Conservation Practice and Policy

Results of efforts by the Convention on Biological Diversity to describe ecologically or biologically significant marine areas

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Abstract: *In 2004, Parties to the Convention on Biological Diversity (CBD) addressed a United Nations (UN) call for area-based planning, including for marine-protected areas that resulted in a global effort to describe ecologically or biologically significant marine areas (EBSAs). We summarized the results, assessed their consistency, and evaluated the process developed by the Secretariat of the CBD to engage countries and experts in 9 regional workshops held from 2011 to 2014. Experts from 92 countries and 79 regional or international bodies participated. They considered 250 million km^2 of the world's ocean area (two-thirds of the total). The 204 areas they examined in detail differed widely in area (from 5.5 km^2 to 11.1 million km^2). Despite the initial focus of the CBD process on areas outside national jurisdiction, only 31 of the areas examined were solely outside national jurisdiction. Thirty-five extended into national jurisdictions, 137 were solely within national jurisdictions, and 28 included the jurisdictions of more than 1 country (1 area lacked precise boundaries). Data were sufficient to rank 88–99% of the areas relative to each of the 7 criteria for EBSAs agreed to previously by Parties to the CBD. The naturalness criterion ranked high for a smaller percentage of the EBSAs (31%) than other criteria (51–70%), indicating the difficulty in finding relatively undisturbed areas in the ocean. The highly participatory nature of the workshops, including easy and consistent access to the relevant information facilitated by 2 technical teams, contributed to the workshop participants success in identifying areas that could be ranked relative to most criteria and areas that extend across jurisdictional boundaries. The formal recognition of workshop results by the Conference of Parties to the CBD resulted in these 204 areas being identified as EBSAs by the 196 Parties. They represent the only suite of marine areas recognized by the international community for their greater importance for biodiversity it is their importance for biodiversity itself not conservation as process explicitly excluded management issues than their surroundings. This comes at a critical juncture in negotiations at the UN that will consider developing a new implementation agreement under UN Convention of the Law of the Sea to support the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction. The EBSA description process is a good example of how to bring the international community together to build a shared understanding of which ocean areas are particularly valuable to biodiversity.*

Keywords: area-based management, areas beyond national jurisdiction, biodiversity, Convention on Biological Diversity, EBSA

571

Resultados de los Esfuerzos para Describir Áreas Marinas Ecológica o Biológicamente Significativas por parte de la Convención sobre la Diversidad Biológica

Resumen: *En 2004, las Partes para la Convención sobre la Diversidad Biológica (CDB) señalaron un llamado de las Naciones Unidas (ONU) para la planeación con base en áreas, el cual incluía la descripción de áreas marinas ecológica y biológicamente significativas (EBSAs, en inglés) como resultado de un esfuerzo global. Resumimos los resultados, valoramos su consistencia y evaluamos el proceso desarrollado por el Secretariado de la CDB para involucrar a los países y a los expertos en el tema en nueve talleres regionales, los cuales se llevaron a cabo de 2011 a 2014. En ellos participaron los expertos de 92 países y 79 cuerpos regionales o internacionales. Los expertos consideraron 250 millones de km² del área oceánica global (dos tercios del total). Las 204 áreas que examinaron a detalle difirieron ampliamente en el área (desde 5.5 km² a 11.1 millones de km²). A pesar del enfoque inicial del proceso de la CDB sobre las áreas fuera de la jurisdicción nacional, sólo 31 de las áreas examinadas estuvieron completamente fuera de alguna jurisdicción nacional. Del total de áreas examinadas, 35 áreas se extendían dentro de una jurisdicción nacional, 137 estaban únicamente dentro de alguna jurisdicción nacional y 28 incluían las jurisdicción de más de un país (un área carecía de fronteras específicas). Los datos fueron suficientes para clasificar 88–99% de las áreas en relación a cada uno de los siete criterios para establecer EBSAs, los cuales ya habían sido acordados previamente por las Partes de la CDB. El criterio de naturalidad fue más alto para un porcentaje más pequeño de EBSAs (31%) que otros criterios (51-70%), lo que indica la dificultad de encontrar áreas relativamente poco perturbadas en el océano. La naturaleza altamente participativa de los talleres, incluyendo el acceso fácil y continuo a la información proporcionada por los dos equipos técnicos, contribuyó al éxito de los participantes en la identificación de áreas que podrían estar clasificadas en relación al mayor número de criterios y de áreas que se extienden a lo largo de fronteras jurídicas. El reconocimiento formal de los resultados de los talleres por parte de la Conferencia de Partes de la CDB derivó en que se identificara a estas 204 áreas como EBSAs por parte de las 196 Partes. Estas representan el único conjunto de áreas marinas reconocido por la comunidad internacional por su gran importancia para la conservación de la biodiversidad y su entorno. Esto llega en un momento crítico en las negociaciones de la ONU para considerar el desarrollo de un nuevo acuerdo de implementación bajo la Convención de la ONU para la Ley del Mar, el cual apoyará la conservación y el uso sustentable de la diversidad biológica marina más allá de las áreas de jurisdicción nacional. El proceso de descripción de EBSAs es un buen ejemplo de cómo unir a la comunidad internacional para la construcción de un entendimiento compartido de cuáles áreas oceánicas son particularmente valiosas para la biodiversidad.*

Palabras Clave: áreas más allá de la jurisdicción nacional, biodiversidad, Convención sobre la Diversidad Biológica, EBSA, manejo basado en áreas

Introduction

In 2004, the Parties to the Convention on Biological Diversity (CBD) took up a call from the United Nations (UN) for area-based planning, including marine-protected areas, that would result in a global effort to describe ecologically or biologically significant marine areas (EBSAs). Originally driven by the commitment to establish marine protected areas beyond national jurisdictions, this initiative has since broadened to inform marine spatial planning and other activities within and beyond national jurisdictions (Dunn et al. 2014).

From 2011 to 2014, the Secretariat of the CBD held nine regional workshops involving experts from 92 countries and 79 regional or international bodies. Participants in these workshops considered 250 million km², or two-thirds, of the world ocean area and described 204 areas in national and international waters that meet the internationally agreed on criteria for EBSAs (Fig. 1). Ecologically or biologically significant marine areas are used by countries to support marine spatial planning in national waters and can be used to inform international negotiations on managing areas beyond national jurisdiction.

In 2015, the UN resolved to negotiate a new implementing agreement for biodiversity beyond national jurisdiction. A preparatory committee will meet from 2015 to 2017 to make recommendations to the UN General Assembly on an international and legally binding instrument under the UN Convention on the Law of the Sea. It was agreed at the 2010 meeting of the Conference of Parties to the CBD (COP 10) that EBSAs may require enhanced conservation and management measures, including through marine protected areas and impact assessments. The new instrument under the Law of the Sea could support the conservation and sustainable use of EBSAs.

We evaluated the properties that contributed to workshop success, described the workshops themselves, and reviewed their results. We considered some options for how EBSAs might be used to inform management of biodiversity beyond national jurisdictions.

Policy Background

The UN Conference on Environment and Development (the Rio Earth Summit) calls on States to "identify
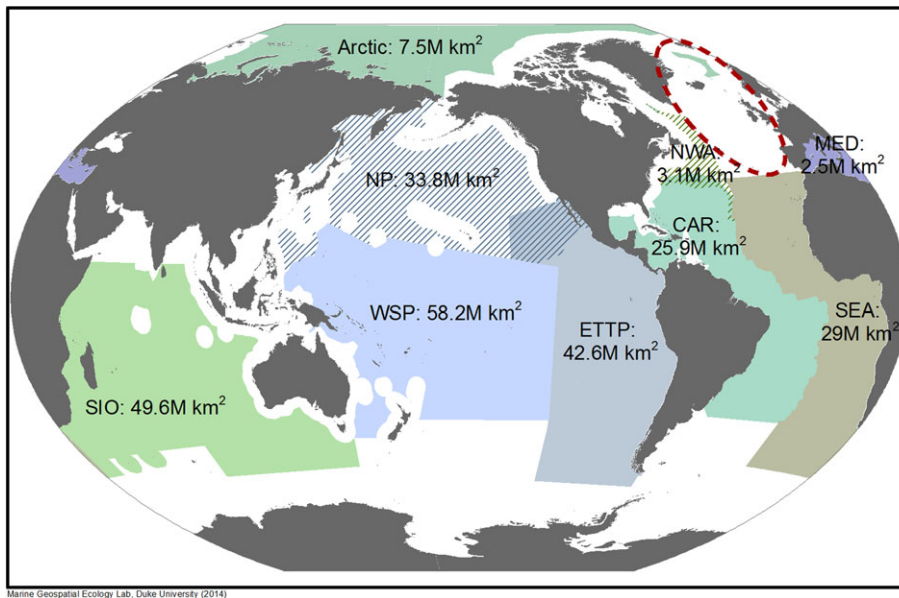
marine ecosystems exhibiting high levels of biodiversity and productivity and other critical habitat areas" (UN 1992). The second Earth Summit confirmed the need to "maintain the productivity and biodiversity of important and vulnerable marine and coastal areas, including in areas within and beyond national jurisdiction" (UN 2002). Responding to these calls, the Convention on Biological Diversity (CBD) initiated a process in 2004 to develop and apply a suite of criteria to describe EBSAs "in need of protection, in open ocean waters and deep sea habitats" (Table 1). Describing these areas was acknowledged as an important first step in the use of available scientific knowledge and of methods to identify areas that might be included in a system of protected areas or prioritized for conservation under other management approaches (Dunn et al. 2014).

In 2010 Parties to the CBD and other governments and relevant organizations were invited to use the suite of criteria

... to organize... a series of regional workshops, ... with a primary objective to facilitate the description of ecologically or biologically significant marine areas through application of scientific criteria in annex I of decision IX/20 as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria . . . " (COP 10/29 para 32).

Regional Workshops

Nine EBSA workshops were convened by the CBD Secretariat from November 2011 to April 2014. All Parties to the CBD with interests in a region covered by the particular workshop, along with relevant regional organizations, were invited to nominate experts to attend—resulting in 122 country attendances and 112 organization atten-

dances (Table 2). Additional workshops have since been held in the northeastern and northwestern Indian Ocean area (data not reviewed by CBD COP and not included here), and the Secretariat is organizing additional workshops to cover the remaining ocean areas.

The geographic coverage of each workshop was determined by participants based on bioregional information presented at the workshop. The exclusive economic zones (EEZs) of individual Parties present were included in the workshop boundaries only when Parties wished them to be. The EEZs were typically excluded if an existing spatial management process was designed to achieve similar objectives (e.g., key ecological features in Australia, Canadian EBSA programs, marine bioregional planning in India, environmental values in Norwegian marine areas). The EBSAs were not identified in the EEZs of countries not attending the workshop unless prior approval had been given. Transboundary EBSAs were marked where they overlapped the EEZ of a country not agreeing to describe EBSAs within their EEZ.

Participants' preparedness varied among workshops, from no prior engagement to holding preparatory meetings aimed at identifying potential EBSAs to attending a capacity-building workshop to explain the EBSA initiative, share data, and encourage early EBSA identification (CBD 2012). All regional workshops started with a 1-day training session on how to access and use available data to identify potential EBSAs.

A technical team helped access global, regional, and national data (Supporting Information) and introduced the EBSA criteria with guidelines and examples on their application (Table 1). The participating Parties and organizations developed EBSA descriptions, ranking each one relative to the EBSA criteria. Every EBSA description was discussed in a plenary session, assessed against all criteria, modified where necessary, archived on a geographic

Table 1. Convention for Biological Diversity scientific criteria for ecologically or biologically significant marine areas (EBSAs) (CBD COP 9/20, Annex 1) and examples of the criteria.[a]

CBD scientific criteria	Definition	Example	Number[b]
1 Uniqueness or rarity	"area contains either (i) unique, rare, or endemic species, populations or communities; and/or (ii) unique rare or distinct habitats or ecosystems; and/or unique or unusual geomorphological or oceanographic features"	Sargasso Sea, persistent polynyas, hydrothermal vents, endemic communities around submerged atolls	7
2 Special importance for life-history stages of species	"area that is required for a population to survive and thrive"	breeding grounds, nursery, feeding, wintering, resting areas	7
3 Importance for threatened, endangered, or declining species and/or habitats	"area containing habitat for the survival and recovery of endangered, threatened, declining species, or area with significant assemblages of such species"	see above but for threatened, endangered or declining species	7
4 Vulnerability, fragility, sensitivity, or slow recovery	"area that contains a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery"	area important to habitat forming species (e.g., corals, sponges) or long-lived species with low reproductive rates (e.g. sharks); area vulnerable to pollution (e.g. ice covered)	3
5 Biological productivity	"area containing species, populations, or communities with comparatively higher natural biological productivity"	frontal areas, upwellings, hydrothermal vents, seamounts, polynyas	3
6 Biological diversity	"area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity"	seamounts, fronts, convergence zones, cold coral communities, deep-water sponge communities	4
7 Naturalness	"area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation"	areas that are relatively less disturbed than others in the same ecosystem or that have successfully recovered	4

[a]*Examples summarized from CBD (2009).*
[b]*Number of times that similar criteria appear in other international mechanisms (UN Food and Agriculture Organisation, Vulnerable Marine Ecosystems, International Maritime Organisation Particularly Sensitive Sea Areas, UNESCO World Heritage, RAMSAR, Birdlife International Important Bird Areas, International Union for Conservation of Nature Key Biodiversity Areas) (from Dunn et al. 2014).*

information system and fully documented before being submitted for approval in a final plenary. Feedback in plenary sessions, including that of the two technical teams, maintained consistency in how the criteria were applied. Officially, described areas had to meet only one of the seven criteria to be submitted to the COP. In practice, the technical team helped Parties rank each area relative to all criteria (insufficient information or low, medium, or high ranking against the criteria) so that changes in interpretation over time or interpretations that differed between the 2 technical teams could be identified.

The 204 EBSAs identified by workshop participants were presented at meetings of the Conference of the Parties in 2012 and 2014 (only the 203 with agreed on boundaries are discussed here [Fig. 2]). Following COP decisions, summary reports describing areas that met the criteria for EBSAs were submitted to the UN General Assembly and relevant UN working groups (UNGA 2013).

Characteristics of EBSAs Described by Regional Workshop Participants

The EBSAs ranged from 5.5 km^2 to 11.1 million km^2 (Supporting Information). Of the 203 described EBSAs, the boundaries of 109 were solely within one national jurisdiction, 28 included the jurisdiction of more than one country but did not extend into areas beyond national jurisdiction (ABNJ), 35 crossed between national jurisdictions and the ABNJ, and 31 were solely within ABNJ (Table 2).

Participants who considered large ocean areas tended to describe more EBSAs ($r^2 = 0.37$) but did not attract

Table 2. Details, participants, and location of the 9 regional workshops convened by the Secretariat of the Convention on Biological Diversity (CBD) from 2011 to 2014 and the areas meeting the CBD scientific criteria for ecologically or biologically significant marine areas (EBSA).[a]

Regional workshop[a]	Date	Host country	Countries	IGOs and NGOs	Area (km ×10^6)	EBSAs[b]	Areas within a single national jurisdiction	Areas within more than one jurisdiction (but not ABNJ[c])	Areas extending over national jurisdiction(s) and ABNJ[c]	Areas solely within ABNJ[c]
Western South Pacific (WSP)	Nov 2011	Fiji	15	10	58	26	9	6	7	4
Wider Caribbean & Western Mid-Atlantic (CAR)	Feb 2012	Brazil	23	15	26	20	9	6	5	0
Southern Indian Ocean (SIO)	Jul 2012	Mauritius	16	20	50	39	22	4	4	9
Eastern Tropical & Temperate Pacific (ETTP)	Aug 2012	Ecuador	13	12	43	21	12	2	4	3
North Pacific (NP)	Feb 2013	Russia	8	7	34	20	15	0	0	5
South-Eastern Atlantic (SEA)	Apr 2013	Namibia	17	15	29	44	31	7	5	1
Arctic	Mar 2014	Finland	7	13	8	11	9	0	0	2
Northwest Atlantic (NWA)	Mar 2014	Canada	2	5	3	7	0	0	0	7
Mediterranean (MED)	Apr 2014	Spain	21	16	3	15	2	3	10	0
Total			122	112	253	203	109	29	36	33

[a]Meeting documents for workshops, respectively, available from http://www.cbd.int/doc/?meeting = RWEBSA-WSPAC-01; http://www.cbd.int/doc/?meeting = RWEBSA-WCAR-01; http://www.cbd.int/doc/?meeting = EBSA-SIO-01; http://www.cbd.int/doc/?meeting = EBSA-ETTP-01; http://www.cbd.int/doc/?meeting = EBSA-NP-01; http://www.cbd.int/doc/?meeting = EBSASEA-01; http://www.cbd.int/doc/?meeting = EBSAWS-2014-01; and http://www.cbd.int/doc/?meeting = EBSAWS-2014-02; http://www.cbd.int/doc/?meeting = EBSAWS-2014-03.
[b]One of the 204 EBSAs accepted by Parties to the Convention on Biological Diversity does not have precise geographical boundaries and is not included in this table or in our analyses.
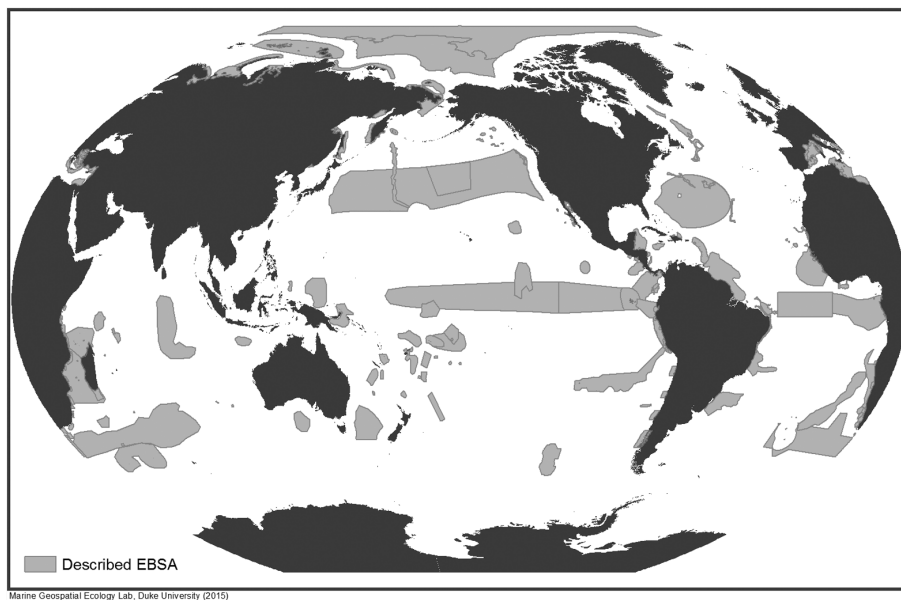[c]Areas beyond national jurisdiction.

Figure 2. Areas meeting scientific criteria for ecologically or biologically significant marine areas (EBSA) by participants in each of the 9 regional workshops. The described EBSAs can overlap or adjoin as indicated by their outlines.

more countries ($r^2 = 0.06$) or organizations ($r^2 = 0.03$). Experts at the regional workshops ranked large EBSAs higher relative to the criteria than small EBSAs for the survival and recovery of threatened and endangered species and habitats and concluded that EBSAs farther from shore were less likely disturbed by human activities and would have a comparatively higher degree of naturalness (Edgar et al. 2014; Supporting Information). Conversely, EBSAs closer to shore are more likely to have greater biological diversity and productivity and more likely to be important for particular juvenile life-history stages that are frequently associated with breeding or nursery areas in shallower waters, consistent with Heincke's Law (MacPherson & Duarte 1991; Beck et al. 2001).

Participants in the western South Pacific, southeastern Atlantic, and southern Indian Ocean workshops ranked EBSAs relatively close to or under the median ranking on all criteria (Fig. 3). These participants considered some of the largest regions and described the most EBSAs (Table 2).

The Arctic environment was ranked by experts as most distinct from other environments assessed because of its relatively low importance for biological diversity; its relatively low importance for threatened and endangered species and habitat; and its relatively high importance due to the presence of vulnerable and fragile habitats that support vital life-history stages. It is possible that the strong seasonal habitat characteristics and habitat use accounted for some of these differences.

Biological productivity was ranked of higher importance in the eastern tropical and temperate Pacific areas than in the western South Pacific, as would be expected from the stronger seasonal upwelling and associated increased primary productivity and fisheries biomass in this region (Pennington et al. 2006).

The western South Pacific and the Arctic were ranked comparatively high for naturalness, consistent with Halpern et al.'s (2008) global assessment of marine impact from 17 sources of anthropogenic change. Areas that were considered highly affected by humans by regional experts included inshore areas, the northwest Atlantic, and the Mediterranean, and the North Pacific. The wider Caribbean and western mid-Atlantic areas were considered highly affected by humans by Halpern et al. (2008) but not by the regional experts. Conversely, although Halpern et al. (2008) found the eastern tropical, temperate Pacific, southeast Atlantic, and the southern Indian oceans relatively unaffected by humans, regional experts considered these areas highly affected (Fig. 3; Supporting Information).

The constant participation by CBD staff members and coordinated and constant technical support from a broad range of experts (including members of global organizations such as BirdLife International and the Global Oceans Biodiversity Initiative) provided consistency among the regional workshops, despite the lack of overlap of regional experts. The differences between regional expert rankings and the global assessment warrant closer examination, particularly for the level of naturalness or human impact. They may be artifacts of an expert process or indicate a difference between regional expert opinion accumulated over a lifetime and available data taken from an arbitrary point in time (Pinnegar & Engelhard 2008; Papworth et al. 2009).

Evaluation of Criteria Used to Identify EBSAs

The frequency with which each EBSA criterion was ranked as high was generally consistent (51–70%; Table 3), with the exception of naturalness, which was ranked high for 31% of the EBSAs (Table 3). Special
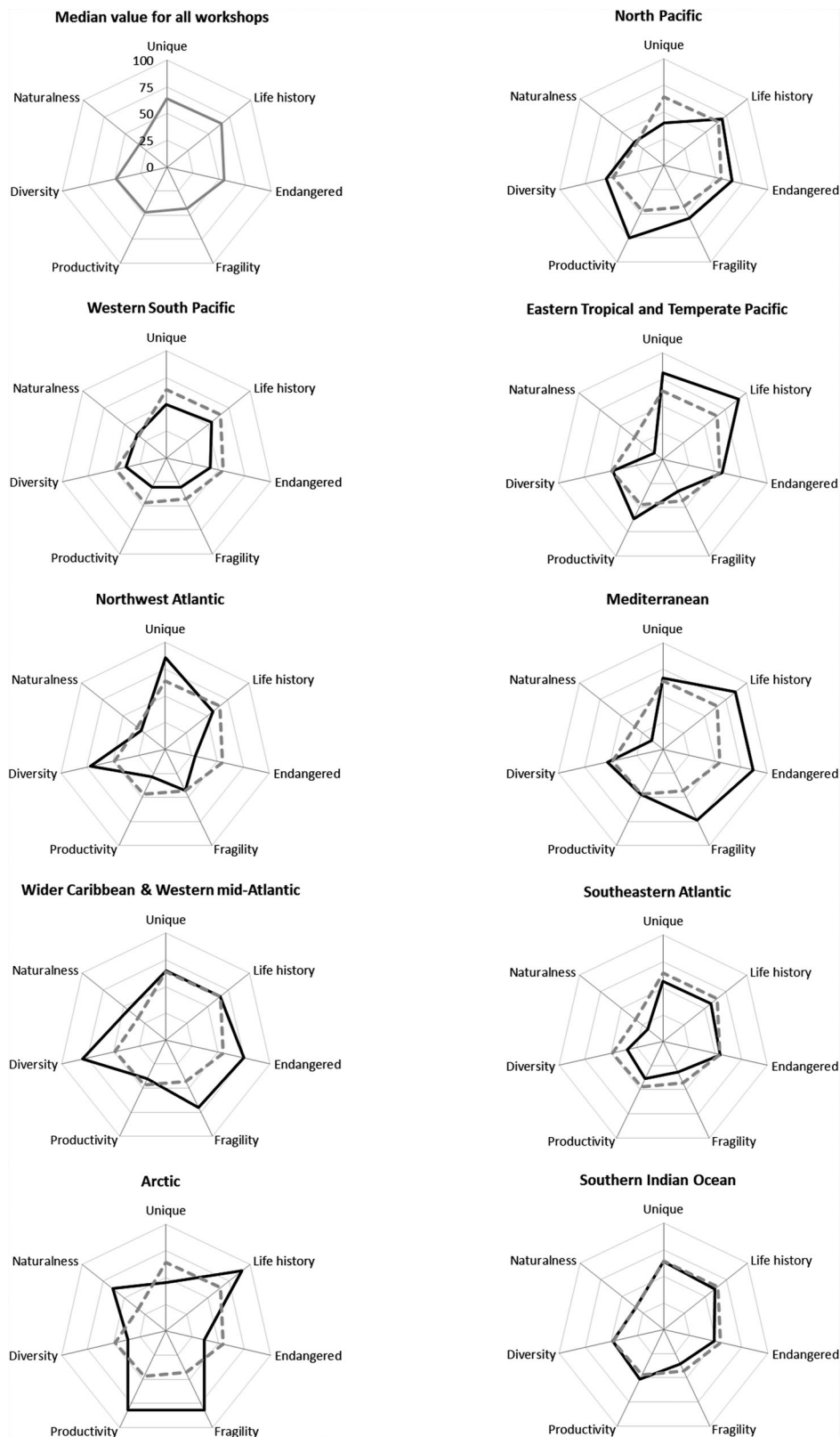
Figure 3. *Median ranking of ecologically or biologically significant marine areas (EBSA) identified by participants in the 9 workshops relative to each of the 7 internationally agreed on scientific criteria.*

Table 3. The percentage of ecologically or biologically sensitive marine areas that ranked high relative to Convention on Biological Diversity (CBD) scientific criteria across the 9 regional workshops.

CBD scientific criterion	Average%	Min %	Max %	Insufficient data %
Uniqueness or rarity	62	40	86	1
Special importance for life-history stages of species	70	54	91	8
Importance for threatened, endangered, or declining, species and/or habitats	55	29	87	10
Vulnerability, fragility, sensitivity, or slow recovery	51	31	82	9
Biological productivity	51	29	82	12
Biological diversity	52	34	80	12
Naturalness	31	10	64	10

importance for life-history stages was ranked high most frequently; uniqueness or rarity was also frequently ranked high. There were insufficient data to rank 8–12% of the EBSAs relative to individual criteria, except for the uniqueness criterion, for which regional experts ranked 99% of the EBSAs relative to this criterion, perhaps because this criterion can be met with only physical data (Table 3). This suggests that all criteria could be interpreted by the experts and could generally be ranked against available data.

Rankings based on different EBSA criteria were often significantly correlated and positive (Spearman rank correlations from 0.13 to 0.41 [Supporting Information]). Several patterns emerged. Naturalness was correlated with uniqueness, fragility, and biodiversity, as expected because the criteria based on species and productivity would tend to indicate exploitable populations. Biodiversity and fragility were correlated with all the other criteria, potentially indicating some redundancy in these criteria. Productivity was correlated with life history, endangered and threatened species, fragility, and biodiversity criteria but not uniqueness or naturalness, suggesting that productive areas are not uncommon in oceans but are likely already exploited.

The EBSA criteria (or close facsimiles) are applied in other international processes (Gilman et al. 2011) (Table 1). The most commonly occurring criteria (uniqueness, life history, and endangered and threatened species) were also most frequently ranked high by workshop experts (Table 3), although a relative lack of data on endangered and threatened species compared with other (often commercial) species was apparent in the lower rankings of this criterion. Fragility, productivity, and diversity appeared 2–3 times in other international processes and were ranked high for about half of the EBSAs. These criteria all require scientific knowledge from independent scientific surveys, and with only a small fraction of oceanic biodiversity mapped (especially in offshore and deep sea areas [Webb et al. 2010]), it is not surprising that information generated by independent scientific surveys lags information generated in the process of commercial exploitation.

Naturalness was ranked high in less than one-third of the EBSAs. Perhaps this result is not too surprising given the large amount of information that comes from exploited areas. Areas of high conservation value were often identified, at least in part, from data collected during harvesting, which contributes to the overlap of areas valued by more than one sector and a tendency for protected areas (CBD Aichi Target 11) to be placed outside areas being used for, or with the potential to be used, for commercial purposes (e.g., CBD Aichi Target 6) (Spalding et al. 2013; Devillers et al. 2014).

Lessons Learned

DATA ACCESSIBILITY

Synthesis and mapping of scientific data by the technical teams was challenging in all the workshops, regardless of region. The absence of a common global data network made it difficult to identify data sets; data sets were typically identified through existing scientific networks and additional contacts identified in preparatory meetings. It is likely that important data sets were missed in the first round of regional workshops; this underscores the need for a continuing process with improved data infrastructure.

The ability of states to meet and report on CBD Aichi targets and progress on other international agreements in the face of increasing use of marine areas including the high seas (Halpern et al. 2008; Merrie et al. 2014) depends on their ability to make informed and systematic decisions about the state of, and pressures on, the environment under their jurisdiction (Ban et al. 2014). Yet some scientists are unwilling to provide access to data, especially before publication (Huang et al. 2012), despite the data collection typically having been supported by public funds. The withholding of data undermines national and international agreements and prevents progress toward conservation targets and sustainable use of resources within and beyond national jurisdictions (Costello et al. 2013). Thus, groups that have collaborated to provide global data sets on seabirds (Birdlife International 2013), seamounts (Clark et al. 2011), biodiversity (Ocean Biogeographic Information System [Halpin et al. 2006]), or geomorphology (Harris & Whiteway 2011) had more influence on the choice of EBSAs and their boundaries than,

for example, turtle or marine mammal researchers where global analyses were lacking, and these groups helped reduce the reliance on commercial fisheries data from regional sources or historical whaling data (Smith et al. 2012). Improving scientists' capacity and willingness to share data would enhance understanding and management of the biodiversity of the world's ocean (Thessen & Patterson 2011); recognizing authors of data is an emerging approach with potential (Chavan et al. 2013).

IMPORTANT DATA GAPS

There are significant data gaps and deficiencies resulting from low levels of data collection or poor data sharing, including for the open ocean and southern hemisphere (Webb et al. 2010). Filling these gaps is a high priority that requires new resources and effort.

Biogeographic classifications used to support spatial planning have been developed for the ocean surface and seabed environments, based primarily on physical data (UNESCO 2009), but data have been so sparse for the pelagic water column below 200 m depth (Webb et al. 2010) that these areas are only rarely included in monitoring and management schemes or in conservation planning (Robison 2009). New data from the Census of Marine Life (Williams et al. 2010) and other national and international efforts are now contributing to a biogeographic classification for the mesopelagic (approximately 200–1000 m) and helping scientists identify major patterns in the bathypelagic (>1000 m).

Globally consistent biological data collections are starting to become available (e.g., Edgar et al. 2014; O'Hara et al. 2014); however, although areas such as seamounts (e.g., Clark et al. 2011), shallow reefs (Edgar et al. 2014), and the continental shelves (Harris & Baker 2012) have been studied more than other areas, there is little information on haydal and abyssal regions. When biologically based biogeographies are compared with those derived from physical data, the differences are clear (O'Hara et al. 2011). This together with the increased understanding of the mesopelagic suggests that it is time to update the Global Open Oceans and Deep Seabed Biogeographic Classification (UNESCO 2009) that may not capture the distributions of phyla that are starting to be better understood.

ENGAGEMENT AND CAPACITY BUILDING

The regional workshops were designed so that all workshop participants would engage in small regional or national groups identifying EBSAs. This surprised some participants who were more accustomed to receiving technical advice that they could take away with them and apply. Effective engagement was promoted by minimizing the number of formal presentations and presenting as much regional information as possible in the form of large disposable paper maps that covered the conference room walls. This ensured that everyone had easy access to the same information and worked with each other as they clustered around the maps to discuss particular issues.

When participants met prior to the regional workshop, coordinated by them or through the Sustainable Ocean Initiative (CBD 2012), they were better prepared to propose and discuss EBSAs, especially in national waters. Prior meetings helped participants better understand the EBSA process, work together with the technical team to identify local data sets, assist each other in accessing and using geographic information systems, and support each other when English was not their first language.

In many regions, the workshops provided valuable capacity-building opportunities and provided participants an improved understanding of their EEZs and beyond. Workshops also identified and made available a large number of previously unknown data sets. All regional data sets were made available to participants online and on smart drives with self-extracting mapping freeware for countries where the internet is unreliable or prohibitively expensive.

The regional workshops were most productive when supported by a preexisting strong regional program that had brought countries together to work on marine issues. The support of the South Pacific Regional Environment Program and the Nairobi and Abidjan conventions (regional cooperation programs affiliated with the UNDP) provided invaluable support and were key to the success of subsequent workshops. Strong regional programs provided the focus and consistency that helped regional workshop experts make relevant and lasting contributions, especially in developing regions. The absence of strong regional groups was noted as limiting for some workshops.

THE NEXT STEP IN THE EBSA PROCESS

Regional workshops to describe areas meeting the EBSA criteria as developed and agreed on by the Conference of Parties to the CBD have covered 68% of the global oceans in a little over 2 years. Covering national, transboundary, or areas beyond national jurisdiction, identified EBSAs will inform area-based management of the marine environment.

The EBSAs are areas that may require enhanced conservation and management, including establishing marine protected areas (MPAs) and conducting environmental impact assessments (CBD COP 10). Some Parties have already used the EBSAs developed in regional workshops to inform national MPA processes or to secure international funding to support national processes. However, the EBSA program was initiated to support area-based management in areas beyond national jurisdiction. It is anticipated that EBSAs will inform all MPA processes agreed to through the implementing agreement being developed under UN Convention on

the Law Of the Sea, but the role of EBSAs in supporting management of biodiversity beyond national jurisdiction does not depend only on a new agreement; existing agreements will be improved by the EBSA information. For example, the Conference of Parties to the Convention on Migratory Species recognizes the value of the EBSA identification process to identifying habitats and ecological networks important to the life cycles of migratory species (Kot et al. 2014) and has requested that their members and participants actively participate in the EBSA process (CMS COP11/Resolution 11.25).

The Central Pacific Equatorial Productivity Zone EBSA is an important area for the South Pacific tuna longline fleet and overlays the Clipperton-Clarion Fracture Zone— a well established target for deep sea mining. An expert-based process proposed an MPA network to safeguard biodiversity and ecosystem function at depth (Wedding et al. 2013), but the upper ocean used by fishers and identified as an EBSA was not included, despite the surface activities that would occur to extract seabed minerals. The International Seabed Authority now has the information and an international consensus to consider the impact of surface activities on this pelagic system in their environmental impact assessments.

Criteria used to identify EBSAs are not unique to the CBD (Table 1), and the EBSA process is now being used in other marine management processes. Many regional workshops have included regional fisheries management associations and organizations that are identifying vulnerable marine ecosystems as areas for bottom fishers to avoid. The EBSAs that include relevant habitat can inform this process and may be incorporated in a formal management rule that strengthens the current "move-on" rule used by these regional fisheries management groups (Ardron et al. 2013).

Systematic management of ABNJ is currently lacking in almost all instances and will require both the more effective implementation of existing agreements and most likely new agreements (Ban et al. 2014). The EBSA program we described is an established approach that can help the international community assess existing and develop new agreements. For example, progress in the CBD Aichi Target 11, which calls for "ecologically representative... systems of protected areas and other effective area-based conservation measures, and integrated into the wider... seascapes," can now be assessed in part by how many systems overlap with EBSAs. However, EBSAs vary in their attributes and supporting data and are currently neither comprehensive nor fully representative; each workshop identified the need for further effort to build a more systematic approach. These gaps, along with considerations of the size of the EBSA and the reason for its description must be addressed when considering EBSAs in national or regional planning process, or even when comparing EBSAs (e.g., see Kot et al. 2014). Filling these gaps could be supported by an updated global biogeography and could also benefit from increased socio-

cultural considerations that are frequently omitted from scientific advice to managers (Daw et al. 2015).

The recommendation to start negotiating a new implementing agreement to manage biodiversity beyond national jurisdiction represents a hard-fought recognition by Parties to the UN of the need to improve management of the world's oceans, which comprise half the planet. A concurrent mobilization of the international scientific community is required if considered and agreed on scientific advice is to be ready when the global community needs it. This requires increased global and sectoral scientific collaboration, improved sharing of data and the means to access it at appropriate levels of aggregation, a new global ocean biogeography, and international processes that promote systematic scientific evaluation of the oceans' resources incorporating ecological, economic, and sociocultural concerns. The EBSA identification program provides an international standard for others to build and improve on.

Acknowledgments

Supporting Information

Details of the data provided, sources, ongoing access, and statistical methods (Appendix S1) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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