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# PROGRESS REPORT ON MARINE AND COASTAL BIODIVERSITY: USE OF SCIENTIFIC AND TECHNICAL INFORMATION FOR DESCRIBING ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS (EBSAs)[1]

*Note by the Executive Secretary*[2]

## I. INTRODUCTION

1. The Conference of Parties, at its tenth meeting, established a global process for describing ecologically or biologically significant marine areas (EBSAs), through the application of scientific criteria set out in annex I to decision IX/20, other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20. The process is based on the organization of a series of regional workshops involving Parties and other Governments, as well as competent organizations and regional initiatives (decision X/29). At its eleventh meeting, the Conference of Parties reviewed the outcomes of the first two regional workshops and requested that further workshops be organized for the remaining regions or subregions where Parties wish workshops to be held (decision XI/17).

2. Figure 1 shows the coverage by the six regional EBSA workshops convened by the Secretariat of the Convention on Biological Diversity since the tenth meeting of the Conference of the Parties. Table 1 summarizes key information about the workshops. The countries represented at the six regional workshops organized so far by the Secretariat described a total of 172 areas as meeting the EBSA criteria. Further details on the workshops can be found in the web links provided in the footnotes to table 1.

* UNEP/CBD/SBSTTA/17/1.

[1] The designations employed and the presentation of material in this note do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

[2] This note draws on the inputs provided by the technical team members of the Commonwealth Scientific and Industrial Research Organisation of Australia (CSIRO) and Duke University (USA) that provided scientific and technical support to different regional workshops.

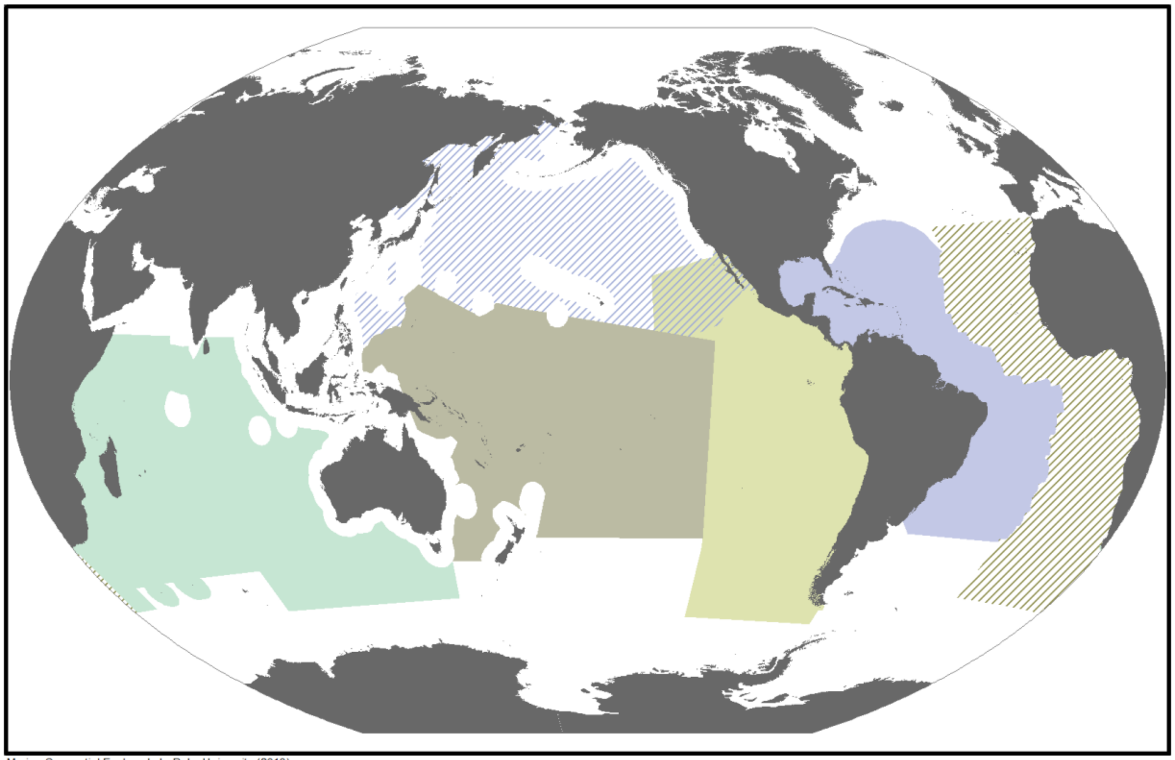


Figure 1. The geographical scope of the six regional workshop areas organized by the CBD Secretariat to facilitate the description of areas meeting EBSA criteria.

3. Given the focus of the seventeenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice on the scientific and technical needs for the implementation of the Strategic Plan for Biodiversity 2011-2020 and the achievement of the Aichi Biodiversity Targets, this note describes scientific and technical information that has been utilized in the CBD's process of describing areas that met the EBSA criteria. The biographic, biological, physical and oceanographic data sets are described in section II. Section III describes how these have been compiled, synthesized for the workshops and how the participants in the workshops have analyzed the data to describe the EBSAs. Section IV describes the potential use of EBSA-related scientific information to further enhance our efforts toward achieving the Aichi Biodiversity Targets in marine areas. Finally, section V provides some conclusions and overall lessons learned. Document UNEP/CBD/SBSTTA/17/6 includes a summary of the current information note.

4. As emphasized by the Conference of the Parties at its tenth and eleventh meetings, the application of the scientific criteria for EBSAs is a scientific and technical exercise, while the identification of EBSAs and the selection of conservation and management measures are matters for States and competent intergovernmental organizations, in accordance with international law, including the United Nations Convention on the Law of the Sea (decisions X/29 and XI/17).

***Table 1: CBD regional workshops to facilitate the description of EBSAs.***

| **Workshop** | **Countries**[a] | **Organiza-tions**[b] | **EBSAs (total)**[c] | **EBSAs (total NJ)**[d] | **EBSAs (total ABNJ)**[e] | **EBSAs (single EEZ)**[f] | **EBSAs (multiple EEZ)**[g] | **EBSAs (EEZ + ABNJ)**[h] | **EBSAs (ABNJ only)**[i] |
|---|---|---|---|---|---|---|---|---|---|
| **Western South Pacific** (Nov-Dec 2011, Fiji)[1] | 15 | 10 | **26** | *22* | *11* | 8 | 7 | 7 | 4 |
| **Wider Caribbean & Western Mid-Atlantic** (Feb-Mar 2012, Brazil)[2] | 23 | 15 | **21** | *21* | *5* | 11 | 5 | 5 | 0 |
| **Southern Indian Ocean** (July-Aug 2012, Mauritius)[3] | 16 | 20 | **39** | *30* | *13* | 22 | 4 | 4 | 9 |
| **Eastern Tropical & Temperate Pacific** (August 2012, Ecuador)[4] | 12 | 13 | **21** | *18* | *7* | 12 | 2 | 4 | 3 |
| **North Pacific** (Feb-Mar 2013, Russia)[5] | 7 | 8 | **20** | *15* | *5* | 15 | 0 | 0 | 5 |
| **South-Eastern Atlantic** (April 2013, Namibia)[6] | 17 | 15 | **45** | *42* | *7* | 31 | 7 | 4 | 3 |
| **Sum of above**[7] | **92** | **79** | **172** | ***148*** | ***48*** | **99** | **25** | **24** | **24** |

[a] Number of countries represented.
[b] Number of organizations represented.
[c] Total number of areas described for EBSA criteria by the workshop.
[d] Total number of areas described for EBSA criteria wholly or partly within national jurisdiction.
[e] Total number of areas described for EBSA criteria wholly or partly beyond national jurisdiction.
[f] Number of areas described for EBSA criteria within the national jurisdiction of a single country (EEZ=exclusive economic zone).
[g] Number of areas described for EBSA criteria within national jurisdiction of more than one country but without areas beyond national jurisdiction.
[h] Number of areas described for EBSA criteria within national jurisdiction and having areas going beyond national jurisdiction.
[i] Number of areas described for EBSA criteria only beyond national jurisdiction.

[1] http://www.cbd.int/doc/?meeting=RWEBSA-WSPAC-01.
[2] http://www.cbd.int/doc/?meeting=RWEBSA-WCAR-01.
[3] http://www.cbd.int/doc/?meeting=EBSA-SIO-01.
[4] http://www.cbd.int/doc/?meeting=EBSA-ETTP-01.
[5] http://www.cbd.int/doc/?meeting=EBSA-NP-01.
[6] http://www.cbd.int/doc/?meeting=EBSA-SEA-01.
[7] Note: Some countries and organizations were represented at more than one workshop.

## II. SCIENTIFIC AND TECHNCIAL DATA ON MARINE BIODIVERSITY IN OPEN-OCEAN AND DEEP-SEA HABITATS TO SUPPORT THE EBSA PROCESS

### *A. Advances in scientific understanding of marine biodiversity in open-ocean and deep-sea habitats*

5. New advances in data collection and analysis have improved our understanding of open-ocean and deep-sea ecosystems and habitats. The technological advances include remote sensing, marine acoustics, deep-sea trawling, genetics and autonomous vehicles, while analytical advances provide scientists with the tools to integrate this rich information resource. In addition, the ten-year (2000-2010) Census of Marine Life programme brought numerous researchers from multiple countries together to focus on marine science in areas both within and beyond national jurisdiction (Williams et al. 2010).

6. The development of global data sets of oceanographic conditions from satellite remote sensing, *in-situ* data collections (e.g., Argo drifters) and assimilative models has rapidly advanced our understanding of broad processes in the open oceans and deep seas. Long-term data collection on sea surface temperature (SST), ocean colour and productivity, salinity, dissolved oxygen, nitrate, silicate as well as ocean surface altimetry have promoted rapid advancements in global oceanographic data products and understanding of open-ocean environments. Data archives such as the World Ocean Atlas (NOAA-NODC WOA09) and the CSIRO Atlas of Regional Seas (Dunn and Ridgway 2002, Ridgway et al. 2002, CARS 2009) now provide open access to these global data products.

7. Refinement and analysis of global bathymetric data sets such as ETOPO2 (Smith and Sandwell 1997) have been providing baseline information on topographic features such as seamounts, ridges and submarine canyons. Newly derived data products for locating and classifying seamounts and cold-water corals (Clarke et al. 2010), canyons (Harris and Whiteway 2011), and hydrothermal vents and seeps are providing critical information on these important deep-sea features (Yesson et al. 2012).

### *B. Biogeographical classifications*

8. These advances in the data and knowledge of open-ocean and deep-sea environments are being used to develop new biogeographic classifications. Biogeographic classifications have been developed for the ocean surface and seabed environments, but classification of pelagic water column regions is only now emerging. Biogeographic data provided an essential context for the EBSA assessment process and assisted the design of the regional workshops. Biogeographic maps served two essential purposes for the workshops: (1) biogeographical regions were used to help define the regional scope of each workshop; and (2) biogeographic data were used to help identify features and areas in the regions that met the EBSA criteria.

9. Biogeographic classification systems divide the ocean into regions using environmental features and – to the extent data are available – their species composition. This represents a combined physiognomic and taxonomic approach. Generalized environmental characteristics of the benthic and pelagic environments (structural features of habitat, ecological function and processes as well as physical features such as water characteristics and seabed topography) are used to select relatively homogeneous regions with respect to habitat and associated biological community characteristics. These are refined with direct knowledge or inferred understanding of the patterns of species and communities, driven by processes of dispersal, isolation and evolution; ensuring that biological uniqueness found in distinct basins and water bodies is also captured in the classification. Recent global biogeographies are the backbone of efforts to quantify our progress toward meeting objectives for representative protection of the world’s biomes and sustainable fisheries (e.g., Aichi Target 6 & 11).

10. The Global Open Ocean and Deep Seabed (GOODS) biogeographic classification (http://unesdoc.unesco.org/images/0018/001824/182451e.pdf; UNESCO 2010) provides a comprehensive coverage of open-ocean and seabed features. The GOODS biogeographic classification subdivides the

world's oceans into 30 provinces as well as benthic areas subdivided into three large depth zones consisting of 38 provinces (14 bathyal,[3] 14 abyssal[4] and 10 hadal[5]). In addition, 10 hydrothermal vent provinces have been delineated. This represents the newest and most comprehensive classification of the open ocean and deep sea floor into distinct biogeographic regions. The GOODS classification has undergone further refinement since the start of the EBSA regional workshop process (Watling et al. 2013).

11. Additional oceanographic classifications systems, including the Longhurst Marine Province classification, were also used. This data set represents a partition of the world's oceans into provinces as defined by Longhurst (1995, 1998, 2006) and is based on the prevailing role of physical forcing as a regulator of phytoplankton distribution. The boundaries of these provinces are not fixed in time and space, but are dynamic and move under seasonal and interannual changes in physical forcing. At the first level of reduction, Longhurst recognized four principal biomes (also referred to as "domains" in earlier publications): the Polar Biome, the Westerlies Biome, the Trade-Winds Biome, and the Coastal Boundary Zone Biome. These four biomes are recognizable in every major ocean basin. At the next level of reduction, the ocean basins are partitioned into provinces, roughly ten for each basin. These partitions provide a template for data analysis or for making parameter assignments at a global scale.

12. Two coastal-shelf biogeographic classifications, the Marine Ecosystems of the World (MEOW) (Spalding et al. 2007) and the Large Marine Ecosystems (LME) (Sherman and Hempel 2009) classifications were also used to support the consideration of the geographic scope of the EBSA regional workshops and the description of areas meeting the EBSA criteria.

13. To date, all efforts to produce comprehensive global pelagic biogeographies have been limited to the upper 200 metres of the water (e.g., Longhurst provinces, or the GOODS report and follow-on work by Spalding and co-authors). Data on the deep pelagic zones have been so sparse that these areas have generally not been included in monitoring and management schemes or in conservation planning. However, a wealth of new data is now available for deep pelagic realms from programmes of the Census of Marine Life, such as INDEEP, the Census of Marine Zooplankton (CMarZ) and the Mid-Atlantic Ridge Ecosystem (MAR-ECO), as well as other national efforts (Williams et al. 2010). Under the auspices of the Global Oceans Biodiversity Initiative and INDEEP, these data are informing work on a new global deep pelagic biogeography. This new work has produced a biogeographic classification for the mesopelagic (200 m – 1000 m) and has begun to collate views on major patterns that might be expected in the bathypelagic (>1000 m). It is hoped in future to undertake large-scale analyses of certain taxa that can dominate at greater depths in an effort to inform future efforts towards bathypelagic biogeography. The deep water column has rarely, if ever, been discussed by the regional EBSA workshops. The lack of direct consideration of deep pelagic zones (200 m – 10,000 m) at the workshops at a national or regional scale is due to the paucity of scientific data in this zone.

14. While there has been increased understanding of the benthic areas of the world's oceans over recent decades there are still vast areas with little or no information, especially biological information. Seamounts are relatively well understood, and the continental shelves of all the world's continents have been studied (to a greater or lesser extent), however, the hadal and abyssal regions of the world's oceans are poorly understood. The GOODS report provided a first overview of the biogeography of those regions. However, new biogeographies particular to specific taxon groups (e.g. *galatheids* and *ophiuroids*) are in development and may help refine our understanding of the oceans. Regional analyses of these data show that the primarily physical basis of GOODS may not capture the regional biogeographies of phyla that we are starting to understand better (O'Hara et al. 2011). International

[3] Sea floor between 200 (or 300 m) and 3500 m depth. Typically equates with the continental slope and continental rise that descend from continental margins.

[4] Sea floor that lies between 3500 m and 6500 m depth.

[5] The region of the sea at depths greater than 6500 m. Such waters are almost entirely confined to deep trench formations that run along tectonic plate boundaries.

collaborations developed as part of the Census of Marine Life, including INDEEP and MAR-ECO, are contributing to the development of these new biogeographies.

### *C. Biological data*

15. Despite decades of effort, biological data on the deep oceans are difficult to obtain. However, several common biological data layers were collated and used to support the EBSA workshops. These data layers included habitats, protected species, foraging and breeding areas, commercial fisheries, and aggregated biodiversity data from the Ocean Biogeographic Information System (OBIS, http://www.iobis.org/).

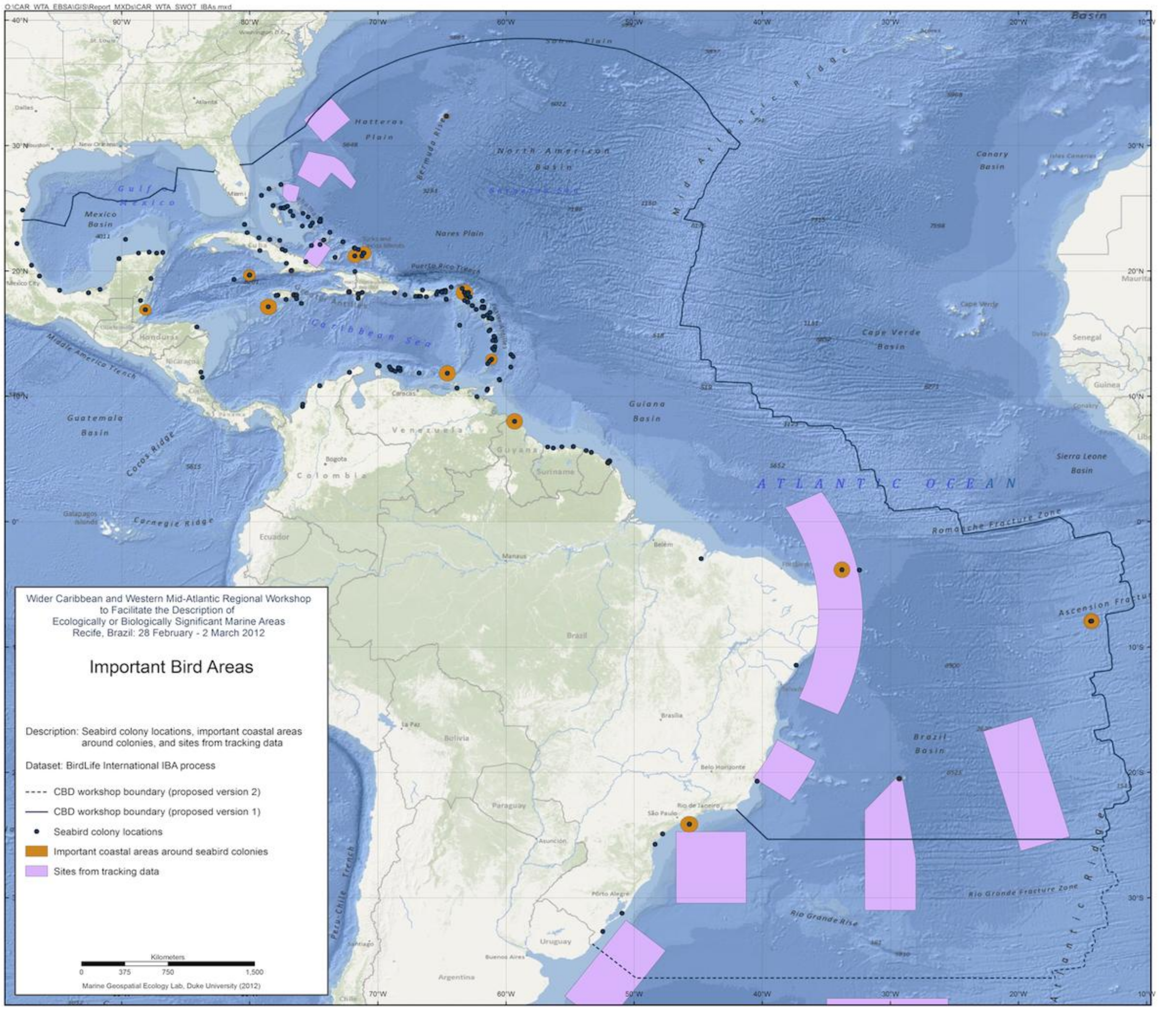


Figure 2. Wider Caribbean and Western Mid-Atlantic Regional Workshop - Important Bird Areas *(source: BirdLife International).*

16. The distribution of deep-sea corals is a very important indicator, because this is a habitat-forming species that provides critical ecosystem functions in deep-sea ecosystems. Because there have been relatively few direct surveys of deep-sea coral habitats, predictive habitat models are increasingly being used to identify species' distributions in areas that have not been sampled. A global habitat suitability model was generated by Davies and Guinotte (2011) for five species of framework-forming scleractinian corals. Model outputs indicated that the majority of suitable coral habitat is likely to occur on the continental shelves and slopes of the Atlantic, South Pacific and Indian oceans. Numerous small-scale features (e.g., seamounts) that have not been sampled but were predicted to have a high probability of

supporting cold-water coral habitat were identified as potential coral habitats in all ocean basins. Yesson et al. (2012) developed global habitat suitability models and distribution maps for seven suborders of Octocorallia: Alcyoniina, Calcaxonia, Holaxonia, Scleraxonia, Sessiliflorae, Stolonifera and Subselliflorae. The results of these models were presented to identify the deep-sea habitats that may contain one or more of these coral species at any site.

17. BirdLife International made available analyses of Important Bird Areas (IBAs) (figure 2) to assist in the description of important seabird use areas for the EBSA process. The IBA identification process relies on four core criteria: (1) globally threatened species, (2) restricted-range species, (3) biome-restricted species, and (4) congregations of species (http://www.birdlife.org/datazone/info/ibacritglob). IBAs are identified using several data sources: (1) terrestrial seabird breeding sites for species meeting the IBA criteria; (2) marine areas around breeding colonies estimated from the distance required by each species based on literature reviews; and (3) sites identified by satellite tracking of seabirds using kernel density analysis, first passage time analysis and bootstrapping approaches. Together these IBAs form a network of sites of importance to coastal, pelagic, resident and or migratory species. Information from IBA descriptions was particularly relevant to the application of the EBSA criteria for “important for life-history stages”, “threatened species”, “diversity” and “fragility”.

18. Observation records for individual species and indices of biodiversity were collected from OBIS (http://www.iobis.org/) (figure 3). OBIS is an open-access global information system archiving and disseminating marine biogeographic information for use in scientific, management and policy analysis. OBIS is maintained by the UNESCO-IOC/IODE[6] programme and operates through data contributions of a number of international organizations and institutions. The OBIS information system is currently the largest single data repository for biological data for the world’s oceans, with more than 30,000,000 geographically registered biological observations online at the time of the EBSA workshops. The OBIS information system plays a vital role in scientific analysis to support a number of international processes in areas beyond national jurisdiction (ABNJ). Data products were created for species diversity, IUCN Red List species, marine mammal data and sea turtle data.

19. Although data on protected species can be sensitive, occurrence records from a variety of observing platforms are available through global biogeographic information data centres. Marine mammal species richness data from presence-only observations were generated for each region from data held in the OBIS data centre. For selected geographies, additional derived data products were made available for workshop participants. These included habitat probability models, targeted occurrence records for rare or endangered species, and seasonal/annual utilization distributions generated from tagging and tracking data (figure 4). Data from historical records of whaling from 1780 to 1920 were also used to inform each workshop on the potential historical distributions of four whale species: sperm whales, right whales, humpback whales and bowhead whales (Smith et al. 2012) (figure 5). Despite these data resources, more work needs to be done to derive habitat preferences and density distributions from existing animal observations.

20. While most of the focus of the EBSA workshops was on open-ocean areas, global data on coral reefs, seagrass and mangroves were aggregated from data sets from the World Conservation Monitoring Centre (WCMC). Data on sea turtle nesting sites were provided from the State of the World’s Sea Turtles (SWOT) information system to provide general information for the world. The current SWOT database contains sea turtle nesting records from over 120 countries around the world (Dimatteo et al. 2009).

[6] International Oceanographic Data and Information Exchange (IODE) programme of the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

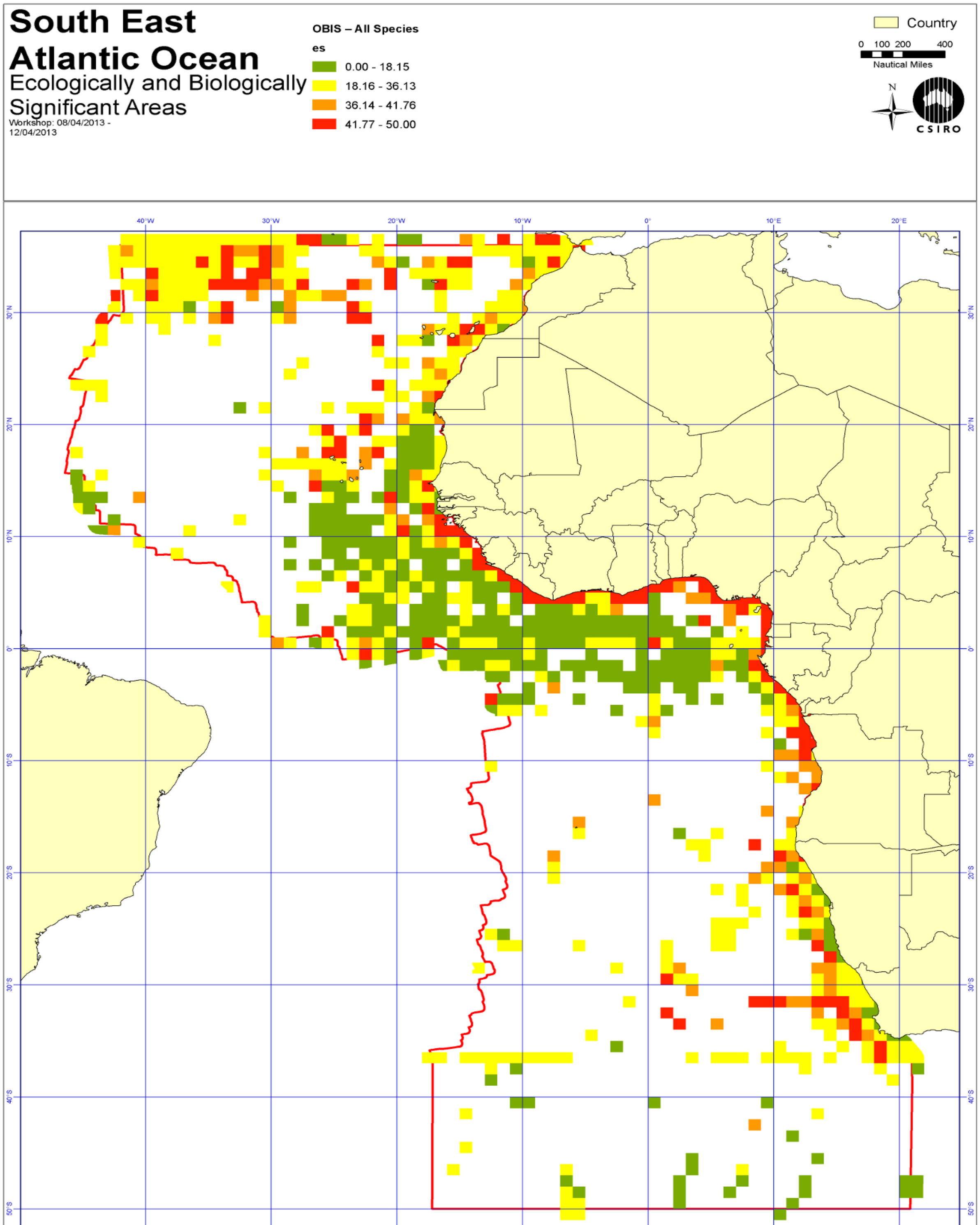


Figure 3. South-Eastern Atlantic Workshop - Summary of data available in OBIS presented at the workshop.

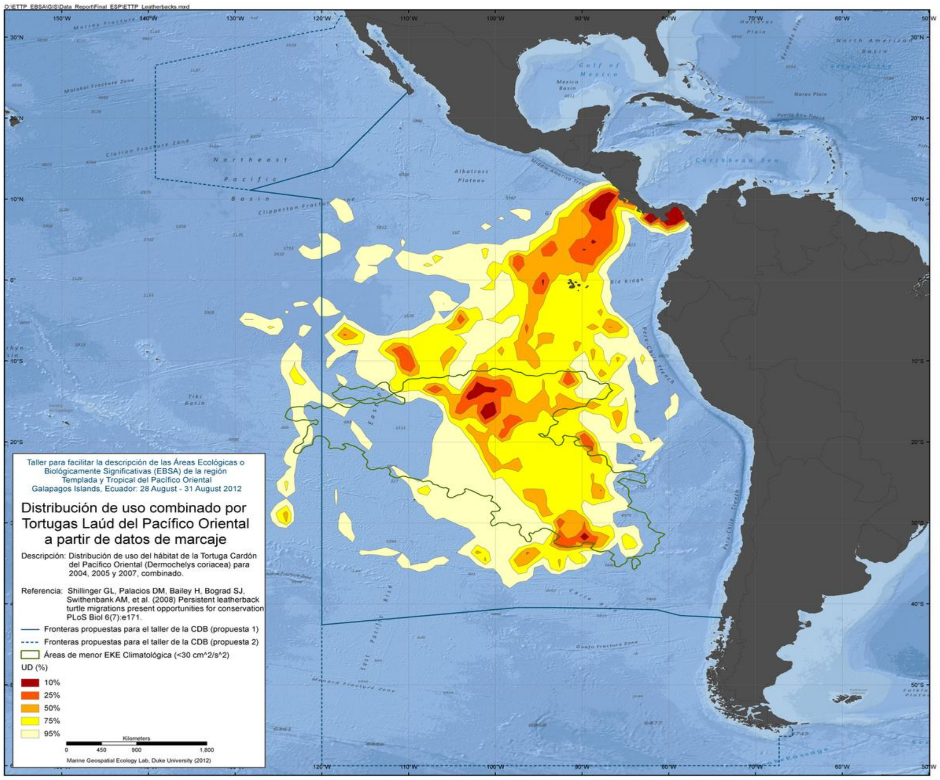


Figure 4. Eastern Temperate and Tropical Pacific Regional Workshop - Combined utilization distribution by eastern Pacific leatherback turtles from tracking data.

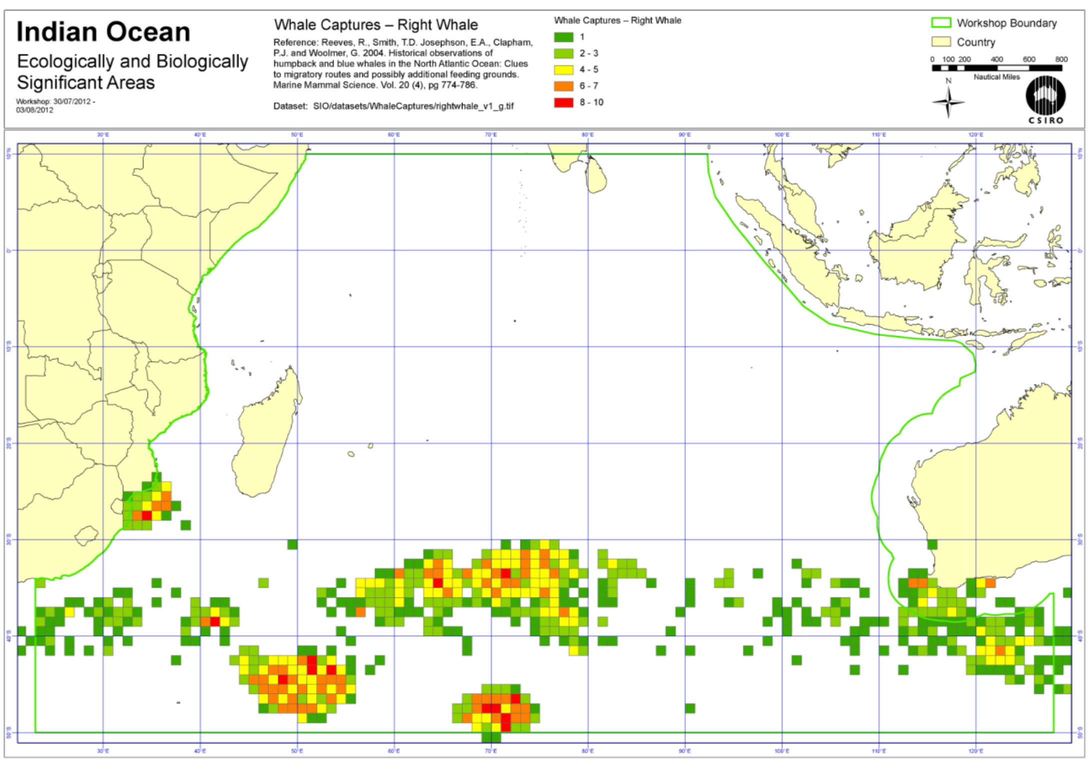


Figure 5. Southern Indian Ocean Workshop - Historical catches of southern right whales.

### *D. Physical and oceanographic data*

<u>*Bathymetry*</u>

21. Bathymetric data provide a fundamental data layer for identifying benthic features and interpreting habitats in the open ocean and deep seas. The GEBCO_08 data set was used at the EBSA regional workshops to provide a common bathymetric surface. This data set represents a global 30 arc-second grid generated by combining ship depth soundings with interpolation between sounding points guided by satellite-derived gravity data. Land data are largely based on the Shuttle Radar Topography Mission (SRTM30) gridded digital elevation model (source: http://www.gebco.net/data_and_products/gridded_bathymetry_data/).

<u>*Seamounts*</u>

22. Seamounts and undersea knolls often rise more than 1000 m from the sea floor. These features provide important habitats for aquatic predators, demersal deep-sea fish and benthic invertebrates (Clark et al. 2010). However, most seamounts have not been surveyed, and their numbers and locations are not well known. The most recent assessments use global bathymetric data at 30 arc-second resolution to identify seamounts and knolls. Yesson et al. (2012) identify 33,452 seamounts and 138,412 knolls, representing the largest global set of identified seamounts and knolls to date. As only 6.5 per cent of the ocean floor has been surveyed with soundings it is likely that new seamounts will be discovered as surveying improves. Seamount habitats constitute approximately 4.7 per cent of the ocean floor, and knolls cover 16.3%. Spatial data on the distribution of potential seamount and knoll features were an important input at each of the EBSA regional workshops.

<u>*Vents and seeps*</u>

23. Chemosynthetic ecosystems are a unique and globally rare ocean floor feature. The location of these features was important to a number of EBSA workshops in applying the EBSA criteria. Data on chemosynthetic ecosystems were accumulated under the ChEss programme (Chemosynthetic Ecosystem Science) of the Census of Marine Life programme (CoML) and available through ChEssBase.[7] The ChEss programme developed recent information on the biogeography of deep-water chemosynthetic ecosystems at a global scale in order to help understand the processes driving these ecosystems. ChEss focused on deep-water reducing environments such as hydrothermal vents, cold seeps, whale falls, sunken wood and areas of low oxygen that intersect with continental margins and seamounts (ChEssBase: http://www.noc.soton.ac.uk/chess/). New species are continuously being discovered and described from sampling programmes around the globe (InterRidge: http://www.interridge.org/irvents/maps).

<u>*Distribution of large submarine canyons*</u>

24. Like seamounts, submarine canyons are important features influencing the biogeography of the open oceans and deep seas. River-associated or shelf-incising canyons tend to hold greater benthic biomass and biodiversity than non-shelf-incising canyons. Data on the occurrence of submarine canyons were provided at each EBSA workshop. This data set was based on an analysis of the ETOPO1 data set that has a resolution of 1 arc-minute (1 nautical mile=1.852 km) and represented an inventory of 5,849 separate large submarine canyons in the world's oceans (Harris and Whiteway 2011). Large submarine canyons were defined as covering a depth range of at least 1000 m, a length of at least 150 m and with the canyon head in waters less than 4000 m deep.

<u>*Climatologies*</u>

25. The description of areas meeting the EBSA criteria focuses not only on fixed benthic features, but also dynamic features of the ocean surface and pelagic zones. Oceanographic climatologies (figure 6) provided an essential data set for the description of these areas. Global oceanographic climatological data were provided from the World Ocean Atlas (NOAA-NODC WOA09) and the CSIRO Atlas of Regional

[7] http://www.noc.soton.ac.uk/chess/database/db_home.php.

Seas (CARS 2009). The CARS data set is a digital climatology, or atlas of seasonal ocean water properties. It comprises gridded fields of mean ocean properties over the period of modern ocean measurement and average seasonal cycles for that period (http://www.marine.csiro.au/~dunn/cars2009/). These data provided information on surface temperature, salinity, nitrate, silicate, phosphate, oxygen and mixed-layer depth.

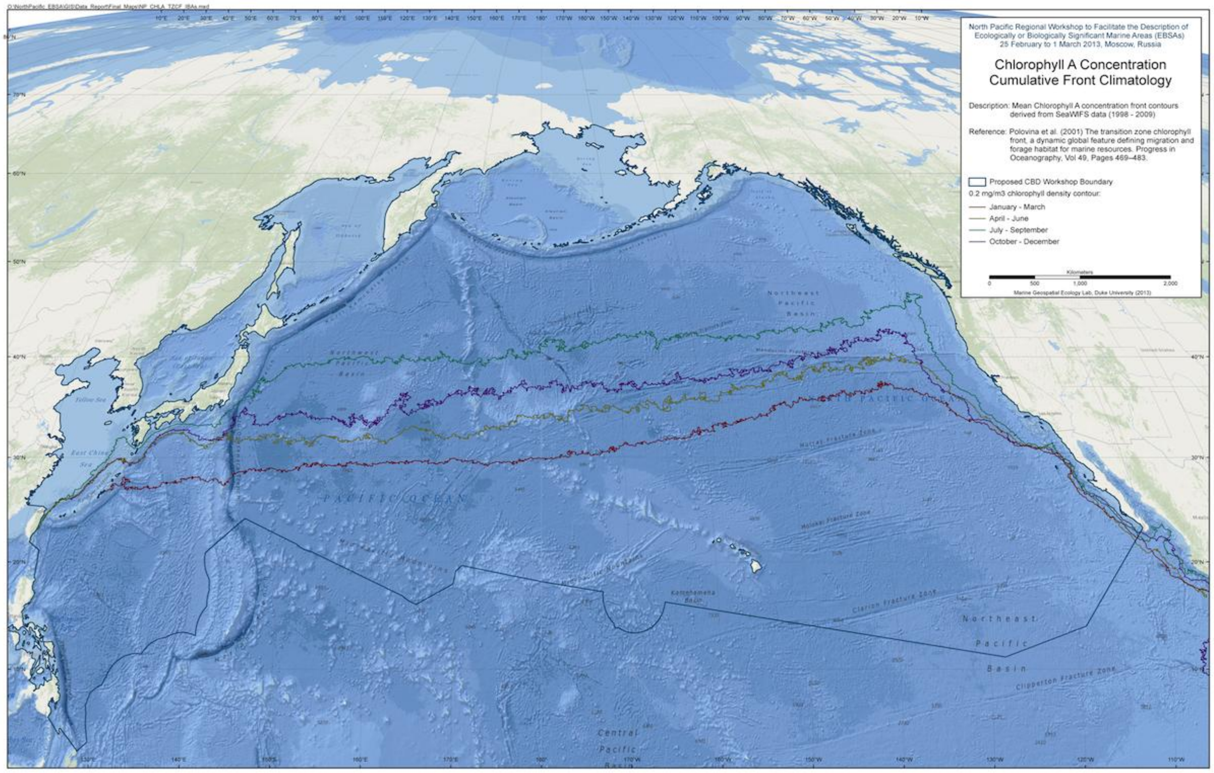


Figure 6. North Pacific Regional Workshop – Chlorophyll A concentration, cumulative front climatology.

26. In addition to climatological conditions, specific features such as sea surface temperature fronts, chlorophyll or productivity fronts, eddies and eddy kinetic energy play an important role in identifying recurring oceanographic conditions that may help define important areas.

*Sea surface temperature front probability*

27. Composite maps of sea surface temperature fronts based on analyses of 9-km-resolution Advanced Very High Resolution Radiometer (AVHRR) and Sea-viewing Wide Field-of-view Sensor (SeaWiFS) data from 2006-2011 were provided for the EBSA workshops (Miller et al. 2009; Cayula and Cornillon 1995). The composite front technique combines the location, gradient, persistence and proximity of all fronts observed over a given period into a single map. Using this method: (a) front detection is based on local window statistics specific to frontal structures, not simply on horizontal SST gradients; and (b) fronts are not detected on monthly SST composites, but rather on individual SST "snapshots" that reveal the detailed thermal structure without averaging artifacts. Eight-day composite front maps were used to generate seasonal front climatologies that enabled identification of strong, persistent and frequently occurring features. Such frontal systems were considered at the regional workshops as key factors influencing the distribution of productivity and diversity.

*Ocean productivity*

28. Ocean Productivity Standard Products (figure 7) were provided to the workshops to help identify areas of high productivity, one of the seven EBSA criteria. These products are based on the Vertically

Generalized Production Model (VGPM) (Behrenfeld & Falkowski 1997), MODIS surface chlorophyll concentrations (Chlsat), MODIS sea surface temperature data (SST), and MODIS cloud-corrected incident daily photosynthetically active radiation (PAR). Euphotic depths are calculated from Chlsat following Morel and Berthon (1989). For this effort, a cumulative climatology was created from Standard VGPM data derived from MODIS AQUA data from 2003-2007 (VGPM: http://www.science.oregonstate.edu/ocean.productivity/standard.product.php; MODIS: http://oceancolor.gsfc.nasa.gov/).

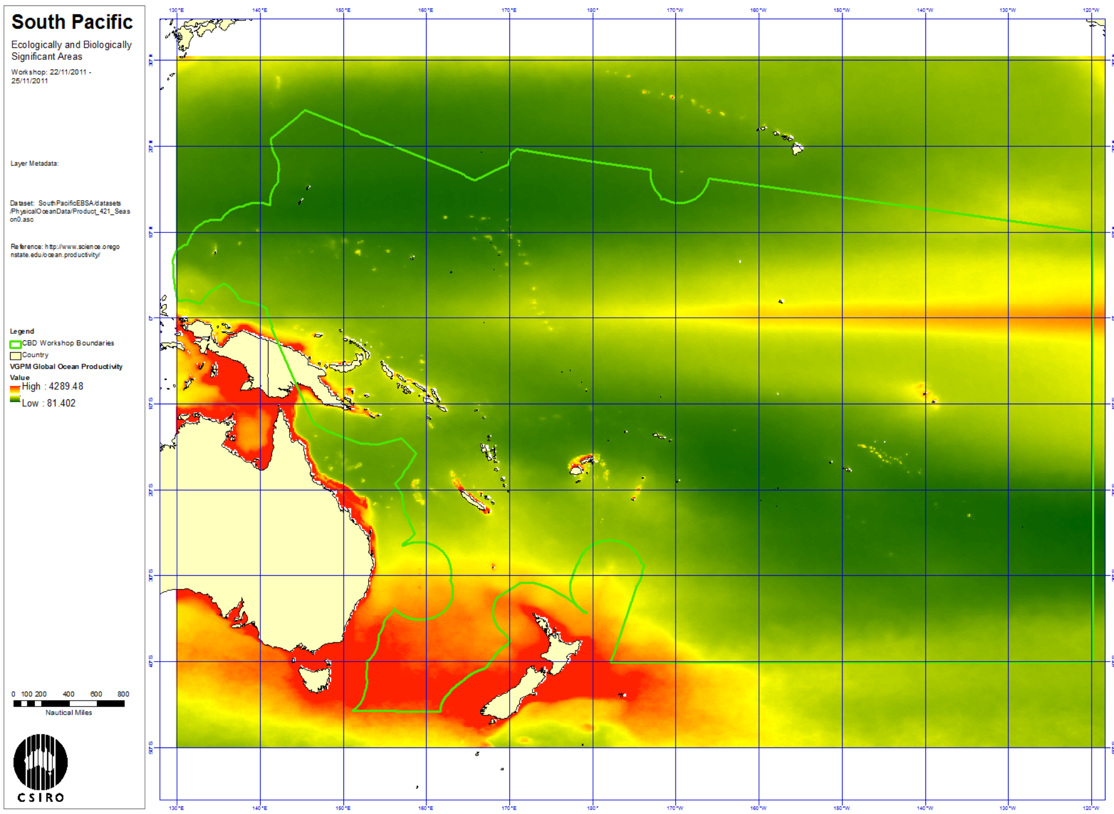


Figure 7. Western South Pacific Workshop - Ocean productivity.

Oxygen minimum zone depth

29. Oxygen minimum zone (OMZ) directly affects the vertical stratification and distribution of species and habitats in the open oceans and deep seas. In order to provide this information to the EBSA workshops, data were derived from the World Ocean Atlas 2009 oxygen data set. An arbitrary dissolved oxygen level ($O_2$ <= 1.43 ml/l ~ 60 uMol/kg), a commonly used threshold for hypoxia, was chosen to represent the depth of oxygen minimum zone (OMZ). Data were extracted monthly and then compiled into seasonal depth climatologies. The OMZ is the oceanic layer within which dissolved oxygen values are a minimum, due to high rates of oxygen consumption and low rates of advective supply of oxygen-rich waters. Typically the OMZ is shallowest within the equatorial regions and the eastern boundary systems. Shoaling of the OMZ, as has been observed in recent decades, can restrict the usable habitat of many marine species and cause significant shifts in their habitat (Garcia et al. 2010, Stramma et al., 2011).

*Sea surface height*

30. Sea surface height helps us interpret important oceanographic features such as the location of upwelling and downwelling eddy features. The Archiving, Validation and Interpretation of Satellite Oceanographic data (AVISO) group publishes various products derived from satellite altimetry data,

including estimates of sea surface height (SSH), geostrophic currents, wind speed modulus, and significant wave height (AVISO: http://www.aviso.oceanobs.com/en/).

*Mesoscale eddy density*

31. The density and distribution of eddy features can be used to help describe areas that meet EBSA criteria. Depending on the rotational direction of an eddy it may result in either upwelling of colder, nutrient-rich waters from the deep ocean, or downwelling of surface waters and aggregation of planktonic organisms. In either case, these areas represent zones of higher prey aggregation (either through bottom-up productivity, or aggregation of external sources of productivity). Thus, areas with a high density of eddy features are likely to be points of aggregation for many pelagic species. A database of trajectories of mesoscale eddies for the 18-year period from October 1992 to January 2011 was provided to the EBSA workshops to allow participants to interpret long-term recurrence of these features (Chelton et al. 2011).

*Eddy kinetic energy*

32. Similar to locating eddy features, identification of areas of high eddy kinetic energy (EKE) was provided to the workshop participants to allow for interpretation of important surface features and aggregations. EKE is a measure of turbulence, or the strength of current flow concurrently in the north/south and east/west directions. High EKE generally indicates strong mixing and increased productivity. As with eddy density, such areas are likely to be points of aggregation for many pelagic species. Locations where shear between water masses is high can generate productivity due to mixing.

*Drifter climatology of near-surface currents*

33. Information on the position, direction and velocity of ocean currents is important for interpreting ecological and biological features in the open oceans. Satellite-tracked SVP drifting buoys (Sybrandy and Niiler 1991, Niiler 2001) provide observations of near-surface circulation. Data from the Global Drifter Array, a component of the Global Ocean Observing System, provided information from 1250 drifters. A drifter is composed of a surface float that includes a transmitter to relay data, a thermometer that reads temperature a few centimetres below the air/sea interface, and a submergence sensor.

*Surface current velocity*

34. In addition to drifter-derived data, satellite-based observations of surface current velocity were also provided as common data layers for the EBSA description process. The AVISO group publishes various products derived from satellite altimetry data, including estimates of sea surface height (SSH), geostrophic currents, wind speed modulus and significant wave height (Bonjean and Lagerloef 2002).

## III. REGIONAL-SCALE ANALYSIS, COMPILATION, SYNTHESIS AND MAPPING OF SCIENTIFIC DATA IN THE EBSA PROCESS

35. To support the EBSA workshops, the scientific data described above were compiled for each region by the technical support teams from either the Commonwealth Scientific and Industrial Research Organisation of Australia (CSIRO) or Duke University (USA) into data reports prior to each workshop. The data sets covered three primary data types outlined in the previous section: biogeographic, biological, and physical/oceanographic. These data were intended to provide a consistent and comprehensive understanding of environmental conditions across the workshops that could be then supplemented by regionally relevant data sets. These data were obtained from global oceanographic and biogeographic data centres as well as individual researchers active in each workshop's region of interest. For each region, new analyses and data extractions were performed by relevant regional/global organizations, including intergovernmental organizations and non-governmental organizations, to support the data needs of the workshop.

36. The core data were supplemented by the technical support teams to include available data on features, geographies and species of unique interest to each region. Prior to each workshop an extensive

communication effort was undertaken, based on CBD notifications requesting the submission of relevant scientific information,[8] which were issued to CBD Parties and relevant scientists and institutions that might have data that could contribute to the EBSA workshops. Examples of regionally specific data sets include data on regional migration patterns, distribution of endemic species, and regional oceanographic cycles (e.g. *El Nino* / Southern Oscillation).

37. For each of the regional workshops, the regional fisheries management organizations were also contacted to obtain publicly available fisheries data and information that could be used to support the description of areas meeting the EBSA criteria. In some cases, maps of pelagic commercial fisheries species catch were extracted from the FAO Tuna Atlas data service. Data were obtained directly from the Western and Central Pacific Fisheries Commission and the Indian Ocean Tuna Commission. These data sets typically summarized catch data in 5-degree squares, aggregating data for FAO by regional fisheries management organizations. The data provided aggregated information on major pelagic billfish and tuna fisheries catches in each region for 1993-2010.

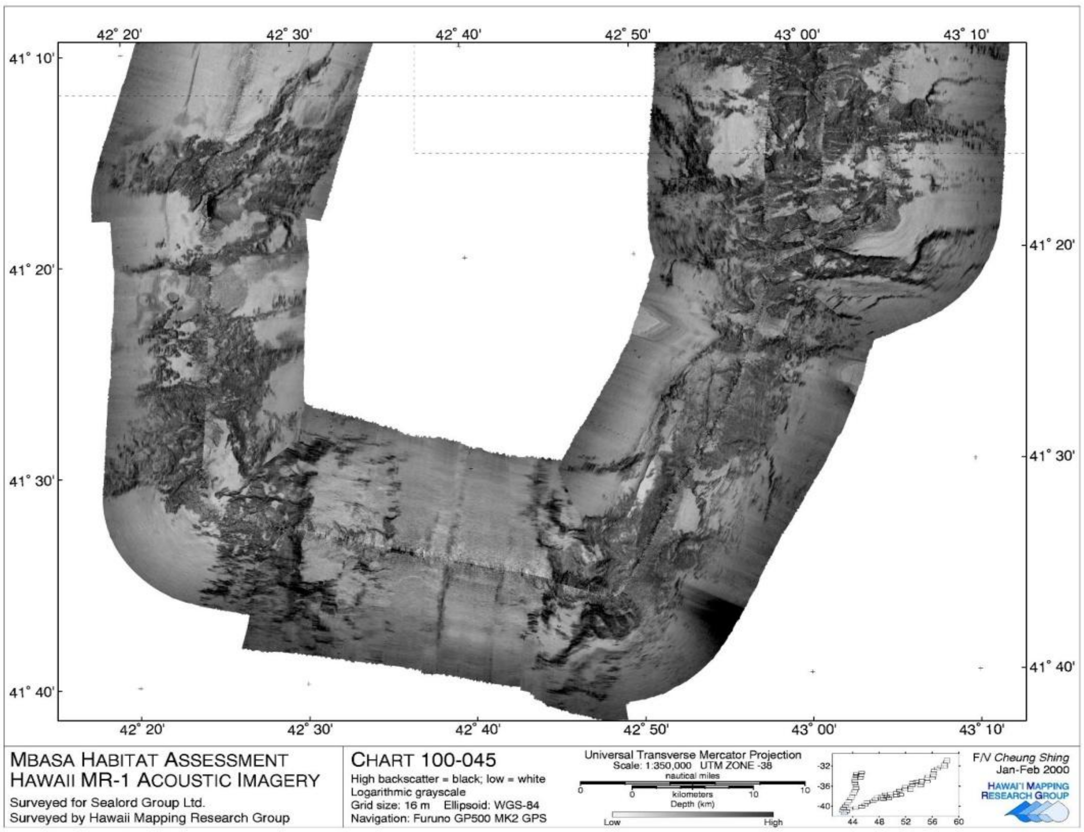


Figure 8. Southern Indian Ocean Regional Workshop. Acoustic imagery of coral seamount benthic protected area (*source: the Southern Indian Ocean Deepsea Fishers Association: SIODFA*).

44. Some Parties undertook their own national preparatory process to provide inputs to their respective regional workshops, mobilizing scientific collaboration of interdisciplinary experts at the national level. Notable examples of this include the biogeographic analyses conducted by South Africa to

[8] Southern Indian Ocean: http://www.cbd.int/doc/?meeting=EBSA-SIO-01 (notification: 2012-073);
Eastern Tropical and Temperate Pacific: http://www.cbd.int/doc/?meeting=EBSA-ETTP-01 (notification: 2012-073);
North Pacific: http://www.cbd.int/doc/?meeting=EBSA-NP-01 (notification 2012-152); and
South-Eastern Atlantic: http://www.cbd.int/doc/?meeting=EBSA-SEA-01 (notification 2012-153).

inform their marine management process (Sink et al. 2012) and the analyses conducted by Brazil for marine areas within their national jurisdiction.

45. A number of regional-scale analyses were also made available. An assessment of the potential world heritage areas in the western Indian Ocean conducted by Coastal Oceans Research and Development in the Indian Ocean (CORDIO, Obura et al. 2012) provided important information for the Southern Indian Ocean workshop, and an ecological gap analysis conducted by the Réseau Régional d'Aires Marines Protegées en Afrique de l'Ouest (RAMPAO, Tendeng et al. 2012) facilitated the description of many areas meeting EBSA criteria in the region. Other regional data sets included data on turtle nesting and foraging sites, tuna/seamount interactions and the distributions of southern bluefin tuna.

46. Finer-scale data was provided prior to the workshops in some cases or supplied during the workshops. The Southern Indian Ocean Deepsea Fishers Association (SIODFA) provided detailed acoustic imagery of areas in the Indian Ocean (figure 8). Many of these areas have also been identified as benthic protected areas by SIODFA. Many of the participants brought detailed information of particular areas within their national waters, which could inform the description of areas meeting EBSA criteria. In addition, many additional scientific papers and analyses that were unknown to the technical teams were supplied by the workshop participants. These provided the basis for many of the EBSA descriptions in marine areas within their national jurisdictions.

***Data aggregation and presentation at workshops***

47. The digital data were compiled and collated, by the technical support teams of CSIRO and Duke University as requested by the CBD Secretariat, into a Geographic Information System (GIS). The data were then compiled into data reports[9] which were provided to workshop participants prior to each regional workshop. Each individual data set was described in the data report with appropriate references, metadata and map representation. The maps within the data reports were also brought to each workshop in large format printed hardcopies for review and discussion by workshop participants. All of the data compiled in the workshop data reports were provided to each workshop in several laptop computers containing GIS mapping and analysis software, and each workshop group discussion was assisted by the technical support teams for mapping and analysis for application of EBSA criteria as needed throughout the workshop plenary and break-out sessions. An overview of the available maps and GIS data was provided during the opening plenary session of each workshop. In addition, the large-format printed maps were displayed around the meeting room and several smaller-format map books were circulated for review by the workshop participants.

***Discussion of data use by workshop participants***

48. There were common barriers encountered across all the regional preparations during the analysis, synthesis and mapping of scientific data for each workshop. Not every data set of interest could be obtained in advance of the meeting. Some data holders expressed concern over the possible misinterpretation of data, which was partially driven by a lack of clear understanding of CBD's EBSA process. In the absence of a common data network, the identification of data sets was determined by networks of scientific collaborations. It is likely that important data sets could have been missed during this first round of EBSA workshops, underscoring the need for a continuing process and better data infrastructure. As workshop participants better understood the workshop EBSA process, they became more comfortable identifying and contributing additional data and analyses. This holds some promise for any future efforts to revisit the EBSA descriptions defined by regional workshops using a more systematic approach that would identify gaps in the representativity of EBSAs developed in the first series of regional workshops around the world. Improved capacity of scientific institutions to share data would enable a significantly more systematic understanding of the world's oceans and enhance the process for future EBSA descriptions. These concerns were best addressed by working with regional data

[9] UNEP/CBD/RW/EBSA/WSPAC/1/2, UNEP/CBD/RW/EBSA/WCAR/1/2, UNEP/CBD/RW/EBSA/SIO/1/2, UNEP/CBD/RW/EBSA/ETTP/1/3, UNEP/CBD/EBSA/NP/1/3, UNEP/CBD/RW/EBSA/SEA/1/3.

experts who understood the EBSA process, with expertise in regional data availability and established networking with possible regional data providers. In many cases, inviting experts on specific scientific field to the workshop allowed additional data to be presented by the data holder along with appropriate caveats around its use.

49. The open discussions around the scientific data and EBSA criteria provided many opportunities for scientific interaction and networking for the workshop participants, in particular among international, regional and national-scale experts. A key benefit was the intersection of regional and local knowledge with global-scale data sets. This enhanced the workshop's knowledge about oceanographic and ecological dynamics at larger spatial scales and helped workshop participants better understand their global or regional oceanographic context. This exchange of information and data extended to ongoing post-meeting correspondence between the workshop participants and the technical team members around data and mapping issues. Data exchange of publicly available data sets was a common opportunity taken advantage of by all of the workshops. In summary, the interaction among the workshop participants increased interest in regional data, strengthened existing networks or made new connections between experts, expanded the data and analytical capacities of the regions and provided an ongoing framework for additional capacity-building.

50. The ability of States to meet the Aichi Biodiversity Targets, both at national and international levels, depends on their ability to make informed decisions about the state of, and pressures on, the ecosystems under their jurisdictions as well as marine biodiversity in marine areas beyond national jurisdiction. A key problem encountered in each workshop was the inability to identify or access scientific data. The majority of scientific data is currently inaccessible to all but the researchers and institutions that currently hold them. In every region, informative data sets were identified but remained inaccessible due to constraints on access. The success of OBIS indicates that information can be shared. However, to fully meet the needs of the EBSA process, a much more systematic stocktaking of the world's biodiversity-relevant information needs to be undertaken. Significant data exist in national and academic institutions that are not present in current global databases. Regional efforts to gather biological, ecological and physical layers have been partially successful in discovering and providing means to access this information (e.g., ODIN Africa, http://www.odinafrica.org/, the Coral Triangle Atlas, http://ctatlas.reefbase.org/). However, significant efforts are still needed at individual, institutional and national levels to overcome barriers to sharing scientific information so that it can be used in national, transnational and regional management programmes

***Expert scientific judgment in applying the scientific criteria for EBSAs***

51. Description of areas meeting the EBSA criteria at the regional workshops was facilitated by both the compilation of scientific data undertaken by the Secretariat with the technical assistance of a team either at CSIRO or Duke University, and the submission of scientific information by workshop participants on possible areas meeting EBSA criteria contributed prior to the regional EBSA workshop or at the workshop itself. Compiling scientific information prior to the regional workshop on potential areas meeting the EBSA criteria, using the template provided by the Secretariat through a CBD notification (e.g., notification 2012-153, http://www.cbd.int/doc/?meeting=EBSA-SEA-01), provided the opportunity to gather appropriate data and information supporting those EBSA descriptions, and led in many instances to final EBSA descriptions having been adopted by the workshop plenary after they were further refined and enhanced through workshop deliberations. On the other hand, workshop participants proposing potential areas for EBSA description prior to the regional workshops sometimes had to adjust, amalgamate or remove their proposed description in response to additional scientific information provided at the workshop and the workshop discussion, in particular the scientific inputs at the regional scale provided by the workshop plenary discussion. Regardless of the information sources for the EBSA description, each regional workshop went through intensive discussion on each potential EBSA description in both subregional group and plenary settings. The list of EBSA descriptions was finalized through the official process of consideration and adoption by the workshop plenary.

52. The organizational aspect of the workshop process included an initial plenary session communicating the process developed under the CBD to describe areas meeting the criteria for EBSAs, an overview of the data available for the workshop, and a summary of relevant regional initiatives and scientific programmes that could benefit or benefit from the EBSA process. To build consensus on the exact areas that would be considered by each workshop, the biogeographic data and maps were presented to and discussed by the workshop participants, especially those nominated by Parties and other Governments, in plenary sessions. Once the spatial extent of the workshop was agreed in plenary, the workshop discussion continued in smaller break-out group session generally involving geographical (e.g., subregional, large marine ecosystems (LMEs), coastal, open-ocean and deep-sea habitats) and/or language-based groupings of workshop participants, assisted by at least one member of the technical support team. Through the break-out group sessions, workshop participants were engaged in substantive scientific discussion of applying EBSA criteria in potential areas. Each break-out group was encouraged to consider areas of transboundary nature that could meet the EBSA criteria, as well as potential areas meeting EBSA criteria beyond national jurisdiction, especially since these areas were not fully considered when the workshop participants had originally submitted descriptions of potential EBSA description focusing on areas within their national jurisdictions. Experts from regional and international organizations, depending on their specific expertise and the scientific information they provided, supported different subgroups and ensured that the information provided was being interpreted correctly. Proposed areas meeting EBSA criteria were identified in a GIS map and presented at the plenary for its consideration, review and comments. Building upon the comments from the workshop participants, further modifications were made before they were submitted, or re-submitted, together with the text of the EBSA description, for consideration and approval by the workshop’s final plenary.

53. In all the workshops, data maps displaying all the data were made available in the meeting rooms, enabling interactive discussions. Experts used the maps and real-time GIS mapping sessions to identify areas and delimit the boundaries of each area. Areas within national jurisdiction were often supported by additional information that experts provided at the workshops. Experts considered the scientific data in marine areas beyond national jurisdictions for the description of areas meeting EBSA criteria beyond their national waters. In all cases, the experts used the data displayed in GIS and worked with the technical teams to identify the final polygons on the map of each of the areas described to meet the EBSA criteria.

54. Experts nominated by Parties played key roles in finalizing the description of the areas meeting EBSA criteria with the scientific and technical assistance of experts nominated by relevant regional and international organizations as well as technical support teams. The nature of scientific input provided by the technical support team included assistance in: data access and interpretation, application of the EBSA criteria, and preparation of EBSA descriptions. Such scientific interaction among different experts facilitated better understanding and interpretation of the regional data sets provided in the background documents. While large-scale printed copies of the maps were the most useful form of regional data at the workshop (electronic versions were also used to refine EBSA boundaries in the GIS), the data were also provided in electronic form to all participants after the workshops to benefit their respective future efforts toward enhancing marine biodiversity conservation and sustainable use.

55. Some countries did not wish the regional workshop to discuss EBSA descriptions in marine areas within their national jurisdictions as they have their own national processes on EBSAs or similar processes to define areas of importance (e.g., key ecological features in Australia, the national EBSA processes in Canada and Japan, and marine bioregional planning in India). On occasions where an area meeting the EBSA criteria overlapped the exclusive economic zone (EEZ) of a country that had not wished to define EBSAs within their EEZ, the overlapping portion was marked on the map with a dashed line. Generally EBSAs were not identified in the national waters of countries not represented at the workshop unless a specific request was made by those countries to designate some relevant experts attending the workshop to facilitate the EBSA description within their national waters on their behalf (e.g., South-Eastern Atlantic workshop).

***Scientific capacity-building and expert/data networking at the regional scale through the EBSA process***

56. Various levels of capacity-building opportunities were provided at each of the six regional EBSA workshops. A key element provided through capacity-building was the development of an understanding of the concepts underlying the description of areas meeting EBSA criteria and how the application of EBSA criteria could be undertaken in both coastal waters and open-ocean/deep-sea habitats. In every workshop the full set of data compiled by the Secretariat and the technical teams (more than 50 GIS layers) was available to all the workshop participants during their deliberations. The global data sets used are available for downloading from the Australian Ocean Data Network (http://portal.aodn.org.au/aodn/). In every case, the workshop participants, including the technical teams, left the workshop with an enhanced understanding of the ecological and biological state and dynamics of each region’s marine biodiversity, as well as an improved understanding of the ecological connectivity and scientific links within the region.

57. The workshops also provided a useful forum for communication among experts from neighbouring countries and for identifying common values and transboundary features that could be applied in developing EBSA descriptions. By focusing on scientific data and information-sharing, which required the workshop participants to provide their best expertise and expert opinions, the regional workshops maintained high levels of scientific engagement, networking and communication throughout.

58. During the EBSA training organized by the Secretariat prior to the regional workshops, it was emphasized that the EBSA process is a scientific and technical exercise, and the identification of EBSAs and selection of conservation and management measures (e.g., marine protected areas, impact assessments, fisheries management) are matters for States and competent intergovernmental organizations. This training also enhanced the participants’ understanding of (1) the EBSA criteria (decision IX/20, annex I); (2) scientific data and information that could be used to apply EBSA criteria; (3) various considerations to be made in applying EBSA criteria, in particular those areas of data paucity; and (4) biogeographic characteristics of each region. This training therefore provided each participant with a better understanding of the biology and ecology of the region, information on the process of applying EBSA criteria, and approaches to apply scientific information to prepare EBSA descriptions for their respective regions. Participants were also provided with the additional tools and approaches articulated in the EBSA training manual (UNEP/CBD/SBSTTA/16/INF/9).

59. The latest workshop, on the South-Eastern Atlantic, was supported by the Sustainable Ocean Initiative (SOI) Capacity-Building Workshop for West Africa (Dakar, Senegal, February 2013), held two months prior to the EBSA regional workshop, held in Namibia. The SOI provides a global platform to build partnerships and enhance capacity to achieve the Aichi Biodiversity Targets related to marine and coastal biodiversity in a holistic manner. There was significant, intentional overlap between the participants of the SOI capacity-building workshop and the subsequent EBSA regional workshop in Namibia. About 1½ days of the SOI workshop programme were dedicated to equipping the participants to contribute to the Namibia EBSA regional workshop. Participants were given extensive examples of the outcomes of previous workshops and how previous workshops had used data and scientific information to describe areas meeting the EBSA criteria. The participants also discussed potential EBSA descriptions that might be prepared within the South-Eastern Atlantic region and the data that might support them. The use of the EBSA template, provided through the CBD notification, was also explained by the technical team. Participants who had been nominated to participate in the subsequent EBSA workshop in Namibia were then requested to prepare for this workshop by compiling the necessary scientific data and information, using the EBSA template. The experiences at Dakar and Namibia showed that such training, organized at least two months prior to the actual EBSA workshop, provided the best outcome at the subsequent EBSA workshop, with all participants arriving at the EBSA workshop a clear understanding of the process and data, allowing the workshop to spend considerably more time on describing the areas meeting EBSA criteria. It also allowed the technical team members to communicate with expected participants well in advance of the workshop regarding the necessary data compilation and analysis.

## IV. POTENTIAL APPLICATION OF SCIENTIFIC INFORMATION RELATED TO AREAS MEETING EBSA CRITERIA IN SUPPORT OF ACHIEVING AICHI BIODIVERSITY TARGETS RELATED TO MARINE AND COASTAL BIODIVERSITY

60. In line with the theme of the seventeenth meeting of the Subsidiary Body, this section explores the possible application of scientific information related to EBSA description in support of countries' efforts toward achieving the Aichi Biodiversity Targets. This section draws on experiences from the South Pacific region, where the results of the Western South Pacific regional workshop were used for national marine spatial planning practices.

61. The areas described as meeting EBSA criteria can be used to prioritize management actions when combined with information on the distribution of pressures. Under this framework the areas described as EBSAs by each workshop can be considered as areas of high ecological or biological value. They are areas where increased attention should be focused to ensure that they are managed sustainably. The distribution of pressures across the ocean is not homogenous, and areas meeting the EBSA criteria overlap with pressures in different ways. Further, as some areas meeting the EBSA criteria refer only to benthic or pelagic habitats, the values that they represent are not necessarily impacted by all pressures to the same extent. Two examples are given. The first example shows the total number of hooks from longline tuna fisheries over the period from 2001 to 2010, sourced from data from the Western Central Pacific Fisheries Commission (WCPFC). This shows that fishing effort is not distributed evenly across the South Pacific but is concentrated in discrete locations. Of note is the highest concentration associated with the EBSA described for the New Hebrides Trench (figure 9).

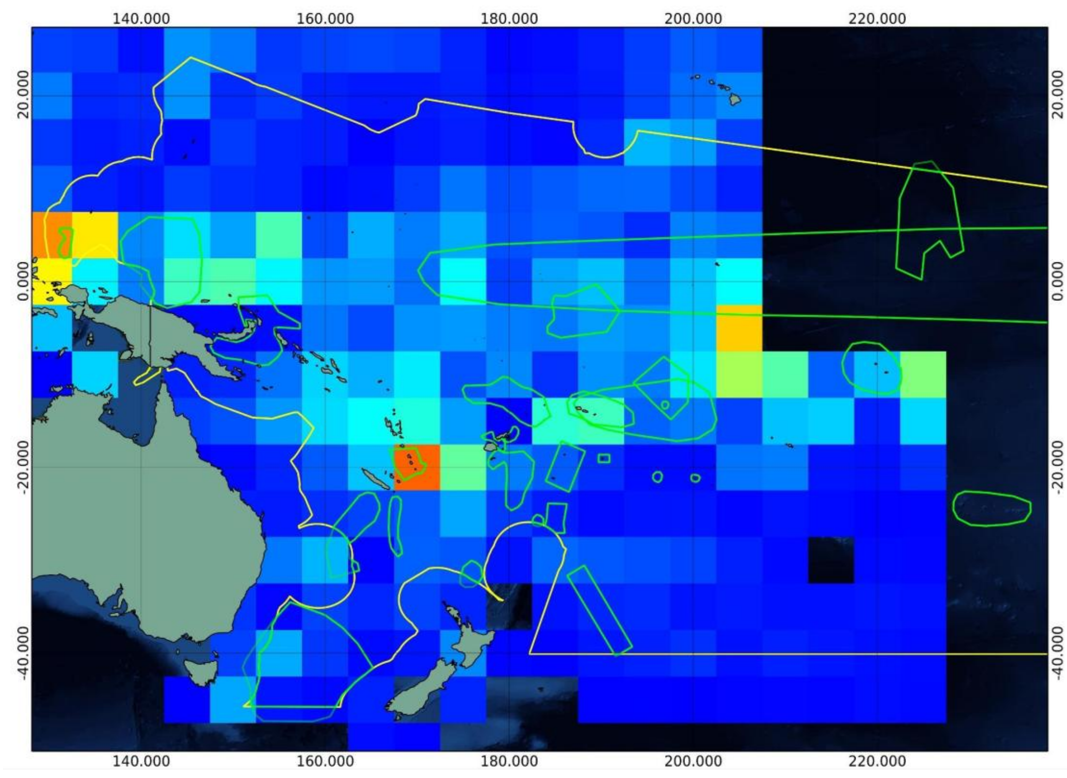


Figure 9. Longline fishing intensity from 2000 to 2010 across the Western South Pacific. Blue shows low counts of total hooks and red shows high counts of total hooks. Areas identified as EBSAs are shown in green.

62. The second example overlays climate change projections for the change in sea surface temperature (SST, figure 10). The projections are taken from the IPCC Coupled Model Intercomparison

Project Phase 5 (CMIP5) (Taylor et al. 2011) model showing the change in sea surface temperature from the mean of 1950-2000 to the mean 2050-2100.[10] The Western South Pacific shows two distinct projected significant warming areas associated with south-east Australia and the central Pacific. The increase in SST in the central Pacific is directly associated with the Equatorial High-Productivity Zone, an EBSA described by the Western South Pacific workshop.

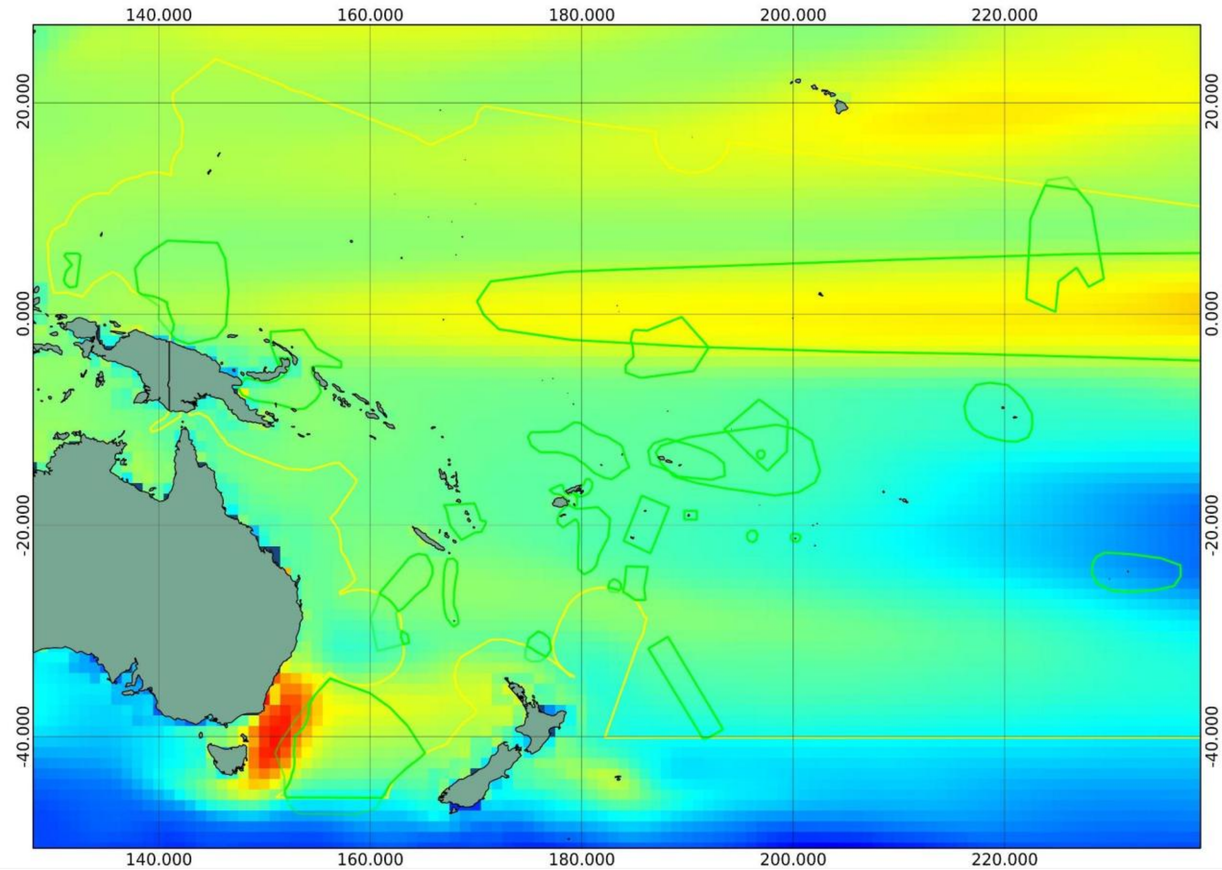


Figure 10. Projected change in sea surface temperature from Pacific Regional model from 1950-2000 mean to 2050-2100 mean temperatures. Areas identified as EBSA are shown in green.

63. A number of other pressures can be identified that may potentially impact on the EBSAs described by the Western South Pacific workshop. These include natural pressures such as cyclones and human-derived pressures such as shipping, mining and benthic fisheries. To demonstrate the utility of EBSA-related scientific information in prioritizing different management measures, the interaction between different pressures and EBSAs was examined using data on the spatial distribution of each of the pressures (figure 11). This shows that some EBSAs may potentially be impacted and that pressures are not evenly distributed across the region and overlap with different EBSAs.

[10] The SST field are multi-model means of 19 models (ACCES1.0, ACCESS 1.3, CanESM2, CCSM4, CNRM-CM5, CSIRO-Mk3.6.0, GFDL-ESM2G, GFDL-CM3, GISS-E2-R, HadGEM2-CC, HadGEM2-ES, inmcm4_esm, inmcm4, IPSL-CM5A-LR, IPSL-CM5A-MR, MIROC5, MPI-ESM-LR, MRI-CGCM3, NorESm1-M). The output was generated by CSIRO for the South West Pacific Regular Process Workshop and were ensembles from the "Representative Concentration Pathway 8.5" (RCP8.5). RCP8.5 is a high-emission scenario that imposes increasing GHG emissions until 2100 with $CO_2$ stabilization at a concentration of approximately 960 ppm. Over the last few years the RCP8.5 (close to SRES scenario A1F1) tracks most closely the average growth rate of $CO_2$ emissions estimates. Within the PACSAP project, climate models from CMIP have shown some skill in reproducing broad-scale climate features of the Western Pacific region (ABoM and CSIRO, 2011, Smith et al. 2012, Brown et al. 2013, Brown et al. 2013).


Figure 11. Interaction between EBSAs described by the Western South Pacific regional workshop and potential pressures. Red indicates a high pressure value in each EBSA, orange medium pressure, green low pressure, and grey no pressure.

64. There are several other opportunities to use EBSA-related scientific information to support the conservation and sustainable use of marine biodiversity. EBSA descriptions prepared by regional workshops provide information on areas that are relatively more valuable for their ecological systems or biodiversity than surrounding areas. In the long term, EBSA descriptions may directly inform efforts to conserve and sustainably use biodiversity, including a network of marine protected areas, as indicated in annex II to decision IX/20. EBSA-related scientific information could contribute to identifying areas that are relatively more important and could therefore be used to focus area-based management; identifying areas where it may be important to exercise a relatively higher level of precaution, including an increased need for environmental impact assessment; and identifying areas where uniqueness or rarity (EBSA criterion 1) or biological diversity (EBSA criterion 6) would indicate an increased probability of finding new genetic diversity.

65. It was clear at the regional EBSA workshops that some of the country participants were intending to use the EBSA information agreed to by regional experts to support marine management in areas within their national jurisdictions. For example, EBSAs described by the Western South Pacific regional workshop provided input to the Cook Islands' intention to declare a marine reserve within their national jurisdiction.

66. Finally, EBSA descriptions can be used by the international science community to target discovery and monitoring. There are ongoing discussions in international scientific fora on what would constitute "Essential Ocean Variables" (EOVs) for the ecological communities in a similar way to how EOVs have been described for the physical marine environment. Experience around the world has shown that these discussions are difficult because there is no unique set of ecosystem processes or species that is relevant to all situations. The EBSA process provides one opportunity to overcome this difficulty, as it provides regional expert opinion indicating the areas or systems that are relatively more valuable from an ecological or biological perspective. By superimposing the pressures that are likely to affect the agreed values of an area meeting EBSA criteria, it is possible to identify those processes and/or species that are likely to be most vulnerable. Monitoring these processes and/or species can provide a clear indication of when or whether the identified values are changing. This approach is being used in Australia to determine the health of its (offshore) marine environment (Hosack and Dambacher 2012).

## V. CONCLUSION AND LESSONS LEARNED

67. Global and regional data networks are critical to the EBSA international process to provide an unbiased open-access information system open to use by all countries and individuals, and to provide contributed data in marine areas both within and beyond national jurisdiction. While the OBIS information system represents the largest marine biological data collection available to support international processes, there are significant gaps and deficiencies that need to be addressed to better meet the rapidly increasing demands of the international community. Data availability for our world's oceans is unevenly distributed, with significant gaps in the open ocean, in particular in marine areas beyond national jurisdiction, and southern hemisphere regions (Webb et al. 2010). These gaps may represent areas of low data collection or may represent areas where data exist but have not yet been made available to the international community. Filling the existing data gap, in terms of availability and accessibility, is an extremely high priority but will take new resources and efforts. In addition, raw data must be processed and analyzed to produce useful information to inform international processes. Institutional capacity to support the aggregation and analysis of raw data into useful information must be increased and sustained to support growing needs. And regional capacity to objectively use and apply this information must also be increased in order to put this information to use by ongoing international processes.

68. In many regions, the workshops provided valuable capacity-building opportunities. The difficulty that OBIS faces in identifying and collecting data is magnified in countries with limited scientific capacity. These workshops supplied a large number of data sets that were previously unknown and often unobtainable by the participants at each workshop. The participants also benefited from an improved scientific understanding of marine areas within their region, in particular open-ocean and deep-sea habitats.

69. The regional workshops were most productive when supported by strong regional initiatives and programmes committed to the achievement of the Aichi Biodiversity Targets. For example, the support of the Secretariat of the Pacific Regional Environment Programme was critical in successfully concluding the first regional workshop, including facilitating the necessary coordination among participants and provision of regional expertise. The secretariats of the Nairobi Convention and the Abidjan Convention, in East and West Africa respectively, both provided invaluable support and were key to the success of the Southern Indian Ocean and South-Eastern Atlantic Ocean workshops, as were regional and subregional bodies responsible for fisheries management, such as the Southeast Atlantic Fisheries Organisation (SEAFO) in West Africa, while the Caribbean Environment Programme (CEP) Secretariat, the Secretariat of the Permanent Commission of the South Pacific (CPPS), the Northwest Pacific Action Plan (NOWPAP) Regional Coordinating Unit and the North Pacific Marine Science Organization (PICES) played valuable roles for their respective workshops in their regions, together with various other regional organizations and initiatives, including relevant regional fisheries management organizations and bodies.

70. The regional workshops to describe areas meeting the EBSA criteria, organized by the Secretariat of the Convention on Biological Diversity as called for by the Conference of the Parties to the Convention in its tenth and eleventh meetings, have covered a large portion of the globe (ca. 75 per cent of world oceans) in less than two years, together with parallel processes that have been taking place in North East Atlantic and Mediterranean regions by respective intergovernmental regional organizations. These workshops drew on a broad range of expertise from countries and regional or international bodies, and have described a total of 172 areas that participants considered to be of relatively high ecological or biological value, using the CBD EBSA criteria. The areas described by the regional EBSA workshops can already be used by participating countries to enhance their current marine conservation and management efforts and by existing regional and international bodies within their competencies. They indicate areas where it would be appropriate to exercise a higher level of precaution when considering spatial management options for a variety of marine activities. They also indicate areas and attributes that the international marine scientific community can consider when designing and prioritizing global monitoring efforts.

71. It should be noted that the workshops used an expert-driven, rather than a systematic approach and thus the areas described for EBSA criteria cannot automatically be expected to be either comprehensive or representative. Each regional workshop identified the need for an additional workshop to progress towards a more systematic approach with the advancement of available scientific information. The regional expert workshops have made rapid progress in describing areas that are relatively more important than surrounding areas for their ecological or biological values, and the Convention's EBSA process thereby becomes a new vehicle for international- and regional-level scientific collaboration and capacity-building. The end of this first round of regional workshops will be only the start of a longer process that will continue to evolve through advancement of research, monitoring, and data management of marine biodiversity, particularly in open-ocean and deep-sea habitats.

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