Clean Ocean
Initiative, Inc.

Rethinking. Recycling.

March 11, 2016

Antilles Regulatory Section
SAJ-2015-02635 (SP-DCM); Aguadilla #4

SAJ-2015-02638 (SP-DCM); Aguadilla #3

SAJ-2015-02639 (SP-DCM); Ponce #6

SAJ-2015-02640 (SP-DCM); Ponce #5

SAJ-2015-02641 (SP-DCM); Mayaguez #2

SAJ-2015-02643 (SP-DCM); Mayaguez #1

Mr. Sindulfo Castillo
Jacksonville District Corps of Engineers
Antilles Office
Fund. Angel Ramos, Annex Build.,Suite 202
383 Franklin Delano Roosevelt Ave.
San Juan, Puerto Rico 00918

Attention: Ms. Deborah J. Cedeno-Maldonado

Dear Mr. Sindulfo Castillo:

Enclosed herewith is the response by Clean Ocean Initiative, Inc. to the Department of the Army (DA) permit application dated January 21, 2016 for retrieval of six submarine decommissioned telecommunication cables from the navigable waters in the U.S. within the Atlantic Ocean, the Mona passage and the Caribbean Sea.

Thank you for your consideration of Clean Oceans project, and please do not hesitate to contact our offices should you have further questions or concerns.

Sincerely,

David R. Willis

David R. Willis
President

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National Marine Fisheries Service

SUBMARINE CABLE SURVEY
HABITAT and BENTHIC COMMUNITIES

Joshua Morel Matos
Marine Biologist
Clean Ocean Initiative, Inc.

1. Overview

The objective of a submarine cable survey for habitat and benthic communities is to provide an evaluation of the aquatic organisms and habitats that follow the path of the submarine cables. During this survey six submarine cables with initial installation in the coast of Puerto Rico are evaluated and analyzed along transects above the cables path. Said submarine cables are identified as SAJ-2015-02643 (SP-DCM) known as Mayagüez #1 (Mayagüez-Santo Domingo), SAJ-2015-02641 (SP-DCM) known as Mayagüez #2 (Mayagüez-Desecheo and Desecheo-Dominican Republic), SAJ-2015-02638 (SP-DCM) known as Aguadilla #3 (Ramey-Grand Turk), SAJ-2015-02635 (SP-DCM) known as Aguadilla #4 (Ramey-Antigua), SAJ-2015-02640 (SP-DCM) known as Ponce #5 (Ponce-St. Croix) and SAJ-2015-02639 (SP-DCM) known as Ponce #6 (Ponce-Jamaica). Utilizing video recording taken by our dive team we are able to analyze the ocean floor and gather marine ecological data. Even though many biogeographic settings will be included in this survey, our main goal is to provide biotic components (aquatic organisms and habitats) found along the submarine cable path.

2. Methodology

2.1 Survey & Analysis Design

This report describes the methods used for survey and analysis of the submarine cables, benthic communities and habitats found, and presents the data sets derived from them. The specific objectives of this research were but not limited to:

1. Compare accuracy of Global Marine submarine cable maps and actual location of submarine cables found by Clean Ocean Initiative technicians.
2. Obtain visual confirmation (if able) of submarine cables.
3. Collect all possible data from surrounding habitats, including ecological settings and components, on the submarine cable path from each site.

4. Count and identify to species level (where possible) all fauna and flora observed from a depth of 100’ to 250’.
5. Describe any possible areas where cable removal would cause damage to coral reefs, endangered species or any Essential Fish Habitats (EFH).

2.2 Materials

During the process of conducting the submarine cable survey for habitat and benthic communities various tools and instruments were used.

- JW Fishers Pulse 12 - boat towed pulse induction metal detector with a with topside control unit
- JW Fishers DDW-1 Deep Dive Wing - depressor wing designed to tow instruments at deeper depths
- Lowrance HDS-12 Gen3 touchscreen fishfinder / chartplotter
- Garmin GPSmap 541s
- Global Marine submarine cable nautical charts
- GoPro Hero 4 Silver with deep dive housing
- GoPro Hero 3+ Silver with deep dive housing
- Intovatec Galaxy Waterproof Video Light
- Insight Genesis Uploading tool

Fig. 1 Decommissioned Telecommunication Submarine Cables (telegraph in red and coaxial in green) off the coasts of Puerto Rico.

2.3 Methods

Using the most up-to-date submarine cable nautical charts of the surrounding waters of Puerto Rico, acquired from Global Marine, we were able to choose search points with specific depths to verify the actual location of each individual coax or telegraph cable and observe them visually if able. Global Marine also provided GIS layering through Google Earth, identifying out of service telegraph submarine cables as red and out of service coaxial submarine cables as green. Only the six submarine cables that come out from Aguadilla, Mayagüez and Ponce (two from each) will be evaluated as part of the survey.

The first two cables, SAJ-2015-02643 (SP-DCM) known as Mayagüez #1 (Mayagüez-Santo Domingo) and SAJ-2015-02641 (SP-DCM) known as Mayagüez #2 (Mayagüez-Desecheo and Desecheo-Dominican Republic), are out of service telegraph submarine cables laid in the west coast of Mayagüez, Puerto Rico. The third and fourth cables, SAJ-2015-02638 (SP-DCM) known as Aguadilla #3 (Ramey-Grand Turk) and SAJ-2015-02635 (SP-DCM) known as Aguadilla #4 (Ramey-Antigua), are out of service coaxial submarine cables laid in the northwest coast of Aguadilla, Puerto Rico. The fifth and sixth of these cables, SAJ-2015-02640 (SP-DCM) known as Ponce #5 (Ponce-St. Croix) and SAJ-2015-02639 (SP-DCM) known as Ponce #6 (Ponce-Jamaica), are out of service telegraph submarine cables laid in the south coast of Ponce, Puerto Rico.

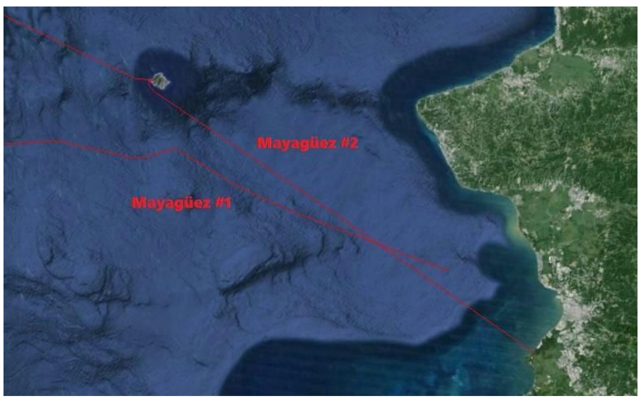


Fig.2 SAJ-2015-02643 (SP-DCM) known as Mayagüez #1 (Mayagüez-Santo Domingo) and SAJ-2015-02641 (SP- DCM) known as Mayagüez #2 (Mayagüez-Desecheo and Desecheo-Dominican Republic), are out of service telegraph submarine cables coming out from the west coast of Mayagüez, Puerto Rico.

Fig.3 SAJ-2015-02638 (SP-DCM) known as Aguadilla #3 (Ramey-Grand Turk) and SAJ-2015-02635 (SP-DCM) known as Aguadilla #4 (Ramey-Antigua), are out of service coaxial submarine cables coming out from the northwest coast of Aguadilla, Puerto Rico.

Fig.4 SAJ-2015-02640 (SP-DCM) known as Ponce #5 (Ponce-St. Croix) and SAJ-2015-02639 (SP-DCM) known as Ponce #6 (Ponce-Jamaica), are out of service telegraph submarine cables coming out from the south coast of Ponce, Puerto Rico.

Our dive and research team visited each respective area using a boat towed pulse induction metal detector with a topside control unit (JW Fishers Pulse 12) to confirm submarine cable locations and compare to the charts acquired from Global Marine. Additionally, using linear and zigzag search patterns and grids to chart findings on board the Lowrance HDS-12 Gen3 touchscreen fishfinder / chartplotter.

Once the chart was plotted, we continued using the JW Fishers DDW-1 Deep Dive Wing with custom made fittings to secure two GoPro Hero 4 Silver with deep dive housings and a waterproof video light. Along our plotted waypoints from the Lowrance, we then selected a transect starting from a 100' depth which would allow us to continue our plotted waypoints up to 250'. In this methodological approach, we are able to save the route taken from the Lowrance showing longitude, latitude and depth/contour, and follow the submarine cable's path from the surface allowing us to capture video of the habitat, benthic communities and the cable itself (if able) with the Deep Dive Wing. Each cable transect was captured by video a total of three times.

The data collected from the Deep Dive Wing was transferred to a computer for video editing and analysis. The Coastal and Marine Ecological Classification Standard (CMECS) was used for organizing information and classifying the environment into biogeographic aquatic settings. And, the reef identification booklets were used for identifying the meiofauna.

3. Results and Discussion

3.1 Ecological Structure Settings & Components

Various habitats or ecoregions are defined by climate, geology, and evolutionary history. By knowing the structure setting and components of a habitat, such as structure and characteristics of the water column or geomorphic structural character of the seafloor, one can predetermine various biotic components that may coexist in such habitats. Using the Coastal and Marine Ecological Classification Standard (CMECS) as our structure basis, we can provide a comprehensive framework for organizing information and classify the environment into biogeographic aquatic settings. The following data represents the ecological structure settings and components for each submarine cable.

3.1.1 SAJ-2015-02643 (SP-DCM) Mayagüez #1

Water Column Subcomponents:

Layer

No layers can be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 320' depth mark.

Salinity

Euhaline Water — Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water — The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform — Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site, and were not necessary for our survey.

Biochemical Feature — No biochemical features can be described in SAJ-2015-02643 (SP-DCM) because the initial salvage depth for this particular cable exceeds the 250’ depth marker, and our dive team was instructed to analyze depths from 100’ to 250’.

Geoform Subcomponents

Tectonic Setting

Neritic Mesopelagic Continental Shelf - an underwater landmass which extends from a continent, resulting in an area of relatively shallow water above the 1000m boundary, also known as a shelf sea.

Physiographic Setting

Continental/Island Shelf - that part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope 0.1°. Island shelves are analogous to the continental shelves, but surround islands.

Geoform — Geoform cannot be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 320’ depth marker. Certain aspects could be presumed but cannot be confirmed until the Research Vessel with a remote operated vehicle (ROV) investigates the submarine cable.

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Geologic Substrate cannot be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 320' depth marker.

3.1.2 SAJ-2015-02641 (SP-DCM) Mayagüez #2

3.1.2a Mayagüez - Desecheo // First Segment //

Water Column Subcomponents:

Layer

100 - 150' Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

151 - 200' Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

200 - 250' Marine Oceanic Epipelagic Lower Layer (Within the Epipelagic Layer, the region below the Epipelagic pycnocline if present (of below mid-depth [100 meters]).

Photosynthesis Can generally occur through this layer although diminishing with depth to the critical depth for phytoplankton, which represents the point where production and respiration are in balance and no net productivity occurs. The lower bound of the Epipelagic Lower Layer is the bottom of the Epipelagic Layer at 200 meters.)

Salinity

Euhaline Water Average between 35-35.5ppt (parts per thousand) taken for various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform Hydroform subcomponents were not taken during the benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

100-150’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Nepheloid Layer (Layer of water that contains a high concentration of silt and sediment—usually at the benthic-water column interface. This layer can be nearly a fluid mud. In the deep oceans, the layer can be hundreds of meters thick; in shallower waters with less fine sediments, it can be much thinner (only a few centimeters in places) or absent. Thickness is determined by substrate composition and current shear.)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and—sometimes—a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

151-200’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Nepheloid Layer (Layer of water that contains a high concentration of silt and sediment—usually at the benthic-water column interface. This layer can be nearly a fluid mud. In the deep oceans, the layer can be hundreds of meters thick; in shallower waters with less fine sediments, it can be much thinner (only a few centimeters in places) or absent. Thickness is determined by substrate composition and current shear.)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and—sometimes—a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

201-250’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and—sometimes—a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

Geoform Subcomponents

Tectonic Setting

Neritic Epipelagic Continental Shelf - an underwater landmass which extends from a continent, resulting in an area of relatively shallow water above the 200m boundary, also known as a shelf sea.

Physiographic Setting

Continental/ Island Shelf Part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope of 0.1°. Island shelves are analogous to the continental shelves, but surround islands.

Geoform

Anthropogenic Cable (Structures that serve as linear conduits for electricity or as supporting lines for other in-water or above-water infrastructure.)

Biogenic Shallow/Mesophotic Coral Reef (Composed mostly of aggregate coral reef (Continuous, high-relief coral formation that occurs in various shapes and lacks sand channels. This type includes linear coral formations that are oriented parallel to the shelf edge)

Spur and Groove Coral Reef (Habitat having alternating sand and coral formations that are oriented perpendicular to the shore or bank/shelf escarpment. The coral formations (spurs) of this feature typically have a high vertical relief (compared to pavement with sand channels), and they are separated from each other by 1 - 5 meters of sand or bare hardbottom (grooves)—although the height and width of these elements may vary considerably. This geoform type typically occurs in the forereef or bank/shelf escarpment zone))

Geologic Fluvio-Marine Deposit (Stratified materials (clay, silt, sand, or gravel) formed by both marine and fluvial processes, resulting from non-tidal sea-level fluctuations, subsidence, and/or stream migration (e.g., materials originally deposited in a nearshore environment and subsequently reworked by fluvial processes as the sea level fell))

Sand Plains – sandy flats found in shallow and deep ocean bottoms

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Medium Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.25 millimeters to < 0.5 millimeters

Coarse Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.5 millimeters to < 1 millimeter.

Silty Sand - Geologic Substrate surface layer shows no trace of Gravel and contains 50% to < 90% Sand; the remaining Silt-Clay mix is 67% or more Silt.

3.1.2b Desecheo - Dominican Republic // Second Segment //

Water Column Subcomponents:

Layer

100 - 150‘ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

151 - 200’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

200 - 250’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

Salinity

Euhaline Water Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water — The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform — Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

100-150’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

151-200’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

201-250’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Thermocline (The zone of rapid temperature change with depth in the water column, often separating two layers of different, homogeneous temperature)

Geoform Subcomponents

Tectonic Setting

Neritic Epipelagic Continental Shelf - an underwater landmass which extends from a continent, resulting in an area of relatively shallow water above the 200m boundary, also known as a shelf sea.

Physiographic Setting

Continental/Island Shelf - that part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope of 0.1°. Island shelves are analogous to the continental shelves, but surround islands.

Geoform

Anthropogenic Cable (Structures that serve as linear conduits for electricity or as supporting lines for other in-water or above-water infrastructure.)

Biogenic Shallow/Mesophotic Coral Reef (Composed mostly of aggregate coral reef (Continuous, high-relief coral formation that occurs in various shapes and lacks sand channels. This type includes linear coral formations that are oriented parallel to the shelf edge)

Spur and Groove Coral Reef (Habitat having alternating sand and coral formations that are oriented perpendicular to the shore or bank/shelf escarpment. The coral formations (spurs) of this feature typically have a high vertical relief (compared to pavement with sand channels), and they are separated from each other by 1 - 5 meters of sand or bare hardbottom (grooves)—although the height and width of these elements may vary considerably. This geoform type typically occurs in the forereef or bank/shelf escarpment zone))

Geologic Sand Plains – sandy flats found in shallow and deep ocean bottoms

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Fine Sand - Geologic Substrate surface layer contains no trace of Gravel and composed of > 90% Sand with a median grain size of 0.125 millimeters to < 0.25 millimeters.

Medium Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.25 millimeters to < 0.5 millimeters

Coarse Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.5 millimeters to < 1 millimeter.

Coral Reef Substrate - Substrate that is dominated by living or nonliving coral reefs with a median particle size of 4,096 millimeters or greater in any dimension.

3.1.3 SAJ-2015-02638 (SP-DCM) Aguadilla #3

Water Column Subcomponents:

Layer

100 - 150’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

151 - 200’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

200 - 250’ Marine Oceanic Epipelagic Lower Layer (Within the Epipelagic Layer, the region below the Epipelagic pycnocline if present (or below mid-depth [100 meters]). Photosynthesis can generally occur through this layer although diminishing with depth to the critical depth for phytoplankton, which represents the point where production and respiration are in balance and no net productivity occurs. The lower bound of the Epipelagic Lower Layer is the bottom of the Epipelagic Layer at 200 meters, which represents the point where production and respiration are in balance and no net productivity occurs.

Salinity

Euhaline Water Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

100 - 150’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

151 - 200’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

201 - 250’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and sometimes a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column.)

Geoform Subcomponents

Tectonic Setting

Neritic Epipelagic Continental Shelf - an underwater landmass which extends from a continent, resulting in an area of relatively shallow water above the 200m boundary, also known as a shelf sea.

Physiographic Setting

Continental/Island Shelf - that part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope of 0.1°. Island shelves are analogous to the continental shelves, but surround islands.

Geoform

AnthropogenicCable (Structures that serve as linear conduits for electricity or as supporting lines for other in-water or above-water infrastructure.)

Biogenic Shallow/Mesophotic Coral Reef (Composed mostly of aggregate coral reef (Continuous, high-relief coral formation that occurs in various shapes and lacks sand channels. This type includes linear coral formations that are oriented parallel to the shelf edge))

Spur and Groove Coral Reef (Habitat having alternating sand and coral formations that are oriented perpendicular to the shore or bank/shelf escarpment. The coral formations (spurs) of this feature typically have a high vertical relief (compared to pavement with sand channels), and they are separated from each other by 1 - 5 meters of sand or bare hardbottom (grooves)—although the height and width of these elements may vary considerably. This geoform type typically occurs in the fore reef or bank/shelf escarpment zone))

Geologic Sand Plains – sandy flats found in shallow and deep ocean bottoms

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Coarse Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.5 millimeters to < 1 millimeter.

Coral Reef Substrate - Substrate that is dominated by living or nonliving coral reefs with a median particle size of 4,096 millimeters or greater in any dimension.

3.1.4 SAJ-2015-02635 (SP-DCM) Aguadilla #4

Water Column Subcomponents:

Layer

100 - 150’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

151 - 200’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

200 - 250’ Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)

Salinity

Euhaline Water Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

100 - 150’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

151 - 200’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

201 - 250’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and sometimes a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

Geoform Subcomponents

Tectonic Setting

Neritic Epipelagic Continental Shelf

An underwater landmass which extends from a continent, resulting in an area of relatively shallow water above the 200m boundary, also known as a shelf sea

Physiographic Setting

Continental/Island Shelf

that part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope of 0.1°. Island shelves are analogous to the continental shelves, but surround islands.

Geoform

Anthropogenic Cable

(Structures that serve as linear conduits for electricity or as supporting lines for other in-water or above-water infrastructure.)

Biogenic Shallow/Mesophotic Coral Reef

(Composed mostly of aggregate coral reef (Continuous, high-relief coral formation that occurs in various shapes and lacks sand channels. This type includes linear coral formations that are oriented parallel to the shelf edge)

Spur and Groove Coral Reef

(Habitat having alternating sand and coral formations that are oriented perpendicular to the shore or bank/shelf escarpment. The coral formations (spurs) of this feature typically have a high vertical relief (compared to pavement with sand channels), and they are separated from each other by 1 - 5 meters of sand or bare hardbottom (grooves)—although the height and width of these elements may vary considerably. This geoform type typically occurs in the forereef or bank/shelf escarpment zone))

Geologic Sand Plains - Sandy flats found in shallow and deep ocean bottoms

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Medium Sand - Geologic Substrate surface layer contains no trace Gravel and is composed of > 90% Sand, with a median grain size of 0.25 millimeters to < 0.5 millimeters

Coarse Sand - Geologic Substrate surface layer contains no trace of Gravel and is composed of > 90% Sand, with a median grain size of 0.5 millimeters to < 1 millimeter.

Coral Reef Substrate - Substrate that is dominated by living or nonliving coral reefs with a median particle size of 4,096 millimeters or greater in any dimension.

3.1.5 SAJ-2015-02640 (SP-DCM) Ponce #5

Water Column Subcomponents:

Layer

No layers can be described in SAJ-2015-02640 because the initial salvage depth for this particular cable begins at the 606' depth marker.

Salinity

Euhaline Water Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

No biochemical features can be described in SAJ-2015-02643 because the initial salvage depth for this particular begins at the 606' depth marker.

Geoform Subcomponents

Tectonic Setting

Transform Continental Margin **-** A feature defined by the transform fault that develops during continental rifting. These margins differ from rifted or passive margins in two key ways; they have a narrow continental shelf (less than 30 kilometers) and a steep ocean-continent transition zone.

Physiographic Setting

Shelf Break - The slope discontinuity (rapid change in gradient) of 3° or greater that occurs at the outer edge of the continental shelf. This boundary generally occurs at a depth between 100-200 meters and forms the boundary between the Marine Offshore and Oceanic Subsystems.

Geoform — Geoform cannot be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 606' depth marker. Certain aspects could be presumed but cannot be confirmed until our Research Vessel with a remote operated vehicle (ROV) investigates the submarine cable.

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Geologic Substrate cannot be described in SAJ-2015-02643 because the initial salvage depth for this particular cable exceeds the 250' depth marker.

3.1.6 SAJ-2015-02639 (SP-DCM) Ponce #6

Water Column Subcomponents:

Layer

100 - 150'	Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)
151 - 200'	Marine Offshore Lower Water Column (Marine waters below the pycnocline (or mid-depth), between the 30 meter depth contour and the shelf break.)
200 - 250'	Marine Oceanic Epipelagic Lower Layer (Within the Epipelagic Layer, the region below the Epipelagic pycnocline if present (or below mid-depth [100 meters]). Photosynthesis can generally occur through this layer although diminishing with depth to the critical depth for phytoplankton, which represents the point where

production and respiration are in balance and no net productivity occurs. The lower bound of the Epipelagic Lower Layer is the bottom of the Epipelagic Layer at 200 meters.

Salinity

Euhaline Water — Average between 35-35.5ppt (parts per thousand) taken from various months (Nov, Dec, Jan) from the Caribbean Coastal Ocean Observing System (CariCOOS) webpage (www.caricoos.org) which provides animations of AMSEAS model outputs that are specifically tailored for our regional surface waters and updated on a daily basis.

Temperature

Very Warm Water — The water temperature ranges between 25°C (77°F) to 30°C (84°F) depending on the month of the year and various weather events.

Hydroform — Hydroform subcomponents were not taken during our benthic survey because we lacked the equipment to measure currents (boundary current, buoyancy flow, deep circulation, mean surface current, etc.), coastal upwelling front, water mass and waves on site and were not necessary for our survey.

Biochemical Feature

100 - 150’ — Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Nepheloid Layer (Layer of water that contains a high concentration of silt sediment—usually at the benthic-water column interface. This layer can be nearly a fluid mud. In the deep oceans, the layer can be hundreds of meters thick; in shallower waters with less fine sediments, it can be much thinner (only a few centimeters in places) or absent. Thickness is determined by substrate composition and current shear.)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and sometimes a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

151 - 200’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Nepheloid Layer (Layer of water that contains a high concentration of silt and sediment usually at the benthic-water column interface. This layer can be nearly a fluid mud. In the deep oceans, the layer can be hundreds of meters thick; in shallower waters with less fine sediments, it can be much thinner (only a few centimeters in places) or absent. Thickness is determined by substrate composition and current shear.)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and sometimes a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

201 - 250’ Euphotic Zone (The zone of the water column that is sufficiently illuminated for photosynthesis to occur)

Nepheloid Layer (Layer of water that contains a high concentration of silt and sediment usually at the benthic-water column interface. This layer can be nearly a fluid mud. In the deep oceans, the layer can be hundreds of meters thick; in shallower waters with less fine sediments, it can be much thinner (only a few centimeters in places) or absent. Thickness is determined by substrate composition and current shear.)

Marine Snow Aggregation (A concentration of organic material in the ocean water column. Composed of a mix of mineral, dead organic materials, and sometimes a rich microbial community. In this feature small particles aggregate through attractive ionic forces and then begin to fall through the water column)

Geoform Subcomponents

Tectonic Setting

Transform Continental Margin **-** A feature defined by the transform fault that develops during continental rifting. These margins differ from rifted or passive margins in two key ways; they have a narrow continental shelf (less than 30 kilometers) and a steep ocean-continent transition zone.

Physiographic Setting

Shelf Break - The slope discontinuity (rapid change in gradient) of 3° or greater that occurs at the outer edge of the continental shelf. The boundary generally occurs at a depth between 100-200 meters and forms the boundary between the Marine Offshore and Oceanic Subsystems.

Geoform

Anthropogenic Cable - Structures that serve as linear conduits for electricity or as supporting lines for other in-water or above-water infrastructure.

Dredge Deposit - A subaqueous area that is substantially shallower than the surrounding area, which resulted from the deposition of materials from dredging and dumping.

Biogenic Shallow/Mesophotic Coral Reef - (Composed mostly of aggregate coral reef (Continuous, high-relief coral formation that occurs in various shapes and lacks sand channels. This type includes linear coral formations that are oriented parallel to the shelf edge)

Spur and Groove Coral Reef - (Habitat having alternating sand and coral formations that are oriented perpendicular to the shore or bank/shelf escarpment. The coral formations (spurs) of this feature typically have a high vertical relief (compared to pavement with sand channels), and they are separated from each other by 1 - 5 meters of sand or bare hard bottom (grooves)—although the height and width of these elements may vary considerably. This geoform type typically occurs in the fore reef or bank/shelf escarpment zone))

Geologic Fluvio-Marine Deposits - (Stratified materials (clay, silt, sand, or gravel) formed by both marine and fluvial processes, resulting from non-tidal sea-level fluctuations, subsidence, and/or stream migration (e.g., materials originally deposited in a nearshore environment and subsequently reworked by fluvial processes as the sea level fell)).

Shelf Break - The slope discontinuity (rapid change in gradient) of 3° or greater that occurs at the outer edge of the continental shelf. This boundary generally occurs at a depth between 100-200 meters and forms the boundary between the Marine Offshore and Oceanic Subsystems.

Substrate Subcomponents:

Geologic Fine Unconsolidated Mineral Substrate

Silty Sand - Geologic Substrate surface layer shows no trace of Gravel and contains 50% to < 90% Sand; the remaining Silt-Clay mid 67% or more Silt.

3.2 Benthic Biota

All observed biotic components, with the exception of planktonic biota, were counted and identified to species level (if possible). Through this identification method it is easy to better understand the habitat and if any area could potentially be an Essential Fish Habitat (EFH). In the occurrence where there are vast quantities of the same species the acronym TMTC will be applied meaning Too Many To Count.

3.2.1 SAJ-2015-02643 (SP-DCM) Mayagüez #1

The benthic biota could not be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 320' depth marker. Certain biological aspects could be presumed but cannot be confirmed until our Research Vessel with a remote operated vehicle (ROV) investigates the submarine cable in this particular area.

3.2.2 SAJ-2015-02641 (SP-DCM) Mayagüez #2

Because of the distance between Mayagüez and Desecheo Island, and the fact that the submarine cable path continues with an entirely new segment at Desecheo waters, with regards to the benthic survey each submarine cable is described in segments.

3.2.2a Mayagüez - Desecheo // First Segment //

Phylum Annelida

Thousands of volcanic cone-shaped mound were seen which belong to a type of segmented worm better known as lugworms, that burrow beneath the sand to digest organic debris and blow excreted sand from burrows by water pressure, forming the conical mounds. Every sand plain found in the Mayagüez area contained thousands of these mounds.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Lugworm	*Arenicola sp.*	TMTC	TMTC	TMTC	TMTC

Phylum Chlorophyta

Very little aquatic plants and algae could be observed after 100' depth, but some green algae were seen below this depth.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Mermaid's Fan	*Udotea sp.*	10	0	0	10

Phylum Mollusca

Some species of Gastropods were easily observed on the ocean floor from their clearly seen large shells and various track over the sandy and silty bottoms.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Queen Conch	*Strombus gigas*	5	0	1	6
Roostertail Conch	*Strombus gallus*	0	0	2	2

Phylum Cnidaria

From the phylum Cnidaria we were able to identify two classes: Hydrozoa (Hydroids) and Anthozoa (Gorgonians and Sea Pens). Hydroids found were counted as clusters instead of individuals.

Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found
Branching Hydroid	*Sertularella speciosa*	6	11	28	45
Unbranched Hydroid	*Cnidoscyphus marginatus*	0	0	4	4
Feather Sea Pen	Unidentified species	0	1	2	3
Devil's Sea Whip	*Ellisella barbadensis*	8	14	0	22
Bipinnate Sea Plume	*Pseudopterogorgia bipinnata*	0	1	4	5
Slit-pore Sea Rod	*Plexaurella sp.*	0	4	3	7
Sea Fan	*Leptogorgia sp.*	0	0	11	11
Rough Sea Plume	*Muriceopsis flavida*	0	0	1	1

Phylum Porifera

Sponges dominated the submarine cable path in Mayagüez area. What is believed to be encrusting sponges were also observed, but the information was not added to the survey because the distance and picture quality of the video did not permit identification and they can easily be confused with bryozoans, tunicates or other small hard corals.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Row Pore Rope Sponge	*Aplysina cauliformis*	27	9	6	42
Netted Barrel Sponge	*Verongula gigantea*	4	2	0	6
Giant Barrel Sponge	*Xestospongia muta*	3	2	17	22
Brown Tube Sponge	*Ageles conifera*	13	8	23	44
Brown Encrusting Octopus Sponge	*Ectyoplasia ferox*	0	1	0	1
Brown Variable Sponge	*Cliona Varians*	0	2	0	2
Scattered Pore Rope Sponge	*Aplysina fulva*	0	6	14	20
Convoluted Barrel Sponge	*Aplysina lacunosa*	0	0	2	2
Yellow Tube Sponge	*Aplysina fistularis*	0	0	9	9
Black Ball Sponge	*Ircinia strobilina*	0	0	1	1

Phylum Chordata - Urochordata

Because most tunicates tend to be small in size, not that many were observed during the survey. Some overgrowing tunicates can easily be confused from a distance as encrusting sponges, bryozoans or small hard corals. No overgrowing tunicates were counted because of these similarities.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Reef Tunicate	*Rhopalaea abdominalis*	0	0	1	1

Phylum Chordata - Osteichthyes

Many fish species were observed but could not be identified because of the distance and size of the fish. Those that could be identified are listed in the following table. All fish spotted in our videos had debris presence in its surroundings.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
French Angelfish	*Pomacanthus paru*	2	0	0	2
Snapper	*Lutjanus sp.*	0	1	0	1
Coney	*Cephalopholis fulvus*	0	3	7	10
Blue Runner	*Caranx crysos*	0	0	4	4
Jackknife Fish	*Equetus lanceolatus*	0	0	1	1
Grunt	*Haemulon sp.*	0	0	24	24
Almaco Jack	*Seriola rivoliana*	0	0	1	1

3.2.2b Desecheo - Dominican Republic // Second Segment //

Phylum Chlorophyta

With Desecheo's extremely clear waters we were able to observe a high amount of marine plants growing between 100' and 150'. It consisted entirely on green algae that spread across the sand plains until it reached the reef substrate.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Stalked Lettuce Leaf Alga	*Halimeda tuna*	22	15	0	37
Mermaid's Fans	*Udotea sp.*	TMTC	TMTC	0	TMTC
Oval-blade Alga	*Caulerpa prolifera*	9	TMTC	0	TMTC

Phylum Cnidaria

It was strange that even with a high visibility margin in the 250' depth practically no octocorals, hydrocorals or stony corals were observed in our videos. Closer and higher definition video might help identify small cnidarians in the reef substrate but only one could be observed in our data.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Devil's Sea Whip	*Ellisella barbadensis*	0	0	2	2

Phylum Porifera

Sponges dominated the submarine cable path in the Desecheo Island area when the reef substrate commenced. What is believed to be encrusting sponges were also observed in high numbers, but the information was not added to the survey because the distance and picture quality of the video did not permit identification and they can easily be confused with bryozoans, tunicates or other small hard corals.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Giant Barrel Sponge	*Xestospongia muta*	1	47	38	86
Netted Barrel Sponge	*Verongula gigantea*	0	2	3	5
Leathery Barrel Sponge	*Geodia neptuni*	0	5	4	9
Brown Encrusting Octopus Sponge	*Ectyoplasia ferox*	0	22	14	36
Scattered Pore Rope Sponge	*Aplysina fulva*	0	11	4	15
Azure Vase Sponge	*Callyspongia plicifera*	0	5	2	7
Brown Tube Sponge	*Ageles conifera*	0	21	19	40
Convoluted Barrel Sponge	*Aplysina lacunosa*	0	3	1	4
Branching Tube Sponge	*Pseudoceratina crassa*	0	12	4	16
Yellow Tube Sponge	*Aplysina fistularis*	0	2	8	10
Branching Vase Sponge	*Callyspongia vaginalis*	0	2	1	3

Phylum Chordata - Osteichthyes

Many fish species were observed but could not be identified because of the distance and size of the fish. Those that could be identified are listed in the following table. Most fish were observed swimming 10' or higher from the ocean floor.

Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found
Flying Gurnard	*Dactylopterus volitans*	1	0	0	1
Sand Tilefish	*Malacanthus plumieri*	5	0	0	5
Trunkfish	*Lactophrys sp.*	1	0	0	1
Blue Runner	*Caranx crysos*	1	0	0	1
Rainbow Runner	*Elegantis bipinnulata*	1	0	0	1
Bar Jack	*Caranx ruber*	1	4	0	5
Ocean Triggerfish	*Canthidermis sufflamen*	7	8	0	15
Ocean Surgeonfish	*Acanthurus bahianus*	0	2	0	2
Whitespotted Filefish	*Cantherhines macrocerus*	0	1	0	1
Great Barracuda	*Sphyraena barracuda*	0	3	0	3
Cobia	*Rachycentron canadum*	0	2	0	2

3.2.3 SAJ-2015-02638 (SP-DCM) Aguadilla #3

Phylum Annelida

From the depth of 170’ you can observe on the videos various cone-shaped mounds with small orifices close to them. These are clear signs of segmented worms burrowing in the sand plains.

Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found

Lugworm	*Arenicola sp.*	0	TMTC	TMTC	TMTC

Phylum Cnidaria

A small presence of octocorals and stony corals was observed after the 100' depth mark

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Corky Sea Finger	*Briareum asbestinum*	2	0	0	2
Porous Sea Rod	*Pseudoplexaura sp.*	0	1	0	1
Knobby Brain Coral	*Diploria clivosa*	1	0	0	1

Phylum Porifera

Same as Mayagüez and Desecheo, a higher number of sponges were observed compared to any other species of fauna found in the area. What is believed to be encrusting sponges were also observed in high numbers, but the information was not added to the survey because the distance and picture quality of the video did not permit identification and they can easily be confused with bryozoans, tunicates or other small hard corals.

Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found
Giant Barrel Sponge	*Xestospongia muta*	33	6	0	39
Convoluted Barrel Sponge	*Aplysina lacunosa*	3	1	0	4
Nettled Barrel Sponge	*Verongula gigantea*	2	2	0	4
Azure Vase Sponge	*Callyspongia plicifera*	3	0	0	3
Variable Boring Sponge	*Aka coralliphaga*	1	0	0	1
Scattered Pore Rope Sponge	*Aplysina fulva*	3	2	0	5
Row Pore Rope Sponge	*Aplysina cauliformis*	8	3	0	11
Erect Rope Sponge	*Amphimedon compressa*	1	3	0	4
Branching Tube Sponge	*Pseudoceratina crassa*	0	1	0	1
Stove-pipe Sponge	*Aplysina archeri*	0	1	0	1
Loggerhead Sponge	*Spheciospongia vesparium*	0	1	0	1

Phylum Chordata - Osteichthyes

The fish seen at Aguadilla #3 are common throughout the coasts of Puerto Rico and can be observed in shallow reefs or around coral substrate.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Banded Butterflyfish	*Chaetodon striatus*	2	0	0	2
Squirrelfish	*Holocentrus adscensionis*	1	1	0	2
Bicolor Damselfish	*Stegastes partitus*	4	0	0	4
Coney	*Cephalopholis fulvus*	2	1	0	3
Snapper	*Lutjanus sp.*	0	2	0	2
Gray Angelfish	*Pomacanthus arcuatus*	0	2	0	2
Lionfish	*Pterois volitans*	0	2	0	2
Atlantic Spadefish	*Chaetodipterus faber*	0	0	2	2
Blue Tang	*Acanthurus coeruleus*	1	0	0	1
French Angelfish	*Pomacanthus paru*	0	2	0	2

3.2.4 SAJ-2015-02635 (SP-DCM) Aguadilla #4

Aguadilla #4 shares most of its biotic and ecological characteristics with Aguadilla #3 because of its close proximity to each other. The biggest difference is its great sand plain through the cables path, extending over 3 miles always between a depth of 110'-140'.

Phylum Annelida

Numbers too many to count in its sand plains.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found

Lugworm	*Arenicola sp.*	TMTC	TMTC	TMTC	TMTC

Phylum Chlorophyta

In the north coast of Aguadilla the water are clear and the rays of the sun easily reach the ocean floor. Thanks to this clarity many patches of algae could be observed during the sand plains.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Oval-blade Alga	*Caulerpa prolifera*	TMTC	0	0	TMTC

Phylum Cnidaria

A small presence of octocorals and stony corals was observed after the 100' depth mark.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Sea Rods	*Plexauridae*	6	0	0	6

Phylum Porifera

Any area where reef substrate was present, the presence of sponges could be found.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Giant Barrel Sponge	*Xestospongia muta*	31	3	0	34
Netted Barrel Sponge	*Verongula gigantea*	8	0	0	8
Convoluted Barrel Sponge	*Aplysina lacunosa*	4	0	0	4
Yellow Tube Sponge	*Aplysina fistularis*	15	0	0	15
Row Pore Rope Sponge	*Aplysina cauliformis*	16	2	0	18
Scattered Pore Rope Sponge	*Aplysina fulva*	6	1	0	7
Erect Rope Sponge	*Amphimedon compressa*	2	0	0	2

Phylum Chordata - Osteichthyes

Most fish species were observed in areas where reef substrate was present. During the various miles of sand plains almost no fish were observed.

Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found
Squirrelfish	*Holocentrus adscensionis*	5	0	0	5
Yellowtail Snapper	*Ocyurus chrysurus*	0	1	0	1
Coney	*Cephalopholis fulvus*	3	2	0	5
Red Hind	*Epinephelus guttatus*	4	0	0	4
Queen Triggerfish	*Balistes vetula*	1	0	0	1
Black Durgon	*Melichthys niger*	3	0	0	3
Sand Tilefish	*Malacanthus plumieri*	4	0	0	4
Snapper	*Lutjanus sp.*	0	1	0	1
French Angelfish	*Pomacanthus paru*	2	0	0	2
Lionfish	*Pterois volitans*	1	0	0	1

3.2.5 SAJ-2015-02640 (SP-DCM) Ponce #5

The benthic biota could not be described in SAJ-2015-02643 because the initial salvage depth for this particular cable begins at the 606’ depth marker. Certain biological aspects could be presumed but cannot be confirmed until our Research Vessel with a remotely operated vehicle (ROV) investigates the submarine cable area.

3.2.6 SAJ-2015-02639 (SP-DCM) Ponce #6

Constant winds, strong currents, and high concentrations of marine snow (detritus) made it nearly impossible to observe the benthic biota in Ponce #6. Only species that are greater than 8 inches could be taken into account between the depths of 100’-185’. All data obtained after 185’ could not be used because the high concentrations of marine snow limited the visibility to less than one foot.

Phylum Cnidaria

A small presence of octocorals and a small colony of black corals were observed after the 100' depth mark near the shelf break. Please note that Clean Ocean's operation will avoid the small colony of black coral. Please refer to study analysis section 3.3 Ponce #6.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Sea Rods	*Plexauridae*	3	0	0	3
Wire Coral	*Cirrhipathes leutkeni*	17	0	0	17

Phylum Porifera

With layers of accumulation of detritus and particulates within the lower water column it was rare to observe any sponges within a very small area.

Common Name	Scientific Name	Found at 100'-150'	Found at 151'-200'	Found at 201'-250'	Total Found
Giant Barrel Sponge	*Xestospongia muta*	8	2	0	10
Scattered Pore Rope Sponge	*Aplysina fulva*	2	0	0	2
Netted Barrel Sponge	*Verongula gigantea*	1	0	0	1
Yellow Tube Sponge	*Aplysina fistularis*	5	0	0	5

Phylum Chordata - Osteichthyes

Low visibility within the lower water column did not permit the identification of many fish species.

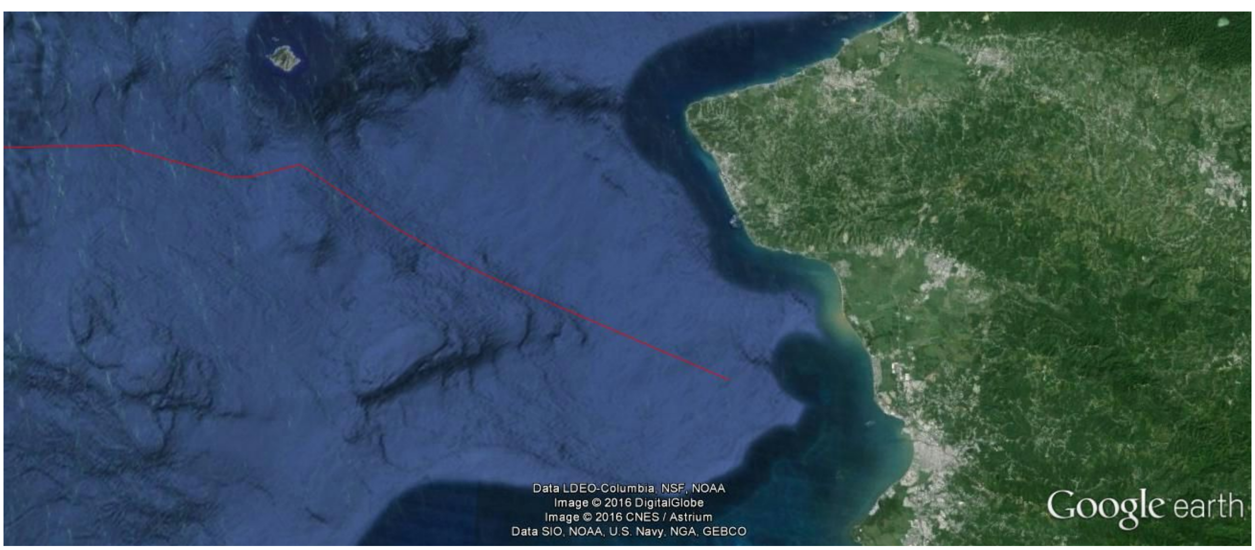
Common Name	Scientific Name	Found at 100’-150’	Found at 151’-200’	Found at 201’-250’	Total Found
Coney	*Cephalopholis fulvus*	2	0	0	2
Yellowtail Snapper	*Ocyurus chrysurus*	1	0	0	1
Grunt	*Haemulon sp.*	5	4	0	9

3.3 Discussion

The abundance and distribution of species in the Caribbean varies with depth, marine habitat, and other limiting factors. These marine habitats may contain many endangered species and Essential Fish Habitats (EFH), which are important areas to conserve and protect. While conducting the survey we encountered four different marine habitats throughout the paths of the submarine cables, which include seagrass beds, sand plains, coral reefs and continental shelf break.

The submarine cable involving SAJ-2015-02643 (SP-DCM) Mayagüez #1 (Mayagüez-Santo Domingo) could not be surveyed or analyzed due to the initial salvage depth exceeding the 250’ depth marker. The submarine cable commences at 893’ depth according to Google Earth and corroborated using Global Marine maps.

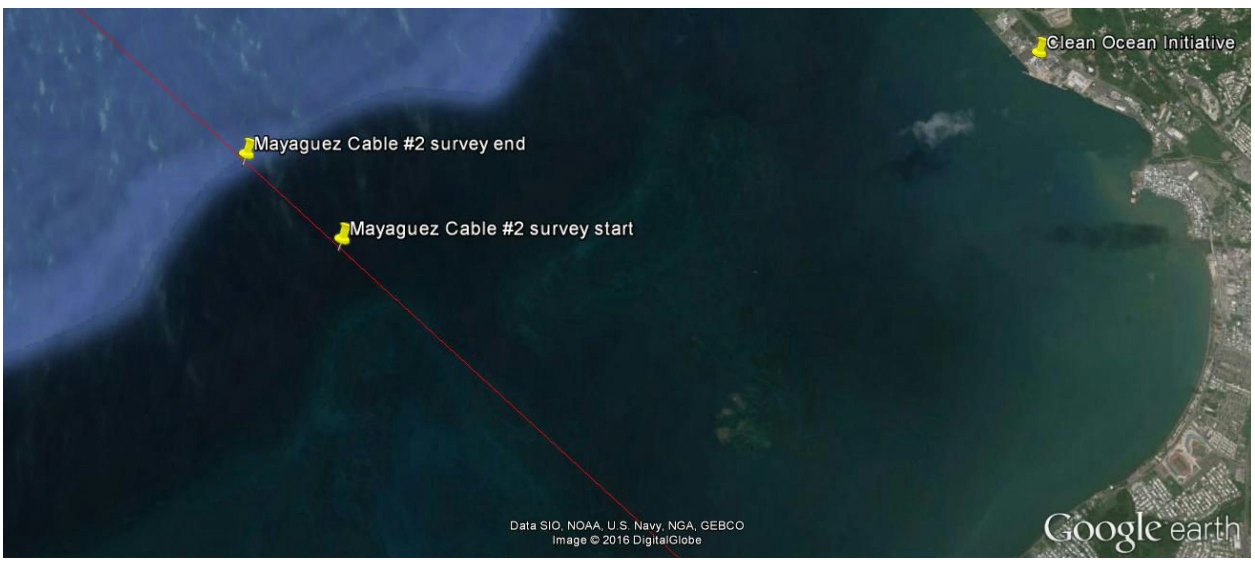
Fig.5 Google Earth layer showing the location of SAJ-2015-02643 (SP-DCM) Mayagüez #1 submarine cable off the west coast of Añasco, Puerto Rico.



The second submarine cable, SAJ-2015-02641 (SP-DCM) known as Mayagüez #2 (Mayagüez-Desecheo and Desecheo-Dominican Republic), was divided into two segments. The first segment laid begins in the west coast in Mayaguez with an end point in Desecheo Island.

The second segment laid [and separate from first segment] begins in Desecheo Island with an end point in the Dominican Republic. The Mayagüez-Desecheo survey from 100' - 250' showed two marine habitats: sand plains and a small adjacent coral reef. Most of the transect consisted of silty sand plains believed to be the consequence from three rivers (Guanajibo, Yagüez, Añasco) depositing sediment into Mayagüez Bay. Many signs of segmented worms and mollusks covered the benthic surface or the silty sand, which also contained woody debris with various inhabitants including sponges, hydroids and some fish species. The small reef was observed after the 150' mark in our sonar. High amount of sediment and marine snow in the water column limited the amount of sunlight needed for many hermatypic species usually found at these depths. These factors did not completely limit the capabilities of some soft corals (octocorals) growing in this reef, but made it possible for sponges to be the dominant species growing in the small reef. No endangered species or EFH were encountered during the survey of this submarine cable and its surrounding habitats. The submarine cable was not located with video during the survey. Little to no impact would occur if the submarine cable's salvage point commences at the 320' mark. Mayagüez's end salvage at Desecheo Island would occur around the 320' mark to minimize any disturbance or impact to the inshore coral reefs.

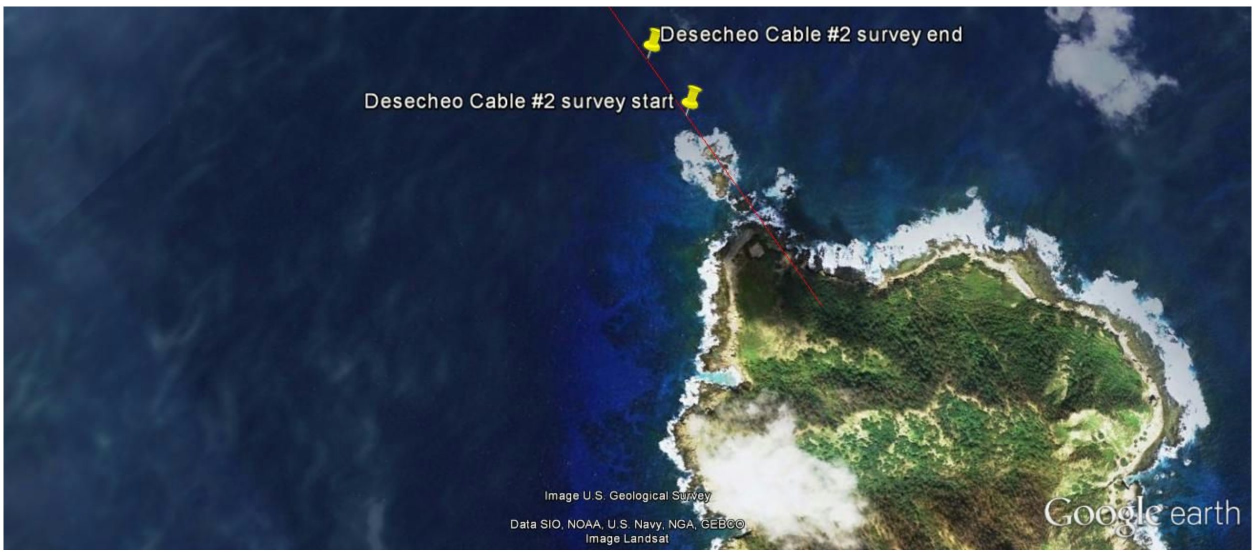
Fig.6 Google Earth layer showing the location of the first segment of SAJ-2015-02641 (SP-DCM) Mayagüez #2 submarine cable and our survey area off the west coast of Mayagüez, Puerto Rico.



The Desecheo - Dominican Republic survey from 100' – 250' showed three marine habitats: sandy plains, seagrass beds and coral reef. The first 40' of the survey consisted of a sand plain with the occasional fish or algae. The plain was followed by a big seagrass bed of Oval-blade alga until a coral reef was found lasting until the end of the survey. No marine snow presence was seen and sunlight illuminated the ocean floor, with visibility exceeding 100' from the ocean surface. Closer and higher definition video might have helped identify small cnidarians in the reef substrate that included octocorals, hydrocorals and stony corals. Hundreds of sponges could be seen at the coral reef, dominating the macrofauna. No endangered species or EFH were encountered during the survey of this submarine cable and its surrounding habitats. The submarine cable was not located with video during the survey, but was located by divers until the

80’ depth mark (seen in videos) where it goes below the sand. Some impact would occur if the submarine cable’s salvage point commences at the 100’ mark, but more damage could be presented if the initial salvage point is below 200’. Divers can easily reach the cables at 100’ to 120’ depths for cutting and prepping for the attachment of the cables to the S-Lay barge but would still create some impact to surrounding corals and habitats. Should we grab the cables at 320’ depths the method would be using the work class ROV system that would use water jets to expose the cable and in turn would grapple via the Barge Crane and pull the cable straight up resulting in some disturbance in both directions but only reaching up to 250’ depths were little or no corals grow.

Fig.7 Google Earth layer showing location of the second segment of SAJ-2015-02641 (SP-DCM) Mayagüez #2 submarine cable and our survey area off Desecheo Island, Puerto Rico.



The third submarine cable, SAJ-2015-02638 (SP-DCM) known as Aguadilla #3 (Ramey-Grand Turk), revealed two different marine habitats: coral reef and sand plains. Commencing the survey we came upon a coral reef from the depths of approximately 100’ to 150’. Most of the benthic biota was observed during the 100 – 150’ transect consisting mainly of sponges. Other octocorals, small stony corals, and various fish species were also observed. The habitat quickly converts to a sand plain that seems to continue beyond the 250’ depth mark. No endangered species were encountered during the survey of this submarine cable and its surrounding habitats. The submarine cable was located with video during the survey at approximately 130’ but could not be found with video afterwards. Initial salvage depth was proposed for 134’ creating minimal impact to the surrounding areas, and also coinciding with the found submarine cable segment. Minimization and conservation plans are being developed to minimize any impact and replant any sponge or coral detached

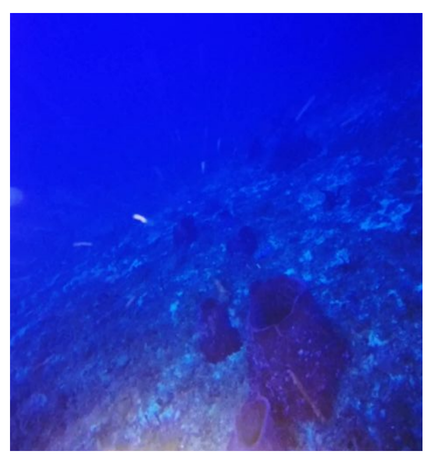


Fig.8 Above: Aguadilla #3 contour dominated by sponges.

from the cable or surrounding areas while the submarine cable is being removed.

Fig.9 Below: Google Earth layer showing the location of SAJ-2015-02638 (SP-DCM) Aguadilla #3 *submarine cable and our survey area off the northwest coast of Aguadilla, Puerto Rico.*

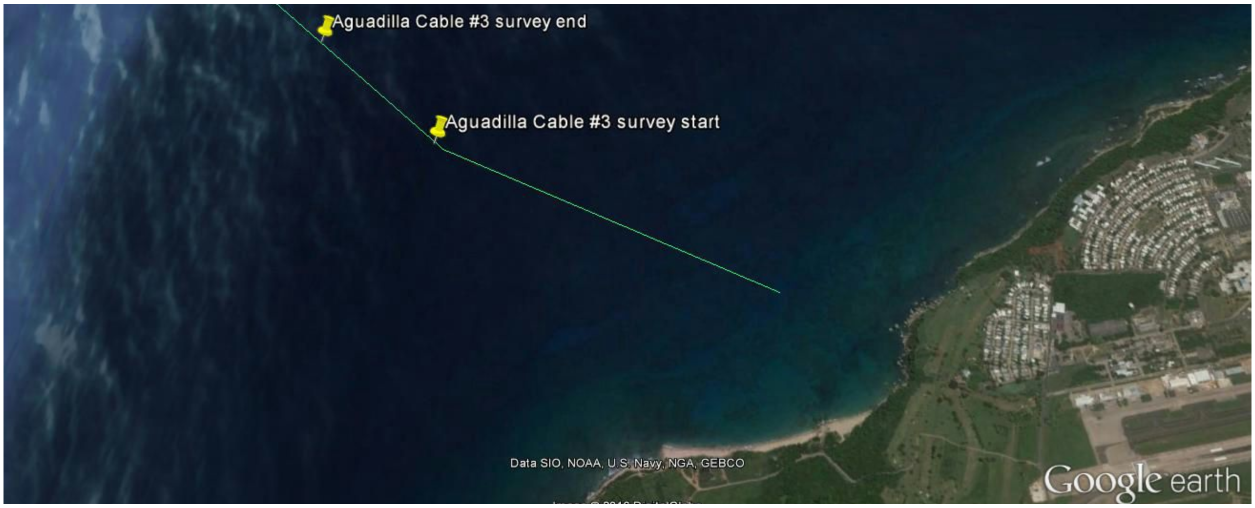


Fig.10 Still-shot of submarine cable at 130' taken from one of our GoPro cameras while attached to our DDW-1.

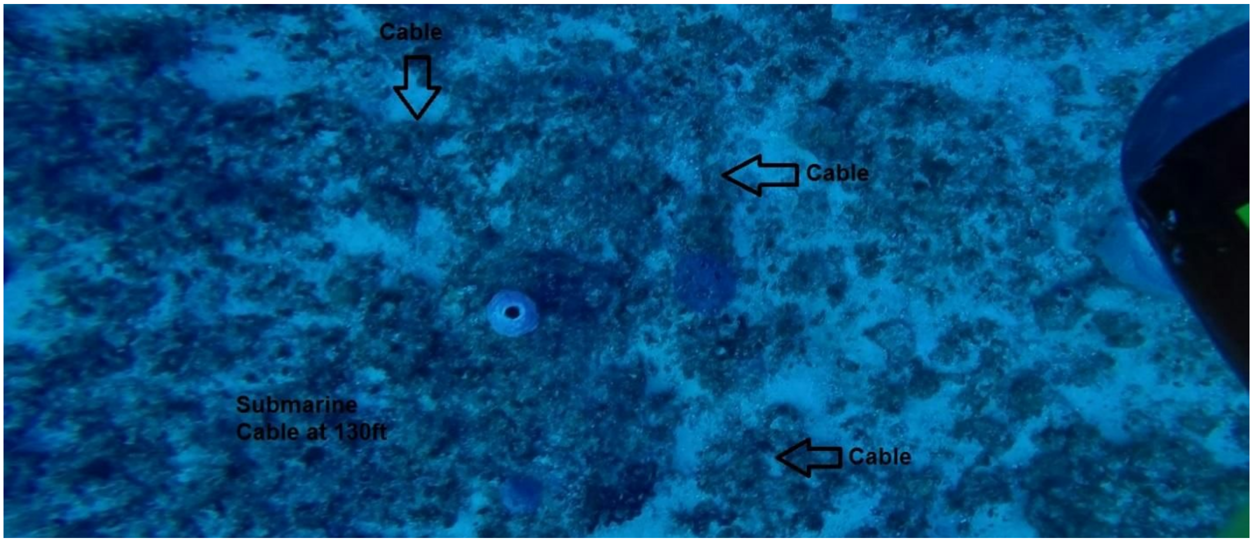
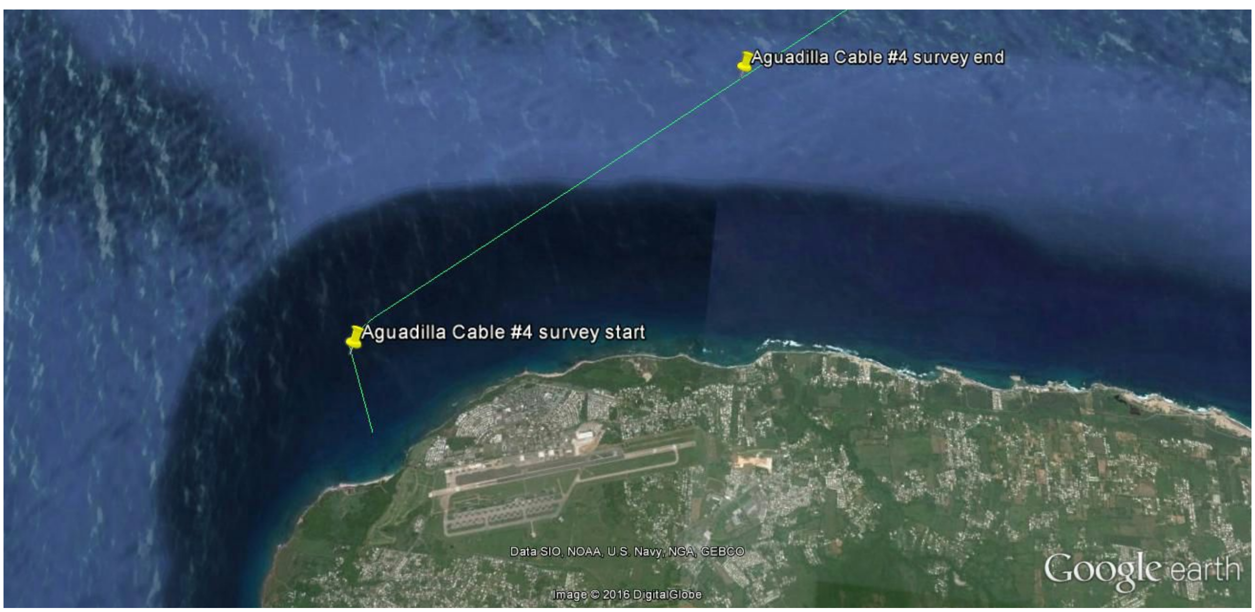


Fig.11 Still-shot of ocean floor contour at 120' depth at Aguadilla #3. Habitat dominated by sponges and algae.

The fourth submarine cable, SAJ-2015-02635 (SP-DCM) known as Aguadilla #4 (Ramey-Antigua), also presented two marine habitats: spur and grove coral reef and sand plain. This submarine cable transect stretches over five miles in distance, with an average depth of 135'. The first half a mile consisted of a spur and groove reef with many sponge and fish species. The rest of the transect consisted of a sand plains with segmented worms and the occasional open water fish. No endangered species or EFH were encountered during the survey of this submarine cable and its surrounding habitats. The submarine cable was not located with video during the survey, but was located by divers from shore until de 60' depth mark (as seen in videos) where it goes below the sand. Little to no impact would occur if the submarine cable's salvage point commences at the 138' mark.

Fig.12 Still-shot of ocean floor contour at 110' depth at Aguadilla #4 a quarter mile along the transect. Biota composed mostly of Sponges, algae and fish.

Fig.13 Google Earth layer showing location of SAJ-2015-02635 (SP-DCM) Aguadilla #4 submarine cable and our survey area off the northwest coast of Aguadilla, Puerto Rico.



The fifth submarine cable, SAJ-2015-02640 (SP-DCM) known as Ponce #5 (Ponce-St. Croix), was surveyed but could not be analyzed. The maps provided by Global Marine did not take to account various dredging activities in the Ponce area that, to our knowledge, completely severed the submarine cables prior to the survey start waypoint. We were able to locate segments of the submarine cable east, west and south of Isla Cardona. The team was unable to locate the Ponce #5 submarine cable, as a result of dredging the cable is now located at depths greater than the

250' depth marker. Certain biological aspects could be presumed but cannot be confirmed until our Research Vessel with a remotely operated vehicle (ROV) investigates the submarine cable areas below the 250’ depth marker and locates the submarine cable. The salvage point for this cable will therefore commence at the continental shelf break descent area after it’s located with the Research Vessel and ROV beginning depth at 606’.

Fig.14 Top right: Segments of metals detected with our Pulse 12 metal detector assumed to be broken submarine cables off the south coast of Ponce, Puerto Rico.
Fig.15 Bottom: Google Earth layer showing the location of SAJ-2015-02640 (SP-DCM) Ponce #5 submarine cable off the south coast of Ponce, Puerto Rico.

The sixth submarine cable, SAJ-2015-02639 (SP-DCM) known as Ponce #6 (Ponce-Jamaica), presented two marine habitats: mesophotic coral reef and a continental shelf break. The transect is fairly short considering that a continental shelf break occurs quickly within the survey. The survey commenced with a small mesophotic coral reef before the continental shelf break that possessed very little species richness due to the high concentrations of marine snow and sediment in the water column. Most rocks and corals displayed a layer of sediment at their surface. A colony of wire corals (black coral) were seen in this area. Once we descended at the shelf the concentration of marine snow and sediments increased thus visibility decreased to less than a foot. No species could be identified after the 120’ depth marker. Wire corals (*Cirrhipathes leutkeni*), were encountered during the survey of this submarine cable at depths between 100’ and 120’ before the continental shelf break descent. The starting salvage point for this submarine cable should not affect the identified species due to removal commencing at the shelf descent at the 601’ depth mark. The submarine cable was not located with video during the survey.

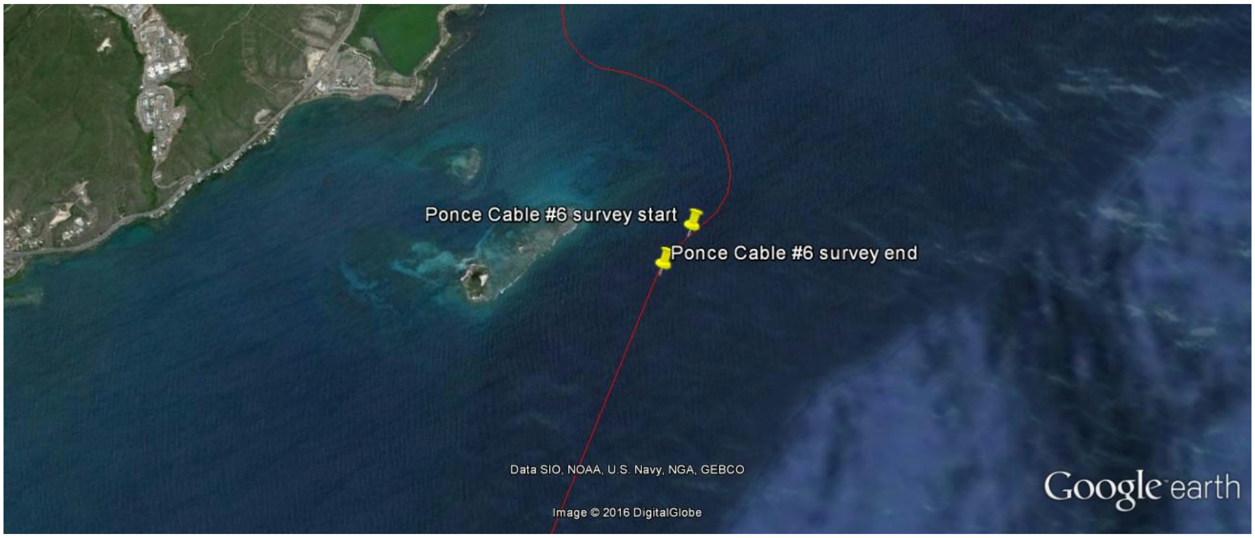


Fig.16 Google Earth layer showing location of SAJ-2015-02639 (SP-DCM) Ponce #6 submarine cable and our survey area off the south coast of Ponce, Puerto Rico.

Avoidance and Minimization Measures / Alternative Analysis

Establishing operational starting and end points

Clean Ocean has shown a benthic study of the cable corridors from 100' to 250'. Clean Ocean's methodology using the JW Fishers metal detectors, dive wing along with manual diving allows all involved to understand the corridor and any potential impacts. At the time permits are issued and cable retrieval operations commence the cable corridors ocean environment will be studied and recorded by Clean Ocean's work class ROV as the large ROV has the necessary horsepower to hold the video and recordings specific to the corridors in question.

Clean Ocean Initiative, Inc.

Submarine Cable Depth Data

Mayaguez #1 SAJ-2015-02643 (SP-DCM)		Begin: 893ft End: 7023ft
Mayaguez #2 SAJ-2015-02641 (SP-DCM)	Mayaguez to Desecheo Island	Begin: 320ft End: 320ft
	Desecheo Island to Santo Domingo	Begin: 320ft End : 1780ft
Aguadilla #3 SAJ-2015-02638 (SP-DCM)		Begin: 134ft End: 12644ft
Aguadilla #4 SAJ-2015-02635 (SP-DCM)		Begin: 138ft End: 1184ft
Ponce #5 SAJ-2015-02640 (SP-DCM)		Begin: 606ft End: 1927ft
Ponce #6 SAJ-2015-02639 (SP-DCM)		Begin: 601ft End: 8028ft

The full study is to identify any and all objects currently on the cable corridor at all applicable depths where cable retrieval will occur. This could include active cables, other decommissioned cables, archaeological objects and any type of sensitive benthic resource.

Clean Ocean will have a policy in effect prior to pulling any cables “any and all appurtenances are to be studied prior to retrieval operations.” Clean Ocean has a very real liability as it relates to the damage of active cables, archaeological objects, or any environmentally sensitive resources.

Clean Ocean has and will invest in the proper equipment to insure all entanglements, reefs or any sensitive appurtenances are properly protected and the cables are cut and processed at safe distances not to affect the appurtenances. Furthermore, the Chickasaw has a detection system on the reel in the event an unexpected appurtenance should be encountered, in other words if the weight increases suddenly the reel comes to an automatic stop allowing for further protection.

Clean Ocean has done years of planning for this operation and has identified the proper method and equipment to cut around any and all appurtenances on the cable, including any natural resources. Clean Ocean personal will be trained and prepared to do whatever is necessary to prevent damage to sensitive areas. Clean Ocean has also agreed to share all recorded data of the cable routes with NOAA. The research vessel and the Chickasaw will be manned at all times with a marine biologist to identify and report any sensitive environmental resources affected by Clean Ocean’s operations and has the authority to stop operations. The marine biologist will coordinate with Clean Ocean’s engineers the proper procedure for protection of the resource.

Clean Ocean has a solid plan and investment in place to have “no impact” on sensitive resources and will remain steady on the statement that Clean Ocean’s operation will have “no impact” on any sensitive benthic resource. Clean Ocean will also provide studies of deep water areas and cut around any appurtenances natural or otherwise to insure no damage of unknown resources. The protection of the ocean during operation is paramount and a part of Clean Ocean’s ongoing mission and will be conducted in a professional manner consistent with good operating procedure. All Clean Ocean’s data upon request will be shared with applicable federal agencies.

Compensation and Transplant Recovery Plan

In preparation of submarine cable removal, Clean Ocean Initiative has created a Recovery Transplant Plan to help with the relocation of any organism that have settled on the submarine cable or surrounding areas that may be disturbed by our actions.

After surveying all submarine cable corridors in shallow water environments between 100 and 250 ft., Clean Ocean concluded only SAJ-2015-02638 (SP-DCM) known as Aguadilla #3 (Ramey-Grand Turk) and SAJ-2015-02635 (SP-DCM) known as Aguadilla #4 (Ramey-Antigua) would be involved in the Recovery Transplant Plan. Some corals and octocorals may be disturbed by the submarine cable removal in the area, but the main focus will be on sponges which dominate the reef area. Sponges provide habitat for juvenile fish and shellfish, including spiny lobsters and other commercially important species. The sounds produced by some of their visitors, such as snapping shrimp, may guide other creatures to this safe habitat. That is why it is important to maintain this ecosystem and be able to safely transplant all organisms along the cable corridors.

The process of transplanting sponges is not that different from transplanting complete corals. Similar techniques can be used for both species, including to bryozoans and hydroids. Technical divers would locate all sponges and organisms needing transplantation from the cable corridor and find suitable locations to be moved to. After safely removing the organism, the technical diver will take the organism to its new location and transplant using marine epoxy or similar adhesive.

Estimated Time to complete removal of each cable.

The specific time to pull cables will vary on the type, condition, age and route. Clean Ocean estimates an average pulling speed an/or operation retrieval speed of 3 knots. The estimate of pulling speed is derived from the Chickasaw historic log of pulling pipe and cables. Additionally, Clean Ocean has accounted for loading and unloading of cargo.

SAJ-2015-02635 (SP-DCM) Aguadilla # 4 Ramey to Antigua
    22 days 24 hour shifts and unloading time

SAJ-2015-02638 (SP-DCM) Aguadilla # 3 Ramey to Grand Turk
    13 days 24 hour shifts retrieval time including unloading

SAJ-2015-02639 (SP-DCM) Ponce # 6 Ponce to Jamaica
    14 days 24 hour shifts ocean retrieval time including unloading

SAJ-2015-02640 (SP-DCM) Ponce # 5 Ponce to St Croix
7 days 24 hour shifts ocean retrieval time

SAJ-2015-02641 (SP-DCM) Mayaguez # 2 Desecheo Island-Anasco to Dominican Republic
5 days 24 hour shifts ocean retrieval time

SAJ-2015-02643 (SP-DCM) Mayaguez # 1 Mayaguez to Santo Domingo
12 days 24 hour shifts ocean retrieval time

Recovery activity in the Exclusive Economic Zone (EEZ) Clean Ocean's essential operation

Clean Ocean's basic operation of retrieving decommissioned telecommunication cables falls within the prevue of incidental catch to the recovery of the cable. Section 670.21 Harvest limitations, states "The taking of prohibited species in the EEZ as incidental catch will not be considered unlawful possession of a prohibited species provided it is returned immediately to the sea in the general area of operations."

Clean Ocean has the proper equipment, full time on vessel marine biologist and personal training to comply with Section 670.21 and will comply in its operations.

Clean Ocean Research Farm

Clean Ocean's research farm would like to keep certain species found on the cable for research purposes and some of the species may be defined as "prohibited species." The Fishery Management Plan applies to the species listed in the "Final Rule" which are mostly shallow water species except for Black Corals (stony corals). It is to be assumed, the species attached to the cable will be of different variations due to the deeper depths. Most deep corals are not stony including black corals, which are widely agreed to be made of some type of protein (Unlike the hard skeletons of shallow water reef building coral, the black coral have flexible skeletons made of protein and chitin, the same material as insects shells, crabs and lobsters. As they grow they lay down new layers to help determine the age of the coral). One species of deep stony coral may exist (Lophelia pertusa, 200m to 1000m depths) which could be attached to the cable. Due to the uncertainty of the species attached to the cables and with consul, Clean Ocean will apply for and obtain a scientific/restoration permit prior to collection of any species for study at Clean Ocean research farm. Clean Ocean will consider the research as a "Fact Finding endeavor" and has applied for a scientific permit per Section 670.24 with NOAA Fisheries, Southeast Regional Director.

Input and output requirements of the research farm

Clean Ocean's research farm will be recirculating saltwater eliminating most of the waters for output. What excess waters are caused to be discharged will be dissipated on site in one of the many water tanks on Clean Ocean's site. No water will be discharged into the ocean or the surrounding environment.

Clean Ocean will not use seawater for use at it's coral research farm. Clean Ocean will simulate the ocean with fresh water tanks and not use any waters from the ocean in its research farm endeavor.

Federal Communications Commission (FCC)

In accordance with the Cable Landing Licensing Act of 1921, only *laying* of submarine cables which are:

1.) owned and operated in the U.S.,
2.) connectivity of submarine cables which connect to Alaska, Hawaii and U.S. Territories,
3.) and U.S. submarine cables to foreign countries (with end point in international waters)

would mandate request for permission from Clean Ocean to the Federal Communications Commission (herein, "FCC"). Moreover, once the FCC grants submarine cable landing license for installation and operation of any submarine cable in the United States, U.S.territories or with end point in international waters, the U.S. Army Corps of Engineers (herein "ACOE") must authorize the installation of any submarine cable in U.S. waters pursuant to the Rivers and Harbor Act of 1899, as well as any submarine cable in a estuary pursuant to the Clean Water Act.

Clean Ocean has communicated with several FCC locations: Licensing Division in Pennsylvania, Media Cable & Licensing in Washington D.C. and San Juan, PR bureaus to inform of operation in removing the decommissioned cables in the Caribbean ocean floors. Additionally, Clean Ocean utilized the FCC's web-based Cable Operations & Licensing System (COALS) to conduct and corroborate researched data to further determine the identified decommissioned submarine cables laying in the Caribbean ocean floors no longer possess an active license and thus no longer fall under the jurisdiction of the FCC. Furthermore, the design of the submarine cables limits its active lifespan to 20-25 years.

As to protecting the active cables the FCC has authority as it relates to any active licensed submarine cable landing on American shores. The Convention for the Protection of Submarine Cables of 1884 and 1888 respectively, are the governing authority for damage of submarine cables. The 1884/88 convention is the standard used in the U.S. for protection of Submarine cables. The Convention is recognized by the US Federal Agencies; NOAA, FCC and BOMA.

The Convention states, “The owner of a cable who, on laying or repairing his own cable, breaks or injures another cable, must bear the cost of repairing the breakage or injury, without prejudice to the application, if need by, of Article II of the present convention.” This convention pertains to Clean Ocean’s operation, if Clean Ocean damages another live cable during its operation Clean Ocean will be responsible for the damage.

Clean Ocean will implement and adopt the following procedures to protect the active cables:

- Assign an employee of record to designate cable crossings, maintain records of potential crossings, have on record contact personnel of all active cable owners, quarterly training of all Clean Ocean vessel personnel of procedures in the unlikely event of a live cable damage, follow FCC reporting guidelines of damaged cables including immediate notification to the cable owner and constant compliance with any applicable public or private guidelines as set forth.
- All cable crossings will be identified and recorded by Clean Ocean’s work class ROV prior to any cable retrieval process commencement.
- Clean Ocean will follow the guidelines set forth by The International Submarine Cable Protection Organization to protect the active cables during the retrieval process.
- Clean Ocean will carry an insurance policy naming the cable owner's and other necessary agencies additionally insured.

Compliance on Coastal Zone Management (CZM)

Consistency Certification by the Puerto Rico Planning Board.

- Note for USACE regarding our actions toward compliance and status report.

All documents and requirements up to this point have been completed. A meeting with Ernesto Diaz, Javier Ramos and Nilda Jimenez at the Department of Natural Resources and Environment (DRNA) is scheduled for the week of March 14, 2016, where we will discuss our environmental assessment. Once the DRNA approves the environmental assessment, the Planning Board will issue the Public Notice for compliance.

Tug Boat Usage

Clean Oceans’ barge, Chickasaw, will be escorted by a support and tow vessel (Tug) at all times during operations. The Chickasaw is classified by The U.S. Coast Guard and the American ཤBureau of Shipping as a non propelled vessel and must have a dedicated support and tow vessel within telescopic eye range at all times.

Clean Ocean, will use a Jones Act; compliant Tug to escort the cable retrieval operation.
Clean Ocean will issue a Request for Proposal (herein, "RFP") to qualified Tug operators for annual contracts. Clean Ocean will choose it's Tug operator on a point basis system, with a scale of 1 thru 10.

		Point Scale System
1. Type, horsepower and condition of the Tug.	⇒	10
2. Experience of the Tug operator with specific knowledge of the Caribbean waters.	⇒	9
3. American flagged vessels.	⇒	8
4. Crew experience.	⇒	7
5. Financial condition of the operator.	⇒	6
6. Daily pricing of crew and vessel.	⇒	5
7. Fuel economy of vessel.	⇒	4
8. Availability of additional vessels for mechanical breakdowns and or emergencies at sea.	⇒	3
9. Puerto Rico based operations.	⇒	2

The Request for Proposal (RFP) will have a maximum point system as stated after each item in the proposal. The points will be added and the bidder with the highest point total will be awarded the contract. In the event of a tie a Puerto Rico domiciled company will be awarded the contract. Clean Ocean will notify the Army Corp of the Tug Operator prior to operations.

We respectfully ask to please notify Clean Ocean if any Tug companies in this region which are not in compliance with Federal Regulations so we can eliminate the company from the bid process

In closing, from a practical standpoint protecting the active cables is a function of having the proper supervision, vessel, up to date mapping programs and equipment to carry out Clean Ocean's project, coupled with a strong commitment not to damage installed and operable submarine cables. Clean Ocean will maintain a research vessel with an experienced crew and equipment required to video and cut the potential recovered cables. All active cables will be surveyed and video prior to the retrieval operation. The ROV will in turn cut the recovered submarine cables to avoid any damage during operation. The fiber optic cables currently in use have very accurate maps locating position and have been designed for easy recognition by video. Clean Ocean will have a substantial investment and a dedicated research vessel, crew, mapping system, sonar, and a ROV for the specific purpose of protecting the active cables and the ocean ecosystem.

BRIEF SUMMARY OF CURRENT STATE OF AFFAIRS
STAGE I, UNDERWATER ARCHAEOLOGY

(please attachment)