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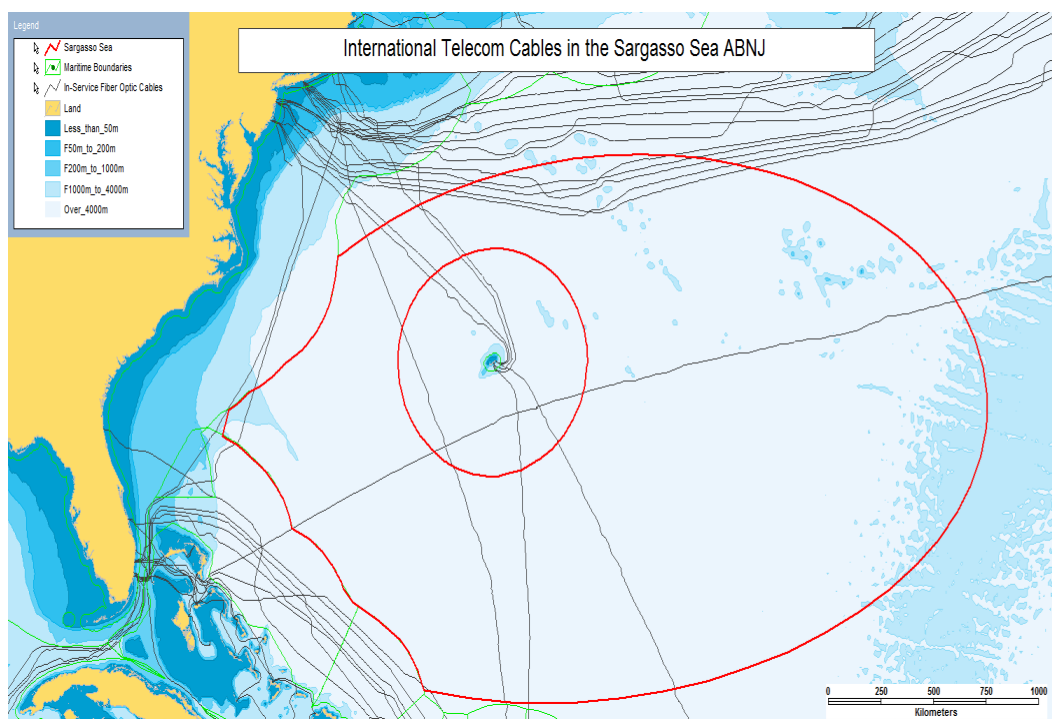
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SUBMARINE CABLES IN THE SARGASSO SEA: LEGAL AND ENVIRONMENTAL ISSUES IN AREAS BEYOND NATIONAL JURISDICTION

23 October 2014, George Washington Law School, Washington
D.C

WORKSHOP REPORT

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I. EXECUTIVE SUMMARY

1. On 23rd October 2014, the International Cable Protection Committee (ICPC),¹ the Sargasso Sea Commission,² George Washington University Law School,³ together with the Centre for International Law (CIL)⁴ at the National University of Singapore, co-organized a workshop titled “*Submarine Cables in the Sargasso Sea – Legal and Environmental Issues Beyond National Jurisdiction*.” The objective of the Workshop was to start a dialogue between the submarine cable industry and the newly established Sargasso Sea Commission regarding best environmental and industry practices for the surveying of cable routes and the laying, repair and maintenance of cables in the Sargasso Sea.
2. The Workshop brought together government representatives from Bermuda, the United Kingdom and the United States, representatives from the cable industry, academics, scientists and lawyers to discuss the impact that cable operations may have on the marine environment, the ecological sensitivity of the Sargasso Sea and whether any best practices should be adopted to minimize the impact, if any, of cable operations in the Sargasso Sea (A list of participants can be found in Annex 3).
3. Conclusions: At the conclusion of the Workshop, there were several key points on which there was general consensus:
 - a. Submarine communications cables are critical infrastructure, which have enormous global benefits.
 - b. The environmental impact of submarine communications cables on the marine environment in the deep ocean is minimal and this is evinced by a range of peer-reviewed scientific reports.
 - c. The Sargasso Sea is an ecologically important area both regionally and globally that deserves protection. However, it is also a data-poor environment which would benefit from further research on the environmental impact of certain activities.

¹ For a more detailed description of the International Cable Protection Committee, please refer to <https://www.iscpc.org/> and Annex 2.

² For a more detailed description of the Sargasso Sea Commission, please refer to <http://www.sargassoalliance.org/about-the-alliance> and Annex 2

³ For a more detailed description of the George Washington University Law School, please refer to <http://www.law.gwu.edu/Pages/Default.aspx>.

⁴ For a more detailed description of the Centre for International Law, please refer to <http://cil.nus.edu.sg/> and Annex 2.

- d. While there is relatively little cable activity in terms of installation and repairs in the Sargasso Sea, it would be beneficial for the cable industry and the Sargasso Sea Commission to agree on best environmental and industry practices for cable operations in the Sargasso Sea.
 - e. The submarine cable industry does not support the imposition of any requirement for an Environmental Impact Assessment (EIA) for cable laying operations in the Sargasso Sea or any other area which is beyond national jurisdiction. In its view, it is not legally required, there is no clear benefit and the costs of conducting an EIA are potentially onerous. That said, they are willing to continue to engage in discussions on this issue.
 - f. It was agreed that regardless of the outcome of continued discussions on the need for an EIA for cable laying operations in the Sargasso Sea, an EIA would not be required for *cable repair operations*, given the importance of expeditious repairs of cable faults to global communications networks.
 - g. The Participants also recognized that further exchange of information between the cable industry, the ICPC and the Sargasso Sea Commission could play an important role in mitigating environmental concerns and issues in the Sargasso Sea.
 - h. While the use of environmental sensors on commercial submarine cables had the potential to be beneficial particularly in the context of the data-poor environment of the Sargasso Sea, there were certain challenges and business considerations. A Joint Task Force, established under the auspices of the International Telecommunications Union (ITU), and which includes the ICPC, was formed for the purpose of studying these issues.
4. *The Way Forward:* It was agreed that there should be continuing cooperation between the ICPC and the Sargasso Sea Commission on areas of mutual concern and interest, which could be reflected in a Memorandum of Understanding or an ICPC Recommendation.⁵ While the two organizations would further discuss the exact modalities and form such co-operation could take, several suggestions were made during the Workshop discussions:
- a. The cable industry, the ICPC and the Sargasso Sea Commission could work together to facilitate further exchange of information. For example:

⁵ An MOU is an organization-to-organization document to foster communication, cooperation, liaison etc., and would not bind any of the members of the ICPC, nor the cable industry. A Recommendation is a document issued by the ICPC which implies a consensus of those substantially concerned with its scope and provisions. It is intended as a non-binding guide to aid cable owners and other seabed users in their cable operations

- The Sargasso Sea Commission could identify areas in the Sargasso Sea that are environmentally sensitive and provide such information to the ICPC for dissemination to the cable industry.
 - If any navigational recommendations or requirements for vessel traffic in the Sargasso Sea were developed then these could be communicated as appropriate to the ICPC. The ICPC, in turn, might consider reflecting these measures in an ICPC Recommendation.
 - The ICPC could approach cable companies that have laid cables in the Sargasso Sea and request them to provide copies of existing Cable Route Surveys used in determining the optimal route. The Sargasso Sea Commission could review these and if there were any questions, further meetings could be arranged.
 - The ICPC could recommend that their Members request that the crew of cable ships traversing the Sargasso Sea observe the *Sargassum* during their voyage. These observations could then be shared with the Sargasso Sea Commission.
 - The ICPC could provide to the Sargasso Sea Commission copies of the various peer-reviewed studies on the environmental impact of submarine communications cables.
- b. The ICPC and the Sargasso Sea Commission also agreed to consider inviting each other's representatives to participate in relevant meetings so as to foster a continuous educational exchange between the two organizations.
- c. With regard to the environmental impact of cable operations in the Sargasso Sea, it was agreed that there should be an ongoing discussion between the ICPC and the Sargasso Sea Commission on the need and basis of an EIA (or equivalent, such as an Environmental Impact Statement) for cable installation in the Sargasso Sea, with the caveat that there was no need for an EIA for cable repairs in the Sargasso Sea.
- d. It was also suggested that there should be an ongoing discussion between the ICPC and the Sargasso Sea Commission on the possible use of environmental sensors on submarine cables in the Sargasso Sea for environmental monitoring purposes, with the understanding that the decision to deploy or not deploy sensors on commercial cables is subject to the business models and decisions of the cable owners.

II. INTRODUCTION

5. The Sargasso Sea is located in an area of open-ocean within the North Atlantic Subtropical Gyre with its boundaries defined by the surrounding currents.⁶ The Sargasso Sea is considered to be an ecologically significant area which contains the world's only holopelagic seaweed ecosystem based upon floating *Sargassum*. It is home to a wide diversity of species that feed, spawn and find protection amidst the *Sargassum* and to many other species which migrate to or through the Sargasso Sea.⁷
6. While the precise boundaries of the Sargasso Sea vary due to the different ocean currents, from a legal perspective, the Sargasso Sea is the portion of the high seas and the Area⁸ under that portion of the high seas that lies beyond the national jurisdiction of any State.⁹ The area of the Sargasso Sea considered by the Sargasso Sea Commission amounts to some 4.2 million square kilometres and extends between 22°-38°N, 76°-43°W centered upon 30°N and 60°W. Bermuda is the only country with land territory within the Sargasso Sea and for this reason, the Government of Bermuda has taken the lead in the sea's protection.¹⁰
7. On 11 March 2014, pursuant to the *Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea*, signed by the Governments of the Azores, Bermuda, Monaco, United Kingdom and the United States the Sargasso Sea Commission was established by Bermuda to "exercise a stewardship role for the Sargasso Sea and keep its health, productivity and resilience under continual review."¹¹ The Sargasso Sea Commission consists of five members who are scientists and other experts committed to the conservation of high seas ecosystems and serve in their personal capacity.¹²

⁶ Annex 1, Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea, signed on 11 March 2014 available at <http://www.sargassoalliance.org/about-the-alliance> (**Hamilton Declaration**).

⁷ See *The Protection and Management of the Sargasso Sea: The Golden Floating Rainforest of the Atlantic Ocean. Summary Science and Supporting Evidence Case* at 9, available at www.sargassoalliance.org/storage/documents/Sargasso.Report.9.12.pdf.

⁸ The Area refers to "the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction." See Article 1 (1), 1982 United Nations Convention on the Law of the Sea (**UNCLOS**).

⁹ Annex 1, Hamilton Declaration. Please refer to Annex 1 which depicts the area representing the Sargasso Sea.

¹⁰ Preamble, Hamilton Declaration.

¹¹ For a further description of the Sargasso Sea Commission, please refer to <http://www.sargassoalliance.org/about-the-alliance> and Annex 2.

¹² Article 6, Hamilton Declaration. For a list of Commission Members, please refer to <http://www.sargassoalliance.org/about-the-alliance>.

8. The International Cable Protection Committee (ICPC)¹³ is a professional not-for-profit organization consisting of 143 members from 64 countries whose goal is to promote awareness of submarine cables as critical communications infrastructure to Governments and other users of the seabed. Submarine communications cables, which consist of fiber optics sheathed in plastic, provide 98 % of the world's telecommunications needs and are vital to the global economy and security. There are presently eight (8) submarine communications cable systems transiting the Sargasso Sea providing telecommunications to various jurisdictions including the United States, the United Kingdom, Bermuda, France, Denmark, Germany, Spain, Portugal, Italy, Brazil and the Netherlands.¹⁴
9. On 23rd October 2014, the George Washington University Law School hosted a Workshop organized together with the ICPC, the Sargasso Sea Commission, and the Centre for International Law (CIL) at the National University of Singapore. The Workshop was titled “*Submarine Cables in the Sargasso Sea – Legal and Environmental Issues Beyond National Jurisdiction*.” The objective of the Workshop was to start a dialogue between the submarine cable industry as represented by the ICPC and the newly established Sargasso Sea Commission regarding the mutual exchange of information and the best environmental and industry practices for the surveying of cable routes and the laying, repair and maintenance of cables in the Sargasso Sea.
10. The Workshop brought together government representatives from Bermuda, the United Kingdom and the United States, representatives from the cable industry, academics, scientists and lawyers to discuss the impact that cable operations may have on the marine environment, the ecological sensitivity of the Sargasso Sea and whether any best practices should be adopted to minimize the impact, if any, of cable operations in the Sargasso Sea (A list of participants can be found in Annex 3).
11. This was the first ever Workshop to address the interaction between submarine communications cables and the environment in areas beyond national jurisdiction and participants engaged in a robust and positive discussion on a variety of important issues. This Report reflects the main issues that were raised during the Workshop as well as suggestions on areas for further cooperation between the cable industry and the Sargasso Sea Commission.
12. It should be noted that the Workshop only comprehensively addressed the environmental impact of submarine *communications* cables and not submarine *power*

¹³ For a more detailed description of the International Cable Protection Committee (ICPC), please refer to <https://www.iscpc.org/> and Annex 2.

¹⁴ Please refer to Annex 5 of this Report for a complete list of submarine cable systems transiting the Sargasso Sea.

cables, which are used to transmit electrical power from one location to another.¹⁵ There are no submarine power cables in the Sargasso Sea.

III. STRUCTURE OF WORKSHOP

13. The Workshop opened with Welcome Remarks by **Professor Lee C. Paddock**, Associate Dean, Environmental Studies, GWU Law School, **the Hon. Jeanne Atherden**, JP, MP, Minister of Health, Environment and Seniors, Government of Bermuda and **Neil Rondorf**, Director of Marine Operations, Leidos, and Chairman of the ICPC.
14. After the Welcome Remarks, the Workshop was divided into three main sessions.¹⁶ The first session featured a panel representing the submarine cable industry, details of which are set out below. The presentations were followed by a question and answer session.
 - a. *Legal Framework under UNCLOS* by **Douglas Burnett**, ICPC International Cable Law Advisor; Partner, Squire Patton Boggs;
 - b. *Cable System Route Planning: Surveys, Business and Stakeholder Considerations* by **Bob Wargo**, Marine Liaison Manager, AT & T Corp.;
 - c. *Cable Laying and Repair and Cable Ship Operations* by **Dr. Ron Rapp**, Director, Industry & Marine Liaison, TE Subcom.
 - d. *Environmental Impacts* by **Dr. Lionel Carter**, ICPC Marine Environmental Advisor; Antarctic Research Centre, Victoria University of Wellington, New Zealand.
15. The second session consisted of a panel representing the interests of the Sargasso Sea Commission and featured the following presentations, followed by a question and answer session.
 - a. *The Sargasso Sea Project* by **Dr. David Freestone**, Executive Secretary, Sargasso Sea Commission;

¹⁵ For more information on submarine power cables, please refer to Malcolm Eccles, Joska Ferencz and Douglas Burnett, "Submarine Power Cables," in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds.), *Submarine Cables: The Handbook of Law and Policy* (Martinus Nijhoff, 2014), 301 – 323.

¹⁶ The biographies of the Presenters and their PowerPoint Presentations are available at <http://www.sargassoalliance.org/about-the-alliance/submarine-cables-workshop>. The Agenda of the Workshop can be found at Annex 4 and the aforementioned website.

- b. *Ecological Importance of the Sargasso Sea* by **Professor Howard Roe**, Chair of the Sargasso Sea Commission;
 - c. *Seamounts of the Sargasso Sea Region* by **Professor Les Watling**, University of Hawaii.
16. The third session was an open discussion for the Participants to discuss and debate the issues that were raised in the previous sessions. It was chaired by **Mr. William Francis**, Bermuda Department of Economic Development

IV. KEY ISSUES DISCUSSED DURING THE WORKSHOP

Submarine Communications Cables as Critical Infrastructure

17. Representatives from the submarine cable industry emphasized the critical importance of submarine communications cables which are the backbone of the international telecommunications system. They transport more than 98 % of international Internet, data and telephone traffic. Submarine cables also facilitate the huge numbers of financial transactions that occur on a daily basis. The global cable network is composed of approximately 213 independent cable systems totaling about 877, 122 kilometers of fiber optic cables. Only a few countries remain isolated from fiber connectivity and many of them have cable projects underway. It was pointed out that Bermuda itself was a major center for international insurance and re-insurance and relied on four submarine cables that linked the island's economy to the world.
18. It was explained that a trans-oceanic cable can cost USD\$500 million or more and financing such cables usually poses challenges. Financing occurs in two ways, either through a consortium consisting of 20 – 30 telecommunications companies that jointly fund the construction of a cable and own their proportionate share of the capacity, or can be privately financed by a few owners. Cable projects usually require two to three years preparation before the cable is actually laid.

Cable Operations

19. Representatives from the cable industry elaborated in great detail on the nature and various steps involved in laying a cable. Essentially, the life cycle of a submarine communications cable involves four phases: (1) the planning and surveying of cable routes; (2) the manufacture and laying of submarine cables; (3) the repair and maintenance of cables; and (4) addressing end of life/out of service cables.

20. The Planning and Surveying of Cable Routes: The planning and surveying of cable routes is a multi-faceted process, which focuses on risk avoidance and risk mitigation utilizing a Desk Top Study (DTS) and a Cable Route Survey.

- a. The DTS uses a pre-survey route to determine hazards developed by reviewing scientific and grey literature, fault rates of previous cables in the area, detailed nautical and bathymetric data, and fisheries and shipping information. The DTS refines a general route for the Route Survey.
- b. During the Route Survey, a vessel is sent to check the route identified by the DTS, using an array of technologies to identify potential hazards and further refine the DTS. These technologies include multi-beam echo sounders, side-scan sonar, sub-bottom profilers, magnetometers, seismic profiling and seabed mapping systems (the latter is used to accurately chart depth, topography, slope angles and seabed type). It was noted however, that due to the water depth of the Sargasso Sea, cables are never buried there, thus seismic and bottom or sub-bottom profiling is not typically done.
- c. The selection of the final route is determined by a cost-benefit analysis of the cost of laying a cable along a particular route versus the need to protect the cable. The route will avoid, as far as possible, hazards and obstacles such as fishing areas, anchorages, military operation areas, munitions or other dumping areas and environmentally sensitive areas. The most flat and benign seabed will be selected and seamounts are generally avoided. In the Sargasso Sea, none of the cables laid traverse any seamounts.

21. The Manufacture and Installation of Cables:

- a. The route that is ultimately selected will determine the type of cable to be used. Submarine communications cables consist of optical fibers, an electrical conductor, an internal steel strength member and a protective sheath of marine grade polypropylene, which are constructed to withstand harsh environmental conditions for 25 years. Depending on where it is laid, a cable may have a protective armor (used on the continental shelf) composed of steel wires. Cables without protective armor are usually laid in the deep ocean and are typically 17 mm – 20 mm diameter whereas armored fiber-optic cables may reach 50 mm diameter. Cable sections and amplifiers, which boost the light signals carried by the glass fibers, are assembled into a nearly complete system, coiled in tanks in a factory and then loaded onto special cable-laying ships for installation.

- b. Prior to installation, cable owners/operators will usually determine whether permits are needed either to land a cable or to lay a cable in a particular maritime zone. Permitting processes have the potential to increase the cost of cable operations and delay the installation of cables. It is therefore in the interest of both cable owners and States for cables to come into service in a timely manner with no or minimal permitting delays.
- c. The actual installations of cables are carried out by highly specialized cable ships equipped with state-of-the art equipment and experienced crew. Depending on the route, the cable will either be buried beneath the seabed or laid on the seabed surface. In water depths beyond the risks posed by human activities like anchoring and fishing, typically deeper than about 1500 m, cables will be surface laid. Cable ships will lay cables at a speed of 6 knots or less, weather permitting, according to a pre-engineered method of procedure using shipboard slack management software so the cable lays flat on the seabed and in the engineered and surveyed location. In the Sargasso Sea, all cables are surface laid.

22. The Repair and Maintenance of Cables:

- a. Cables are vulnerable to a variety of threats from natural hazards and other seabed users. It is imperative that cable faults are repaired as soon as possible, not only because of the impact of lost service but because each cable acts as a restoration path for traffic on any damaged cable. Repairs are generally considered an emergency situation and are undertaken as expeditiously as possible.
- b. Cable owners/operators usually enter into contracts or agreements with marine maintenance companies that have cable and equipment storage depots and cable ships strategically positioned throughout the world available on a 24/7 basis to repair cable faults. There are approximately 40 – 42 cable repair ships worldwide and only 5 – 6 are standing by to carry out repairs in the Atlantic Ocean, from ports in the United Kingdom, France, United States, Canada, Bermuda and the Caribbean. The maintenance agreements are economical since many cable owners share the cost of keeping the cable ships available on stand-by, ready to sail for a repair on 24-hour notice.
- c. Different repair methods are used in different depths and conditions. A common method of repair involves cutting two ends of damaged cable with a grapnel and laying the spare cable to join the two ends.

23. End of Life/Out of Service Cables

- a. ICPC Recommendation No. 1¹⁷ reflects the custom and practice in the industry with respect to out of service cables and provides cable owners with a decision matrix for a cost-benefit analysis of what to do with a cable that is out of service.
- b. Most cables have a life span of 25 years and are left in place when out of service. However, if the opportunity arises, they will be re-used or recycled. For example, recovered cables have been placed to form artificial reefs off New Jersey and Maryland. Limited lengths of deep-water cables have been recovered and recycled subject to crossings and close parallels. Some out of service cables have been donated to scientific institutions for re-use. There are currently three companies engaged in recovery and recycling of near shore and deep water cables around the world. It was pointed out that the fact that cables can be recycled attests to the long-term stability of their constituent materials.

The Legal Framework Governing Submarine Cables under UNCLOS

24. It was explained that while there are several international conventions that addressed submarine cables, the most comprehensive and up-to-date is the 1982 United Nations Convention on the Law of the Sea (UNCLOS).
25. In *areas beyond national jurisdiction*, i.e. the high seas and the Area, UNCLOS essentially recognizes that all States have the freedom to lay submarine cables and pipelines. There is general agreement that the freedom to lay cables includes all aspects of cable operations, namely the right to conduct cable route surveys, and the right to repair and maintain cables.
26. This right is not unlimited however and is subject to the obligation to exercise due regard for the interests of other States in the high seas; due regard for activities in the Area; and due regard for cables and pipelines already in position, in particular ensuring that possibilities of repairing existing cables or pipelines shall not be prejudiced.¹⁸
27. In *areas under national jurisdiction* i.e. the Exclusive Economic Zone (EEZ) and Continental Shelf, the freedom to lay submarine cables is affirmed under

¹⁷ Available on request from the ICPC. An ICPC Recommendation is a document issued by the ICPC which implies a consensus of those substantially concerned with its scope and provisions. It is intended as a non-binding guide to aid cable owners and other seabed users in their cable operations.

¹⁸ Article 87, Article 112, UNCLOS.

UNCLOS¹⁹ but was modified to take into account the interests and rights of coastal States and noncoastal States in these maritime zones.²⁰ This manifested itself in two major qualifications to the freedom to lay, repair and maintain cables:

- a. States or companies conducting cable operations in these maritime zones are required to exercise due regard with respect to the rights and duties of the coastal State in these maritime zones which include, *inter alia*, rights over the exploration and exploitation of resources, jurisdiction over artificial islands, installations and structures; jurisdiction over marine scientific research and jurisdiction over the protection and preservation of the marine environment.²¹
 - b. While the coastal State may not impede the laying or maintenance of cables, it may impose reasonable measures for the exploration of its continental shelf and the exploitation of its natural resources.²²
28. UNCLOS also obliged States under Articles 113, 114 and 115 to adopt certain measures to protect submarine cables, both in areas beyond national jurisdiction and areas under national jurisdiction.

Ecological Significance of the Sargasso Sea and Initiatives for its Protection

29. The ecological importance of the Sargasso Sea was also described in great detail by scientists and other experts from the Sargasso Sea Commission:²³
- a. First, the presence of floating *Sargassum* makes it a unique place of great beauty and ecological value, often described as the “floating golden rainforest” of the Atlantic. Two species of *Sargassum* occur in the Sargasso Sea, *S. fluitans* and *S. natans* but there are major gaps in our

¹⁹ Article 58, 79 (1), UNCLOS.

²⁰ See generally, Articles 56, 58, and 79 of UNCLOS. For a more detailed discussion on the legal regime governing submarine cables in the EEZ/continental shelf, please refer to Douglas Burnett, Tara Davenport, Robert Beckman, “Overview of the International Legal Regime Governing Submarine Cables,” in in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds.), *Submarine Cables: The Handbook of Law and Policy* (Martinus Nijhoff, 2014), 77 – 83.

²¹ Article 56, UNCLOS.

²² Article 79 (2), UNCLOS.

²³ For a more detailed description of the ecological importance of the Sargasso Sea, please see *The Protection and Management of the Sargasso Sea: The Golden Floating Rainforest of the Atlantic Ocean. Summary Science and Supporting Evidence Case*, available at www.sargassoalliance.org/storage/documents/Sargasso.Report.9.12.pdf.

understanding of the dynamics, distribution and productivity of both species.

- b. Second, the *Sargassum* and the encircling currents make it an important habitat for a variety of species which feed, spawn and find protection amongst the mats. For example, more than 145 invertebrate species live in association with the *Sargassum*. It is also a nursery/feeding area for the eggs/juveniles of more than 80 species of fish. Many other species migrate into and through the Sargasso Sea which acts as a crossroads for a variety of endangered pelagic species including various species of whales, tuna, marlin, sharks, American and European eels.
 - c. Third, beneath the surface where water depths reach around 4,500 meters, there are both abyssal plains and seamounts. There are three groups of seamounts in the Sargasso Sea: the New England Seamounts, Corner Rise Seamounts and Mid-Atlantic Ridge seamounts. These seamounts are very old, between 70 to 90 million years. Benthic diversity is very high on the Corner Rise and New England Seamount chains. Further, various species of deep water fish congregate around these seamounts and beaked whale feeding marks have been documented on these seamounts and continental slopes.
 - d. Fourth, the Sargasso Sea is a critical area for global oceanography. For example, it is the site of the longest continuous Ocean Time Series, sampled twice a month since 1954. This has facilitated critical understanding of the changes that have occurred in subtropical oceans and the reactions of the ocean to global change.
30. It was emphasized that contrary to common assumptions, the importance of the marine environment of the Sargasso Sea was not limited to the surface where the *Sargassum* floated. Every aspect of the marine environment of the Sargasso Sea was important ranging from the surface to the sub-surface to the deep bottom.
31. In terms of the impact of human and other activities on the Sargasso Sea environment, it was acknowledged that the Sargasso Sea is a very data-poor environment. This makes it difficult to establish direct causal relationships between specific activities and adverse impacts. For example, it is unclear whether breaking up of the *Sargassum* mats by ships is harmful or encourages growth.
32. Nonetheless, there is accumulative evidence to suggest that the Sargasso Sea is being adversely affected by human activities. Threats and potential threats include harmful impacts arising from over-fishing, garbage and plastics, pollution, discharges, spills, climate change and ocean acidification, underwater noise and

Sargassum harvesting. The impact of other activities such as the introduction of exotic species through ballast water, deep-sea mining, and tourism is unknown.

33. There are several challenges, however, in adopting protective measures to preserve the marine environment of the Sargasso Sea. The first is the fact that the Sargasso Sea is located in areas beyond national jurisdiction, and no government has responsibility for its protection. Further, there are no international treaty bodies with specific responsibility for the Sargasso Sea – it is an area that is unregulated by a Regional Fisheries Management Organization (RFMO) and is also not covered by any of the Regional Seas Programs. The second challenge is the lack of direct evidence of causal effects of specific activities which makes it difficult to convince relevant stakeholders to take precautionary action.
34. In 2010, the Sargasso Sea Alliance was established under the leadership of the Government of Bermuda. Its goals were to achieve international recognition of the global importance of the Sargasso Sea, work with existing international and sectoral organizations to achieve better protection for the Sargasso Sea in accordance with UNCLOS and use this experience as a model for achieving protective status for areas beyond national jurisdiction. The Sargasso Sea Alliance has had several notable achievements including bringing together 74 collaborators from over 10 countries and 11 scientific institutions to produce a summary science and evidence case for the protection of the Sargasso Sea; Bermuda's 2012 establishment of a Marine Mammal Sanctuary in the Sargasso Sea; the declaration of the Sargasso Sea as an Ecologically or Biologically Significant Area under the Convention on Biological Diversity; and working together with fisheries organizations to recognize the need to protect fisheries within the Sargasso Sea. The Alliance has also entered into an in-kind partnership with NASA to develop an initial satellite map product for the Sargasso Sea using three years of oceanographic data.
35. Most notably, the Sargasso Sea Alliance worked together with interested governments to draft the *Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea* which was signed in March 2014. The Signatories are the Governments of Azores, Bermuda, Monaco, the United Kingdom and the United States. The Hamilton Declaration is a non-binding political statement reflecting the voluntary collaborative arrangement among signatory governments to protect the Sargasso Sea. The Signatories agree, *inter alia*, to pursue collaboration and cooperation in furtherance of the common vision of the Declaration and to take forward proposals for protection measures to appropriate international bodies.
36. One of the key proposals under the Hamilton Declaration was the establishment of the Sargasso Sea Commission by Bermuda as a stewardship body responsible for keeping the health, productivity and resilience of the Sargasso Sea under continual review. The Sargasso Sea Commission is an independent science-based

body composed of distinguished scientists and other experts of international repute. It consists of five commissioners nominated by the signatory governments. It is serviced by a small permanent Secretariat.

37. It was pointed out that while the Sargasso Sea Commission does not have international legal personality, and does not have management powers, it is nevertheless endorsed and supported by a number of governments and a wide range of other partners and sets a new paradigm for high sea stewardship.

Cable Operations in the Sargasso Sea

38. One of the crucial issues discussed was the nature and frequency of cable operations within the Sargasso Sea. Representatives from the cable industry explained that there are presently 8 cable systems transiting the Sargasso Sea (please refer to Annex 5 for a list of the cable systems.) The majority of these cable systems follow the Great Circle routes between the United States and the United Kingdom on the northern border of the Sargasso Sea. There are no cable systems through the central section of the Sargasso Sea except those to Bermuda.
39. The Sargasso Sea is mostly deep-ocean which has implications for the type of cable used, as well as cable-laying techniques. The cables are very small in diameter and inert with polyethylene covering. Further, they are laid on the surface and cable burial is not utilized in this area. Cables are also not laid on seamounts as this would pose a hazard to cables which are best protected on a flat and uninteresting seabed.
40. According to the anecdotal accounts of crew of cable-ships who have traversed or conducted cable operations in the Sargasso Sea, weed mats are typically avoided if sighted during daylight hours, although during the night, this may not be possible. It was emphasized however that cable ships would not be able to deviate from pre-established cable routes as the cable was custom designed for that particular route.
41. It was generally agreed that there is a relatively low amount of cable activity within the Sargasso Sea and this would remain the status quo in the near future:
 - a. The last transatlantic cable was installed in 2002 between New Jersey and Bermuda;
 - b. Upgrading existing cable systems within the Sargasso Sea has been done by simply replacing terminal equipment in land-based cable stations without having to disturb existing cables;
 - c. Future cables are more likely to follow well-established routes such as the Northern Great Circle Route and it is unlikely that any great portion of

the undersea network will traverse and thus potentially affect the Sargasso Sea;

- d. There have been very few cable faults in the Sargasso Sea and repairs are rare. There is approximately one repair every two years and for the period 2008 – 2013, there were only 3 repairs, all at depths around 5000 meters (see Annex 6 for a list of repairs). This is partially attributable to the fact that the Sargasso Sea is deep-ocean and thus there is less risk of fishing and shipping activities damaging a cable. It also reflects the non-seismic nature of the region and hence the low incidence of submarine landslides and turbidity currents.

Balancing Cable Operations with Competing Activities in the Sargasso Sea

42. Given that one of the current issues in areas beyond national jurisdiction is the impact of multiple activities in one area, a question was raised as to how the cable industry cooperates and coordinates with other users in this area.
43. It was explained that generally speaking, many potential conflicts between cable operations and competing activities are avoided because the Desktop Survey and the Cable Route Survey identify areas that are intensely used and should be avoided. Further, vis-à-vis other cables and pipelines, the cable industry had an established practice of entering into crossing agreements with other cable owners and/or pipeline owners, which minimizes conflicts.²⁴ With regard to fishing activities in areas beyond national jurisdiction, only deep sea trawling poses an issue and in areas subject to trawling, cables are buried (cables are not buried in the Sargasso Sea). The cable industry also issues Notices to Mariners to inform them when cable operations are taking place and as-laid routes are documented and provided to Hydrographic Offices.
44. With regard to mining activities in the Deep Seabed, otherwise known as the Area, the ICPC has concluded a Memorandum of Understanding (MOU) with the International Seabed Authority (ISA) which establishes mechanisms for cooperation in order to help avoid potential conflicts between the laying and maintenance of submarine cables and current and future activities in the Area.²⁵

²⁴ The ICPC has issued Recommendation No. 3 on Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria (available from the ICPC on request).

²⁵ The MOU between the ICPC and the ISA was signed in 2010 and is available at www.isa.org.jm/files/documents/EN/Regs/MOU-ICPC.pdf.

The Environmental Impact of Submarine Cables and Cable Operations in General and in the Sargasso Sea

45. There was extensive discussion on the environmental impact of submarine cables, both generally in the marine environment and specifically in the Sargasso Sea (For a more detailed summary of the environmental impact of submarine cables with corresponding references, please refer to Annex 7).
46. General Impacts: There was consensus that submarine communications cables have a minimal impact on the deep ocean environment, a conclusion which is supported by available scientific information reflected in peer-reviewed journals and reports (some of these are listed in the references in Annex 8):
- a. The Desk Top Survey and Cable Route Survey ensures that environmentally sensitive areas are avoided as much as possible.
 - b. With regard to the possible impact of Cable Route Surveys on marine mammals, it was observed that the seismic signal used by cable route survey ships is not very powerful when compared to the survey vessels used in oil and gas exploration activities. Sub-bottom profiling only goes a few meters deep and multi-beam sonars only survey the bathymetry of the seabed. The sound pressure levels are also not high.²⁶
 - c. When the installation of submarine cables requires burial (which it does not in the Sargasso Sea, as explained in paragraph 47 [a] below), cables are usually buried up to 1.5 meters and the width of the trench is less than 2 feet. Cables are buried with the use of ploughs which are towed along the seabed with skids. The recovery of the seabed after the burial depends on the location of the burial. For example, for cables buried in shallow waters, the trench heals itself and fauna re-establishes itself immediately. It was pointed out that some cable companies use video cameras to record cable burial and that some jurisdictions require regular surveys after burial and these surveys have not reflected any major change to the seabed.

²⁶ National Research Council, 2003. Ocean Noise and Marine Mammals. National Academy Press, Washington, DC. <http://www.nap.edu/openbook.php?isbn=0309085365> SCAR, 2002. Impacts of Marine Acoustic Technology on the Antarctic Environment. Report Working Group, 62 pp http://www.geoscience.scar.org/geophysics/acoustics_1_2.pdf

For more information on surveying of submarine cable routes, please refer to Graham Evans and Monique Page, "The Planning and Surveying of Submarine Cable Routes," in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds.), *Submarine Cables: The Handbook of Law and Policy* (Martinus Nijhoff, 2014), 93 – 123, and Carter L., Burnett D., Drew S., Marle G., Hagadorn L., Bartlett-McNeil D., and Irvine N. (2009). *Submarine Cables and the Oceans-Connecting the World*. UNEP-WCMC Biodiversity Series No. 31. ICPC/UNEP/UNEP-WCMC at 21-25 and 29-42.

- d. For water depths over 2000 m, cables are laid directly on the seabed and hence seabed disturbance is minimal.
- e. The laying of a cable is intended to be a one-off operation in the 25 year design life of a cable, although faults may occur mainly via natural and human-related hazards. When repairs are needed, grapnels used for cable recovery may disturb the seabed along meter-wide paths. The recovered cable is repaired and lowered to the seabed to minimize further disturbance. Again, a repair is planned to be a one-off operation in a cables' remaining design life.
- f. Cable operations also have a low carbon footprint, and are done with concern for safety, fuel economy and the environment.
- g. Once the cable is laid, the physical impact on the seabed is minimal. The size of communications cables is small, ranging from 17 mm to 21 mm. Cables are protected by a substantial sheath of marine grade polyethylene which is inert in the ocean.
- h. Research into cables and benthic organisms living on and in the seabed show that there is no statistical difference in the abundance and diversity for organisms living near and away from a cable.
- i. Studies have also been done on the direct environmental impact of cables on marine life²⁷ (including whales²⁸ and sharks²⁹). Whale entanglements with cables ceased with the transition from telegraph to coaxial cables by the early 1960s which reflected improved cable design, laying techniques and seabed mapping.

²⁷ See for e.g., Kogan, I., Paull, C., Kuhn, L., Burton, E., Von Thun, S., Greene, H.G. and Barry, J., 2006. ATOC/Pioneer Seamount cable after 8 years on the seafloor: Observations, environmental impact. *Continental Shelf Research* 26: 771–787 and Grannis, B.M., 2001. Impacts of mobile fishing gear and a buried fiber-optic cable on soft-sediment benthic community structure. MSc thesis, University of Maine, 100 pp) as well as submarine power cables (Andrulewicz, E., Napierska, D. and Otremba, Z., 2003. The environmental effects of the installation and functioning of the submarine SwePol Link HVDC transmission line: A case study of the Polish Marine Area of the Baltic Sea *Journal of Sea Research* 49: 337–345) that show no negative impact on the abundance and diversity of benthic organisms.

²⁸ M.P. Wood and L. Carter, "Whale Entanglements with Submarine Telecommunications Cables" (2008) 33 *IEEE Journal of Oceanic Engineering* at 445-450.

²⁹ L.J. Marra, "Shark bite on the SL Submarine Light Wave Cable System; History, Causes, and Resolution" (1989), *IEEE Journal of Oceanic Engineering* at 230-237.

47. Environmental Impact in the Sargasso Sea: Taking the above points into consideration, it was suggested that the impact of submarine cables and cable operations in the deep water of the Sargasso Sea would also be minimal, especially bearing in mind the following:
- a. There is no cable burial in the Sargasso Sea and all cables are laid on the seabed. Further, cables are not laid on seamounts.
 - b. As explained in paragraphs 38 - 41 above, cable activity in the Sargasso Sea is low. There are only 8 existing cable systems, there are no new cables planned and the incidence of cable faults and thus repairs is infrequent, thereby minimizing disturbance to the seabed.
48. While the focus of the Workshop was submarine communications cables, the difference between the environmental impact of submarine communications cables and submarine power cables was also discussed. Because power cables are larger in diameter than communications cables and generate an electromagnetic field, there is greater concern that it may have a detrimental impact on the environment, although there have been no conclusive scientific studies on this issue and the matter is currently under study.³⁰ There are presently no power cables running through the Sargasso Sea. Cable industry representatives agreed that if power cables were to be installed in the Sargasso Sea in the future, this would merit another workshop.
49. A related question was also raised as to the environmental impact of the copper conductor used in submarine communications cables to carry power to repeaters. It was explained that the power voltage carried by the copper conductor in submarine communications cables is a constant DC current of 0.6 to 1 amp and was significantly less than conventional power cables. To put this low power into perspective, a lap top computer operates on about 3 amp power and most household circuit breakers are set around 15-20 amps. Studies had been done on this submarine cable power, and no adverse impact had been reported.

The Need for an Environmental Impact Assessment for Cable Operations in the Sargasso Sea

50. While there was general consensus that the impact of submarine communications cables in the Sargasso Sea was minimal, it was also pointed out that it could not

³⁰ For more information on submarine power cables, please refer to Malcolm Eccles, Joska Ferencz and Douglas Burnett, "Submarine Power Cables," in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds.), *Submarine Cables: The Handbook of Law and Policy* (Martinus Nijhoff, 2014), 301 – 323.

be said with certainty that there was no impact, particularly given the data-poor environment in the Sargasso Sea. In this regard, a question was raised as to whether an Environmental Impact Statement (EIS) or Assessment (EIA) could be provided by the cable companies before the commencement of cable operations in the Sargasso Sea.

51. There was a robust discussion concerning EIAs for cable operations in the Sargasso Sea. There were several issues with this suggestion.
52. First, there was debate about whether an EIA in areas beyond national jurisdiction is a legal requirement under UNCLOS. The cable industry participants were keen to stress that the plain language of Articles 87(c) and 112 - which sets out the freedom to lay and maintain cables on the high seas and which is a key legal bedrock of the global undersea communications network – does not contain any requirement for an EIA or EIS. Nevertheless, Article 206 of UNCLOS states:

*When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205.*³¹

53. Representatives from the cable industry argued that the introduction of submarine cables in the marine environment could not be considered “pollution” which is defined in UNCLOS as “*the introduction by man, directly or indirectly of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.*”³² Submarine cables did not cause significant and harmful changes to the marine environment. Representatives from the cable industry emphasized that this was backed by science-based peer-reviewed reports.
54. Another issue that was highlighted was the fact that the obligation to conduct an EIA is placed on States, whereas cable operations are conducted by private enterprises. Unlike vessels, cables were not registered under any flag and as mentioned previously, cables are owned either by a consortia of companies or private owners, all of which are from different States. Thus, it was not

³¹ Also see Article 204, UNCLOS.

³² Article 1 (1), UNCLOS.

immediately clear from the UNCLOS provision on EIAs, if it were applicable, who might have the obligation to carry out such an environmental assessment.

55. Further, because the area concerned is in an area beyond national jurisdiction, there are challenges in determining what would be an appropriate body to decide a range of issues such as the requirements for an EIA in the Sargasso Sea, as well as where and to whom should such an EIA be submitted for review. Another issue was determining who would decide if the route required a revision, and who would pay for a longer cable if required.
56. It was pointed out that these questions are further complicated by the fact that a key element of any EIA is an adequate understanding of the environment in which it is conducted, also referred to as a baseline assessment. A baseline assessment provides justification as to why an EIA is necessary and also enables the determination of the environmental impact of any activity. Given the lack of knowledge of the marine environment in the Sargasso Sea, there would appear to be no baseline from which an EIA can be made.
57. Representatives from the cable industry stated that in their view, an EIA was not a requirement in areas beyond national jurisdiction such as the Sargasso Sea. Given that cable companies were ultimately commercial companies that operate in a competitive environment, any decision about whether to undertake an EIA would have to be based on a cost-benefit analysis. EIAs had the potential to significantly increase both the costs and time incurred in a cable project. The construction and installation of submarine cables require a considerable capital investment from cable owners (be it a private owner or a consortium) and any additional costs incurred or longer permitting times would have to be justified, and carefully weighed against the benefits. At the moment, there appeared to be no clear benefit of EIAs in such areas.
58. In response to the above points, other participants pointed out that EIAs had acquired a negative connotation particularly in North America where the requirements in some states (i.e. California) were especially onerous. However, it was highlighted that there are many levels of EIAs. The first and most basic level is an Environmental Impact Statement, which requires much less information than an environmental impact assessment. It was opined that the information collected during the Desk Top Survey and Cable Route Survey replicates the information provided in an Environmental Impact Statement.
59. A question was also raised as to whether information could be extrapolated from existing environmental studies done for cable operations conducted in zones under Bermuda's jurisdiction. However, it was pointed out that the majority of studies done in Bermuda focused on coral reefs and thus were not comparable to the abyssal plains of the Sargasso Sea.

60. It was also agreed that an EIA (or equivalent) should not be required before cable repairs take place in the Sargasso Sea given the importance of ensuring that repairs are done as expeditiously as possible.
61. One of the participants also wondered whether it would be helpful if the cable industry itself carried out a scientific study of the impact of cables, which would lay enough groundwork so that further assessments would not be necessary. In response to this, it was pointed out that an industry-sponsored study may not be credible as it could be perceived as inherently biased. That is why the cable industry relies on peer-reviewed scientific papers, of which there are several, which demonstrates the minimal impact of cables on the marine environment (a list of these peer-reviewed scientific papers is referenced in Annex 7).

Exchange of Information

62. One proposal that was put forward to address the environmental concerns that were raised during the Workshop was the further exchange of data between the cable industry (through the ICPC or otherwise) and the Sargasso Sea Commission.
63. It was suggested that the Sargasso Sea Commission could:
- a. Identify areas in the Sargasso Sea that are environmentally sensitive in a database or otherwise and this information could be fed into the Desktop Survey for future cable installation;
 - b. If any navigational recommendations or requirements for vessel traffic in the Sargasso Sea were developed³³ then these would be communicated as appropriate to the ICPC. The ICPC, in turn, might consider reflecting these measures in an ICPC Recommendation, which are non-binding but experience a high level of compliance from the cable industry.
64. Similarly, it was proposed that the ICPC could:
- a. Approach cable companies that have laid cables in the Sargasso Sea and request them to provide copies of existing Cable Route Surveys used in determining the optimal route to the Sargasso Sea Commission for study.³⁴ While cable owners regard the information collected in these documents as commercially sensitive and they would generally not share

³³ There are currently no restrictions or recommendations currently in place regarding vessel traffic through the Sargasso Sea.

³⁴ Because one of the goals of the ICPC is to expand knowledge and understanding on submarine cables, it is happy to facilitate requests for information from third parties (often scientists) to cable companies.

such data with competitors, they are more willing to provide this information upon request to governments, academic scientists, or international organizations. The Sargasso Sea Commission could review this and if they had any questions, further meetings can be arranged. The basic goal would be to determine if the information could assist the Sargasso Sea Commission in gaining a better understanding of the marine environment in the Sargasso Sea.

- b. Recommend to their Members to request that the crew of cable ships traversing the Sargasso Sea make observations of the incidence of *Sargassum* during their voyage. These observations could then be shared with the Sargasso Sea Commission.
 - c. Provide to the Sargasso Sea Commission copies or citations of the various peer-reviewed studies on the environmental impact of submarine communications cables. (See Annex 7)
65. It was also suggested that both the ICPC and the Sargasso Sea Commission invite each other's representatives to participate in relevant meetings so as to foster a continuous educational exchange between the two organizations.

Marine Data Collection Through the Use of Environmental Sensors on Cables

66. In light of the paucity of data on the marine environment in the Sargasso Sea, one of the issues that was raised was the possibility of integrating submarine communications cables in the Sargasso Sea with scientific sensors which would collect measurements such as temperature, pressure, salinity, hydro-acoustic and cable voltage.³⁵ This information could be used for real-time monitoring of the oceans, climate change and disaster monitoring. The scientific sensors would be placed within repeaters, or within close proximity to, found on submarine cables every 60 – 100 km. If these sensors are placed on existing communications cables or are integrated in a new generation of cables, this would result in such cables having dual uses, namely, marine data collection as well as telecommunications.³⁶

³⁵ For more information on this issue, see Kent Bressie, "Using Submarine Cables for Climate Monitoring and Disaster Warning," (United States: International Telecommunications Union, 2012); Yuzhou You, *Using Submarine Communications Networks to Monitor the Climate*, ITU-T Technology Watch Report (November 2010), 1, available at http://www.itu.int/dms_pub/itu-t/oth/23/01/T23010000110003PDFE.pdf.

³⁶ While this was not discussed extensively during the Workshop, it should be noted that there are three ways in which scientific sensors could be integrated with submarine communications systems. First, they could be attached to out-of-service cables, in which case, they would be single purpose cables i.e. only used for marine data collection. Second, sensors and related components could be attached to in-service communications cables, although there are limitations in their usage due to the fact that repeaters in existing cables have not been constructed to house such sensors. The third option is the development of a new generation of multi-purpose cables. This approach entails

67. In response to this, it was pointed out that a Joint Task Force has been established by the International Telecommunications Union (ITU),³⁷ the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC) and the World Meteorological Organization (WMO) to develop a strategy and roadmap that could lead to the availability of submarine repeaters equipped with environmental sensors for ocean and climate monitoring and disaster risk reduction.³⁸ The ICPC has been working closely with the Joint Task Force for the past 2 years on the concept of integrating environmental sensors into repeaters with submarine communications cables for the purpose of climate monitoring and disaster warning. So far, there has been little progress due to a range of legal, technical and business model considerations as well as little industry interest to fund such an endeavor.

- a. First, the cable industry is concerned that in areas under national jurisdiction such as the EEZ/continental shelf, submarine communications cables which also have marine data collection capabilities could be regulated as Marine Scientific Research and thus subject to coastal State and landlocked State consent.³⁹ This could potentially erode the fundamental freedoms afforded to submarine communications cables in the EEZ and continental shelf. It was acknowledged, however, that this would pose less of an issue in areas beyond national jurisdiction such as the Sargasso Sea where both the freedom to lay cables and the freedom to conduct marine scientific research are recognized.⁴⁰
- b. Second, from a technical perspective, engineering requirements for compatible sensors at extreme ocean depths are yet to be tested and no prototypes have been deployed and qualified. There is also concern that using dual-purpose cables may undermine the reliability of the

redesigning the repeaters that are integrated with built-in sensors that would enable climate monitoring and disaster detection. The last two methods would result in dual purpose cables known as dual purpose telecom-marine data cables: See Yuzhou You, *Using Submarine Communications Networks to Monitor the Climate*, ITU-T Technology Watch Report (November 2010), 1, available at http://www.itu.int/dms_pub/itu-t/oth/23/01/T23010000110003PDFE.pdf.

³⁷ The International Telecommunications Union (ITU) is the United Nations specialized agency for information and communications technologies. For more information, see <http://www.itu.int/en/about/Pages/default.aspx>.

³⁸ For more information on this, see <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Pages/default.aspx>.

³⁹ See Article 246, UNCLOS.

⁴⁰ See Article 87, UNCLOS.

communication network and compromise the manufacturer's amplifier warranties, which from the cable industry's perspective, remains the first priority.

- c. Third, there are potential issues with the data collected. There is limited consensus amongst scientists on the type of data that should be collected. Each scientist tends to want the data that supports his or her interests - making design and testing problematic. Additionally, telecommunication cables because of their great circle route tendencies do not provide a uniform or complete data collection for the full ocean area. The concentration of submarine telecommunications cables in the Sargasso Sea underscores this point with the cables generally all running to the north and none to the south of the Sargasso Sea.
- d. Fourth, the added costs to certify (for warranty), qualify (design, build and field test in the ocean), install and maintain this capability must be considered; estimates vary but are significant. While cable companies acknowledge that the technology could be developed, there needs to be sufficient financing and a viable business plan that does not compromise communications reliability and provides an acceptable return on investment.
- e. Use of a single purpose scientific cable that is dedicated to science avoids most of the problems associated with dual use cables. Although costs are considerable, there is a solid record of success with these systems.⁴¹

V. CONCLUSIONS AND THE WAY FORWARD

- 68. *Conclusions:* At the conclusion of the Workshop, there were several key points on which there was general consensus:
 - a. Submarine communications cables are critical infrastructure which have enormous global benefits.
 - b. The environmental impact of submarine communications cables on the marine environment in the deep ocean is minimal and this is evinced by a range of peer-reviewed scientific papers and reports.

⁴¹ For more information on submarine scientific cables, please refer to Lionel Carter and Alfred H.A. Soons, "Marine Scientific Research Cables," in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds.), *Submarine Cables: The Handbook of Law and Policy* (Martinus Nijhoff, 2014)323 – 338.

- c. The Sargasso Sea is an ecologically important area both regionally and globally that deserves protection. However, it is also a data-poor environment which would benefit from further research on the environmental impact of certain activities.
 - d. While there is relatively little cable activity in terms of installation and repairs in the Sargasso Sea, it would be beneficial for the cable industry and the Sargasso Sea Commission to agree on best environmental and industry practices for cable operations in the Sargasso Sea.
 - e. The submarine cable industry does not support the imposition of any requirement for an EIA in the Sargasso Sea or any other areas beyond national jurisdiction. In its view, it is not legally required, there is no clear benefit and the costs of conducting an EIA are potentially onerous. That said, they were willing to continue to engage in discussions about this.
 - f. It was agreed that regardless of the outcome of continued discussions on the need for an EIA for cable laying operations in the Sargasso Sea, an EIA would not be required for *cable repair operations*, given the importance of expeditious repairs of cable faults to global communications networks.
 - g. The Participants recognized that further exchange of information between the cable industry, the ICPC and the Sargasso Sea Commission could play an important role in mitigating environmental concerns and issues in the Sargasso Sea.
 - h. While the use of environmental sensors on commercial submarine cables had the potential to be beneficial particularly in the context of the data-poor environment of the Sargasso Sea, there were certain challenges and business considerations. It was noted that a Joint Task Force, formed under the auspices of the ITU and which includes the ICPC, was formed for the purpose of studying these issues.
69. *The Way Forward:* It was agreed that there should be continuing cooperation between the ICPC and the Sargasso Sea Commission on areas of mutual concern and interest, which could be reflected in a Memorandum of Understanding or an ICPC Recommendation.⁴² While the two organizations would further discuss the exact modalities and form such co-operation could take, several suggestions were made during the Workshop discussions:

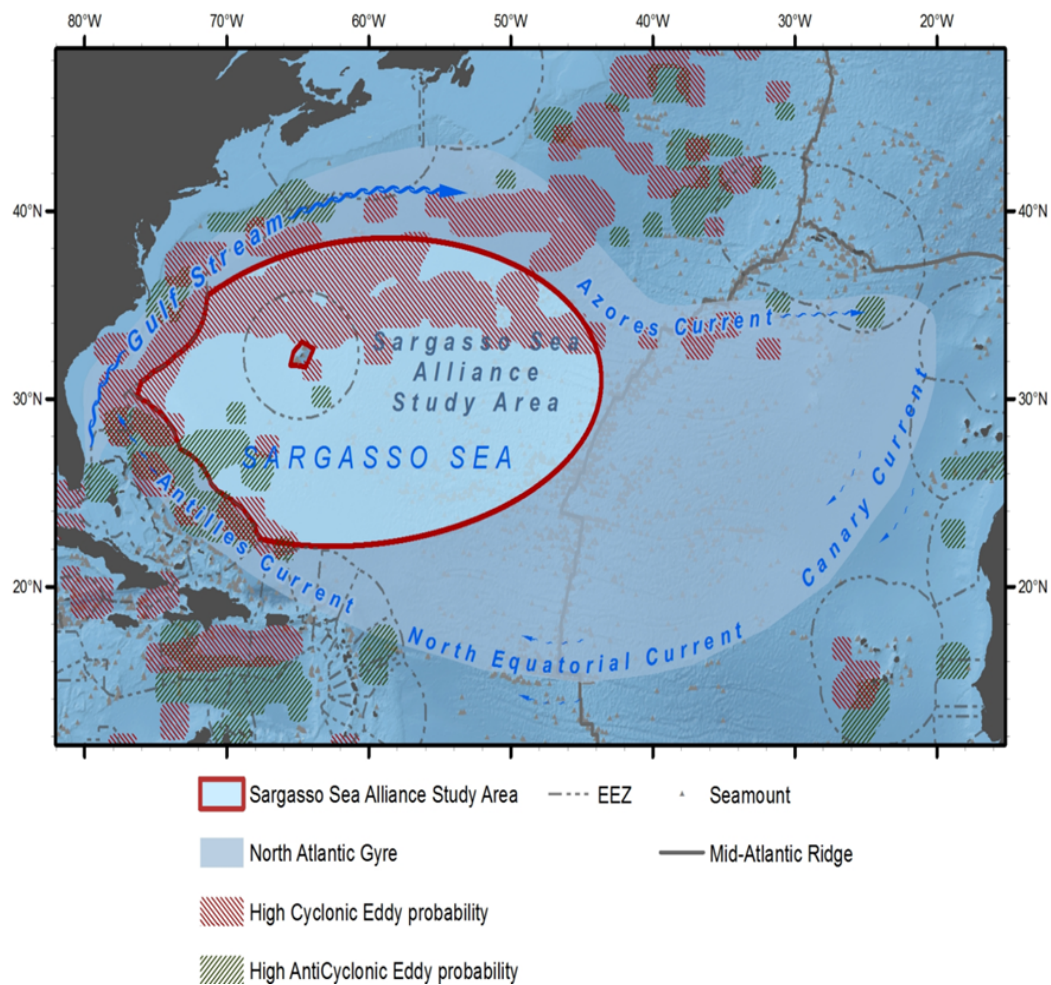
⁴² An MOU is an organization-to-organization document to foster communication, cooperation, liaison etc., and would not bind any of the members of the ICPC, nor the cable industry. A Recommendation is a document issued by the ICPC which implies a consensus of those substantially concerned with its scope and provisions. It is intended as a non-binding guide to aid cable owners and other seabed users in their cable operations

- a. The cable industry, the ICPC and the Sargasso Sea Commission could work together to facilitate further exchange of information. For example:
- The Sargasso Sea Commission could identify areas in the Sargasso Sea that are environmentally sensitive and provide such information to the ICPC for dissemination to the cable industry.
 - If any navigational recommendations or requirements for vessel traffic in the Sargasso Sea were developed then these would be communicated as appropriate to the ICPC. The ICPC, in turn, might consider reflecting these measures in an ICPC Recommendation.
 - The ICPC could approach cable companies that have laid cables in the Sargasso Sea and request them to provide copies of existing Cable Route Surveys used in determining the optimal route. The Sargasso Sea Commission could review this and if they had any questions, further meetings could be arranged.
 - The ICPC could recommend to their Members to request that the crew of cable ships traversing the Sargasso Sea make observations of the incidence of *Sargassum* during their voyages. These observations could then be shared with the Sargasso Sea Commission.
 - The ICPC could provide to the Sargasso Sea Commission copies or citations of the various peer-reviewed studies on the environmental impact of submarine communications cables (See Annex 7).
- b. The ICPC and the Sargasso Sea Commission also agreed to consider inviting each other's representatives to participate in relevant meetings so as to foster a continuous educational exchange between the two organizations.
- c. With regard to the environmental impact of cable operations in the Sargasso Sea, it was agreed that there should be an ongoing discussion between the ICPC and the Sargasso Sea Commission on the need and basis of an EIA (or equivalent, such as an Environmental Impact Statement) for cable installation in the Sargasso Sea, with the caveat that there was no need for an EIA for cable repairs in the Sargasso Sea.

- d. It was also suggested that there should also be an ongoing discussion between the ICPC and the Sargasso Sea Commission on the possible use of environmental sensors on submarine communications cables in the Sargasso Sea for environmental monitoring purposes, with the understanding that the decision to deploy or not deploy sensors on commercial cables is subject to the business models and decisions of the cable owners.

VI. ANNEXES

Annex 1: Map of Sargasso Sea



Annex 2: Description of Co-Sponsors

SARGASSO SEA COMMISSION

The Sargasso Sea Commission was established pursuant to the [*Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea*](#), signed on 11 March 2014, by the governments of the Azores, Bermuda, Monaco, UK and US. The Commission will “encourage and facilitate voluntary collaboration toward the conservation of the Sargasso Sea.” While the Commission has no management authority, it will “exercise a stewardship role for the Sargasso Sea and keep its health, productivity and resilience under continual review.” A more specific initial mandate is listed in [*Annex II of the Declaration*](#).

The establishment of the Commission is the result of three years of work by the Sargasso Sea Alliance, and it will operate as a stand-alone legal entity established by Bermudian law. Operating in a largely virtual setting, Commissioners will serve in-kind in their personal capacity and will be supported by a small Secretariat based at the IUCN Washington, DC office.

Commissioners were appointed by the Government of Bermuda and were selected through a consultation process in Spring 2014 by governments who support the aims of the Hamilton Declaration.

THE INTERNATIONAL CABLE PROTECTION COMMITTEE

The ICPC is the premier international submarine cable authority providing leadership and guidance on issues related to submarine cable security and reliability. Founded in 1958, the ICPC membership spans over 60 nations and presently includes the owners and operators of over 97 per cent of the world’s international submarine cable systems and the 18 submarine power cable owners. Since 2010 governments have been eligible to join and many have elected to do so. Membership is also open to submarine cable system suppliers and installers, marine survey companies, cables ship owners and operators, international banks, and others with interest in critical submarine cable infrastructure.

The ICPC issues *Recommendations*, available to the public upon request, on aspects of submarine cable laying, repair, surveying, and protection. The ICPC works to promote education and compliance with the United Nations Convention on the Law of the Sea (UNCLOS) and customary international law impacting submarine cables among its members, States, international organizations, and other seabed users. More information is available from the ICPC website www.iscpc.org.

CENTRE FOR INTERNATIONAL LAW, NATIONAL UNIVERSITY OF SINGAPORE

The Centre for International Law (CIL) is a university-wide research centre established in 2009 at the National University of Singapore (NUS) in response to the growing need for international law expertise and capacity building in the Asia-Pacific region. CIL focuses

on multidisciplinary research and collaborates very closely with the NUS Faculty of Law as well as other high calibre organizations and institutions to further its research and capacity-building objectives.

CIL focuses its activities on three core areas that are critical to the Southeast Asia region, these being Ocean Law and Policy, ASEAN Law and Policy, and Trade and Investment Law and Policy. As part of its activities in Ocean Law and Policy, CIL has undertaken work on piracy and international maritime crimes, the South China Sea disputes, biodiversity and environmental issues. This present publication, *Submarine Cables: The Handbook of Law and Policy*, is part of an extensive CIL research project on submarine cables, which has included two regional Workshops organized in collaboration with the International Cable Protection Committee (ICPC). CIL research and other relevant materials on submarine cables are available on our website, www.cil.nus.edu.sg.

Annex 3: List of Participants

<u>Prefix</u>	<u>Last name</u>	<u>First name</u>	<u>Title</u>	<u>Affiliation</u>
The Hon.	Atherden	Jeanne	Minister	Ministry of Health, Seniors and Environment
Mr.	Bressie	Kent	Partner	Harris, Wiltshire & Grannis
Mr.	Bryner	Nick	Fellow	The George Washington School of Law
Mr.	Burnett	Douglas	International Cable Law Advisor	ICPC
Mr.	Burton	Joseph	Counselor for Technology and Security Policy	U.S. Department of State
Prof.	Carter	Lionel	Professor	Victoria University and ICPC
Dr.	Causey	Billy	Commissioner	Sargasso Sea Commission
Mr.	Charlton	Ray	Vice President	Cable Co Ltd.
Ms.	Creese	Catherine	Director, Naval Seafloor Cable Protection Office	US Navy
Ms.	Davenport	Tara	Workshop Rapporteur	National University of Singapore
Mr.	Francis	William	Permanent Secretary - Economic Development	Government of Bermuda
Dr.	Freestone	David	Executive Secretary	Sargasso Sea Commission
Prof.	Glicksman	Robert	Professor	The George Washington School of Law
Ms.	Hotaling	Liesl	VP for Education	Marine Technology Society
CDR	Jones	Tom	Head, Law of the Sea for The Office of the Navy Judge Advocate Code 10	Navy
Dr.	Kim	Elizabeth	Foreign Affairs Officer	U.S. Department of State
Mr.	Kirwan	Paul	VP Project & Consortia Management	Columbus Networks / CWC
Ms.	Leonard	Alice	Law Clerk	Squire Patton Boggs (US) LLP
Ms.	Martin	Alexis	Graduate Fellow	Global Ocean Forum/ University of Delaware
CDR	McGuire	Rick	Head, Maritime Environmental Law	U.S. Navy
Mr.	Monkman	Kevin	Permanent Secretary	Bermuda Government
Ms.	Morrison	Kate	Deputy Executive Secretary	Sargasso Sea Commission
Mr.	O'Brien	Greg	Oceans Policy Advisor	U.S. Department of State
Mr.	Oppenheimer	Peter	Chief, International Section	NOAA Office of General Counsel
Mr.	Paddock	Lee	Associate Dean	George Washington University
Dr.	Rapp	Ronald	Director, Industry & Marine Liaison	TE SubCom
Captain	Roach	J. Ashley	JAGC USN (Ret.)	CIL NUS Singapore
Prof.	Roe	Howard	Commissioner	Sargasso Sea Commission
Mr.	Rondorf	Neil	Chairman ICPC	LEIDOS Corp
Mr.	Salley	Frank	Senior Engineer	Submarine Cable Systems, Verizon
Mr.	Salzmann	Kirk	Senior Litigation Counsel	Tata Communications
Ms.	Savill	Louise	Head, Maritime Policy Unit	Foreign and Commonwealth Office
Mr.	Stup	Robb		Squire Patton Boggs
Mr.	Thiele	Torsten	Fellow	Harvard University

Prof.	Tladi	Dire	Commissioner	Sargasso Sea Commission
Dr.	Trott	Tammy	Commissioner	Sargasso Sea Commission
Mr.	Venkus	Steve	Deputy Chief Office of Maritime and International Law	US Coast Guard
Mr.	Wargo	Robert	Marine Liaison Manager	AT&T
Prof.	Watling	Les	Biology of Deep-sea Octocorals and Their Associates, Biology of Crustacea, and Conservation Studies	University of Hawai'i
Mr.	Wirakara	Rizal	First Secretary, Economic Affairs	Embassy of the Republic of Indonesia

Annex 4: Workshop Agenda



Submarine Cables in the Sargasso Sea-

Legal and environmental issues in areas beyond national jurisdiction

23 October 2014

GW Law School Moot Court Room

FINAL AGENDA

The objective of the workshop is to start an informed dialogue between the Submarine Cable Industry and the newly established Sargasso Sea Commission regarding best environmental practices for the laying and maintenance of cables in high seas areas, such as the Sargasso Sea. The intended outcomes are a published report of the Proceedings and an Agreed Statement of “Best Practices” that might form the basis of an MOU.

- | | |
|-----------------|--|
| 8:30- 9:00 am: | Registration and coffee |
| 9:00-9:30 am: | Welcome Remarks <ul style="list-style-type: none">• Professor Lee C. Paddock, Associate Dean, Environmental Studies, The George Washington University Law School• Hon. Jeanne Atherden, Minister of Health, Environment and Seniors, Government of Bermuda• Neil Rondorf, Leidos, Director of Marine Operations, International Cable Protection Committee Chairman’s Introduction |
| 9:30- 9.50 am: | Legal Framework under UNCLOS <ul style="list-style-type: none">• Doug Burnett, ICPC International Cable Law Advisor; Partner, Squire Patton Boggs |
| 9.50-10.10 am: | Cable System Route Planning: Surveys, Business and Stakeholder Considerations <ul style="list-style-type: none">• Bob Wargo, Marine Liaison Manager, AT&T Corp. |
| 10:10-10.30 am: | Cable Laying and Repair and Cable Ship Operations <ul style="list-style-type: none">• Dr. Ron Rapp, Director, Industry & Marine Liaison, TE Subcom |

10.30-10.50 am:	Environmental Impacts <ul style="list-style-type: none"> • Dr. Lionel Carter, ICPC Marine Environmental Advisor; Professor, Marine Geology, Antarctic Research Centre, Victoria University of Wellington, New Zealand.
10.50-11.15 am:	Question & Answer Session
11.15-11:30 am:	Coffee Break
11:30- 11.50 am:	Sargasso Sea Commission- Overview of Initiative <ul style="list-style-type: none"> • Dr. David Freestone, Executive Secretary
11.50-12.10 pm:	Ecological Importance of Sargasso Sea <ul style="list-style-type: none"> • Professor Howard Roe, Sargasso Sea Commission
12.10- 12.30 pm:	Seamounts of the Sargasso Sea Region <ul style="list-style-type: none"> • Dr. Les Watling, University of Hawai'i
12.30- 1.00 pm:	Question and Answer Session
1.00- 2:30 pm	Lunch- Marvin Center
2:30- 4:00 pm:	Combined Discussion Session Chair: William Francis, Bermuda Department of Economic Development Rapporteur: Tara Davenport, Centre for International Law, National University of Singapore
4:00- 4:15 pm:	Coffee Break
4:15- 4:30 pm:	Next steps <ul style="list-style-type: none"> • Outcome documents
4:30- 4:45 pm:	Closing Remarks & Adjourn Meeting
5:00 pm:	Reception- Law School Faculty Conference Center (5 th floor)

Annex 5: List of Submarine Cable Systems in the Sargasso Sea

System Name	Ready For Service year (upgrade)	Length (Overall) KM	Owner	Landing Points
APOLLO	2003 (2012/2014)	12,700	Alcatel, Apollo SCS Limited C&W	Brookhaven (USA), Lannion (France), Manasquan (USA), Widemouth (UK)
CB-1	2009	1,448	Cable Company Ltd., Verizon	Bermuda, Charleston, RI (USA)
COLUMBUS III	1999 (2012)	9,833	Columbus III Consortium	Conil (Spain), Hollywood (USA), Lisbon (Portugal) Mazara (Italy), Ponta Delgada (Portugal)
GEMINI BERMUDA	2007	1,500	C&W, Verizon	Manasquan (USA), Bermuda
GLOBENET	2001 (2010)	22,960	Globenet	Bermuda, Boca Raton (USA), Fortaleza (Brazil), Maiquetia (Venezuela), Rio de Janeiro (Brazil) Tuckerton (USA)
MAC	2000 (2010/2011)	7,461	Global Crossing	Brookhaven (USA), Hollywood (USA), St Croix (US Virgin Islands)
TAT 14	2001	15,453	TAT-14 Consortium	Blaabjerg (Denmark), Katwijk (Netherlands), Manasquan (USA), Norden (Germany), Saint-Valery-en-Caux (France), Tuckerton (USA), Widemouth (UK)
TGN TRANS-ATLANTIC	2001 (2013)	12,670	Tata Communications	Highbridge (UK), Saunton Sands (UK), Wall Township (USA)

Annex 6: List of Repairs to Cable Systems in the Sargasso Sea 2008 – 2013

	Fault Type	Water Depth	Location	Cause	LAT Deg	LAT Min	N/S	LON Deg	LON Min	E/W	Notification received
Fault A	Fibre break	5400 m	Mid Atlantic	Abrasion	39	0.000	N	048	0.000	W	Jan 13
Fault B	Cable Fault	5000 m	Mid Atlantic	Maintenance	37	22	N	63	40	W	12/25/2012
Fault C	Cable Fault	5000 m	Mid Atlantic	Maintenance	37	20	N	63	46	W	2/1/2013

Annex 7:

Summary of the Interactions Between Submarine Telecommunications Cables and the Abyssal Marine Environment of the Sargasso Sea

By Lionel Carter, ICPC Marine Environmental Advisor;
Professor, Marine Geology, Antarctic Research Centre,
Victoria University of Wellington, New Zealand

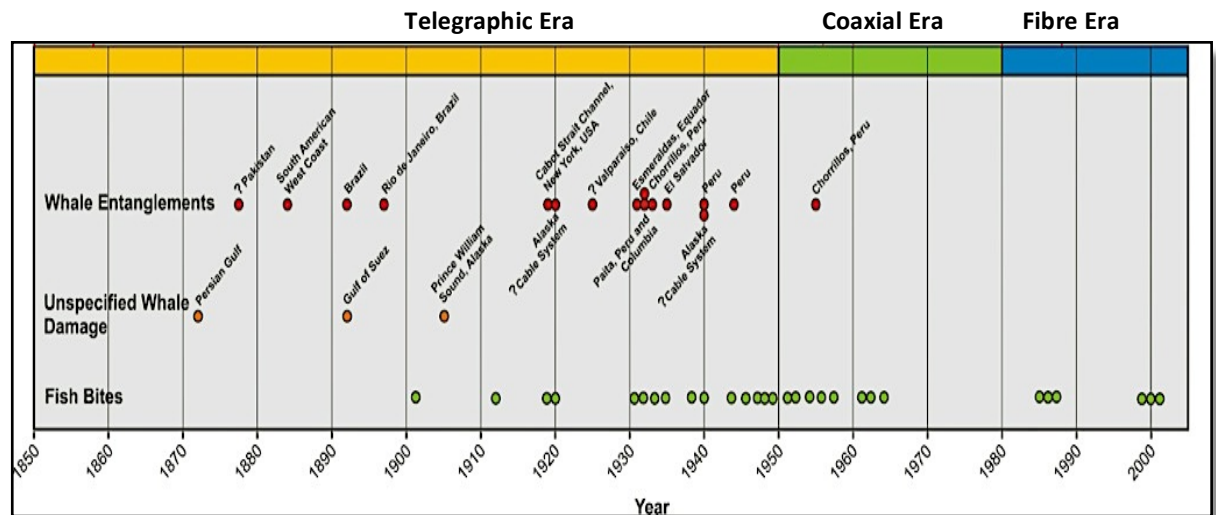
Following the initial meeting between the Sargasso Sea Commission and International Cable Protection Committee, the following summary, specific to the Sargasso Sea (SS) as defined by the Commission, may be helpful.

1. For water depths over 2000m, which occupy all of the SS, cables are laid directly on the seabed. There is no requirement for protective burial hence seabed disturbance is minimal.^{1,2} [Please note superscripts refer to appended references]
2. Laying is planned to be an one-off operation in the 20-25 year design life of a cable, but faults may occur mainly via natural and human-related hazards.^{3,4}
3. Overall, SS cable faults are few, about 1 per 2 years. Thus the seabed surface disturbance caused by recovery operations will be infrequent. When repairs are needed, grapnels used for cable recovery may disturb the seabed along metre-wide paths. The recovered cable is repaired and lowered to the seabed to minimize further disturbance.^{5,6} Again, a repair is planned to be a one-off-operation in a cables' remaining design life.
4. The size of a cable in Sargasso Sea depths is 17-21mm diameter, hence its physical footprint is small.^{7,8}



5. Cables are protected by a substantial sheath of marine grade polyethylene, which is inert in the ocean^{9,10}.
6. Research into cables and benthic organisms living on and in the seabed show there is no statistical difference in the abundance and diversity for organisms living near and away from a cable.¹¹⁻¹³

7. Whale entanglements with cables ceased with the transition from telegraph to coaxial cables in the early 1960s. This change reflected improved cable design, laying techniques and seabed mapping. It should also be noted that SS depths exceed diving limit of sperm whales (~2000m) - the species mainly involved in entanglements.⁶
8. Fish bites, including those of sharks, have affected cables, but numbers have reduced due to improved bite protection. Bite-related faults have not been reported since 2006.^{4,6,14}



9. The risk from natural hazards is low with about one cable fault per 6 years. This reflects the non-seismic nature of the region and hence the low incidence of submarine landslides and turbidity currents¹⁵. But earthquakes have caused cable breaks outside the SS, on the Grand Banks in 1929.¹⁶
10. Risks from climate change are low due to the SS abyssal depths, which dampen more obvious effects of change over the upper ocean such as increased storminess and rising sea level¹⁷. Any change in the number/strength of Gulf Stream eddies affecting the western SS boundary, are very likely to be within cable tolerances. In contrast, the Deep Western Boundary Undercurrent may decline.

Other Environmental Considerations

Since their inception, submarine cables have provided information and knowledge on the marine environment in collaboration with the science community.

1. Recovered cables yielded biological samples for museum and university collections.¹⁸
2. Cables underpin the communications and data transfer for major ocean observatories including Ocean Networks Canada and the Ocean Observatories Initiative.^{19,20}

3. Cables have acted as sentinels of the deep ocean providing information on processes that shape the ocean floor such landslides and turbidity currents.²¹
4. Discussions are underway between the industry, academia and the International Telecommunications Union regarding the feasibility of equipping cables with environmental sensors²² to monitor ocean change and hazards.
5. Cables have a low carbon footprint.²³ For a two-day teleconference between Stockholm and New York lasting 8 hours/day, 5.7kg of CO₂eq would be released compared to 1920kg emitted for the face-to-face meeting, which involved 16,000 km of air travel. This study shows the modest carbon footprint of submarine telecommunications and their contribution to reducing greenhouse gas emissions.

Conclusion

Submarine telecommunications cables have a minimal impact on the deep ocean environment²³, a conclusion is supported available scientific information^{1,2}. Our focus on peer-reviewed research reflects the long-standing and continuing association with the science community that began with deployment of the first trans-oceanic cable.



References

1. Burnett, D.R., Beckman, R .C. and Davenport, T.M. 2014. *Submarine Cables: the handbook of Law and Policy*. Martinus Nijhoff Publishers. ISBN 978-90-04-26032-0.
2. UNEP/ICPC, 2020. *Submarine Cables and the Oceans – Connecting the World*. UNEP-WCMC Biodiversity Series No 31. ICPC/UNEP/UNEP-WCMC.

3. Kordahi, M.E., Shapiro, S. & Lucas, G., 2007. Trends in submarine cable faults. Proceedings SubOptic 2007, Baltimore; paper We A1.2, 4 pp. <http://www.scig.net/>
4. Drew, S., 2010. Submarine Cables and other maritime activities in *Submarine Cables and the Oceans – Connecting the World*. UNEP-WCMC Biodiversity Series No 31. ICPC/UNEP/UNEP-WCMC, p.43-48.
5. Ford-Ramsden, K. and Burnett, D., 2014. Submarine cable repair and maintenance in Burnett, D.R., et al. *Submarine Cables: the handbook of Law and Policy*. Martinus Nijhoff Publishers. ISBN 978-90-04-26032-0, p.155-177.
6. Wood, M.P. & Carter, L., 2008. Whale entanglements with submarine telecommunication cables. IEEE Journal of Oceanic Engineering 33, 445-450
7. Hagadorn, L., 2010. Inside submarine cables in *Submarine Cables and the Oceans – Connecting the World*. UNEP-WCMC Biodiversity Series No 31. ICPC/UNEP/UNEP-WCMC, p.43-48.
8. Ford-Ramsden, K. and Davenport, T., 2014. The manufacture and laying of cables in Burnett, D.R., et al. *Submarine Cables: the handbook of Law and Policy*. Martinus Nijhoff Publishers. ISBN 978-90-04-26032-0, p.124-154.
9. Saido, K *et al*, 2009. New Contamination Derived from Marine Debris Plastics 238th ACS National Meeting, 22-26 August 2009, Washington, DC.
10. Andrady, AL , 2000. Plastics and their Impacts in the Marine Environment” Proceedings of the International Marine Debris Conference on Derelict Fishing Gear and the Ocean Environment, 6-11 August 2000, Hawaii.
11. Kogan, I. *et al*, 2006, ATOC/Pioneer Seamount Cable After 8 Years on the Seafloor: Observations, Environmental Impact” *Continental Shelf Research* 26. 771-787.
12. Andruliewicz, E. *et al*, 2003. The Environmental Effects of the Installation and Functioning of the Submarine *SwePol Link* HVDC Transmission Line: A Case Study of the Polish Marine Area of the Baltic Sea” *Journal of Sea Research* 49, 337-345.
13. Grannis, B.M., 2001. Impacts of Mobile Fishing Gear and a Buried Fiber-optic Cable on Soft-sediment Benthic Community Structure. M. Sc. Thesis, University of Maine.
14. International Cable Protection Committee, 1988. “Fish and Shark Bite Database” Report of the International Cable Protection Committee.
15. Pratson L.F. and Laine, E.P., 1989, The relative importance of gravity induced versus current-controlled sedimentation during the Quaternary along the mid-east U.S. outer continental margin revealed by 3.5 kHz echo-character: *Marine Geology*, 89, 87-126.
16. Heezen, B.C. & Ewing, M., 1952. Turbidity currents and submarine slumps, and the 1929 Grand Banks earthquake. American Journal of Science 250, 849-873.
17. NOAA, 2012. US Climate Extremes Index; NE USA. National Climate Data Center, NOAA. <http://www.ncdc.noaa.gov/extremes/cei/graph/ne/cei/01-12>
18. Ralph, P.M., and Squires D.F., 1962. The extant scleractinian corals of New Zealand. Zoology Publications, Victoria University of Wellington 29, 1-19.
19. Ocean Networks Canada, 2014. About Ocean Networks Canada, <http://www.oceannetworks.ca/about-us>

20. [Ocean Observatories Initiative, 2014.](http://oceanobservatories.org/) <http://oceanobservatories.org/>
21. Carter, L., R. Gavey, P.J. Talling, and J.T. Liu, 2014. Insights into submarine geohazards from breaks in subsea telecommunication cables. *Oceanography* 27(2):58–67, <http://dx.doi.org/10.5670/oceanog.2014.40>
22. [ITU/WMO/UNESCO/IOC, 2014.](http://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-ICT-2014-03-PDF-E.pdf) The scientific and societal case for the integration of environmental sensors into new submarine telecommunication cables http://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-ICT-2014-03-PDF-E.pdf.
23. Donovan, C., 2009, Twenty Thousand Leagues Under the Sea: A Life Cycle Assessment of Fibre Optic Submarine Cable Systems. Degree Project, SoM EX2009-40 KTH Department of Urban Planning and Environment, Stockholm
24. Department of Environment, Food and Rural Affairs, 2011. UK marine policy statement published. <http://www.defra.gov.uk/news/2011/03/18/marine-policy-statement/>

Annex 8: Relevant UNCLOS Provisions

1982 UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, 10 DECEMBER 1982, 1833 U.N.T.S. 3 (ENTERED INTO FORCE 16 NOVEMBER 1994)

ARTICLE 1: USE OF TERMS AND SCOPE

1. For the purposes of this Convention:

(4) "pollution of the marine environment" means the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities;

ARTICLE 19: MEANING OF INNOCENT PASSAGE

1. Passage is innocent so long as it is not prejudicial to the peace, good order or security of the coastal State. Such passage shall take place in conformity with this Convention and with other rules of international law.

2. Passage of a foreign ship shall be considered to be prejudicial to the peace, good order or security of the coastal State if in the territorial sea it engages in any of the following activities:

- (a) any threat or use of force against the sovereignty, territorial integrity or political independence of the coastal State, or in any other manner in violation of the principles of international law embodied in the Charter of the United Nations;
- (b) any exercise or practice with weapons of any kind;
- (c) any act aimed at collecting information to the prejudice of the defence or security of the coastal State;

(d) any act of propaganda aimed at affecting the defence or security of the coastal State;

(e) the launching, landing or taking on board of any aircraft;

(f) the launching, landing or taking on board of any military device;

(g) the loading or unloading of any commodity, currency or person contrary to the customs, fiscal, immigration or sanitary laws and regulations of the coastal State;

(h) any act of wilful and serious pollution contrary to this Convention;

(i) any fishing activities;

(j) the carrying out of research or survey activities;

(k) any act aimed at interfering with any systems of communication or any other facilities or installations of the coastal State;

(l) any other activity not having a direct bearing on passage.

ARTICLE 21: LAWS AND REGULATIONS OF THE COASTAL STATE RELATING TO INNOCENT PASSAGE

1. The coastal State may adopt laws and regulations, in conformity with the provisions of this Convention and other rules of international law, relating to innocent passage through the territorial sea, in respect of all or any of the following:

(a) the safety of navigation and the regulation of maritime traffic;

(b) the protection of navigational aids and facilities and other facilities or installations;

(c) the protection of cables and pipelines;

(d) the conservation of the living resources of the sea;

(e) the prevention of infringement of the fisheries laws and regulations of the coastal State;

(f) the preservation of the environment of the coastal State and the prevention, reduction and control of pollution thereof;

(g) marine scientific research and hydrographic surveys;

(h) the prevention of infringement of the customs, fiscal, immigration or sanitary laws and regulations of the coastal State.

2. Such laws and regulations shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards.

3. The coastal State shall give due publicity to all such laws and regulations.

4. Foreign ships exercising the right of innocent passage through the territorial sea shall comply with all such laws and regulations and all generally accepted international regulations relating to the prevention of collisions at sea.

ARTICLE 51: EXISTING AGREEMENTS, TRADITIONAL FISHING RIGHTS AND EXISTING SUBMARINE CABLES

1. Without prejudice to article 49, an archipelagic State shall respect existing agreements with other States and shall recognize traditional fishing rights and other legitimate activities of the immediately adjacent neighbouring States in certain areas falling within archipelagic waters. The terms and conditions for the exercise of such rights and activities, including the nature, the extent and the areas to which they apply, shall, at the request of any of the States concerned, be regulated by bilateral agreements between them. Such rights shall not be transferred to or shared with third States or their nationals.

2. An archipelagic State shall respect existing submarine cables laid by other States and passing through its waters without making a landfall. An archipelagic State shall permit the maintenance and

replacement of such cables upon receiving due notice of their location and the intention to repair or replace them..

ARTICLE 55: SPECIFIC LEGAL REGIME OF THE EXCLUSIVE ECONOMIC ZONE

The exclusive economic zone is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this Part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other States are governed by the relevant provisions of this Convention.

ARTICLE 56: RIGHTS, JURISDICTION AND DUTIES OF THE COASTAL STATE IN THE EXCLUSIVE ECONOMIC ZONE

1. In the exclusive economic zone, the coastal State has:

(a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds;

(b) jurisdiction as provided for in the relevant provisions of this Convention with regard to:

(i) the establishment and use of artificial islands, installations and structures;

(ii) marine scientific research;

(iii) the protection and preservation of the marine environment;

(c) other rights and duties provided for in this Convention.

2. In exercising its rights and performing its duties under this Convention in the exclusive economic zone, the coastal State shall have due regard to the rights and duties of other States and shall act in a

manner compatible with the provisions of this Convention.

3. The rights set out in this article with respect to the seabed and subsoil shall be exercised in accordance with Part VI.

ARTICLE 58: RIGHTS AND DUTIES OF OTHER STATES IN THE EXCLUSIVE ECONOMIC ZONE

1. In the exclusive economic zone, all States, whether coastal or land-locked, enjoy, subject to the relevant provisions of this Convention, the freedoms referred to in article 87 of navigation and overflight and of the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to these freedoms, such as those associated with the operation of ships, aircraft and submarine cables and pipelines, and compatible with the other provisions of this Convention.

2. Articles 88 to 115 and other pertinent rules of international law apply to the exclusive economic zone in so far as they are not incompatible with this Part.

3. In exercising their rights and performing their duties under this Convention in the exclusive economic zone, States shall have due regard to the rights and duties of the coastal State and shall comply with the laws and regulations adopted by the coastal State in accordance with the provisions of this Convention and other rules of international law in so far as they are not incompatible with this Part.

ARTICLE 77: RIGHTS OF THE COASTAL STATE OVER THE CONTINENTAL SHELF

1. The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources.

2. The rights referred to in paragraph 1 are exclusive in the sense that if the coastal State does not explore the continental shelf or exploit its natural resources, no one may undertake these activities without the express consent of the coastal State.

3. The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation.

4. The natural resources referred to in this Part consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.

ARTICLE 78: LEGAL STATUS OF THE SUPERJACENT WATERS AND AIR SPACE AND THE RIGHTS AND FREEDOMS OF OTHER STATES

1. The rights of the coastal State over the continental shelf do not affect the legal status of the superjacent waters or of the air space above those waters.

2. The exercise of the rights of the coastal State over the continental shelf must not infringe or result in any unjustifiable interference with navigation and other rights and freedoms of other States as provided for in this Convention.

ARTICLE 79: SUBMARINE CABLES AND PIPELINES ON THE CONTINENTAL SHELF

1. All States are entitled to lay submarine cables and pipelines on the continental shelf, in accordance with the provisions of this article.

2. Subject to its right to take reasonable measures for the exploration of the continental shelf, the exploitation of its natural resources and the prevention, reduction and control of pollution from pipelines, the coastal State may not impede the laying or maintenance of such cables or pipelines.

3. The delineation of the course for the laying of such pipelines on the continental shelf is subject to the consent of the coastal State.

4. Nothing in this Part affects the right of the coastal State to establish conditions for cables or pipelines entering its territory or territorial sea, or its jurisdiction over cables and pipelines constructed or used in connection with the exploration of its continental shelf or exploitation of its resources or the operations of artificial islands, installations and structures under its jurisdiction.

5. When laying submarine cables or pipelines, States shall have due regard to cables or pipelines already in position. In particular, possibilities of repairing existing cables or pipelines shall not be prejudiced.

ARTICLE 87: FREEDOM OF THE HIGH SEAS

1. The high seas are open to all States, whether coastal or land-locked. Freedom of the high seas is exercised under the conditions laid down by this Convention and by other rules of international law. It comprises, *inter alia*, both for coastal and land-locked States:

- (a) freedom of navigation;
- (b) freedom of overflight;
- (c) freedom to lay submarine cables and pipelines, subject to Part VI;
- (d) freedom to construct artificial islands and other installations permitted under international law, subject to Part VI;
- (e) freedom of fishing, subject to the conditions laid down in section 2;
- (f) freedom of scientific research, subject to Parts VI and XIII.

2. These freedoms shall be exercised by all States with due regard for the interests of other States in their exercise of the freedom of the high seas, and also with due regard for the rights under this Convention with respect to activities in the Area.

ARTICLE 112: RIGHT TO LAY SUBMARINE CABLES AND PIPELINES

1. All States are entitled to lay submarine cables and pipelines on the bed of the high seas beyond the continental shelf.
2. Article 79, paragraph 5, applies to such cables and pipelines.

ARTICLE 113: BREAKING OR INJURY OF A SUBMARINE CABLE OR PIPELINE

Every State shall adopt the laws and regulations necessary to provide that the breaking or injury by a ship flying its flag or by a person subject to its jurisdiction of a submarine cable beneath the high seas done wilfully or through culpable negligence, in such a manner as to be liable to interrupt or obstruct telegraphic or telephonic communications, and similarly the breaking or injury of a submarine pipeline or high-voltage power cable, shall be a punishable offence. This provision shall apply also to conduct calculated or likely to result in such breaking or injury. However, it shall not apply to any break or injury caused by persons who acted merely with the legitimate object of saving their lives or their ships, after having taken all necessary precautions to avoid such break or injury.

ARTICLE 114: BREAKING OR INJURY BY OWNERS OF A SUBMARINE CABLE OR PIPELINE OF ANOTHER SUBMARINE CABLE OR PIPELINE

Every State shall adopt the laws and regulations necessary to provide that, if persons subject to its jurisdiction who are the owners of a submarine cable or pipeline beneath the high seas, in laying or repairing that cable or pipeline, cause a break in or injury to another cable or pipeline, they shall bear the cost of the repairs.

ARTICLE 115: INDEMNITY FOR LOSS INCURRED IN AVOIDING

INJURY TO A SUBMARINE CABLE OR PIPELINE

Every State shall adopt the laws and regulations necessary to ensure that the owners of ships who can prove that they have sacrificed an anchor, a net or any other fishing gear, in order to avoid injuring a submarine cable or pipeline, shall be indemnified by the owner of the cable or pipeline, provided that the owner of the ship has taken all reasonable precautionary measures beforehand.

ARTICLE 194: MEASURES TO PREVENT, REDUCE AND CONTROL POLLUTION OF THE MARINE ENVIRONMENT

1. States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.

2. States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.

3. The measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment. These measures shall include, inter alia, those designed to minimize to the fullest possible extent:

(a) the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping;

(b) pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges,

and regulating the design, construction, equipment, operation and manning of vessels;

(c) pollution from installations and devices used in exploration or exploitation of the natural resources of the seabed and subsoil, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;

(d) pollution from other installations and devices operating in the marine environment, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices.

4. In taking measures to prevent, reduce or control pollution of the marine environment, States shall refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in pursuance of their duties in conformity with this Convention.

5. The measures taken in accordance with this Part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

ARTICLE 204: MONITORING OF THE RISKS OR EFFECTS OF POLLUTION

1. States shall, consistent with the rights of other States, endeavour, as far as practicable, directly or through the competent international organizations, to observe, measure, evaluate and analyse, by recognized scientific methods, the risks or effects of pollution of the marine environment.

2. In particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.

ARTICLE 205: PUBLICATION OF REPORTS

States shall publish reports of the results obtained pursuant to article 204 or provide such reports at appropriate intervals to the competent international organizations, which should make them available to all States.

ARTICLE 206: ASSESSMENT OF POTENTIAL EFFECTS OF ACTIVITIES

When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205.

ARTICLE 208: POLLUTION FROM SEABED ACTIVITIES SUBJECT TO NATIONAL JURISDICTION

1. Coastal States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with seabed activities subject to their jurisdiction and from artificial islands, installations and structures under their jurisdiction, pursuant to articles 60 and 80.

2. States shall take other measures as may be necessary to prevent, reduce and control such pollution.

3. Such laws, regulations and measures shall be no less effective than international rules, standards and recommended practices and procedures.

4. States shall endeavour to harmonize their policies in this connection at the appropriate regional level.

5. States, acting especially through competent international organizations or diplomatic conference, shall establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment referred to in paragraph 1. Such rules, standards and recommended practices and procedures shall be re-examined from time to time as necessary.