POLICY BRIEF

Deep, distant and dynamic: critical considerations for incorporating the open-ocean into a new BBNJ treaty

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Highlights

- Open-ocean ecosystems are large scale and highly dynamic in space and time.
- A robust international legally binding instrument (ILBI) should consider the unique challenges inherent in the immense ocean area, fluid connectivity and high temporal variability of these ecosystems.
- Adaptive, coherent and integrative governance approaches to these open-ocean communities and ecosystems are critical given the impacts from climate change and increasing use of resources.
- The scale and variability of open-ocean ecosystems require the monitoring mechanisms be put in place at regional or global scales and be sustained over longer time periods than may be necessary in static systems.
- Highly-mobile species contribute to the ecological, social and economic stability of socioecological systems both within and beyond national jurisdictions. Therefore, any changes to the diversity, abundance or range of these highly-mobile species, and the subsequent impacts of these changes, should be tracked and assessed.
- Since open-ocean systems make up the vast majority of areas to be governed under any new ILBI, the successful implementation of the ILBI may be highly dependent on strong commitments regarding technology transfer and capacity development in support of monitoring open-ocean ecosystems, particularly to developing States.

1. Introduction

Coherent and comprehensive conservation and sustainable use of Areas Beyond National Jurisdiction (ABNJ) will require an understanding of the characteristics of marine ecosystems to ensure that effective governance mechanisms are developed. The scale of deep seabed ecosystems (e.g., seamounts, hydrothermal vents or cold-water coral reefs) are similar to terrestrial habitats and are relatively static over ecological time periods. However, open-ocean pelagic ecosystems have very different scales than deep seabed or terrestrial ecosystems. They tend to be orders of magnitude larger and highly dynamic in space and time. To ensure a robust new International Legally Binding Instrument (ILBI), adequate attention will need to be placed on how the governance structures can address both fragile, static deep-sea ecosystems and immense, highly dynamic open-ocean ecosystems. The questions under consideration by the Preparatory Committee (PrepCom) will need to be evaluated in light of the scale, connectivity, and variability in the ecosystems being governed. In this policy brief we provide examples of open-ocean ecosystems, their importance to coastal States, and considerations of how to ensure the robust conservation and sustainable use of dynamic pelagic systems and biological diversity under a new ILBI.

This planet is open ocean

The open-ocean beyond the continental shelf (Fig. 1) accounts for 64% of the planet's surface. The pelagic realm has more than twice the surface area of all terrestrial biomes combined and 168 times the habitable volume. To put this in perspective, if terrestrial habitats were an ant, open-ocean habitats would be the size of a person. The open ocean provides greater than US$10 billion in fisheries landings (Fig. 2; Pauly and Zeller, 2015), and represent the longest "highways" on the planet, connecting the globe and providing for the transportation of ~90% of international trade.

The artificial separation between the exclusive economic zone (EEZ) and the High Seas does not preclude a strong relationship between the High Seas and coastal States in practice. Many of these relationships have large economical value. Sport fishing generates hundreds of millions of dollars for coastal States and depends on many species that move between the High Seas and coastal regions. Similarly, whales and other cetacean populations that sustain flourishing multi-million dollar whale-watching industries constantly travel between the High Seas and EEZ waters. If oceanic species, which migrate between coastal and oceanic ecosystems, are severely depleted during their residency in the open-ocean, such changes will later affect the

ecological relationships in the coastal ecosystem where the species once thrived.

Further, the ocean is critical in moderating Earth's climate. It provides more than half the oxygen we breathe and mitigates impacts from anthropogenic carbon dioxide (CO_2) by absorbing 93% of the heat generated by CO_2 emissions and 26% of the CO_2 (Levin and Le Bris, 2015; Rhein et al., 2013). This climate mitigation service is of enormous value, but the impacts of internalizing that heat and CO_2 are strongly altering open/deep-ocean environment and ecosystems. Accelerating research to further our understanding of open-ocean ecosystems (their biology, ecology and dynamism) and potential impacts to these systems is needed as the ocean continues to evolve from multiple stressors and changing environments. Climate change continues to accelerate ocean warming, deoxygenation and acidification, which affect marine life throughout the ABNJ, from the surface to the deep sea, by changing species' distributions, migration routes, ecosystem structure and functions (Cheung et al., 2010; Hazen et al., 2012). As climate change continues to alter the chemical and physical properties of the Earth's atmosphere and the ocean, establishing adaptive governance approaches which can co-evolve with a changing environment and an increasing use of ocean resources, may provide the best solution to managing dynamic open-ocean ecosystems.

Climate change induced impacts act synergistically with other impacts from human uses of the ocean, in particular, fisheries. Between 1950 and 1989, industrial marine fisheries catch in ABNJ increased by a factor of more than 40 (Fig 2; Pauly and Zeller, 2016, 2015). This growth was an order of magnitude more than the increase in catch within EEZs during the same time period. Since 1990, High Seas marine fisheries catches have remained relatively stagnant (FAO, 2016), but fishing effort, and all concomitant impacts from increasing the amount of fishing gear in the water, more than doubled between 1990 and 2006 (Merrie et al., 2014). In spatial terms, the greatest expansion of fishing effort during the second half of the 20th century took place primarily beyond the limits of the continental shelf and in ABNJ (Swartz et al. 2010). Long thought to be too big and diffuse to harm, there is now growing scientific evidence of the impacts of fisheries not just on open-ocean species, but open-ocean communities and ecosystems (Crespo and Dunn, 2017). The combination of these impacts with the dynamics of a boundary-less, fluid and changing ocean are in urgent need of attention from the international community.

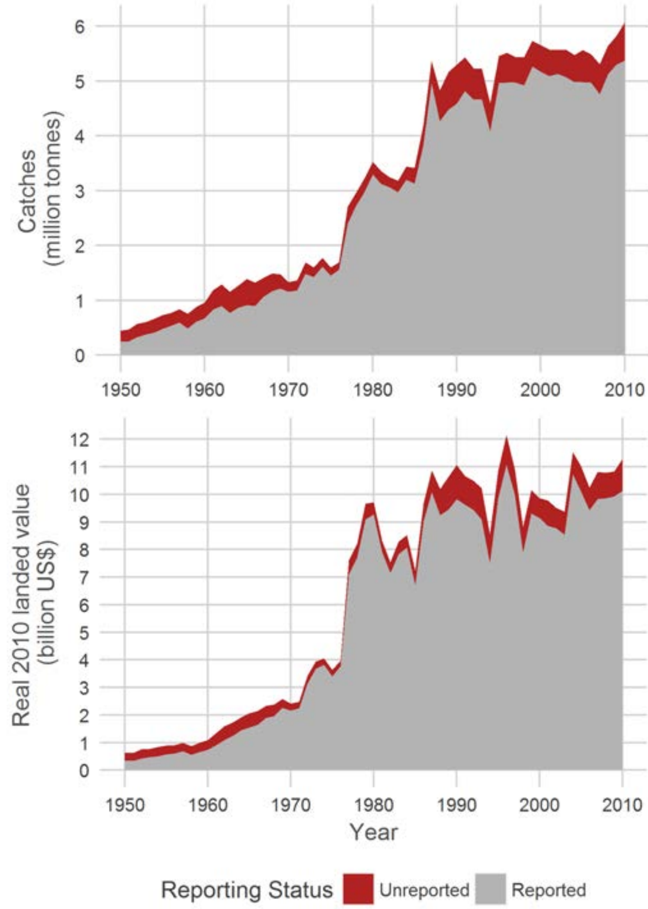

Figure 2. High Seas capture fisheries production and landed value 1950 – 2010. Data downloaded from the Sea Around Us Catch Reconstruction Database (Pauly and Zeller 2015, 2016).

The very nature of open-ocean ecosystems is that they are defined and constantly influenced by powerful winds and oceanic currents. These systems have no fixed boundaries -- their "edges" are dynamic/fluid and depend on oceanography, which shifts over time with seasons, storms and climatic changes. These ecosystems move through time and space. Many iconic migratory and pelagic species use these ecosystems as habitat for spawning, breeding, migrating and feeding; continually moving not only through these systems but also vertically within the water column. Moreover, oceanographic and climatic changes continually impact and alter the ways in which the ecosystem and these species interact. For example, alteration in thermohaline currents cause shifts in species aggregation and abundance. These distributional shifts take place within, beyond and across the jurisdictional boundaries of coastal States, directly impacting economies and ecosystems. To illustrate the challenges for governance of dynamic ecosystems and to better describe the dynamic pelagic systems that make up the vast majority of the area to be influenced by an ILBI, three case studies are provided below.

2. Case studies

2.1 - Costa Rica Thermal Dome

The Costa Rica Thermal Dome (CRTD) is an extensive-permanent upwelling system off the west coast of Central America. Current patterns and seasonal wind friction on surface waters result in an uplift of cold nutrient-rich deep waters that generate primary productivity levels five to six times greater than in adjacent waters (Fig. 3). This high productivity is the base of a complex food web that sustains a multi-million dollar fishing industry and attracts many species of high conservation value. Large populations of tuna aggregate in this region; maintaining an international tuna fleet that captures up to 26 metric tonnes/day within the CRTD. Blue whales from California, México and likely from Chilean coastal regions travel thousands of miles to feed and give birth in the CRTD. Large numbers of porpoises, sharks, squids and other ecologically-important organisms concentrate here as well. The edges of the upwelling zone creates an oceanic front where billfishes from the coastal regions of Mesoamerica come to feed and reproduce. Billfishes are the basis of sport fisheries in Central America that generate annually around US$170 million in Panamá and US$599 million in Costa Rica. The CRTD also provides climate mitigation services by, inter alia, sequestering CO2 emissions equivalent to those released by 10 million cars annually. Recognition of its high relevance in the region has resulted in part of the Dome being described as an Ecologically and Biologically Significant Marine Area (EBSA) by the Convention on Biological Diversity.

The Dome is a highly a dynamic feature that changes in extent and position within and between years, influencing relevant phenomena such as primary productivity and species distribution in the region. The ocean currents and winds which generate the upwelling, change in accordance with climatic variations. Early in the year the CRTD covers an average area 200-300 Km in diameter, mostly confined within the EEZ of Costa Rica and Nicaragua; but by November it has expanded to up to 1,000 Km in diameter and moved into High Seas (Fig. 3). The geographical persistence of the maximum expansion phase of the CRTD varies from year to year. While located mostly in ABNJ, during many years the CRTD expands into the EEZs of five countries, making management jurisdictionally complex.

Understanding such a dynamic feature requires long-term monitoring processes. Some aspects of the CRTD dynamics are already traceable through satellite observations; but long-term observations through drifting buoys would enhance understanding of critical dynamic habitat types like eddies and better track key climate-influenced indices. Further regional coordination and strengthening of institutions would be required to gather relevant information that ought to sustain management decisions for the Dome region.

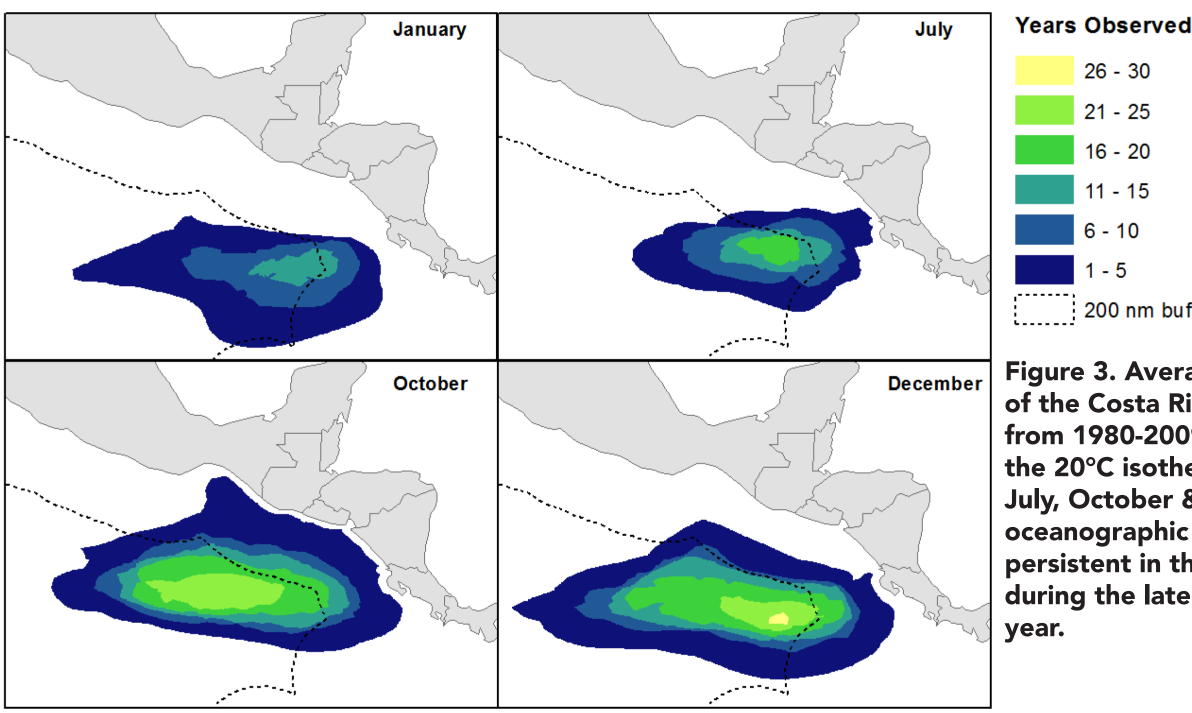

Figure 3. Average persistence of the Costa Rica Thermal Dome from 1980-2009 derived from the 20°C isotherm for: January, July, October & December. The oceanographic feature is more persistent in the time series during the later months of the year.

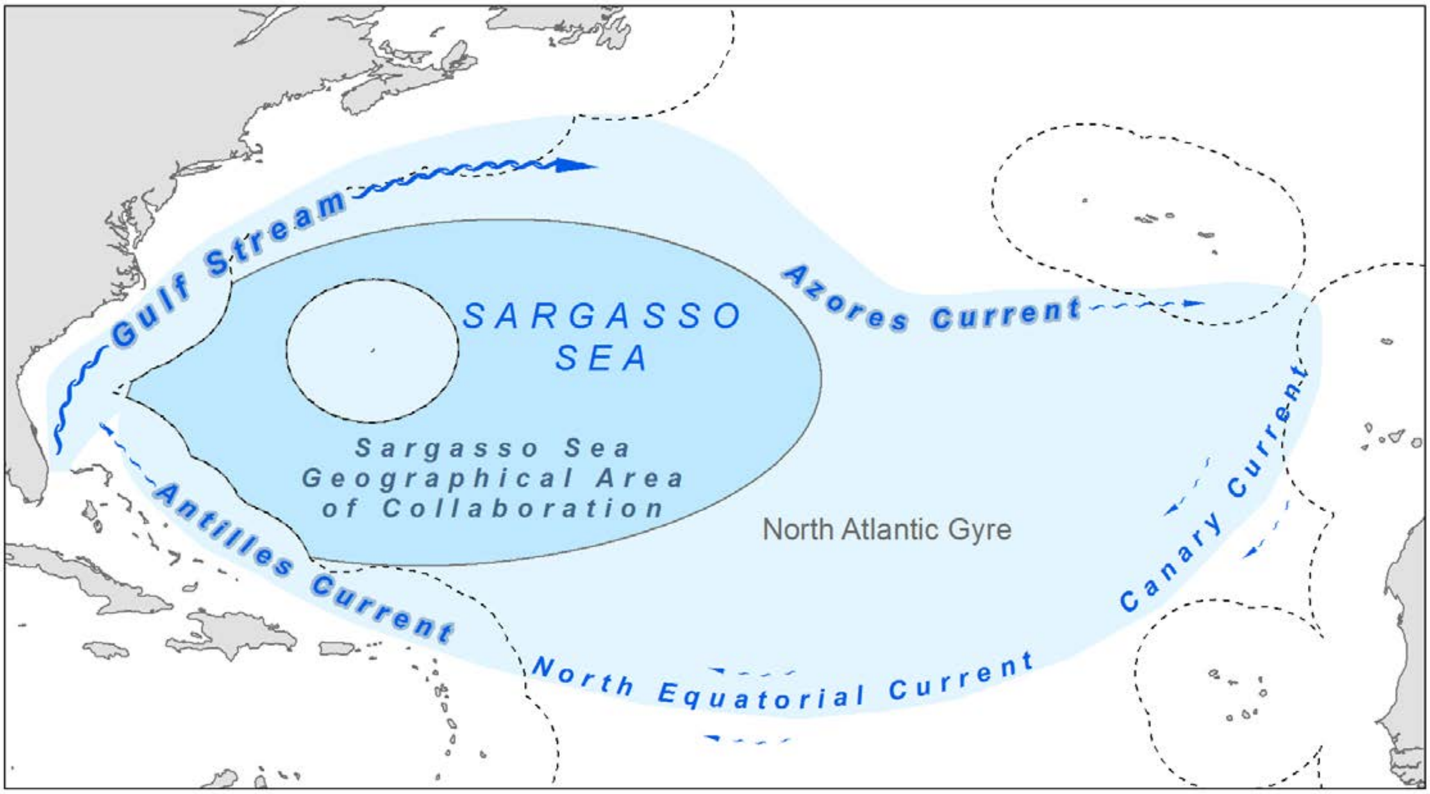

Figure 4. Spatial extent of the Sargasso Sea ecosystem in the North Atlantic Ocean. The ecosystem is bounded by several oceanic currents and changes its size and distribution across space and time.

2.2 - The Sargasso Sea

As recognized in Chapter 50 of the First World Ocean Assessment, the Sargasso Sea is a fundamentally important area of the open-ocean within the North Atlantic Sub-Tropical Gyre, bounded on all sides by clockwise rotating currents (UN Ocean Assessment, 2016). Dr. Sylvia Earle has called it "the golden rainforest of the Atlantic Ocean." Named after its iconic Sargassum weed, the Sargasso Sea's importance derives from the interdependent mix of its physical oceanography, its ecosystems, and its role in global-scale ocean and Earth system processes. It is a place of legend, with a distinct pelagic ecosystem based upon two species of floating holopelagic Sargassum, the world's only macroalgae that spend their whole life-cycle in the water column. The Sargassum hosts a rich and diverse biological community, including ten endemic species. Sargassum mats are home to more than 145 invertebrate species and more than 127 species of fish. The mats additionally act as important spawning, nursery and feeding areas for migratory and non-migratory fish, turtles, marine mammals and seabirds; many of which are listed as endangered or threatened on the IUCN Red List, in the appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species (CMS), or in the annexes of the Caribbean Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region (SPAW).

The Sargasso Sea is the only known spawning area for both the European and American Eels (Anguilla anguilla, A. rostrate respectively). Porbeagle Sharks (*Lamna nasus*) migrate from Canada to the Sargasso Sea, where they are thought to pup; several other shark species undertake similar migrations and may be using the area as nursery areas. Thirty species of whales occur in the Sargasso Sea, and Humpback Whales (*Megaptera novaeangliae*) make regular migrations through the area en route from the Caribbean to the northern North Atlantic. Many other species, including several tuna species, turtles, rays and swordfish, migrate through the Sargasso Sea: it is truly an ecological crossroads in the Atlantic Ocean linking its own distinct ecosystem with Africa, the Americas, the Caribbean and Europe.

The Sargasso Sea was accepted by the Conference of Parties to the Convention on Biological Diversity as meeting the criteria for an EBSA (see https://chm.cbd.int/database/record?documentID=200098). The overall importance of Sargassum as a habitat for pelagic fish has also been recognized by the United States whose National Marine Fisheries Service has developed a fishery management plan to address threats to Sargassum (National Marine Fisheries Service, 2003) and by the International Commission for the Conservation of Atlantic Tunas (ICCAT). In 2012, ICCAT agreed to examine the ecological importance of the Sargasso Sea for tuna and tuna-like species (ICCAT Resolution 12-12).

On 11 March 2014, five Governments -- the Azores, Bermuda, Monaco, the United Kingdom of Great Britain and Northern Ireland and the United States -- signed the Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea, (Freestone and Morrison, 2014), joined more recently by the four additional Signatory Governments of the British Virgin Islands, the Bahamas, Canada and the Cayman Islands. The Hamilton Declaration is the first non-binding instrument to establish a framework for its Signatory Governments to work together through existing international organizations and other partners to minimize the adverse effects of human activities in an ecosystem that lies primarily in ABNJ. The Commission, supported by a growing list of collaborative partners, is working to adopt a Stewardship Agenda that will take ecosystem dynamism into account.

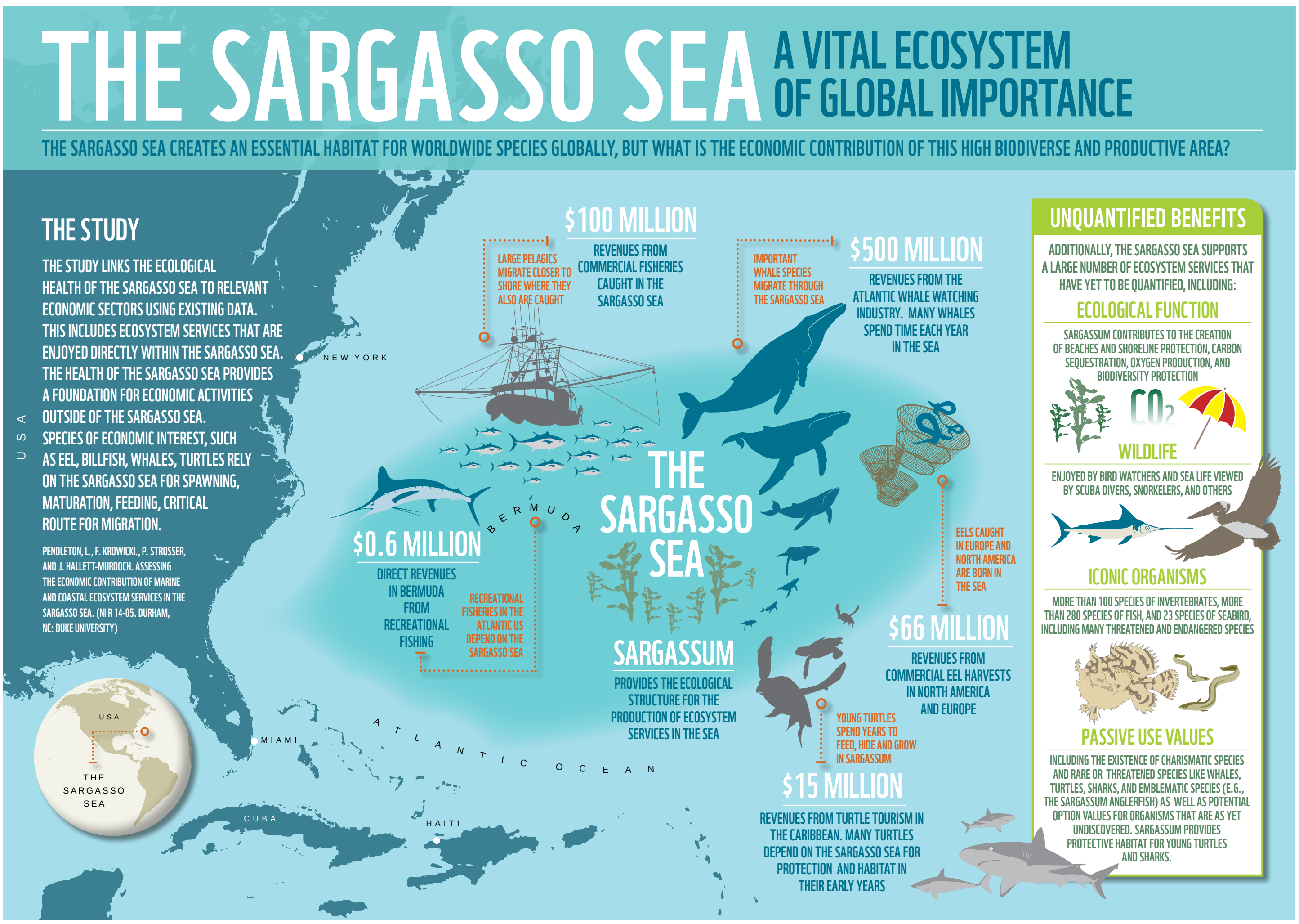

Figure 4. Figure from Linwood Pendleton et al. (2015) exemplifying the ecological importance of the Sargasso Sea ecosystem for a wide range of vertebrate and invertebrate species, both within and beyond the jurisdictional waters of coastal States.

2.3 – The Southern Ocean

The Southern Ocean is delineated from the rest of the global ocean by a massive circumpolar current around Antarctica. The Southern Ocean has a large impact on ocean circulation and global climate, and acts as a major carbon sink, accounting for about 40% of all the carbon absorbed by the oceans despite being smaller than the Pacific, Atlantic, and Indian Oceans. Productivity dramatically increases during the austral summer as sea ice retreats. This productivity supports a large population of Antarctic krill (*Euphausia superba*), which are so numerous that they annually sequester as much as 2.3 x 1013 g of carbon (Kawaguchi and Nicol, 2014). Many Antarctic animals, from starfish to blue whales, in turn prey upon krill.

The Southern Ocean supports vast numbers of penguins, seals and whales, including species that have recovered from exploitation during the 19th and 20th centuries. Some seabird colonies have upwards of a million individuals. However, the vast majority of Antarctic species are invertebrates, some of which have shown promise as sources of new pharmaceuticals. There are only a few species of commercial fishing interest at present. The main target species are Antarctic krill and toothfish (*Dissostichus eleginoides* and *Dissostichus mawsoni*). Recent estimates of the annual value of toothfish and krill fisheries are US$213 million and $159 million, respectively (Brooks 2013). Additionally, tour operators from eleven countries brought over 36,000 tourists to the region in the 2016-2017 Antarctic summer to view its unique wildlife and wilderness.

The annual retreat of sea ice has a massive impact on the ecosystem, most notably by enabling large phytoplankton blooms in the austral summer. At its maximum extent, sea ice covers an average 18.72 million km2 (greater than the land area of the largest country on Earth), while at its minimum it covers an average of 2 - 4 million km2 (approximately the size of India) these seasonal changes make the Southern Ocean a very dynamic ecosystem. Species distributions change dramatically in response to this growth and retreat, with many birds and mammals returning to coastal areas to breed and/or forage in summer. The life cycles of many Antarctic species are

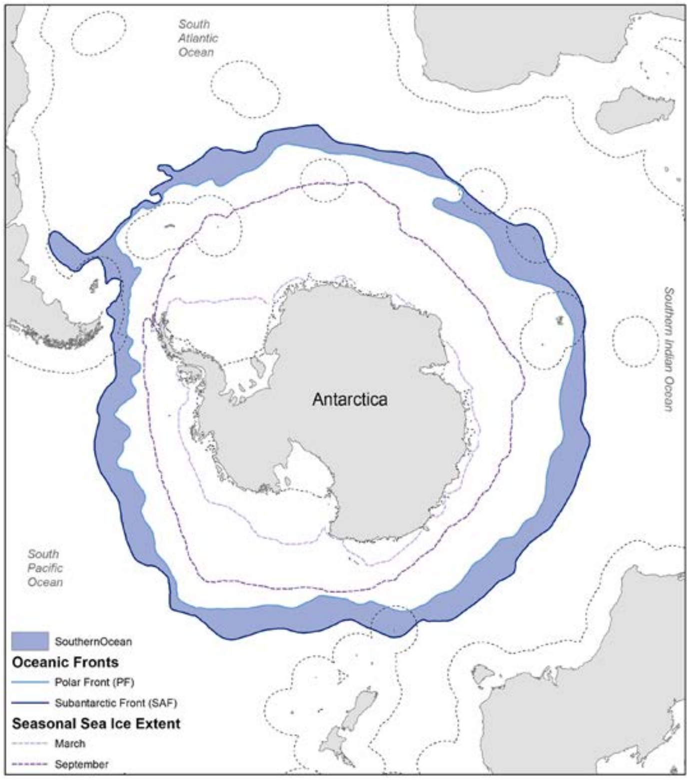

Figure 5. The Antarctic Circumpolar Current (ACC) is bounded by two major fronts, the Subantarctic Front and the Antarctic Polar Front.

closely linked to these annual cycles. For example, juvenile Antarctic krill hide from predators under sea ice and consume algae growing on its underside.

The Southern Ocean is remote and cannot be monitored easily. Activities are managed by the Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR), an international organization with 25 Members (24 countries and the European Union). CCAMLR requires consensus from all Members for all decisions, which means it often takes several years to reach agreement on key issues. There is a significant amount of international coordination and cooperation between scientists working in the region, but there is always a need for more investment in research funds and infrastructure to obtain comprehensive data. A network of marine protected areas (MPAs) has been proposed to provide reference zones for scientists to better understand the impacts of climate change and human activities on Southern Ocean ecosystems.

3. The ILBI and dynamic pelagic systems

For a new ILBI to successfully provide mechanisms for the conservation and sustainable use of BBNJ, governance measures will need to account for both static and dynamic biodiversity. Tracking, understanding and managing dynamic species, communities and ecosystems are challenging tasks which, if not properly implemented, could lead to significant ecological impacts that cross jurisdictional boundaries. An effective governance mechanism for BBNJ may entail incorporating approaches quite different from those used for managing static coastal ecosystems or terrestrial systems. Some considerations to achieve effective conservation and sustainable use of dynamic pelagic systems under a new ILBI are provided below.

3.1 – Area-based Management Tools (ABMTs)

Potential area-based management tools (ABMTs) include marine spatial planning (MSP), individual and networks of MPAs, as well as sectoral measures such as areas closed to some or all fishing or navigation, discharge or reporting requirements. As stated in the PrepCom 3 Chair's overview , there is a need to define ABMTs and their objectives as they relate to the conservation and sustainable management of static and dynamic biodiversity in ABNJ. The High Seas provide critical habitat for migratory species (e.g., those mentioned in the case studies above), which make use of open-ocean ecosystems to fulfill different life stages. There is widespread evidence that many target and non-target oceanic species track dynamic oceanographic features such as frontal zones or eddies, which are becoming increasingly easier to track and predict. The wide-ranging and dynamic distribution not just of those species, but of the ecosystems they utilize means that ABMTs for their conservation may need to be sufficiently 'fluid' to track their changing distributions.

ABMTs, and MPAs in particular, are frequently cited as being part of a precautionary approach to management. The role of MPAs within a precautionary approach is not as a measure to be enacted in reaction to particular events, but as proactive insurance against unknowns in the system and errors in governance. To play this role, they should be in place before evidence of harm is found.

In addition to their role in providing proactive protection in advance of harm, ABMTs can be used to build resilience and to mitigate the cumulative and synergistic impacts of human uses and climate change. For ABMTs to be effective as a precautionary measure, it is critical that monitoring programs are in place that can adequately measure environmental changes. The scale and variability of open-ocean ecosystems require that the monitoring mechanisms be put in place at regional or global scales and be sustained over longer time periods than may be necessary in static systems. While challenging, this is the only way to differentiate local or short-term variability from true impacts to the ecosystem.

The current state of observing programs in ABNJ does not provide sufficient data to differentiate variability in the system from impacts in open-ocean ecosystems. On-board observer programs used by some regional fisheries management organizations (RFMOs) and fishing States are important tools, which are essential for tracking impacts on BBNJ. However, such programs are relatively new features of global and High Seas fisheries management and remain unimplemented or have very limited coverage by percentage of the fishing fleet, gear type or species in many RFMOs (Allain et al., 2011; Crespo and Dunn, 2017; Gilman et al., 2017, 2014). The lack of adequate monitoring remains the case even though most fisheries experts consider observer programs essential to assess the status of fish stocks and the potential ecological impacts of industrial fisheries.

Further challenges to effective monitoring of open-ocean ecosystems come from shared competency to manage species in a single ocean basin and unclear mandates for ecosystem monitoring. While RFMOs have a duty to monitor ecosystem components beyond target species, even strong coordination among RFMOs is unlikely to be sufficient to monitor species, community and ecosystem level indicators given current budgets (Crespo and Dunn, 2017). There is a strong need for enhanced cooperation among organizations with competency for managing open-ocean ecosystems and large-scale biodiversity monitoring programs like the Global Ocean Observing Systems (GOOS) and other programs under UNESCO's Intergovernmental Oceanographic Commission (IOC). An equally critical element to support effective monitoring is technology transfer and capacity building to developing States. We address these issues below to support monitoring through technology transfer and capacity building. Only by increasing cooperation and collaboration among competent organizations, industry and academia, along with other civil society, will appropriate monitoring of the open-ocean ecosystems be available to underpin effective management of open-ocean ecosystems.

3.2 - Environmental Impact Assessments (EIAs)

Ecological impacts on the deep seabed (e.g. changes in species abundance; destruction of benthic habitat) are relatively static. Conversely, ecological impacts on pelagic species, communities or ecosystems move across the ocean as their distributions in ABNJ and EEZs change. Article 5(d) of the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA) provides a solid framework on which species would be included in EIAs. UNFSA Article 5(d) calls for an assessment of the impacts of fishing not only on target stocks but also on "species belonging to the same ecosystem or associated with or dependent upon target stocks." A 2006 Food and Agriculture Organization of the United Nations (FAO) report on the state of migratory straddling and High Seas stocks identified up to 226 highly mobile open-ocean species (Chondrichthyes and Osteichthyes), while a later Convention on the Conservation of Migratory Species of Wild Animals (CMS) and United Nations Environment Program (UNEP) report identified 153 migratory or potentially migratory chondrichthyan fishes (Fowler, 2014; Maguire, 2006). Furthermore, a 2014 study identifies 319 seabird species and 102 marine mammal species which are migratory, highly migratory or very highly migratory (Lascelles et al., 2014). These highly-mobile species contribute to the ecological, social and economic stability of socioecological systems both within and beyond national jurisdictions. Therefore, any changes to the diversity, abundance or range of these highly-mobile species, and the subsequent impacts of these changes, should be tracked and assessed.

If species which migrate between coastal and oceanic ecosystems are severely depleted during their residency in the open-ocean, such changes will later affect ecological relationships in coastal ecosystems. Aware of the dynamic and even transboundary nature of many open-ocean species and ecosystems, and the consequent mobile nature of negative ecological impacts, various delegations throughout the second and third PrepComs expressed interest in ensuring that EIAs account for the mobility of impacts by developing transboundary environmental impact assessments (TEIAs). In the second PrepCom, the African Group took a further step and opined that the ILBI should also cover activities within EEZs with impacts in ABNJ and vice versa. Other coastal States, such as the Pacific Small Island Developing States, advocated for TEIAs as a way to monitor impacts of High Seas activities on adjacent coastal nations. TEIAs are particularly relevant for regions such as the CRTD or the Sargasso Sea, among others, which move, expand and contract across jurisdictional boundaries. In these scenarios, conservation and management measures in ABNJ will have direct implications for the resilience and health of biodiversity and ecosystems within EEZs, and vice versa.

3.3 - Technology Transfer & Capacity Building

The importance of capacity building and transfer of technology is clearly a priority for numerous States, especially the developing States, as reflected in the Chair's overview of the second session of the Preparatory Committee (http://www.un.org/depts/los/biodiversity/prepcom_files/Prep_Com_II_Chair_overview_to_MS.pdf. To quote G77 & China, the scope of capacity building and technology transfer in a new instrument should include, "establishment or strengthening the capacity of relevant organizations/institutions in developing countries to deal with conservation of marine biological diversity in ABNJ; access and acquisition of necessary knowledge and materials, information, data in order to inform decision making of the developing countries." The CARICOM countries apply this more directly to monitoring, stating that the scope should include "[c]apacity building for development, implementation and monitoring of ABMTs including MPAs." Given differences in capacity for monitoring between regions and States, capacity building and technology transfer to support monitoring, as well as minimum monitoring standards across RFMOs and other international organizations could be an important component of the new ILBI.

The distant, deep and dynamic nature of open-ocean ecosystems require ambitious commitments to monitoring as laid out above. Since open-ocean systems make up the vast majority of areas to be governed under any new ILBI, the success of the ILBI may be highly dependent on strong commitments regarding technology transfer and capacity development in support of monitoring open-ocean ecosystems, particularly to developing States. While much discussion of frameworks, modes and types of capacity building and technology transfer have been discussed at the PrepCom meetings, various Stakeholders, including civil society and academia could play an increasingly important role in implementation of any capacity building and technology transfer commitments. This support can come from, for example, civil partnerships providing technical expertise by working directly with individual governmental or intergovernmental organizations, creating a task force of several countries that share information with each other, or by simply making the fishing data of ABNJ transboundary species freely available. Multiple civil society partnerships exist that seek to support monitoring and surveillance through the use of vessel tracking data to increase transparency [e.g., Global Fishing Watch (http://www.

globalfishingwatch.org/), FISH-i-Africa (https://www.fish-i-africa.org/) and Project Eyes on the Seas (http://www.pewtrusts.org/en/multimedia/video/2015/project-eyes-on-the-seas)]. These tools represent a significant form of capacity building and technology transfer by providing all stakeholders with direct access to interpreted information on the distribution of shipping, fishing and even deep-sea mining surveys in any region. Such access to information could drastically improve the capacity of developing countries to monitor waters adjacent to their EEZs and would be a step toward addressing the concerns from the Alliance of Small Island States (AOSIS) and others that any new ILBI "[i]nclude necessary support to implement SIDS' rights and obligations under the new instrument, including technical, scientific and funding support in the development of proposals, review of proposals, development of management measures, and monitoring of ABMTs." The development of such tools illustrates the important role civil society can play in facilitating technology transfer and meeting basic duties that stem back to UNCLOS. Such partnerships will complement more traditional multilateral and bilateral technology transfer and capacity building approaches. The new ILBI could be a platform for fostering coordination and collaboration of various capacity building and technology transfer approaches and initiatives to ensure conservation and sustainable use of ABNJ.

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