So there is hope these will go ahead too.

On the deep seabed Area, the International Seabed Authority, which has jurisdiction over mining activities, is considering the adoption of a network of nine areas of particular environmental interest within the manganese nodule fields of the Clarion Clipperton Fracture Zone in the central Pacific Ocean. If adopted, these nine sites would protect 30 percent of the area from the impacts of mining activities.

With respect to the Southern Ocean, there's a large coalition of organizations working to promote protection for the Ross Sea as one of the last relatively intact large marine ecosystems.

But why aren't there more high seas MPAs, and why aren't we making faster progress? Well, like a tiny sea turtle hatchling, we do have some obstacles that we need to overcome, primarily stemming from lack of scientific information (where are the areas we need to protect), but also awareness (why we should be protecting them), political will (how should we go about doing it), and, of course, the funds to underwrite the activities, including research as well as actual management and enforcement.

Other obstacles include the lack of distinct legal mechanisms for recognition of sites meeting the CBD criteria and clear agreement on the selection and management of MPA networks. I would just note however, that regional fisheries management organizations can, already, close areas to fisheries and could in theory recognize areas that have been identified as needing protection and close them to all or just some kinds of fisheries activities.

So in terms of the priority needs, we need to work towards faster and better identification of significant areas, and towards designing representative networks. And, we need more cooperation and coordination between sectoral organizations, and between regional organizations and the sectoral organizations with authority over shipping, waste dumping, fishing, as well as other activities that may emerge.

The Parties to the Convention on Biological Diversity will in 2010 be talking about how well we have met the global target of reducing the rate of loss of biodiversity. As we're nearing the 2012 target (for establishing networks of MPAs), we need to come up

with new targets and objectives to move from international commitment to international cooperation, building on both regional and sectoral initiatives.

In addition to scientific information and targets to drive progress, we also need to work towards the adoption of protective measures, environmental impact assessments and other tools to improve management. And, of course, we need donor support.

The Global Ocean Biodiversity Initiative (GOBI) is trying to address the first of these concerns, to bring together scientific information. It is a two-year project, supported by the German Federal Agency for Nature Conservation, to help identify significant areas meeting the criteria adopted by the CBD in 2008 by compiling and analyzing the best scientific information available.

We have a wide array of partners that we're continuing to expand. GOBI partners include the Census of Marine Life, UNEP-WCMC, Duke University's Marine Geospatial Ecology Lab, the Ocean Biogeographic Information System (OBIS), Marine Conservation Biology Institute (MCBI), BirdLife International and the University of Freiburg's Evolutionary Biology and Ecology Lab. If you're interested, please contact us. We're always looking for new ways to expand our collaboration and activities.

You'll be hearing more from Pat, Dan, and Jeff about what GOBI has been doing in terms of illustrating how you can identify (using current data, tools and technologies) ecologically and biologically significant areas. I would just note that our illustrations are available to watch and interact with via Google Earth. We also have a website filled with resources that we continue to evolve and expand, and welcome your input on that.

<http://openoceansdeepseas.org>.

In closing, I'll just say that though we are faced with significant obstacles in trying to identify and protect vulnerable and significant high seas areas, we do have very helpful and important opportunities to hand. We have rapidly developing science: with the celebration of the results of the 10 year Census of Marine Life in October 2010, tremendous new resources will be coming on line. We have increased awareness and political will, and we have the UN working group meeting in February 2010 with a specific mandate to talk about conservation beyond national jurisdiction. And finally, we have regional seas organizations and fisheries organizations that are now capable of responding to the need and

public demand to protect biodiversity even in the remote ocean beyond national jurisdiction.

So with that I'll just say thank you, and turn it back over to John and the rest.

John Davis:

Excellent. Thanks a lot, Kristina. That was a great overview and I look forward to checking out all the resources on the GOBI Web site. It's quite a robust Web site that you've already put together.

Our second speaker is Jeff Ardron. Jeff is currently working in Washington, D.C., as director of the High Seas Program for the Marine Conservation Biology Institute. Previously for three years, he was a senior scientific advisor on marine protected areas for the German Federal Agency for Nature Conservation. He has also consulted widely, and recently for marine planning projects in West Africa, Canada, and the U.K. He serves on the IUCN World Commission on Protected Areas as advisor on MPA design, tools, and software, and also serves as a scientific advisor on the High Seas MPA Taskforce.

Jeff is a co-founder and current president of the Pacific Marine Analysis and Research Association, or PACMARA, in British Columbia, Canada. He has worked in the fishing sector, NGO sector, in federal government, and within international conventions. A specialist in marine spatial planning, systematic conservation design, and international maritime policy, a central theme throughout his work is the bridging of marine science with policy development. Here is Jeff Ardron.

Jeff Ardron:

Thank you, John. I think Kristina gave everyone a very thorough overview of the high seas situation, and I thank those especially on the West Coast of North America who got up a little bit earlier maybe to watch this presentation. We chose the time so that people in Europe could also join, so there's always a compromise there.

Since John did an excellent job of introducing me, I think I'll move on to the next slide. I wanted to remind people that the Convention on Biological Diversity passed, or adopted, certain criteria to identify these things they call EBSAs—Ecologically or Biologically Significant Areas in the open oceans and deep seas, as Kristina defined them earlier.

There are seven criteria for these ecologically significant sites, and a little bit later in this presentation I'll talk about one of them. But

I wanted to point out that these criteria will probably appear in different places; they may overlap at times, but many times they will not—they may actually compete for political and scientific attention. So one challenge of our project will be to figure out how to select places as sets to make them coherent networks.

A little later I will talk about an example that my organization, the Marine Conservation Biology Institute, has been involved with looking at corals, but right now I'd like to also point out that in addition to site criteria the CBD adopted network criteria. This is a rather unique division: there's no other criteria system that I'm aware of that broke down site criteria from network criteria, and this was quite insightful as they often are not the same thing. I was part of the group that were looking at this and we went through over, I don't know, two dozen or more different criteria systems around the world to boil it down to what you see here.

Then finally, there's a bit of guidance, again, adopted by the CBD—or noted by the CBD, I think was the correct terminology—that talked about the steps that one would go through identifying sites, and then overlaying these on a classification system, and finally trying to look at the gaps, the first three steps. Assessing the adequacy and viability of sites is right now, I think, outside of the GOBI project—the Global Oceans Biodiversity Initiative—but we are certainly looking at these first three steps.

So a little bit about GOBI. We just adopted this name earlier this year in September, though we've actually been working together for about a year before that. This is the main document that we presented to an expert's meeting at the Convention on Biological Diversity in Ottawa, Canada. I, amongst many other authors, was part of this. It was broken into two parts. The first part was guidance and I've listed on the left-hand side of the screen some of the guidance that we provided, and then there were also illustrations. Pat and Daniel will later be talking about the illustrations.

There are a lot of issues that come up over and over no matter where you are on the oceans, but especially on the high seas. Things like sampling and data issues, including the lack of data. Capacity and scale of the analysis. How to determine when something is significant relative to other features like it. Variability, precision, accuracy, and uncertainty. So we tried to cover some of this at least on a preliminary basis in this report to help countries along in their identification of such areas. As Kristina pointed, out there's a Web site,

www.openoceansdeepseas.org, where you can download this document.

We are hoping to continue to add to the documents. One will be discussing multi-criteria analysis. I've already started to hear people asking, "Well, why don't we just score the sites according to those seven CBD criteria and add them up?" That's a very bad idea. We used to do that a little bit in land conservation maybe 10-20 years ago and discovered there are all kind of problems doing that. For instance, a bunch of "1" scores for various features will add up to a single misleading high score, the first point on this slide. There are many other problems with using scoring, but I just thought I'd get that out there. It's not a good idea to score your sites, there are other ways to do it and we will talk about that more later.

So really there are two things to address here. First is to identify significant sites or areas that fit the CBD's criteria for ecological significance, or really anyone else's criteria. Then the second thing is, from all these sites that we've identified, how do you start selecting them to make coherent networks?

I wanted to point out that I've also been involved with my colleague, John Guinotte and many others—Malcolm Clark, Les Watling, Craig Smith, and Ashley Rowden—on a global seamount classification system. We presented this to the CBD meeting, but I don't really have time to present it here, other than just to note that there is now a global seamount classification system. It is in press, I believe. I don't think I've seen the paper yet, but it's been accepted last I heard. I think I'm right on that, actually, I'm not entirely sure, but it's either in submission or in press, and it's out there. This would be overlaid over the existing GOODS classification—the Global Open Ocean Deep Sea classification that the UNESCO IOC published earlier this year.

So we do now have some global classification systems out there, which we can use as reference points for things like representivity.

This slide just shows you that fishing does have an effect on the naturalness of sites. Places where fishing has occurred, in this particular example of seamounts in New Zealand, no corals were found—simply no corals were found; whereas, in neighboring seamounts corals were still found.

So we decided that there was a need to start to predict the distribution of coral habitat before perhaps they were lost through

fishing or other activities. This project involves a number of institutions and authors. I'd like to highlight, in the bottom right-hand corner—Alex Rogers, Andrew Davies, John Guinotte, Derek Tittensor—have all been involved in this project, and our respective institutions that are listed on the left-hand side of the screen.

Just in case you haven't heard, deep water corals are indeed sensitive, fragile, slow to recover, and in many cases they are also vulnerable to human activities.

I'm just looking at my screen here and see that there's a bit of a lag time. So I might just wait for it to catch up.

In this analysis we used 4,000 combined coral records, but as you can see on this map, some of them are very sparsely distributed in some parts of the earth, so predictive modeling was in order.

In our analysis we used a variety of variables (I don't expect you to be able to read these necessarily on your screen), 26 different physical environmental variables to begin to model the possible distribution of corals. We were using the maximum-entropy approach—Maxent—some of you may be familiar with.

One big difference in our analysis from previous analyses was the scale—the resolution. We took it down to 1-kilometer grid squares. In the upper left-hand side, you can see the scale of our previous work on this question, and then the bottom right you can see how much less pixilated things become. This is important not just because it makes pretty maps, but because now we are getting results that are at a scale relevant to management measures. Previous modeling results simply were too broad; they were like these red smears across maps.

Here are the results of some of our runs, but I know they're very hard to see. So let's look at a couple areas, and I've put boxes around them—Areas 1 and 2.

The first area we will look at is the North Atlantic where a considerable number of closures have been put in place. Here we're showing in black hashing the closures that have been enacted by the North East Atlantic Fisheries Commission and the Northwest Atlantic Fisheries Organization. You can see by the colors that while these closures do indeed capture a number of areas that the model predicts would have stony corals—Scleractinia family of corals—there are also many other areas that

I've circled in pink that probably warrant further investigation because they are not currently under any protection at all. Still, a good beginning in the North Atlantic.

The next place I wanted to zoom into was the Indian Ocean. Of course, these are vast, vast areas of water, and it's misleading to put such a vast area on one PowerPoint slide. Nonetheless, you can see in the yellow boxes some of the voluntary closures by a fishing association in the area. Voluntary closures, of course, come with all kinds of issues, such as compliance, but that said, there are nonetheless some voluntary measures in place. But you can, again, see that some places appear to be potential hotspots for corals. Let's zoom into one of them, the circle on the right of center, and have a look there.

There, if we zoom in, you can see that there are indeed a number of seamounts, it appears, that could, however, be stony corals. Notice that the scale of our analysis allows for management decisions; you can actually see separate seamounts, and areas that appear to be hot. These could be targeted in research surveys, for example.

So what this analysis has demonstrated to us is that habitat modeling is certainly a form of decision support, not just in terms of what places to protect, necessarily, but also follow-up actions such as surveys, as well as precautionary management. For instance, they might be closed on a precautionary basis until they are surveyed and you actually find out if corals are or are not there.

Predictive habitat modeling is also applicable in data-limited situations such we find pretty much always in the high seas, and can help smooth out some of the effects of sampling bias.

Finally, as I mentioned earlier, we believe that these models really come into their own when they're at a scale that is appropriate for management. This link between science and management is not always made, sometimes for purely technical reasons. For example, at a one-kilometer grid square, we are dealing with single files that are almost a terabyte in size (they're about 800 gigabytes)—huge, huge files to do a global analysis. But computers do come with hard drives this size—you know, plug-in hard drives of that size. We can do it, and because we can do it I would argue that we should do it so that we can produce results that are useful to management.

So moving from looking at the GOBI project, it is in a period of transition right now, helping provide guidance on how things

might, could, should be done, to actually doing it. There's really four steps there.

There's assembling global data sets, which will require broad cooperation and I urge any listeners of this presentation to contact us if you have data—environmental data or biological data—that you feel might be helpful to this project.

Then there is the stage of identification. We don't pretend that we will ever be able to identify all the ecologically significant areas, certainly not by 2010, but we've got to make a start at it. Then from those areas begin to go through a process of selection, and that will probably be done on a regional basis using regional workshops. Then identify gaps, probably largely based on representivity, overlaying things like the GOODS biogeographic classification system, the seamount classification system, and other such classifications that may be appropriate regionally.

So those are the four steps as I see them. I just accidentally exited the presentation without giving thanks where thanks were due. I wanted to acknowledge the many people involved in this project—the GOBI project—and, of course, our partners. I'll leave it at that, and look forward to questions at the end of the presentations.

John Davis:

Great. Thanks a lot, Jeff. It's so exciting to see those relatively high res images of bottom habitat. It's such a big difference from what was available ten or even five years ago.

Our final speakers are Pat Halpin and Daniel Dunn. Patrick Halpin is the Gabel Associate Professor of the Practice of Marine Geospatial Ecology, and director of the Geospatial Analysis Program at the Nicholas School of the Environment and Earth Science at Duke University in the U.S. His research focuses on marine geospatial analysis, ecological applications of geographic information systems and remote sensing, and marine conservation and ecosystem-based management.

Professor Halpin leads the Marine Geospatial Ecology Lab at Duke University, and sits on a number of international scientific and conservation program steering committees, including the U.S. National Committee of the Census of Marine Life, the international scientific steering committee of the Census of Marine Life, the steering committee for the Ocean Biogeographic Information Systems International Committee, and the Google Oceans Advisory Council. He is heading the mapping and visualization

team responsible for assisting with the final synthesis and production of the first Census of Marine Life.

Daniel Dunn works for the Marine Geospatial Ecology Lab, where he focuses on ecosystem-based management and marine spatial planning, particularly as they apply to fisheries. His current research centers on applying the concept of marine protected areas to dynamic pelagic zones and to the mitigation of bycatch.

Previously his work ranged from being the project manager for the MEBM Tool Innovation Fund, to mapping fishing effort in data-poor situations. He is a liaison for the Census of Marine Life to the Global Oceans Biodiversity Initiative, and to the Secretariat to the Convention on Biological Diversity.

He is the editor of a group of illustrations depicting methods to identify ecologically or biologically significant areas beyond national jurisdiction, and will focus on that topic in his presentation today.

Here are Pat Halpin and Daniel Dunn.

Pat Halpin:

Okay, great. I think Kristina and Jeff have given a really good foundation for continuing to discuss the actual implementation of ecologically or biologically significant areas and the further development of marine protected areas in the open oceans and deep seas. What I want to focus on is some of the more practical issues of how do we actually do this? I'm going to focus from our perspective on working with the Census of Marine Life, which is a large international program, and OBIS, the Ocean Biogeographic Information System, on how we can actually put the data and knowledge together to be able to identify these areas in non-jurisdictional areas or seas.

So first slide just on outline. I want to discuss the role of the Census of Marine Life and OBIS, and the development and implementation of the EBSA criteria. I'll talk very briefly about some analysis and tools and resources that we're going to need to use that are pretty particular to these high seas issues. Then Daniel's going to take over and go through some brief illustrations of how you would implement some of the seven criteria—the ecological-biological significant area criteria—and then close by talking a little bit about the path forward.

Kristina already mentioned that 64 percent of the open oceans and deep seas lie beyond national jurisdiction. This really is an

extremely important issue because in national waters there's very compelling reasons that nations will take interest to fund scientific research and develop data sets on their own, individually, in their own territorial waters. But in the international non-jurisdictional areas, we really need to rely on international programs that have community-shared data.

So we feel that the Census of Marine Life can help address this issue, and this is something where having a truly international program representing right now more than 80 countries and 2,000 scientists, is a perfect match for trying to bring some of this data and some of this knowledge to bear for this issue.

The Census of Marine Life is a decade-long program. The first census is wrapping up next year, in 2010. The goal and mission for that program was to begin to assess and explain marine life diversity, distribution, and abundance for the past, present, and future.

The Census of Marine Life program is formally wrapping up in 2010, but there's many legacies from that program that are going to move on past 2010.

So I have, on the next slide just a screen capture of the main portal site for the Census of Marine Life, and if you're not familiar with the program you may want to visit the <http://coml.org> site to get more familiar with the activities going on around the world.

In addition, the Census of Marine Life, we feel, can help to deliver information on global patterns of marine biodiversity, information on past changes in marine biodiversity, predictive modeling of future biodiversity, and then probably most important for moving this program forward in the future is public access to information.

On the next slide, a screen capture from the OBIS site—the Ocean Biographic Information System portal, which is located at Rutgers University. The OBIS site is the global repository and aggregator for marine data currently. This site has now been adopted under the UNESCO IOC program, and will live on past 2010 permanently as an international function. So this is something that's changed very recently, and we're very happy about this. The OBIS system is an aggregator of data, and there's more than 20 million records online currently. It's continuing to grow very rapidly.

The OBIS portal is all open-access data available to anyone, so we feel like this is a very important tool into the future for being able to actually apply data in international non-jurisdictional areas to these problems. The Web site there is <http://iobis.org>.

Here at Duke, in my lab, we run one of the nodes that feeds into the OBIS network, and that's called "OBIS-SEAMAP," which is a particular node that thematically looks at marine mammals, sea turtles, and sea birds—the large mega-fauna in the oceans. So we're one of the contributing nodes into this OBIS network. The SEAMAP site focuses on those tasks, which are often protected species and highly visible species in terms of conservation issues.

One other activity, and one that we're using right now to try to move this forward, is the Census of Marine Life mapping program, which we currently run at the Marine Geospatial Ecology Lab. It is tasked with working with the GOBI initiative, with IUCN (Kristina and Jeff), on trying to make the data from the census available. So the CoML map site is working on tools and other ways that we can try to make these resources available, and start beginning to develop the criteria and develop implementation and pilot projects.

The diagram on the next slide is just showing kind of a schematic diagram of how we're working with the many field projects of the census (there's actually 17 large field programs of the Census of Marine Life that are divided up by oceanographic realms), working with the ocean OBIS portal, and then trying to facilitate analysis and technical tool development to feed in to the Convention on Biodiversity and the GOBI program.

There's emerging partnerships that have developed where we are looking at partnering with IUCN, with UNEP-WCMC, and our group, along with many other collaborators such as Bird Life International and other groups that are now participating. What formed as kind of an ad hoc group has now developed an acronym, at least, so we're now called GOBI, which is what Kristina described earlier.

Jeff mentioned the first publication that came out—gray literature publication that came out. It was a briefing document for a U.N. CBD conference workshop in Ottawa in late September/early October. This white paper, which is a draft document, was trying to provide information to the policy process to look forward at how we can put data together to actually meet the criteria that have been under development.

To organize this and try to draw in more partners, and to advertise the work, we're sponsoring with collaborators at WCMC and IUCN and other groups, the development of the Open Oceans and Deep Seas site. So I urge you all to come to this site. This is what we're trying to use as a platform that's specifically looking at this topic.

As far as analysis tools and resources go, the issues of dealing with the open oceans and deep seas really mean that we need to look far beyond the current methods people have been using for designing MPAs. Current MPA design often is in shallow territorial waters where data is more accessible, it's easier to observe things, and also we're not dealing as much with ephemeral features. You still are dealing with a lot of ephemeral, dynamic features. But in the open oceans a lot of these things become much more apparent.

Many of the EBSA criteria, which Daniel's going to talk about in a minute, deal with issues that may not be particularly familiar to people who are currently working in the MPA world. Many of the criteria deals specifically with analysis of biodiversity, looking for biodiversity hotspots, looking for species ranges and critical parts of species habitats, looking for specific physical habitats, looking at highly migratory species and migratory corridors in the oceans, which is going to be a fairly challenging new effort. Then the last two are much more oceanographic. Some of the specific criteria are looking at dynamic oceanographic features and things like ocean productivity.

So each of these different areas are going to require us to stretch the way we've been designing and identifying hotspots in the ocean, and identifying how we present these as potential marine protected areas in the future.

I'm going to shift now over to Daniel who's going to talk very briefly about criteria, and illustrations of the EBSA criteria. This is a screenshot here of sites that were selected not as potential marine protected areas, but just sites that were picked because we thought they might be representative discussion points to illustrate how you might implement different ecologically or biologically significant area criteria.

So at this point I'm going to shift over to Daniel, and Daniel can begin to cover the next set of slides.

Daniel Dunn:

Okay. Thanks, Pat. Pat's still controlling the slides, so I'm going to be asking him to move them forward.

First thing I wanted to do is thank everybody for participating in this. I think these webinars are a really great resource, and thank Sarah and John for putting them on. Between these webinars and the EBM Tools Network webinars and tool demos, they're doing some great work and I'm really excited that we are getting the chance to present to you today.

Secondly, I'd like to thank everybody who participated in creating these illustrations. I'm actually not presenting any of my own work today and one of the benefits of editing a document like this is that you have lots of partners, and those partners show up when you do a webinar. So we're padding the numbers of this webinar by at least a few. I saw Ben Lascelles, Ei Fujioka, Andre Boustany, and Jesse Cleary all on the list there. So the good news about that is that they will be able to answer any questions we might hit them with, with the specifics of these illustrations.

I'm going to dive right in. Next slide please. I think you've seen [the CBD EBSA criteria] in a couple of these presentations. These are the seven criteria that the CBD has come up with for identifying EBSAs, and our task with these illustrations was really to begin to flesh out how you might identify areas that meet these criteria. They are not terribly specific, and they definitely don't have any suggestions as to what types of analyses you might do, or what sort of techniques you might use. So these illustrations are an effort to show how you might be able to identify some of these criteria. Next slide, please.

The first and main criteria that people understand most intuitively is biodiversity, and in our case we have two biodiversity illustrations that we want to talk about today. The first one comes from OBIS—the Ocean Biogeographic Information System. There are something like 20 million records in OBIS at this point in time. As you see in the map (this is the map of one degree cells of biodiversity) a particular biodiversity statistic, and you can see that even with 20 million records there are still large gaps in the data. So sometimes you have to deal with larger cell sizes because of the range of data.

So, Pat, just forward it for me so you can see that this is the five-degree cell version of the same biodiversity statistic. That statistic is a Hurlbert Index, which is simply a random sample of 50 records

from within a cell to come up with an index based on richness and evenness.

What we're doing here is creating an example of one of the criteria. If we move on to the next, another example of biodiversity was the AquaMaps initiative. This is a credit to Kristen Kaschner from Sea Around Us, now at the University of Freiburg, I think. She has created, based on an environmental envelope, range maps for a number of different species; actually, over 9,000 species of fish, marine mammals and invertebrates at this point. Essentially what she's doing is taking depth, sea surface temperature, salinity, those types of parameters and using them to delimit the range of any particular species.

If we just click forward just one slide, you'll see that if you put them together what she's doing here is actually coming up with an index of the number of species, or the number of species ranges, that overlap in any given cell in the world. So you come up with sort of a global index of marine mammal abundance. Next slide, please.

This is an example from Birdlife International, and as I said, we have Ben on the call here today. So if we have any specific questions, hopefully he will be able to chime in. What they're doing here is trying to identify important life history stage areas, and the most common technique really at this point in time for doing that is to use a kernel home range estimate. One of the things that they're doing that's very interesting in this example is that they actually did the kernel home range estimates by years and seasons, and then identified important areas not just based on where they had the most data points, but whether these areas were being used across seasons and across years.

So in the map there, you can actually see the legend says, "Single Year and Multiple Seasons, or Multiple Years and Single Season." So that helps us identify how important it is across an entire life history for these particular species. Next slide, please.

Another example of the kernel home range analysis is the shark café in the Eastern Tropical Pacific. This is work done by TOPP, the Tagging of Pacific Predators—Andre Boustany wrote the illustration for us. In this case, what we have is white sharks that seem to be going into an area of the Eastern Tropical Pacific where there is no particular reason that we can identify for why they're doing it. The way that we were able to capture this, or Weng et al. were able to capture this, was by tagging these white sharks and

using that data to create these kernel home range maps. You can see across seasons they have very disparate areas that they're using, and some of them are in areas beyond national jurisdiction. Next slide, please.

For our example of how you would identify productivity, and the importance of productivity as a criterion, there was some in-house work done by Jason Roberts on identifying sea surface temperature fronts. He used an algorithm by Cayula and Cornillon, which essentially parses out these sea surface temperature fronts from sea surface temperature images, in this case AVHRR Pathfinder 5.0 images. He was working with 21 years of data.

The first step is to find the actual front and then from there you calculate the frequency of those fronts in any given cell over 21 years. If you just click forward it should show you that by doing this you essentially identify the probability that a front will be in a particular cell. By doing that, he identified two potential areas of importance in the Eastern Tropical Pacific. One sort of caveat for this one that we've been trying to put forward more and more is that the relationship between productivity and abundance of animals, or biodiversity, isn't necessarily direct. Thus, we need to do a little bit more—or a lot more—work on really identifying that relationship and using that in how we use this criteria. Next slide, please.

I think this is the next-to-last slide of illustrations. In this case, again, work that was written in-house but the data and some of the analysis was actually done by folks working at CenSeam—Ashley Rowden, Malcolm Clark, and Mireille Consalvey. Here we are illustrating the Naturalness criterion. Jeff gave you a quick glimpse of this before, where we have seamounts that have been identified, and in some cases we actually have very high resolution bathymetry of them, and we can tell through photographs and the bathymetry whether they have been fished or not fished, and the amount of coral that are on those seamounts.

We took it one step further from that and tried to identify, based on the amount of fishing that had taken place in these cells, which of these seamounts would be more or less natural. You see the map on the left of the potential area. Through that we used the Discovery Tablemount as an example of an area that might meet the Naturalness criterion.

Uniqueness and rarity: in this case, this was a less quantitative analysis. This was work that was written up by Marjo Vierros, who's been an integral part of GOBI. Here she was just searching literature for information about how we could identify this Saya de Malha Banks, which is a unique seagrass biome in the open ocean. As you can imagine, in the open ocean there aren't very many seagrass banks. So this one, in particular, is quite unique. She searched through some literature to find some ways to identify the bank and how unique it is, and in this case you're looking at a image of productivity, and how productivity changes over that particular bank.

Again, we'd like to bring up the Web site, and hope everybody visits it: www.openoceansdeepseas.org. There we have more illustrations. I think we showed you seven illustrations or so. There are approximately 17 or 18 illustrations on that site, I think. As well, there is a Google Earth KML layer that you can download and look through from that program. Finally, there's interactive mapper that we have brought up a couple times, that we will be continuing to flesh out by adding layers and linking it to the bibliography, and increasing the bibliography on the site. Hopefully, through outreach measures like this webinar, we will get in touch with everybody out there and try to link to more resources on conserving ecologically and biologically significant areas beyond national jurisdiction.

Pat, I'll just hand it back to you for the final slide.

Pat Halpin:

What I want to do is just wrap up with some next steps for 2010 and beyond. There are a lot of activities we're trying to contribute right now, and one is continuing the Convention on Biodiversity process. There are meetings that are going to be going on. There are still technical documents that need review and comment. We do plan to try to expand the interactive open oceans/deep seas mapper tool as a way for us to bring in more partners and more people around the world to start focusing on this process and contributing.

We're trying to increase interaction with collaborators, developing more contributions from our program, since it's marine life, but also the GOBI program in general, to the U.N. The technical SBSTTA meetings, and then the COP 10 meeting coming up in Nagoya, Japan, next October.

Jeff mentioned one of the big challenges ahead is assembling the different criteria together in a way that would be more systematic

and more objective, instead of just adding them up. So there's the MCA for multi-criteria analysis: this is a big research component that we feel needs a significant amount of work in the next year or so, and beyond. We're also interested in working towards trying to develop and implement some ecologically or biologically significant area pilot projects to work through some of these issues, and use them as test cases for implementation.

Last on the list from our particular perspective is we're trying to further develop the long-term contribution of the Census of Marine Life and OBIS to the open oceans and deep sea efforts in general. The main point there is the information system we feel is going to be very important in this non-jurisdictional context, because we need to have an open and completely freely available information system to apply data outside of national jurisdictions.

So that's it from our group.

QUESTION & ANSWER SESSION:

John Davis: Great, thank you very much, Pat and Daniel. We now open up the webinar to the audience for the next about 25 minutes. If you have a question for our panelists, you can submit it in the question box that is on the control panel on screen. We will be drawing from those questions throughout this Question and Answer Session, and we'll try to fit as many questions into the remaining time that we have.

Alternatively, if you want to try speaking out loud to the panelists, you may raise your virtual hand on the webinar control panel, click on the little hand beside your name and we'll call on you. When we do so, please identify yourself so we know who you are and where you're from. Thanks.

This first question has to do with enforcement. "Enforcing MPAs on the high seas poses an array of challenges, including jurisdictional and logistical ones. What do you see as the main challenges and how can they be met?" For that matter, how can site selection also take enforcement into account?

Jeff Ardron: John, I'd like to take that if I could.

John Davis: Sure.

Jeff Ardron: This is Jeff. This enforcement question is a very important one, and it was raised initially—well, not initially, but it was raised at a

meeting held by the government of France about a year ago in Brest. This question was raised, you know, "Why should we protect areas that are so far away we'll never be able to enforce them?"

So I looked at this issue with my colleagues here at the Marine Conservation Biology Institute, partnering with other organizations, including the international branch of NOAA. We held a workshop recently at the NOAA headquarters on this very issue. It was a preliminary workshop, and we're hoping to expand it further just in case some of you didn't hear about it. It was originally meant to be something of a steering committee meeting, but then expanded to having some experts discuss this issue.

We call it SERMA, the Surveillance and Enforcement of Remote Maritime Areas. We will be putting out a report on that workshop fairly soon. If you're interested, contact me at my MCBI address: jeff.ardron@mcbi.org.

But in short, some of the main conclusions were that, surprisingly to me, actually, the technology is already available to surveil and enforce remote areas, and more technology is coming online every day.

Another conclusion was that although the technology is available, the cross-agency cooperation is not yet necessarily there, but will be required in order to surveil and enforce these remote areas.

Another surprising outcome of the workshop was that this is no longer just a conservation issue. This is actually intimately linked to our food security, globally, and also our national security. Really, conservation is inextricably linked to security on the high seas. Fishing boats currently have enjoyed several exceptions to maritime shipping requirements, but these exceptions, unfortunately, have turned into loopholes for issues of national concern. For instance, the Mumbai bombers ended up, of course, taking many lives in India where they pirated a fishing vessel in order to get into India.

So these sorts of exceptions whereby fishing boats have been flying under the radar screen we hope will no longer be the case in the future, and that fishing along with all other maritime activities will be properly monitored within national waters and on the high seas.

John Davis: Anyone else have anything to add to that? Perhaps on site selection...?

Pat Halpin: This is Pat. I would like to add there are some specific issues in terms of site selection, in terms of thinking about enforcement. When you are developing sites, this is a fairly common issue with marine protected areas in general. But the ability to define locations that can be easily located on maps and charts and have simple boundaries that are easier to enforce is a pretty standard issue and it's one that is fairly easily addressed.

John Davis: Great, thank you.

Kristina Gjerde: John, may I just say two words here on the legal side. The issues for high seas MPAs are not unlike those for regional fisheries management organizations and fisheries closures, per se. There are problems with respect to enforcement of fisheries closures, but nations are now looking more and more to port states to try to make sure that only legal fish are actually allowed into the ports or into markets. So I think we can look at some of these shore-based mechanisms to help us enforce high seas marine protected areas in the future. That's it.

John Davis: Thank you. All right, moving on to the next question, which is actually two questions, and on the surface at least not necessarily related to each other. "Is climate change factored into predictive mapping"—the predictive mapping that you guys are doing? And "Are RFMOs the best organizations to protect biodiversity on the high seas?"

Pat Halpin: This is Pat. I'll try to address the first question. Climate change is a very big issue and it's not currently addressed in the current criteria that we've been assessing, but it's definitely something that's on our radar screen. Several of the criteria that are considered right now for EBSAs do involve looking at oceanographic conditions, and looking at things like productivity and recurring oceanographic features. So there is a direct lever-mechanism that deals with ocean climate that is in the criteria already. It wasn't explicitly implemented as a climate change issue, but if those factors do change then we have a tool at our ready. There are other projects that I'm currently working on right now looking at potential climate change impacts on marine protected areas globally, so there are other parallel projects going along that I think fit right with this.

Daniel Dunn: Let me just add to that really quickly. It's Daniel here. Predictive mapping is actually probably the only way that we can really factor climate change into what we're doing. Without the predictive mapping you wouldn't really be able to forecast into the future and assume changes, and then see where potential ranges might have adapted to that or changed because of it. So predictive mapping is essential in that process.

Jeff Ardron: Hi, it's Jeff here. Yes, in fact, in terms of the predictive coral mapping that I presented, we are now looking at aragonite saturation horizons projected into the future and seeing how that could affect those distributions of corals. So the answer is "yes" we're trying, of course, it's a lot of guesswork. I hate to say the word "guesswork," but you know what I mean. There's a lot of uncertainty in these sorts of things, but we certainly try to take climate change and associated effects of increased carbon dioxide such as ocean acidification into account.

Kristina Gjerde: Okay. This is Kristina. I guess that leaves me to answer the second question, which is, are RFMOs the best organization to protect biodiversity?

Well, I won't say they're necessarily the best, but they're the best thing we have right now. It does help to have a higher level of scrutiny to help push and prod and promote good behavior by the regional fisheries management organizations and the states, so they do their best with respect to biodiversity.

We do have an example of that with respect to high seas bottom fishing. As I described in my presentation, the United Nations General Assembly has, out of concern for the impact of fishing on deep sea biodiversity, set a time-limited framework for specific action by RFMOs. This includes prior environmental impact assessments being required before fishing is actually authorized to proceed, that measures have to be adopted to prevent significant adverse impacts, and that there is an ongoing review by the United Nations as well as by the FAO of measures taken by steps and RFMOs to implement these protective measures.

So ideally, if you have something like that operating with respect to ecologically or biologically significant areas, then you would be able to see some, I think, fairly fast action by the RFMOs. But I would say the regions where you've had the fastest action have been where you have both RFMOs and regional seas organizations, as in the Northeast Atlantic under OSPAR, where you have the fisheries organization there cooperating together now for these

deep sea closed areas, and in the Southern Ocean and in the Mediterranean.

So it's helpful to have both at the regional level, but also a higher global level of scrutiny to complement it.

John Davis: Great. Thank you. To the audience, please keep your questions coming in. We look forward to hearing from you.

The next question deals with the financial side of high seas MPAs. "What are some of the viable ways to more effectively monetize MPAs beyond ecotourism? What about voluntary marine biodiversity offsets that would create tradable marine conservation credits?"

I think basically what the questioner is asking is: Are there ways that high seas MPAs could be made financially self-sustaining?

Jeff Ardron: Hi, this is Jeff. In terms of the surveillance and enforcement, we are looking at this issue. We have a Ph.D. student, Pippa Gravestock, who works under Callum Roberts looking at this question of the economics of surveillance and enforcement of remote areas.

I can't really comment about the tradable offsets myself, but we do know that certain marine features like seagrasses sequester a lot of organic carbons. So places like Saya De Malha Banks that were mentioned earlier by Daniel, or the Sargasso Sea, I think we should view those areas definitely as carbon sinks, and those should be taken into account in our carbon accounting.

John Davis: Great. Anyone else care to comment on that?

Pat Halpin: This is Pat. I think just in general there are many analogies right now with cap-and-trade types of mechanisms that are being considered in many other areas in conservation. The issues that come up with those definitely raise the bar considerably in terms of the ability to create accounting systems and have the detailed data you would need to enforce them. So this is something that, I think, is very interesting to consider at this point. It might be a bit far ahead in terms of what actually our capabilities are at this point, but I think it's something that as these other initiatives come online it will be probably easier to present this to policymakers.

John Davis: Anyone else? All right, thank you.

The next question pertains to our understanding of the ecology of the open ocean and deep sea. "What are some of the ways that our ecological understanding of those environments have changed in recent years—what are some of the main ways? How can those changes inform our planning of MPAs in those environments?"

I know that Daniel, you already covered a bit of this in your presentation, but I also know that the deep sea remains a relatively mysterious place in terms of our scientific understanding of it.

Daniel Dunn: I'll actually throw this one to Pat, because this is kind of a softball for the Census of Marine Life. This is exactly what they've been doing. So, Pat?

Pat Halpin: Okay, I figured you were going to pick it up. I mean, there's definitely been a considerable amount of new knowledge gained in the last decade on open oceans and deep seas, and that's continuing to ramp up quite a bit. There's many aspects of that that are going to influence how we select and design MPAs in these environments.

Some of the issues that are coming up from our understanding from the Census of Marine Life is that in especially the abyssal plains and very deep sea areas, that rarity is actually common. So a lot of the things that we use to trigger the selection of a site in terrestrial conservation might need to adjust how we're thinking about that. Also, when we start to look at the different diversity of life forms in the deep sea environments on the considerable amount of microscopic diversity is just phenomenal. So there are many aspects of what we're finding out about the oceans that are changing our view, just in general.

The other thing that is sobering, at this point, is that the more we know about the deep seas, the more we don't know. That's been a very important lesson right now: we're finding out some pretty amazing information in certain places where we've taken the time and the effort, and the resources, to investigate these sites. But there's still a massive volume of the oceans that we just haven't really explored. So there are huge holes in the maps.

Another area that is still very open right now is we know the most about nearshore areas at the surface, and in the benthic environment. We know much, much less—considerably less—about what's going on in the midwater columns. So there's quite a bit of knowledge to be gained, and it's a very exciting time in that things are changing quite a bit.

Kristina Gjerde:

Hi, this is Kristina. I would just say that we have available new technologies to actually give us eyes to get down to the deep sea and the open ocean. But unfortunately the more research we do the more we find footprints of humankind having reached what we used to think of being remote and impervious areas. So I'm thinking of, for example, the huge gyres of garbage that are floating in the Pacific, as well as the Indian and Atlantic oceans, the size of basically Texas or the United States themselves—just circulating garbage that comes from both land as well as ship discharges. Looking at the impact of deep sea bottom fishing on seamounts, you never would have had an international campaign to target high seas bottom fishing had it not been the first images of trawled coral reefs that came out of Australia in the 1990s.

So it's the new technological capacity that has really opened our eyes to the open ocean and deep sea. Of course, when we find more human impacts we have greater cause for concern, because we're learning more about ecological functions, and we're really just catching a glimmering of the importance and the complexities.

Daniel Dunn:

I was going to add to what Pat was saying. I think there are kind of two fronts that we're continually finding new information for, and that are opening up huge areas for further research. These are the deep sea and the habitats in the deep sea that we've been talking about today, most of which very, very little is known now and basically nothing was known about them even a decade ago. So knowing that those habitats exist and beginning to understand what exists and what lives there and what they're depending on has been an eye opener.

I think it's also really pushed these efforts at spatial planning or MPAs in the high seas, because most people are very comfortable with the idea of a marine protected area over a static habitat, and I don't think that a decade ago people were talking about important static habitats in the deep sea. Now we know more about those habitats, so people are more comfortable with the concept of putting an MPA or some sort of protective measure on top of those static habitats.

On the other side, we are beginning to get a much better idea of how animals are interacting with dynamic oceanography: understanding where, in some cases, they are very much related to productivity gradients (these fronts that we were talking about). And in other circumstances, they're actually not related to those at all, they're entrained in large oceanic gyres and that's their habitat.

So I think on the other side—on the dynamic side—we are getting a much better idea of the relationships between animals and this oceanography, and that's opening up the possibility of trying to create these dynamic MPAs as well.

Jeff Ardron: This is Jeff. I just wanted to add that I think this whole process of trying to identify sites brings together people who are not necessarily used to being together, and no one person knows everything about the high seas and deep seas. The Census of Marine Life synthesis projects are certainly an excellent source of synthesizing information. But then taking it one step further and saying, "Okay, so let's start identifying these candidate areas...." Pooling of expertise has had the effect of actually increasing our knowledge because we're pooling together, we're learning from each other, and the GOODS biogeographic classification and the seamount classification I briefly presented today are good examples of that. Then, when we worked together, we actually ended up with a product that was greater than what we individually knew separately.

John Davis: Thanks, guys. Sarah?

Sarah Carr: Yeah, let me see if I can get him. Steven, are you there? Steven? Okay. Steven had raised his hand. He has a question. I'll try and get him to either send it in or we'll try him again later. Okay.

John Davis: In the meantime we can go to the next question. It has to do with the 2012 target. "Will we meet the 2012 target for networks of MPAs on the high seas? If not, when will we meet it?"

Kristina Gjerde: Nobody wants to touch that one.

Pat Halpin: But we know you will, Kristina.

Kristina Gjerde: Well, IUCN had done a study that showed that globally we would meet the 2012 target for the high seas, I think, by 2060, which was fairly depressing news. We probably won't meet the 2012 target, in terms of 10 percent of each type of habitat conserved, but I think we can rapidly scale up through the Global Ocean Biodiversity Initiative and support from governments, that we can certainly start looking at dates in the late teens, you might say, where we could actually meet some of these targets for the high seas.

Of course, I'm always an optimist, but I think the scientific information and the political will—as these two come together, we can certainly look forward to significant progress rather quickly.

John Davis: Anyone else?

Jeff Ardron: My perspective is that these targets, while well-meaning and everything, there's always a level of cynicism attached to them: "Oh, we will never reach those," and so forth. But I just wish to remind listeners that even if they were, to some extent, political in nature, they were made. Countries lose a significant amount of face when they are not met. They serve as useful prods to people that, "Gosh, you know, ten years ago it seemed like this was a long ways away." Well, here we are now. It's 2010. It's 2012. What have we done?

I think, really, the next round of targets we're going to see will be less, perhaps, idealistic or aspirational in nature, and more action-oriented—basically saying, "Well, okay, we didn't meet those initial targets fully. This is what we're going to have to do, and these are the steps we're going to have to take to do a better job."

So these targets were set, perhaps, out of political ambition, but remember the thing driving that political ambition was the recognition that biodiversity needs to be protected.

Kristina Gjerde: It has had a significant force in terms of compelling as much progress as we've had to date.

Pat Halpin: This is Pat. Just one other additional comment. I also agree, I think it's very unlikely that we'll directly meet the 2012 targets, but there's a lot of work that could be done on setting priorities for: What are the highest priority sites? What are the types of sites that would be the highest priorities? What are the easiest ones to try to achieve? I think that is probably a more reasonable way to start looking at how we actually start some implementation and getting these things met.

John Davis: Thank you. Let's go to our final question, I think we have time for one more. It has to do with threats to high seas biodiversity. "Is there currently a component of GOBI, or a similar initiative, that looks at or analyzes specific threats to high seas biodiversity in specific areas using some compatible methodology?"

Pat Halpin: This is Pat. I'll just start this off and I'm sure we'll get other comments.

When we were looking specifically at the criteria as defined by the CBD, we were specifically looking at the inherent biodiversity and ecological values for sites, and they pretty much were not focusing the selection on threats to sites. I think most of us in this group have a lot of strong opinions for whether or not that's the best way to go. But the current framework was to identify sites based directly on their ecological importance first, and then to weave in threats somewhat secondarily.

So the current criteria that Daniel described was all looking at kind of the inherent value of sites, but we didn't really show the parallel work that can be done looking at the threats.

Jeff or Daniel, do you want to comment on this?

Jeff Ardron:

Yeah, I certainly agree with everything you just said, Pat. The Convention on Biological Diversity toned down the aspect of human effects a great deal. That said, there are two criteria where threat is an implicit factor. One is the fragility criterion, which goes on to say, sensitivity and vulnerability, and the understanding of vulnerability is usually understood to be vulnerability to a human activity. For instance, coral sitting on the moon would not be vulnerable, no matter how fragile they are. So there's an inherent sense of threat in that criterion, though it hasn't been broadly expanded. Also, the naturalness criterion: again, while things are only natural if they haven't been significantly disturbed by human activities.

So there's an inherent sense of threat there, but there's been a political sensitivity surrounding the CBD stepping on the regulatory toes of other organizations.

The FAO has this thing called Vulnerable Marine Ecosystems based on the U.N. General Assembly resolutions, and that explicitly talks about vulnerability to bottom fisheries. So in that particular case there could be an overlap between the work of GOBI and the ongoing work of regional fisheries management organizations looking at vulnerability to bottom fisheries. But that is only bottom fisheries, and, of course, there are other threats and stressors out there.

Kristina Gjerde:

This is Kristina. I have to say, it's definitely something that needs to be done. It's not something that we're currently looking at because of capacity restraints and specific mandate. But it's something that if people are interested in looking at those

questions, I hope they will contact us to see how we can provide mutually supportive information.

Daniel Dunn:

Just to add, this question definitely hits on the tightrope that we're walking where we have been tasked with just identifying the ecologically or biologically significant areas, and when the threats are brought up, you get into a politically squeamish area. So I think for now, like Kristina said, this is what we've been tasked with and what we're focusing on. But most of us have worked on the side, or through other means—other groups—where we are very interested in the relationship between those significant biologically or ecologically significant areas and the threats.

John Davis:

Thank you very much, all of you. With that, we conclude this webinar. We want to thank Kristina, Jeff, Pat and Daniel for contributing their insights, and the audience for participating as well.

I know there are still some of you who have questions that we have not yet gotten to. We do want to hear them. Anyone who still has a question, please submit it in the Question Box on your webinar screen. Your questions will be invaluable for informing future issues of MPA News, and we look forward to tracking down answers for you.

Also, upon departing the webinar, please participate in the poll question on the usefulness of this session. As I mentioned at the beginning, we're looking to learn from this event. If you'd like to add any comments in response to your poll answer, you can use the Question Box for that as well.

We will leave the webinar open for the next five minutes or so to allow you time to contribute your questions and comments. Again, thank you for participating, and we look forward to hearing from you. Sarah, anything more?

Sarah Carr:

No, I just thank everybody for attending today, and thank our presenters for being willing to come out and do this.

[End of Recording]