

MEMORANDUM FOR: The Record

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Subject: Review of impacts to EFH and ESA-listed species from activities covered under updated SMMP for Puerto Rico ODMDs

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Background:

The U.S. Environmental Protection Agency (EPA), Region 2 and U.S. Army Corps of Engineers (USACE), Jacksonville District have taken the administrative step of preparing a draft combined Site Monitoring and Management Plan (SMMP) which outlines disposal controls and monitoring activities that will be implemented to minimize the potential for unacceptable adverse impacts from transportation and ocean disposal of dredged material at Arecibo Harbor, Mayagüez Harbor, Ponce Harbor, San Juan Harbor, and Yabucoa Harbor, PR Ocean Dredged Material Disposal Sites (ODMDs). This administrative step to issue a combined SMMP covering all five Puerto Rico ODMDs serves to ensure that management policies and monitoring practices are consistently applied across the five ODMDs and to streamline the revision, review, and consultation process for any future SMMP updates.

History of Consultations for Puerto Rico ODMDs

USACE recently completed a programmatic, regional EFH and Section 7 ESA consultation process with the Services which covered dredging and placement activities related to projects under the jurisdiction of its Civil Works and Regulatory Programs (and dredging/sand mining in borrow sites in federal waters under the jurisdiction of the Bureau of Ocean Energy Management (BOEM) Marine Minerals Program) in the Southeast United States, including the islands of Puerto Rico and the U.S. Virgin Islands. At the conclusion of this process, the Services issued the South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO) which concluded that the covered dredging and placement activities, including placement at the five Puerto Rico ODMDs, are “not likely to jeopardize the continued existence of ESA-listed species or result in adverse effects to designated critical habitats[.]” The SARBO also includes requirements (Reasonable and Prudent Measures (RPMs) and Terms and Conditions (T&Cs) that minimize the impacts to ESA-listed species and designated critical habitats.

In addition to the SARBO, EPA and USACE have previously conducted Essential Fish Habitat (EFH) and Section 7 Endangered Species Act (ESA) consultations with NOAA’s National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (FWS) (the Services) to support finalization of SMMPs for each of the individual Puerto Rico ODMDs (see Table 1). The most recent SMMP was finalized in 2019 to guide dredged material transportation and disposal activities at the Mayagüez Harbor, PR ODMD.

As stated above, creating a combined SMMP to outline consistent policies and practices for the five ODMDs is an administrative action. *This action does not designate any new ODMDs, alter the designations of the existing ODMDs in any way, or authorize any specific dredging projects or disposals.*

Thus, the provisions of the combined SMMP govern activities that are within the scope of activities encompassed by the 2020 SARBO and that served as the basis for previous site-specific consultations. Nevertheless, EPA has prepared this memorandum to complement the SARBO by specifically focusing on ODMD-specific details to allow for accurate assessment of risk to ESA-listed species, designated critical habitats, and EFH at each of the five ODMDs in Puerto Rico.

Table 1: Site locations, depths, and dates of last SMMP update/consultation

ODMD	Distance and location	Depth range	Date of last SMMP/consultation
Arecibo Harbor (AS)	1.5 nm north of harbor	101 – 417 m	February 1, 2012
Mayagüez Harbor (MS)	6 nm west of harbor	320 – 400 m	September 19, 2019
Ponce Harbor (PS)	4.5 nm south of harbor	60 – 540 m ¹	November 3, 2003
San Juan Harbor (SJS)	2.2 nm north-northwest of harbor	213 – 400 m	January 6, 2011
Yabucoa Harbor (YS)	6 nm east of harbor	600 – 880 m ²	January 30, 2003

¹Site use of PS is restricted to the southern half of the site in deeper water with a depth range of 365-540 m.

²Site use of YS is restricted to the southeastern quadrant of the site which includes deepest depths.

Scope of this Memorandum

This memorandum complements the 2020 SARBO by specifically focusing on potential impacts of transport of dredged material to the Puerto Rico ODMDs and the ocean disposal of dredged material within each of the ODMDs and includes site-specific details to allow for more accurate assessment of risk to ESA-listed species, designated critical habitats, and EFH. Consultations for individual dredging projects/permits or other in-harbor activities are conducted separately by USACE and are beyond the scope of the SMMP. Therefore, potential impacts of those specific actions on ESA-listed species and EFH are not discussed in this memorandum.

This memorandum identifies natural resources [specifically Endangered Species Act (ESA)-listed species and Essential Fish Habitat (EFH)] present in and around the ODMDs, discusses potential risks to the resources from dredged material transportation and disposal activities, and presents SMMP measures that have been required to mitigate any such risks.

The first section of this memorandum discusses the SMMP provisions related to all EFH relevant to the ODMDs in Puerto Rico. The second section presents detailed information on Coral Reef EFH and ESA-listed coral species and their designated critical habitat areas, the areas of emphasis for our analysis of risk. The final section concludes the document with a discussion of ESA-listed fish (including shark and ray species), marine mammals, and sea turtles.

Essential Fish Habitat in Puerto Rico

EFH has been designated for protection of six species or species groupings in Puerto Rican waters: Reef Fish, Pelagic Fish, Rays, Spiny Lobster, Queen Conch, and Coral. Each area of the EFH is designated based on use by specific life stages of the named target organisms (Table 2).

Table 2. Summary of waters and other habitats included in each designated Puerto Rico Essential Fish Habitat (EFH). Some of the habitat types are designated between MHW or MLW and 100 fathoms (600 feet) and some extend from MHW out to the EEZ boundary (Puerto Rico FMP/EA, NMFS & CFMC 2019).

Resource/ Habitat	Reef Fish	Pelagic Fish	Rays	Spiny Lobster	Queen Conch	Coral
All waters from MHW to outer EEZ boundary	Eggs and larvae	All life stages	Juveniles and adults	Larvae	Eggs and larvae	Eggs and larvae
All substrates from MHW to 100 fathoms	✓					
All waters to 100 fathoms	* ✓					
Sargassum		*				
Coral reef		*	*	✓	✓	✓
Hard bottom		*	*	✓	✓	✓
Mangroves		*	*	✓		* ✓
Seagrass		*	*	✓	✓	* ✓
Sand			*		✓	* ✓
Benthic Algae /Algal Plain				✓		* ✓
Mud						* ✓

* = Select species, ✓ = Other life stages than those listed in first row

The largest area designated by NOAA as EFH is “all waters from MHW to the outer EEZ boundary.” This habitat was designated as essential for eggs and/or larvae of reef fish, spiny lobster, queen conch, and corals, for all life stages of pelagic fish and for juvenile and adult rays. NOAA also designates “all waters to 100 fathoms” as essential for other stages of reef fish. Elevated suspended sediment in the water column caused by dredged material disposal can impact egg fertilization if timing coincides with spawning (Ricardo et al. 2016). Disposal activities at the ODMDs will result in temporary and localized degradations in water quality that could interfere with foraging opportunities for pelagic fish (including sharks and rays) and for open ocean ESA-listed species such as sharks, rays, turtles and whales.

Due to the large geographic area and volume of all waters from mean high water to outer EEZ boundary and the limited size of each ODMDs as well as limited duration of turbidity following disposals, the SARBO concludes that disposal activity at southeastern ODMDs (including the five ODMDs in Puerto Rico) would have insignificant impacts to eggs and larvae for all broadcast spawning species and that large mobile pelagic species can readily avoid these temporarily degraded areas.

Although EPA concurs with the conclusions of the SARBO with respect to the potential for significant impacts to species that rely on “waters from MHW to outer EEZ boundary” EFH, including ESA-listed species, the combined SMMP includes provisions which ensure that water quality impacts are transient and limited in scale. Consistent with the initial mixing provisions of the regulations implementing the Marine Protection Research and Sanctuaries Act, the combined SMMP requires that physical mixing models be used in conjunction with the results of toxicity and chemical assays to ensure that suspended particulate and dissolved phases of dredged material do not exceed toxicity thresholds (including water quality criteria) at any time outside the site boundaries or persist anywhere in the water column four hours after disposal. If necessary, barge load limitations will be required to ensure compliance with these water quality endpoints.

The Puerto Rico ODMDs are in deep areas of ocean bottom that are normally mud/sand environments. Multibeam and side scan SONAR surveys conducted by NOAA and EPA show that sheer vertical walls separate them from shelf edge habitats. The sheer vertical shelf edge walls act as natural impediments to the landward migration of dredged material during and following disposal operations. Video imaging conducted by EPA within and around the Mayagüez, Arecibo, and San Juan ODMDs (or in adjacent areas at similar depths; see Figure 1) confirmed that bottom habitats within the disposal sites and the shelf edge walls primarily consist of (or are covered by) fine sediments (sand and mud) that support very few visible organisms and that any hard bottom (rocks) within those areas is sparsely colonized by sponges and soft corals. No deep-water hard corals were observed at or near the three ODMDs. Video imaging conducted by NOAA confirmed that similar benthic environments are present near the Yabucoa and Ponce ODMDs.

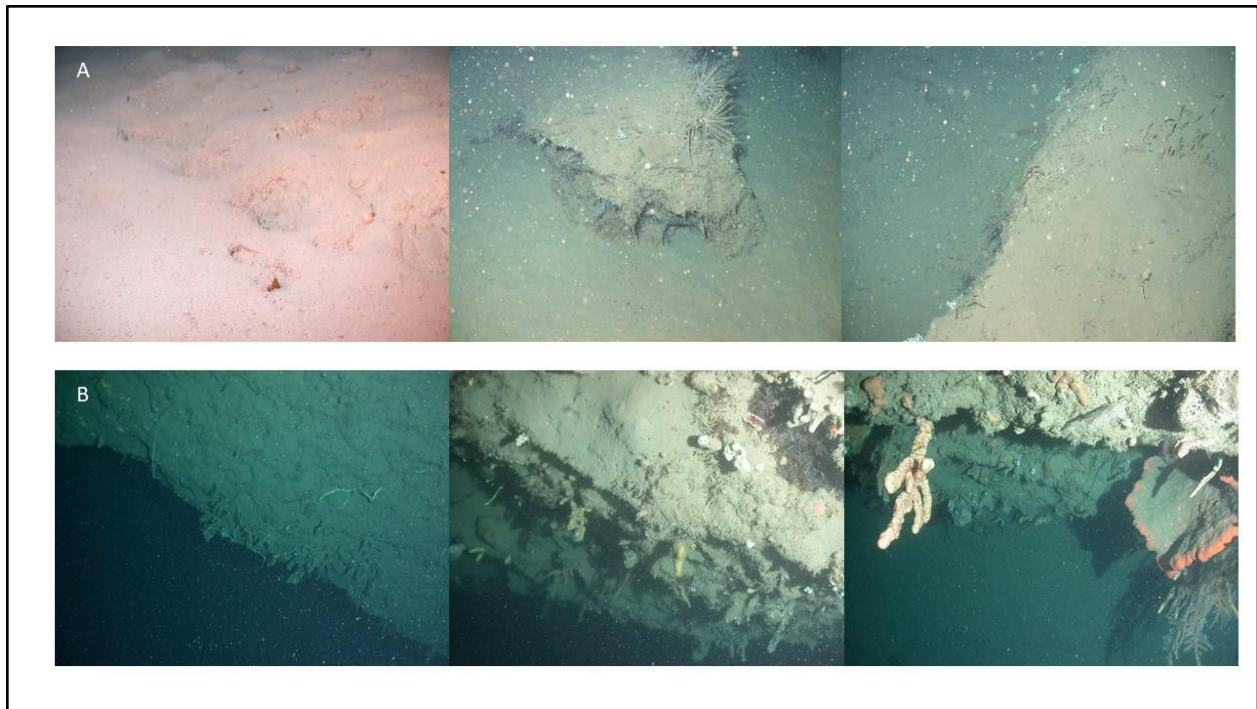


Figure 1. Representative images of bottom habitats in and around Puerto Rico ODMDs. Panel A shows typical mud/sand bottom habitat in and around an ODMDS (Dive 2103, Arecibo Harbor, PR ODMDS). Panel B shows typical vertical wall habitat proximate to an ODMDS (Dives 2086 and 2087, San Juan Harbor, PR ODMDS)

Of the specific habitat types designated as EFH (sargassum, coral reef, hard bottom, mangroves, seagrass, sand, benthic algae/algal plain, and mud), coral reef and hard bottom resources, particularly those in shallower areas have the most potential to be impacted by suspended and settling sediment from disposal activities at the ODMDs. Sediments suspended in the water column can limit light availability required for primary production and settling sediment can negatively affect corals' feeding and reproduction, especially polyp establishment onto existing reefs or hard bottom (Erftemeijer et al. 2012).

SMMP provisions focus on minimizing the risks of dredged material management activities to shelf and shelf edge areas to ensure protection of these resources. Protecting coral reef and hard bottom will protect spiny lobster, queen conch, and coral reef fish, as well as the corals themselves.

ESA Corals and Coral Reef EFH

Benthic mapping efforts by NOAA have documented the presence of coral reef, hard bottom, and other bottom type habitats in shelf areas around much of the island of Puerto Rico. EPA has also conducted video ROV surveys focused on characterizing the habitat value of hard bottom in shelf areas between dredging locations and disposal sites for Arecibo, Mayagüez, and San Juan Harbors. The location of coral

reef and hard bottom habitat in shelf areas adjacent to each ODMDs is discussed separately for each site in the following sections. A discussion of provisions for each site that have been incorporated to protect these resources at each ODMDs is also provided.

ESA Corals

There are seven species of ESA-listed Caribbean corals. These species and their designated critical habitat depth ranges are provided below in Table 3. Additional species of non-listed stony corals, fire corals, soft corals, and coralline algae co-occur with these species and constitute shelf edge reef habitat which is designated as essential fish habitat for a variety of NMFS Fishery Management Council-managed species (e.g., snappers and groupers). Critical habitat for elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*) was established with a final rule on December 26, 2008 as “all areas surrounding the islands of the Commonwealth of Puerto Rico, 98 ft (30 m) in depth and shallower, seaward of the COLREGS line,” excluding already constructed federally authorized harbors, channels, and other man-made structures (NOAA 2008). Critical habitat for five additional threatened coral species was proposed in November 2020: depth ranges of 0.5-90 m for boulder star coral (*Orbicella franksi*) and mountainous star coral (*O. faveolata*), 1-25 m for pillar coral (*Dendrogyra cylindrus*), and 5-90 m for rough cactus coral (*Mycetophyllia ferox*) (NOAA 2020).

Shelf edge reef EFH has previously been operationally defined by NMFS as restricted to areas shallower than 200 feet in previously conducted consultations for individual Puerto Rico disposal sites (i.e., San Juan, Arecibo, Ponce, and Mayagüez Harbor ODMDs). As the critical habitat depth range for boulder star and mountainous star corals is the widest and includes the deepest areas of all other ESA-designated coral critical habitats and the 200-foot isobath used to define shelf edge EFH, their lower depth range (90 m) is used in maps of the ODMDs locations to illustrate the distribution of critical ESA-listed coral habitat near specific ODMDs. All five Puerto Rico ODMDs are located in waters substantially deeper than the deepest critical habitat water depth range for ESA-listed corals.

Table 3. Caribbean coral species that are ESA-listed as “Threatened” and their designated critical habitat depth ranges in Puerto Rico.

ESA-Listed Species		Water depth range (m)	ESA Status
Boulder star Coral	(<i>Orbicella franksi</i>)	0.5-90	Threatened
Lobed Star Coral	(<i>Orbicella annularis</i>)	0.5-20	Threatened
Mountainous Star Coral	(<i>Orbicella faveolata</i>)	0.5-90	Threatened
Elkhorn Coral	(<i>Acropora palmata</i>)	0-30	Threatened
Staghorn Coral	(<i>Acropora cervicornis</i>)	0-30	Threatened
Pillar Coral	(<i>Dendrogyra cylindrus</i>)	1-25	Threatened
Rough Cactus Coral	(<i>Mycetophyllia ferox</i>)	5-90	Threatened

Arecibo Harbor ODMDS

As shown in Figure 2, the south boundary of the Arecibo Harbor, PR ODMDS lies 0.25 nm seaward of the depth limits associated with ESA-listed coral and shelf edge resources. Figure 4 shows multibeam bathymetry and the location of ROV dives made in 2013 to evaluate habitat quality in and around the site.

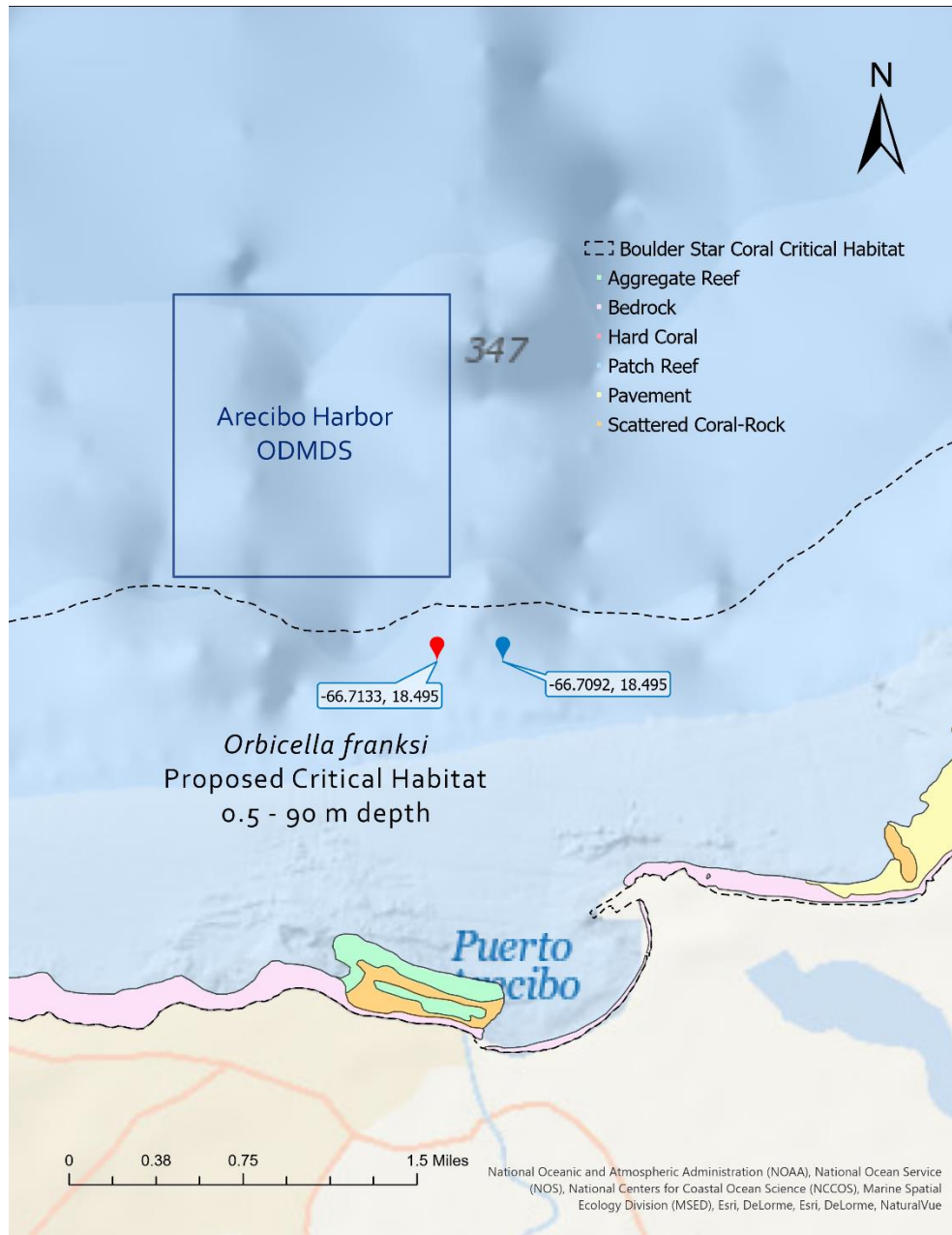


Figure 2. Position of Arecibo Harbor ODMDS shown along with boulder star coral critical habitat outlined with a dashed line and NOAA mapped coral reef and hard bottom habitat from available GIS layer dated 2016-2017. Coordinate point marked in red which dredging scows must maintain a line of transit east of ($18^{\circ} 29.700$ N and $66^{\circ} 42.800$ W) and point marked in blue which scows must maintain a line of transit west of ($18^{\circ} 29.700$ N and $66^{\circ} 42.550$ W).

EPA identified and mapped areas of hard bottom between Arecibo Harbor and the Arecibo Harbor ODMDS with side scan SONAR in 2011 and with multibeam echosounder in 2013 (see Figure 3). Identified hard bottom areas were then investigated using a video-equipped remotely operated vehicle (ROV) in 2013. Imagery confirmed that hard bottom habitats near the most direct transit route between Arecibo Harbor and the ODMDS, do not have high relief hard bottom habitats. However, several hard bottom areas with vertical relief outside the direct route between Arecibo Harbor and AS (Figure 3) were confirmed to support live colonies of ESA-listed (*M. ferox*) and non-ESA coral (*Agaricia spp.*) (see Figure 5).

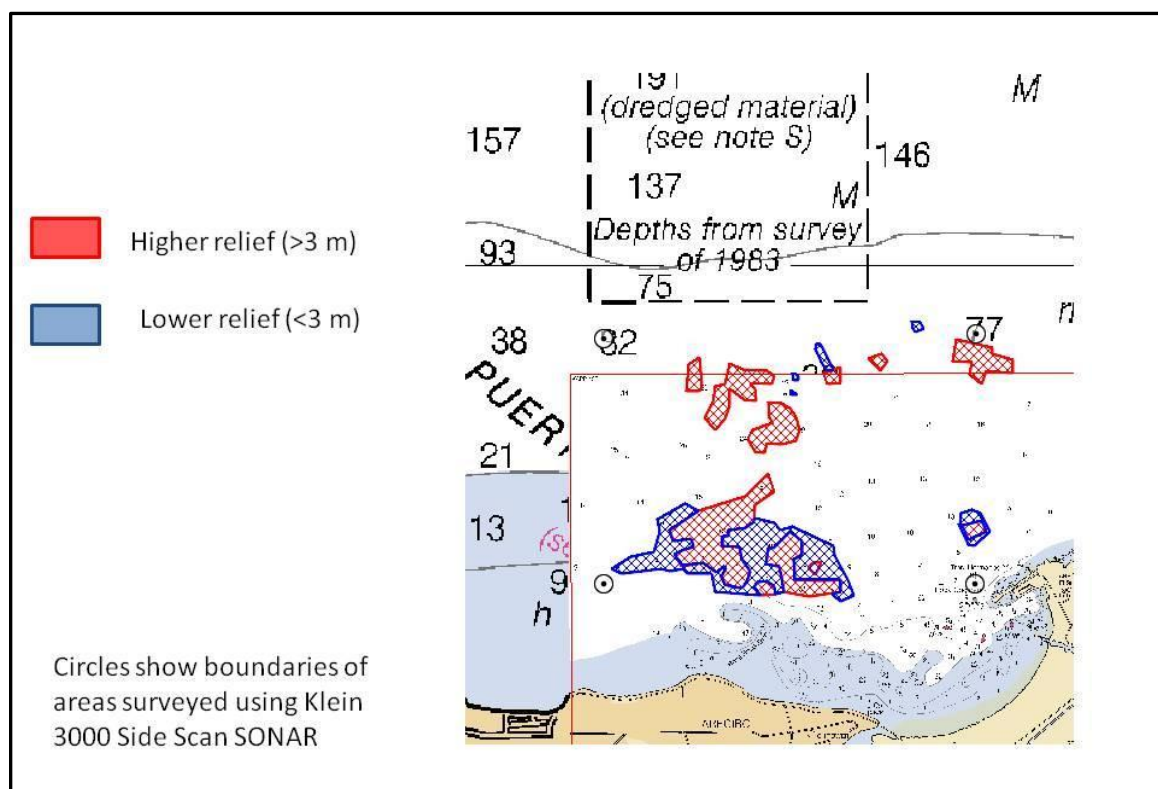


Figure 3. Hard bottom features have significant vertical relief outside Arecibo Harbor. Based on EPA Region 2 side scan SONAR survey (conducted in November 2011). Live corals were documented to be present in high relief areas south of the ODMDS (Dive 2104) during a 2013 video survey.

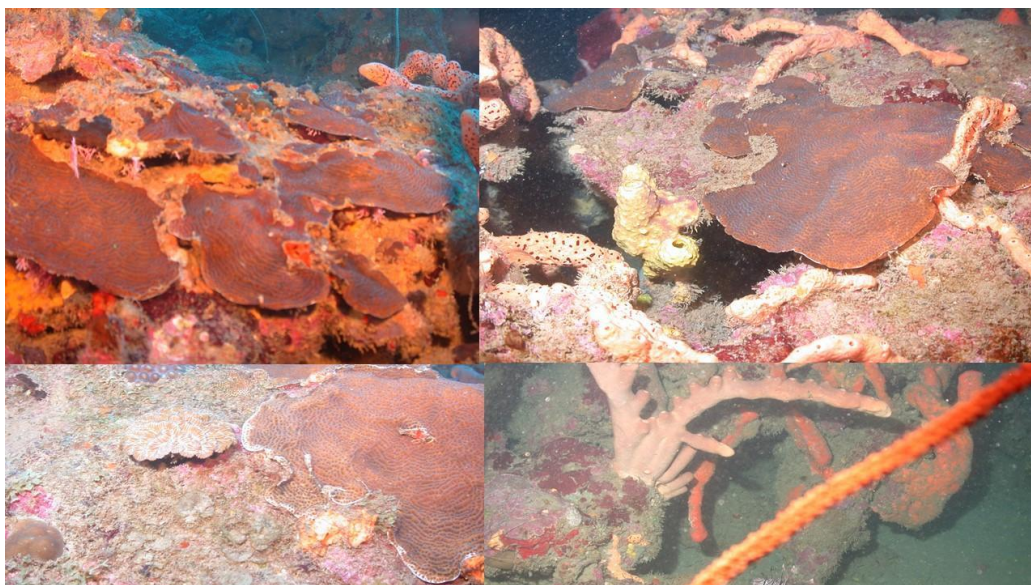
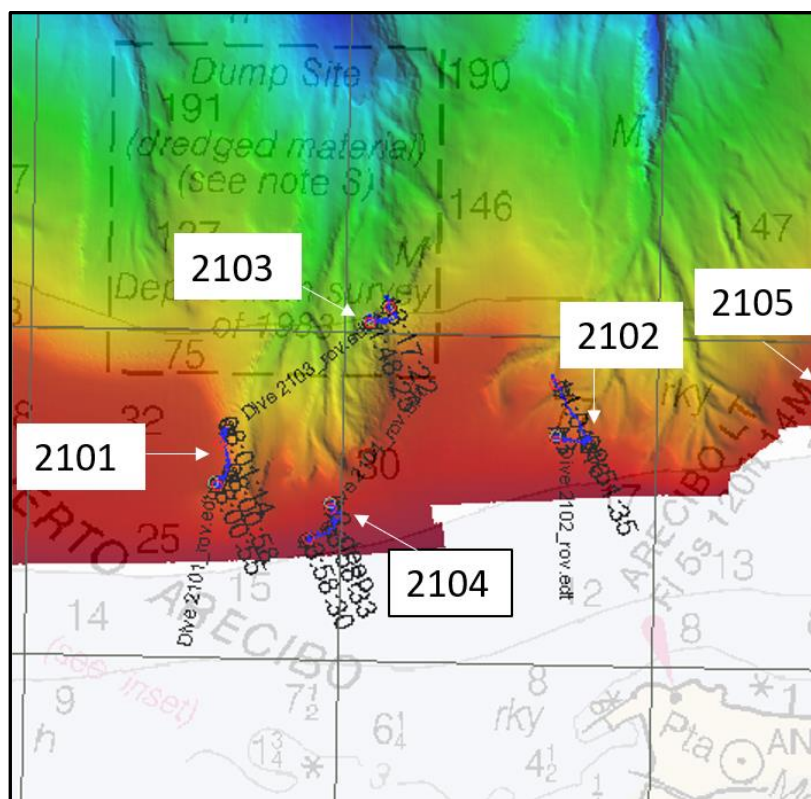


Figure 5. Representative images of high value coral habitat south of Arecibo Harbor, PR ODMS (Dive 2104)

Previous consultations with NMFS resulted in navigation route restrictions being placed on dredged material disposal scows to prohibit transit across the area shown to support coral south of Arecibo Harbor, PR OMDS. This restriction on navigation has been maintained in the combined SMMP.

Accordingly, the combined SMMP requires dredging scows transiting between Arecibo Harbor and the ODMDS to maintain a line of transit that passes east of 18° 29.700 N and 66° 42.800 W and west of 18° 29.700 N and 66° 42.550 W to minimize the potential for losses of dredged material onto these potentially sensitive areas (see Figure 2).

Mayagüez Harbor ODMDS

As shown in Figure 6, the Mayagüez Harbor, PR ODMDS lies approximately 2 nm seaward of the depth limits associated with ESA-listed coral and shelf edge resources. A ridge extends from shelf areas toward the southeastern corner of the ODMDS but becomes less defined before it reaches the site boundary.

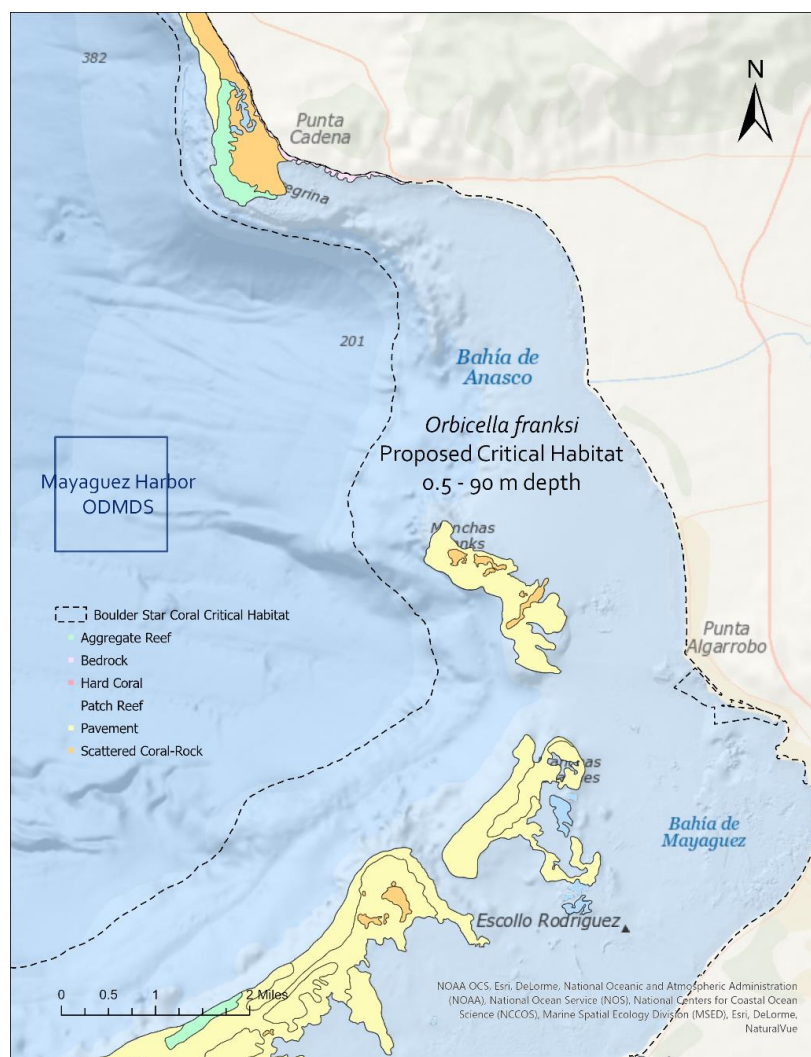


Figure 6. Position of Mayagüez Harbor ODMDS shown along with boulder star coral critical habitat outlined with a dashed line and NOAA mapped coral reef and hard bottom habitat from available GIS layer dated 2016-2017.

In 2013, EPA conducted a survey to assess the quality of habitats along the projected path that scows loaded with dredged material from Mayagüez Harbor would take to transit to the ODMDS. Following a multibeam echosounder survey, an ROV was used to visually assess three bottom locations (Dives 2095, 2097, and 2099) showing vertical relief outside the Mayagüez Harbor entrance markers that would be under the direct path of scows (Figure 7). Video from Dives 2095, 2097 and 2099 was analyzed by the Biogeography Branch, Marine Spatial Ecology Division personnel at NOAA's National Centers for Coastal Ocean Science. All species evident in the videos were identified and counted (see following section). Additional ROV dives were made to assess shelf edge reef condition in areas proximate to the channel entrance or in the general area (but outside the scow path); Dive 2096 was in shallow water immediately north of the Green 3 can marker.

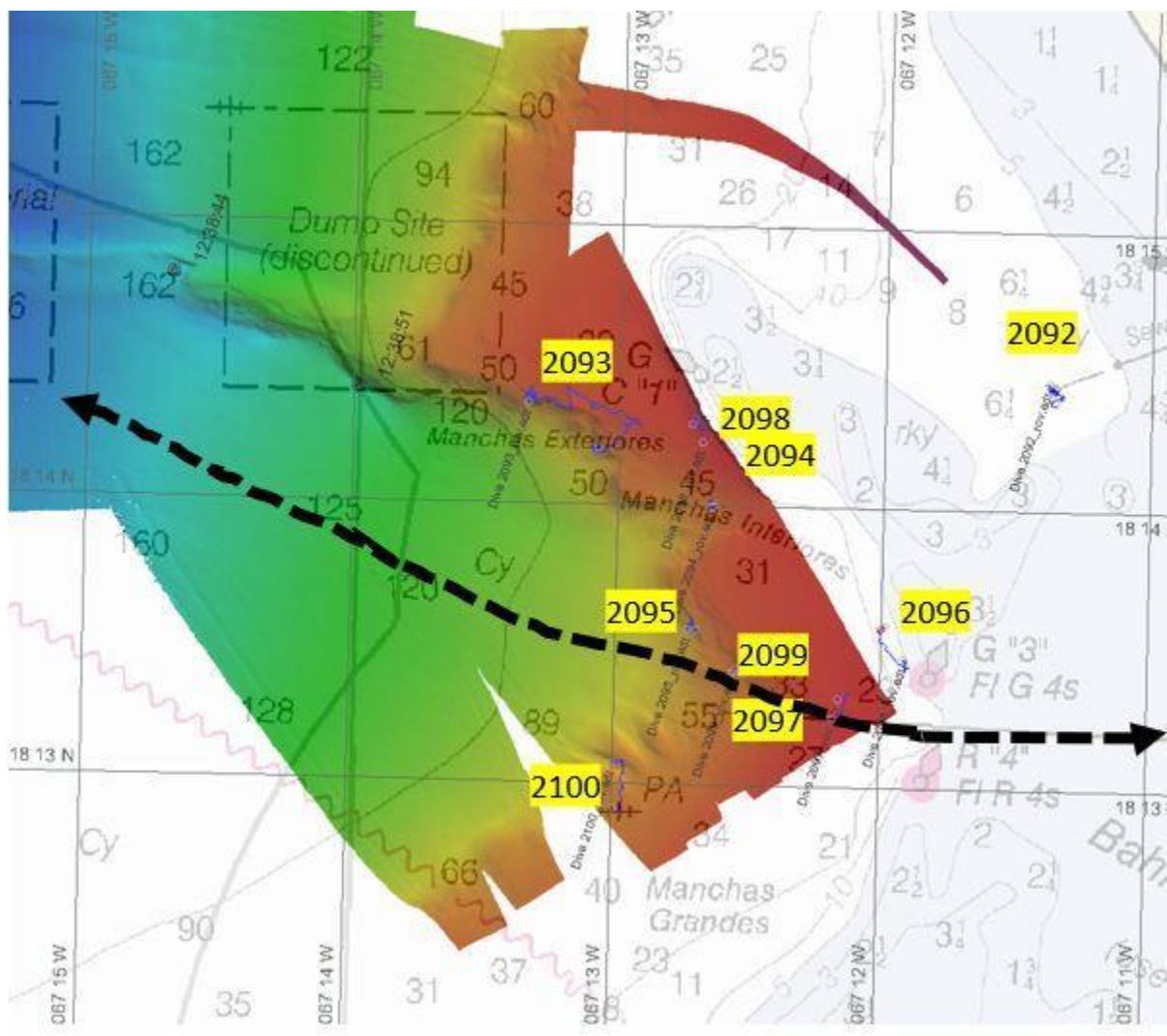


Figure 7. Multibeam bathymetry results in potential scow transit areas and locations of ROV dives made in 2013. Dashed line shows direct transit route between dredging site and Mayagüez Harbor, PR ODMDS.

Habitat Quality for Areas Directly Under Scow Path

The results of NOAA's analysis of Dives 2095, 2097, and 2099 can be provided upon request. Summary information and representative images are provided below (see Figure 8-10). In general, the primary conclusions of these analyses are: 1) ESA-listed coral species were not observed in any video under the direct scow path; 2) sessile benthos were dominated by sponges and soft corals, including a few observations of black coral; 3) *Madracis* spp., a deep water scleractinian coral, was observed to be patchily distributed in the deepest dive area (Dive 2095).

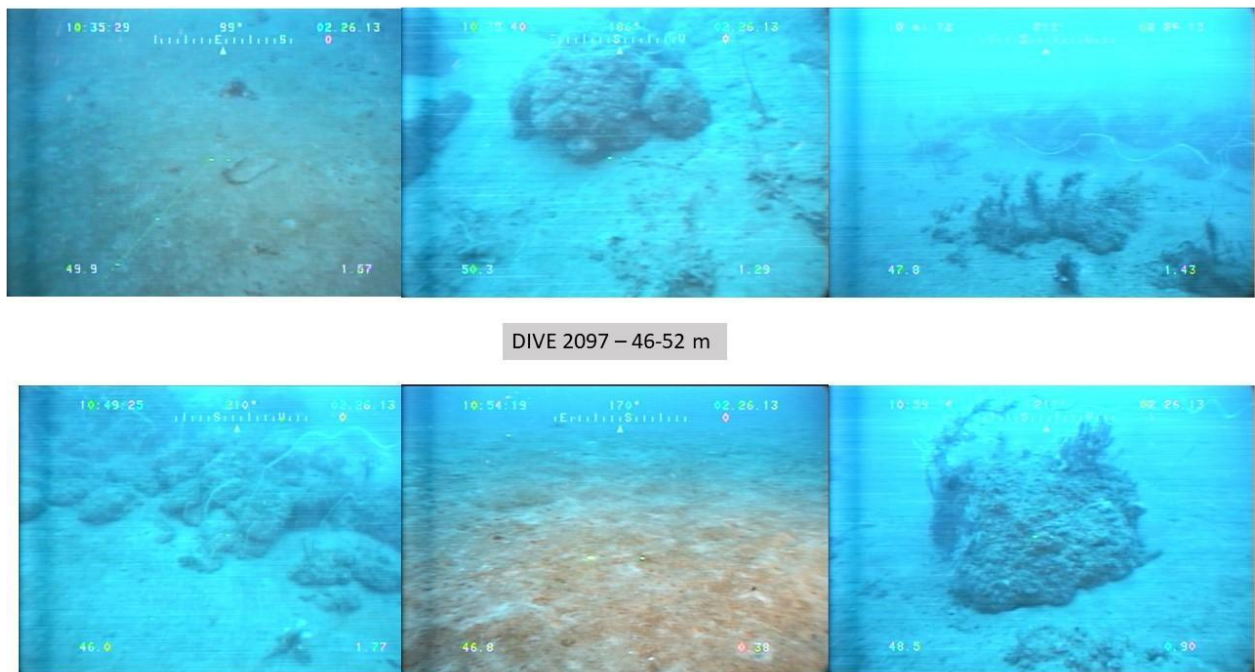


Figure 8. Representative images from Dive 2097



DIVE 2099 – 67-83 m



Figure 9. Representative images from Dive 2099



DIVE 2095 – 95-110 m



Figure 10. Representative images from Dive 2095

Habitat Quality of Shallow Areas Outside of Scow Path

Although vessel entry limitations precluded examination of multiple areas along the Mayagüez Harbor Entrance Channel, ROV video (Dive 2096) was taken in shallow water (10 - 32m) north of the green navigational aid marking the seaward extent of the entrance channel. The area covered in this dive is outside of the path taken by scows to the Mayagüez ODMDS. In general, the video showed that the area is a degraded coral reef that hosts ESA-listed coral species (*Orbicella* spp and *M. ferox*) and a fairly rich community of sponges and soft corals, particularly at depths above 20 m. Large *Agaricia* colonies were prevalent in areas of the survey. No live or dead acroporid corals were observed. Overall health of the reef appeared to be stressed and a lot of dead coral was visible.



Figure 11. Representative images from Dive 2096

The results of the Mayagüez survey clearly support the presence of both ESA-listed species and EFH outside the navigation channel, and that these high value habitats do not occur elsewhere along the direct route to the Mayagüez ODMDS. **Because of navigational safety concerns, scows must use the channel and therefore EPA cannot alter the scow paths landward of the entrance channel markers. Upon leaving the entrance channel, scows will quickly be over deep water that does not support shelf edge reef habitats or ESA-listed corals. Therefore, no designated scow path will be imposed upon dredged material transporters to the Mayagüez ODMDS.**

Ponce Harbor ODMDS

As shown in Figure 12, the Ponce Harbor, PR ODMDS lies seaward of the depth limits associated with ESA-listed coral and shelf edge resources. However, the shelf edge extends southward in the vicinity of the northern boundary of the Ponce ODMDS and bottom above the lower range of ESA corals is present within 0.25 nm of the northern boundary of the ODMDS.

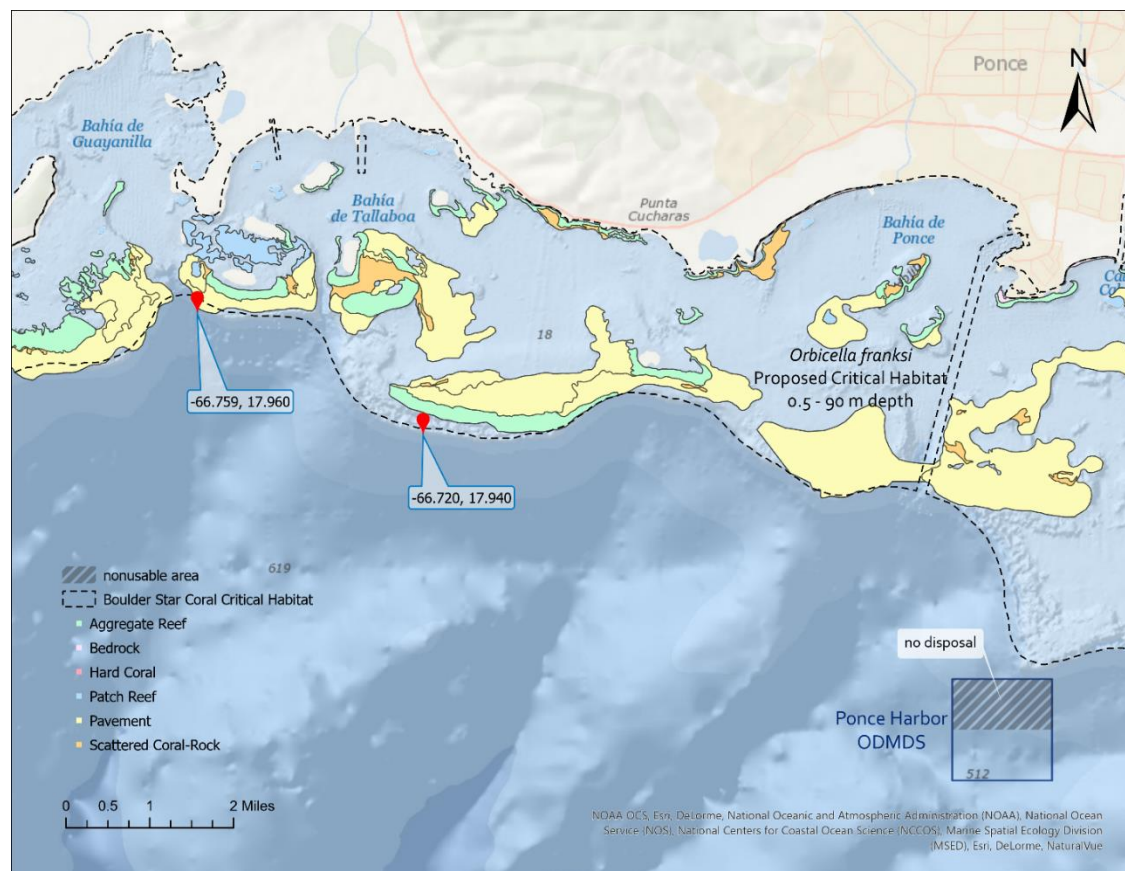


Figure 12. Position of Ponce Harbor, PR ODMDS shown along with boulder star coral critical habitat outlined with a dashed line and NOAA mapped coral reef and hard bottom habitat from available GIS layer dated 2016-2017. The northern half of the ODMDS is not to be utilized as per SMMP to prevent any impacts to the potential coral reef habitat in the shallower area close to the northeast corner (shown in the map by the boulder star coral critical habitat line along 90 m depth isobath). Transit route restriction points shown for potential route from Guayanilla Harbor to the Ponce Harbor ODMDS. Barges transporting dredged material from Guayanilla Harbor to the Ponce ODMDS will be required to maintain a line of transit to pass south of 17° 57.66 N and 66° 45.54 W as well as 17° 56.4 N and 66° 43.2 W.

Bottom habitat mapping in the Ponce Harbor vicinity has been conducted by NOAA. The results of that mapping effort are reflected in the GIS layer included in the map. There has been confirmed coral reef and hard bottom/pavement located within and adjacent to the channel out of Ponce Harbor. There is no option for barges but to transit within the channel to safely exit the harbor area. However, at the end of the channel, barges are immediately in deep water and will not cross any shallow areas taking the most direct route to the Ponce ODMDS.

Because of navigational safety concerns, scows must use the channel and therefore EPA cannot alter the scow paths landward of the entrance channel markers. Upon leaving the entrance channel, scows will immediately be over deep water that does not support shelf edge reef habitats or ESA-listed corals. Therefore, no designated scow path will be imposed upon contractors transporting dredged material to the Ponce ODMDS from Ponce Harbor. In anticipation of future projects in Guayanilla Harbor, the SMMP imposes a transit restriction to avoid transiting over the shelf edge habitats along the coast in between Guayanilla and the Ponce Harbor, PR ODMDS. Barges transporting dredged material from Guayanilla Harbor to the Ponce Harbor, PR ODMDS will be required to maintain a line of transit to pass south of 17 57.66 °N and 66 45.54 °W as well as 17 56.4 °N and 66 43.2 °W (Figure 12).

To minimize the potential for impacts to ESA corals and shelf edge EFH, the SMMP restricts disposal activities to the southern half of the Ponce Harbor, PR ODMDS. This restriction serves to maximize the distance of any disposal activities from the shallower shelf areas to the northeast corner of the site and also ensures the direct transit route from the Ponce Harbor entrance channel avoids these areas and stays over deep water.

ROV work is planned for spring 2022 in the Ponce Harbor area as a part of the next survey to gather further data on bottom habitat types and locations of coral reefs.

San Juan Harbor ODMDs

As shown in Figure 13, the south boundary of the San Juan Harbor, PR ODMDs lies 0.25 nm seaward of the depth limits associated with ESA-listed coral and shelf edge EFH. Benthic habitat classification conducted by NOAA identified coral habitats to be present in shallow, nearshore areas west of the harbor entrance.

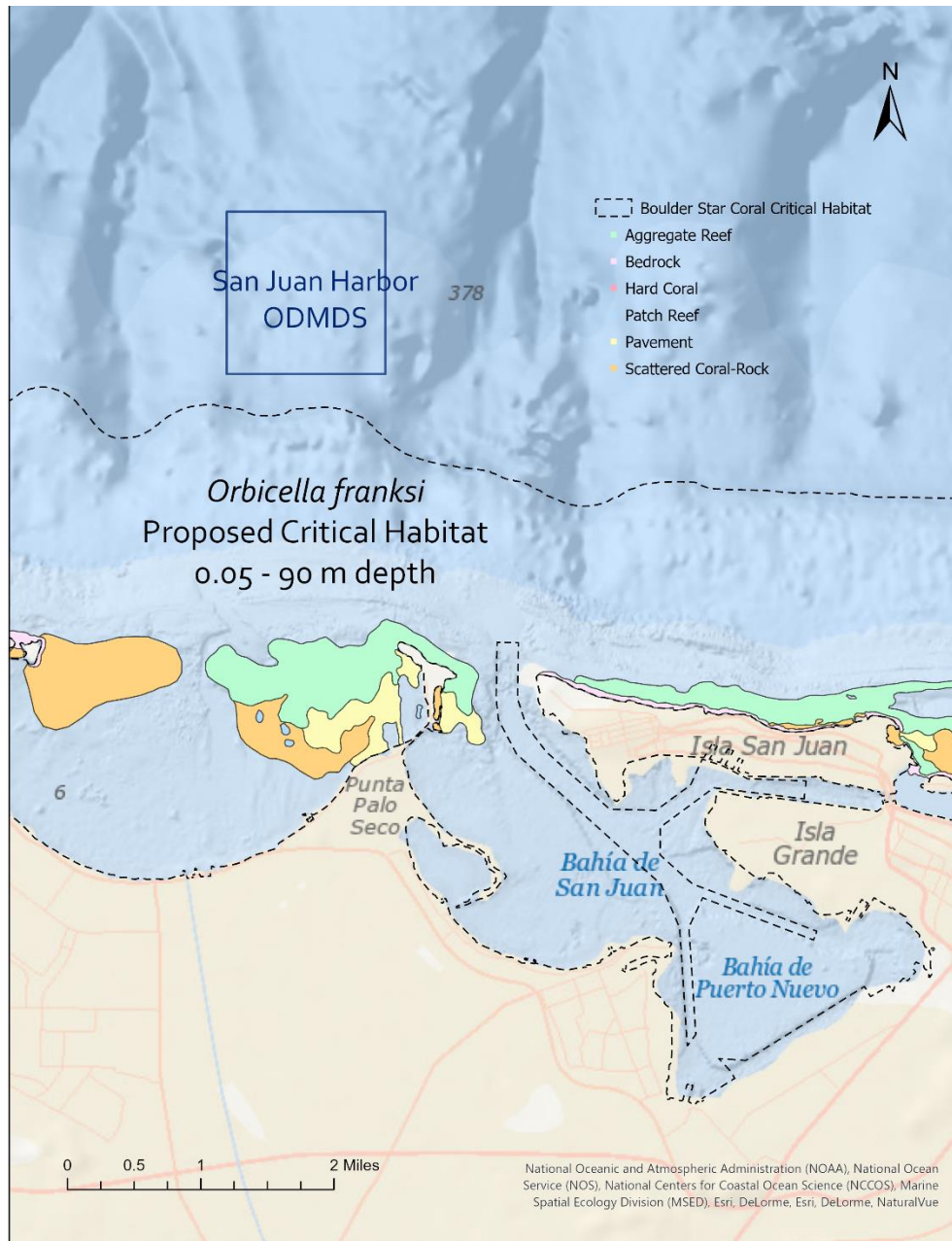


Figure 13. Position of San Juan Harbor, PR ODMDs shown along with boulder star coral critical habitat outlined with a dashed line and NOAA mapped coral reef and hard bottom habitat from available GIS layer dated 2016-2017.

In 2013, EPA conducted a survey using multibeam and a video-equipped ROV to collect information on bottom types and coral locations along barge routes to the San Juan Harbor, PR ODMDS. Figure 14 shows multibeam bathymetry and the location of ROV dives made in 2013 to evaluate habitat quality in hard bottom areas around and along the approach to the site.

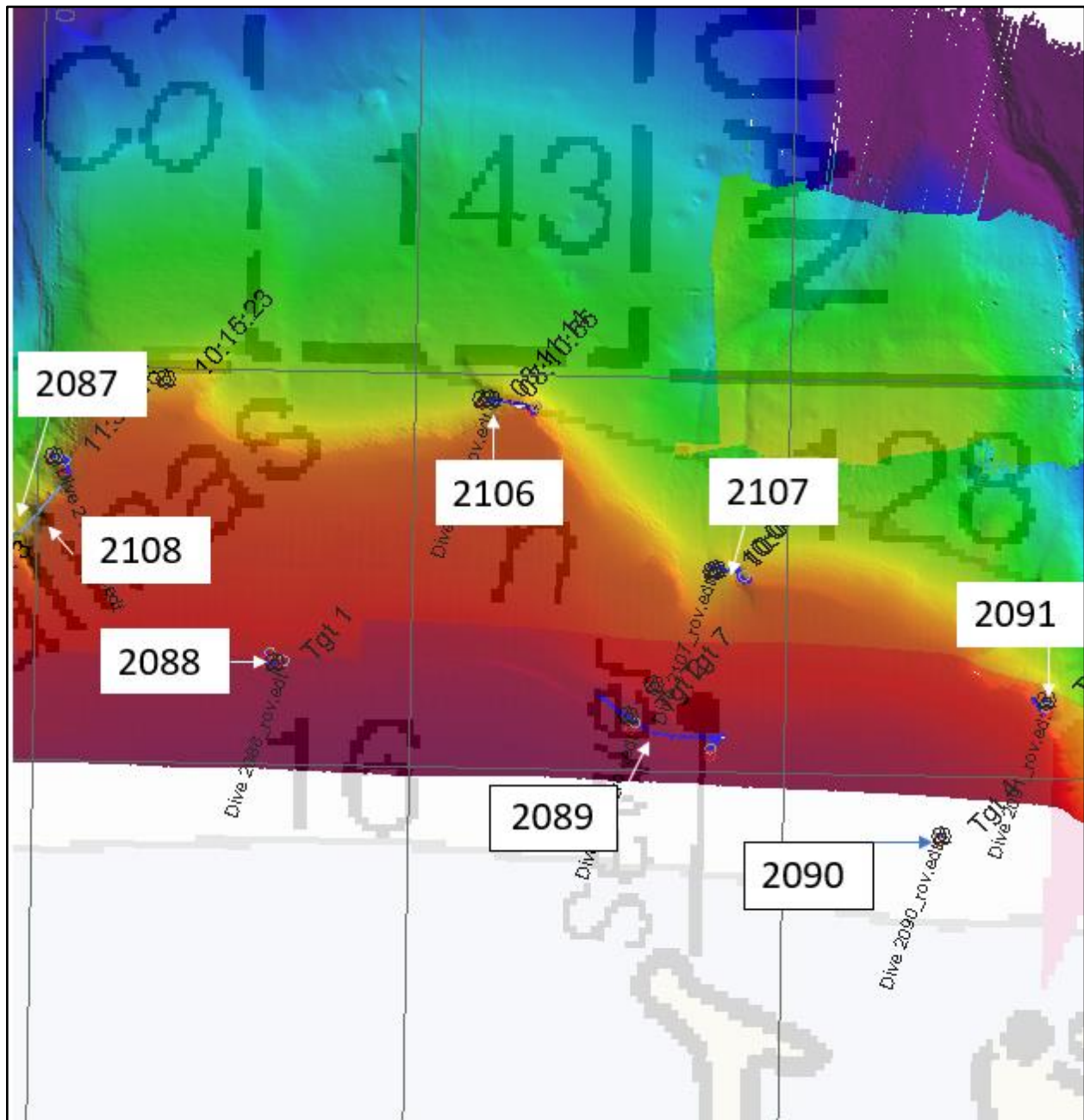


Figure 14. Multibeam bathymetry and location of ROV dives made in 2013 (Dive 2089 was an ocean outfall inspection; Dive 2086 was made just west of Dive 2087).

The 2013 multibeam and ROV survey of benthic habitats along the transit route to the San Juan Harbor, PR ODMDS found no significant hard bottom habitat along the most direct route. Dives 2106 and 2107 were made along the most direct route to the ODMDS (see Figure 14) and did not identify any live rock/reef or ESA-listed or other corals (see Figure 15). Although not within the transit path of scows, EPA did identify and characterize hard bottom habitat at a location north of the direct route between San Juan Harbor and the ODMDS (Dive 2090). This area was shown to be rock that was predominantly covered by algae (see Figure 16).



Figure 15. Representative images of bottom habitat outside San Juan Harbor, PR ODMDS (Panel A shows images obtained during Dive 2106. Panel B shows representative images obtained during Dive 2107).

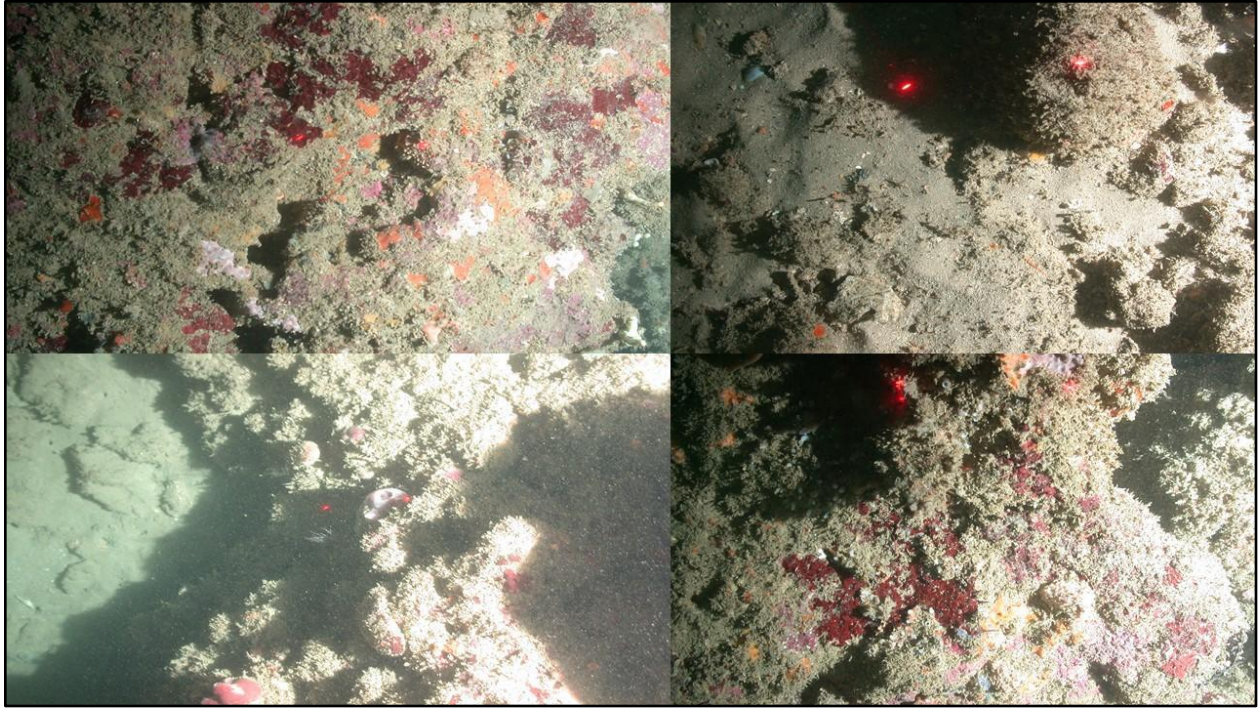


Figure 16. Images of hardbottom feature obtained at location north of direct route to San Juan Harbor, PR ODMDs in approach to San Juan Harbor (Dive 2090)

Because of navigational safety concerns, scows must use the channel and therefore EPA cannot alter the scow paths landward of the entrance channel markers. Upon leaving the entrance channel, scows will immediately be over areas with no significant hard bottom habitat that do not support shelf edge reef habitats or ESA-listed corals. Therefore, no designated scow path will be imposed upon dredged material transporters to the San Juan Harbor, PR ODMDs as the most direct route has least potential impacts to coral reefs.

Yabucoa Harbor, PR ODMDS

As shown in Figure 17, the Yabucoa Harbor, PR ODMDS lies approximately 1 nm seaward of the depth limits associated with ESA-listed coral and shelf edge EFH. However, the shelf edge extends southward across the most direct route between the Yabucoa Harbor entrance channel and the ODMDS.

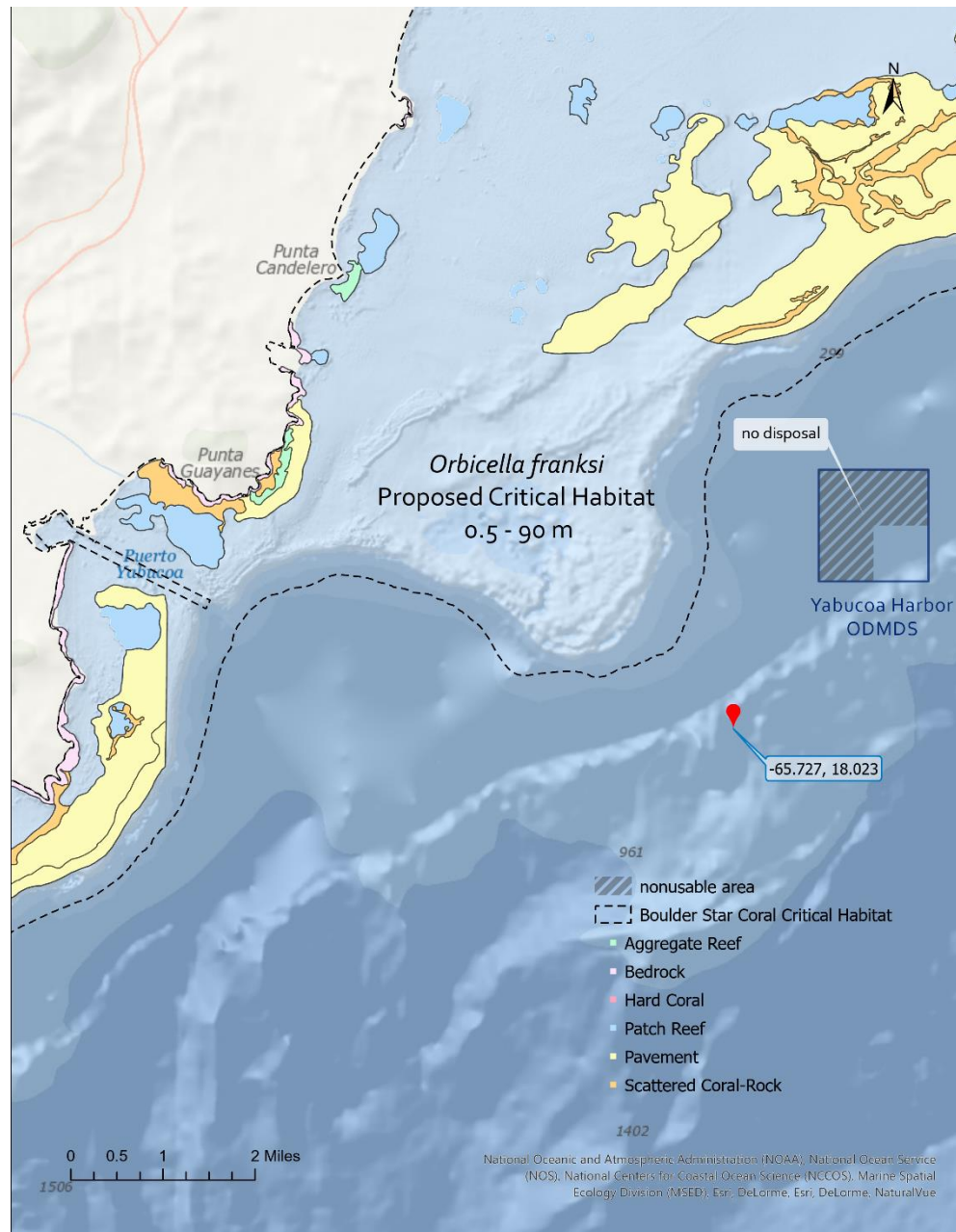


Figure 17. Position of Yabucoa Harbor, PR ODMDS shown along with boulder star coral critical habitat outlined with a dashed line and NOAA mapped coral reef and hard bottom habitat from available GIS layer dated 2016-2017. Only the southeastern quadrant of the ODMDS is to be utilized as per the SMMP to limit disposal to the deeper southeastern corner of the site and prevent any impacts to shallower potential coral reef habitat areas to the north and west of the ODMDS. Coordinates shown mark point for transit restriction: scows carrying dredged material will be required to maintain a line of transit south of 65° 43.62 W 18° 1.38 N.

The results of NOAA's bottom habitat mapping in the Yabucoa Harbor vicinity are reflected in the GIS layer included in Figure 17. In 2006, EPA identified various contiguous areas of high and low relief along the shelf edge areas north and west of the Yabucoa Harbor, PR ODMDS (Figure 18). A towed video camera revealed high relief areas to be well defined spur and groove *Acropora* reef. EPA also deployed an ADCP during that survey which showed that currents were mostly away from reef areas, especially at depth. The documented presence (as of 2006) of these habitats justifies SMMP measures to reduce the potential impacts to shelf edge areas that have historically (pending confirmation) supported ESA-listed coral species and coral reef EFH.

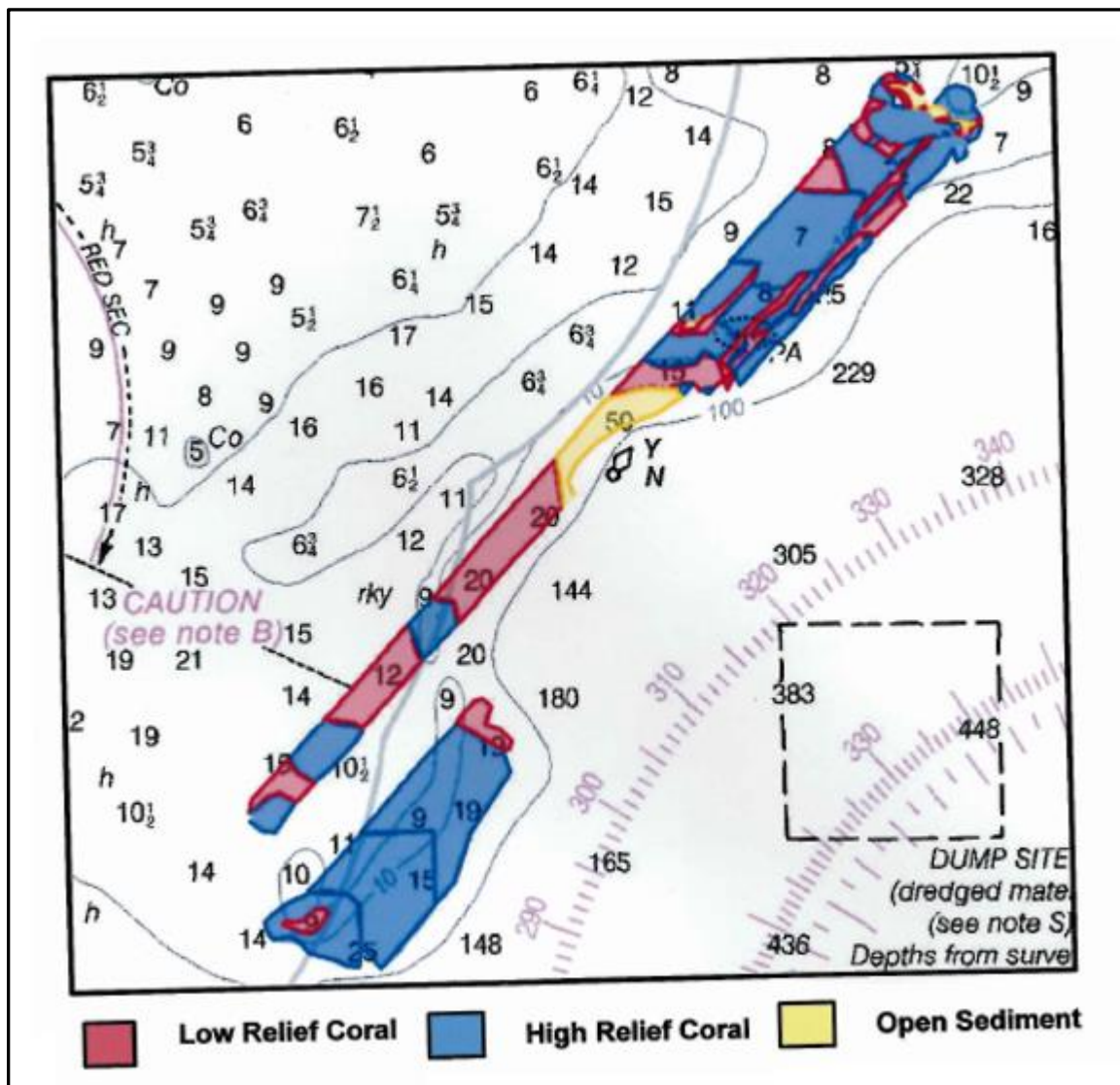


Figure 18. Shelf edge EFH near Yabucoa Harbor, PR ODMDS identified using side scan SONAR in 2006.

The combined SMMP restricts disposal to the southeastern quadrant of the Yabucoa Harbor, PR ODMDs to further minimize the potential for transport of sediments into shelf edge habitats following disposal. The SMMP also imposes a transit restriction to require barges to maintain a line of transit to pass south of 65° 43.62 W 18° 1.38 N (see Figure 17) to avoid transiting over the shelf edge habitats north and west of the Yabucoa Harbor, PR ODMDs.

Conclusions regarding ESA-listed coral species and coral reef EFH and Relevant SMMP Provisions

This review recognizes the presence of designated critical habitat for ESA-listed coral species and coral reef EFH along barge transit routes to all five Puerto Rico ODMDs. Results of the review also support the presence of coral reefs adjacent to harbor entrance channels. The review finds that the ODMDs themselves are not located in depths in which any ESA-listed coral species typically occurs and are beyond the extent of any designated critical habitat depth range.

EPA and the U.S. Army Corps of Engineers recognize the need to protect shelf edge species, including ESA-listed corals and coral reef EFH, located outside the margins of harbor entrance channels from dredged material releases from leaking barges or scow malfunctions and the potential for sedimentation onto nearby shelf areas resulting from discharges at the sites themselves. The SMMP enacts a combination of measures to minimize the potential risk of releases of sediment into the water column close to ESA-listed corals or coral reef EFH: transit route restrictions, site use restrictions, and automated surveillance of scow draft and position information.

The SMMP implements restrictions on usage of the Ponce Harbor, PR and Yabucoa Harbor, PR ODMDs that restrict dredged material discharges to the portions of the ODMDs that are located in deeper water and furthest removed from the shelf edge.

Transit route restrictions required by the SMMP for scows transiting between Arecibo Harbor, Guayanilla Harbor, and Yabucoa Harbor and the ODMDs will prevent scows from traveling over identified or likely coral reef areas once the barges have exited the channel out of the harbor. EPA will incorporate additional video information as well as future benthic mapping data by NOAA into decision making for site management. Future monitoring efforts will include collection of additional video, including outside the Ponce and Yabucoa Harbor, PR ODMDs in a CY2022 survey. This information will be used to determine whether additional site management actions will be enacted to minimize risks to ESA-listed coral species, coral reef, and hard bottom habitat.

To ensure that dredging contractors are abiding by these protective measures, the SMMP includes stringent requirements for automated surveillance of scow draft and position data and reporting that will allow EPA to quickly detect and correct any operational problems or violations. The efficacy of this system was previously demonstrated by the detection of barge leakage during the construction of the Port of Las Americas in Ponce Harbor in 2003 which resulted in an immediate halt to operations, rapid correction of the problem, and EPA enforcement against the Port and its contractor. Since that time, more than 1000 scow trips have been made between dredging projects in San Juan, Mayagüez, and Arecibo harbors and their respective ODMDs without incident.

NON-CORAL ESA-LISTED AQUATIC SPECIES (FISH/SHARK/RAYS, MARINE MAMMALS AND SEA TURTLES)

Fish, Shark, and Ray Species

There are four ESA-listed species of fish (including sharks and rays):

- a. Nassau Grouper - A reef fish listed as threatened under the Endangered Species Act. Adults are found at low densities in reef habitat throughout the Caribbean. Nassau grouper larvae are planktonic and juveniles live in seagrass and macroalgal habitats in shallow coastal water.
- b. Giant Manta Ray - An Endangered Species Act Threatened listed species with worldwide distribution in tropical, subtropical, and temperate bodies of water; the giant manta ray is especially found in productive coastal waters. The giant manta ray is a filter feeder that feeds on zooplankton in both shallow (<10 m) and deeper (200-450 m, and capable of >1,000 m) waters.
- c. Oceanic Whitetip Shark - A pelagic large shark listed as threatened under the Endangered Species Act. Oceanic whitetip sharks are found in tropical and subtropical oceans offshore, on the outer continental shelf, or in waters surrounding islands with depths of at least 600 ft. Oceanic whitetip sharks are surface-dwelling sharks found from the surface to several hundred feet deep (at least 498 ft).
- d. Scalloped Hammerhead Shark - A large shark listed as endangered and threatened under the Endangered Species Act. The distinct population segment for the central and southwest Atlantic, including waters of Puerto Rico, is ESA-listed as threatened. There are no marine areas deemed critical habitat within the jurisdiction of the United States for scalloped hammerhead sharks. Scalloped hammerhead sharks live in warm coastal temperate and tropical oceans, ranging from intertidal to continental shelves and adjacent deeper water.

The four ESA-listed species of fish, sharks, and rays (Nassau grouper, giant manta ray, oceanic whitetip shark, and scalloped hammerhead shark) present in Puerto Rican waters are highly mobile species that will choose foraging habitat with favorable characteristics and can avoid ODMDs if conditions during or following dredged material disposal are unfavorable. Consistent with the conclusions of the 2020 SARBO, the transient and localized water quality degradations resulting from disposal activities at the ODMDs will not have an adverse impact on these highly mobile organisms. Potential impacts to the Nassau grouper, a reef fish, will be further minimized by the policies set in place to protect coral reef habitat along the transit routes.

Manatee

The ESA-listed West Indian (Antillean) manatee (*Trichechus manatus manatus*) frequent shallow coastal areas of Puerto Rico, including bays, and generally do not occur in deeper offshore waters. Nevertheless, manatees are occasionally sighted offshore, so the possibility exists that manatees could be present in waters of the Puerto Rico ODMDs. Manatee encounters are more likely to occur within the harbors near the dredging sites (which is outside the scope of this consultation and should be

addressed in dredging project-specific consultations) or in the harbor entrance channel. Their surface basking behavior and slow swimming speeds put them at potential risk to vessel strikes. SMMP provisions to protect manatees are discussed at the conclusion of this section.

Whales

Fin whales (*Balaenoptera physalus*), sperm whales (*Physeter macrocephalus*), sei whales (*Balaenoptera borealis*), and blue whales (*Balaenoptera musculus*) are all ESA-listed endangered large whale species with ranges that include waters of Puerto Rico. However, none of these species are known to breed or be commonly found in large numbers near Puerto Rico.

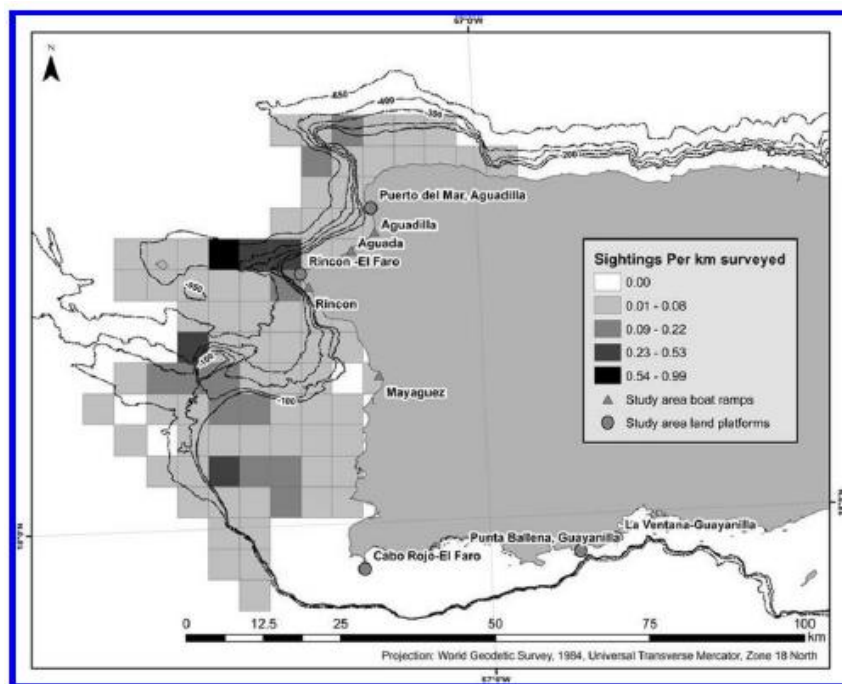


Figure 19. North Atlantic humpback whale (*Megaptera novaeangliae*) sightings per unit effort from 2012 to 2014 (from MacKay et al. 2016. North Atlantic humpback whale (*M. novaeangliae*) hotspots defined by bathymetric features off western Puerto Rico) Can. J. Zool. 94:517-527)

Humpback whales (*Megaptera novaeangliae*) are present in waters off the coast of Puerto Rico during migration in the winter months (January-mid-March). The North Atlantic population that mates and calves in the West Indies is considered not at risk in terms of its population status. During the winter migration period, humpbacks are often seen spy hopping and engaging in other social display behaviors. Newborn calves may accompany female whales. Whales can pass within less than 1 mile of shore but are also observed further offshore. Presence of humpback whales is possible in proximity to all five Puerto Rico ODMDs, but is most common near the Mayagüez ODMD. Waters off Mayagüez are regularly visited by migrating humpback whales. While whales can occur throughout the Mona Passage, their distribution is not entirely random. In a multiyear study, observing humpback whale distributions

off western Puerto Rico, Mackay *et al.* identified areas further north (Rincon), south (Cabo Rojo) and offshore (Bajo de Sico) of Mayagüez as primary locations where humpbacks aggregate during their time in Puerto Rican waters (see Figure 20). Aggregation areas are related to the presence of substantial bathymetric features (e.g. seamounts and steep slopes). The study characterized the area in which the Mayagüez ODMDS and the Mayagüez Harbor entrance are located as an area that is used to a significantly lesser extent by humpbacks. The study also reported that other species can occasionally co-occur with humpbacks. These co-occurring species include pilot whales and Atlantic spotted dolphins (M. Mackay, pers.comm.)

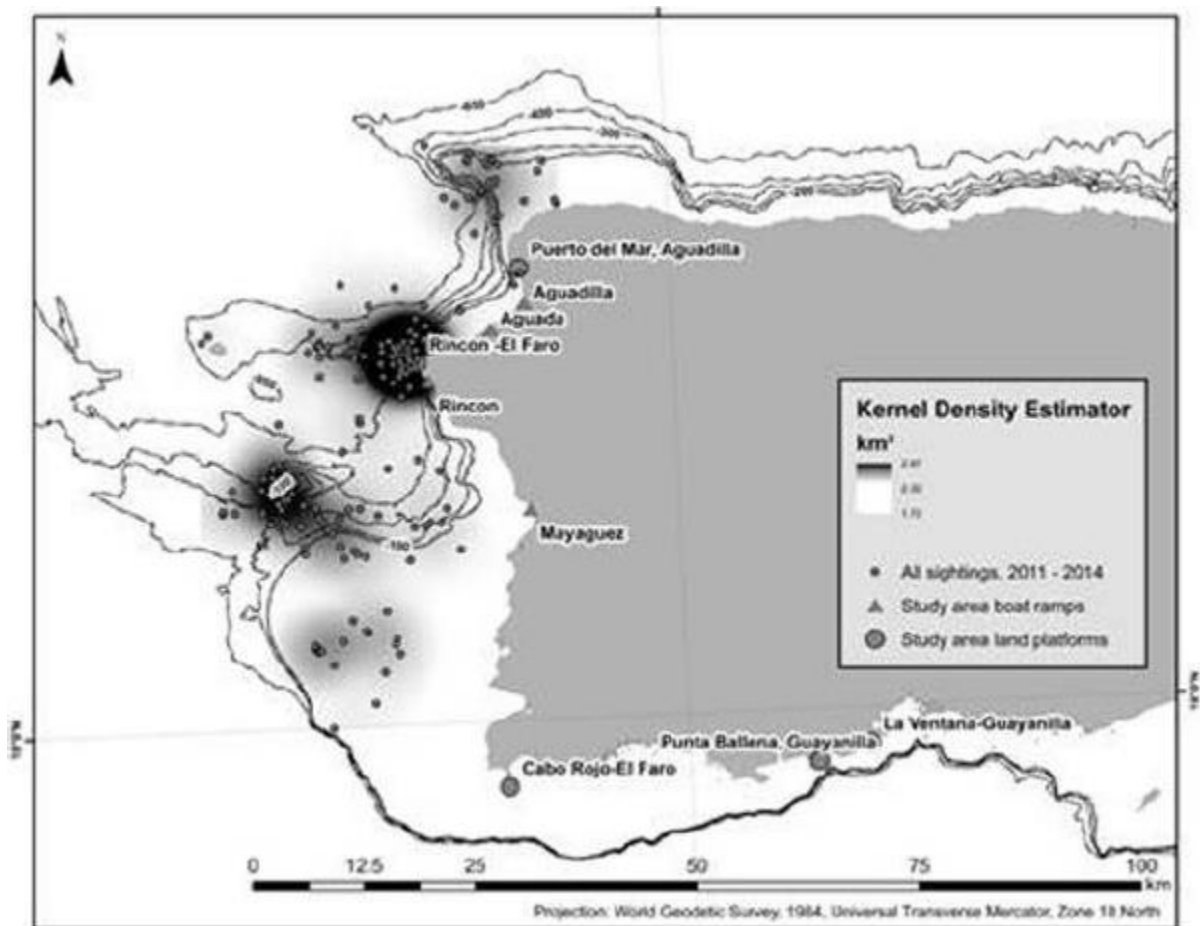


Figure 20. Model result estimating density of humpback whales based on sightings per unit effort from 2012 to 2014 (from MacKay et al. 2016. North Atlantic humpback whale (*Megaptera novaeangliae*) hotspots defined by bathymetric features off western Puerto Rico) Can. J. Zool. 94:517-527)

Sea Turtles

Five species of sea turtles are also known to occur in Puerto Rican waters: green (*Chelonia mydas*) hawksbill (*Eretmochelys imbricata*); leatherback (*Dermochelys coriacea*); loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*). The latter two of these species are significantly less frequently observed in Puerto Rican waters. Of the more commonly observed species, green sea turtles, are ESA-listed as Threatened and leatherback and hawksbill sea turtles are ESA-listed as Endangered. Waters at the Puerto Rico ODMDs are too deep to provide foraging habitat for juveniles and adults of green, hawksbill or leatherback turtles; however, they can be expected to be transiting through these areas and post-hatchling green and hawksbill turtles may be associated with rafts of *Sargassum*. Juvenile and adult green and hawksbill turtles utilize ledges in coral reefs for shelter from predators and hawksbill turtles feed on sponges and other reef organisms. Individual green and hawksbill turtles may be found in nearshore reefs outside of the harbors associated with each ODMD. Juvenile and subadult green turtles primarily feed on seagrasses (turtle grass, *Thalassia testudinum*, and other species) growing in beds found in shallow coastal waters.

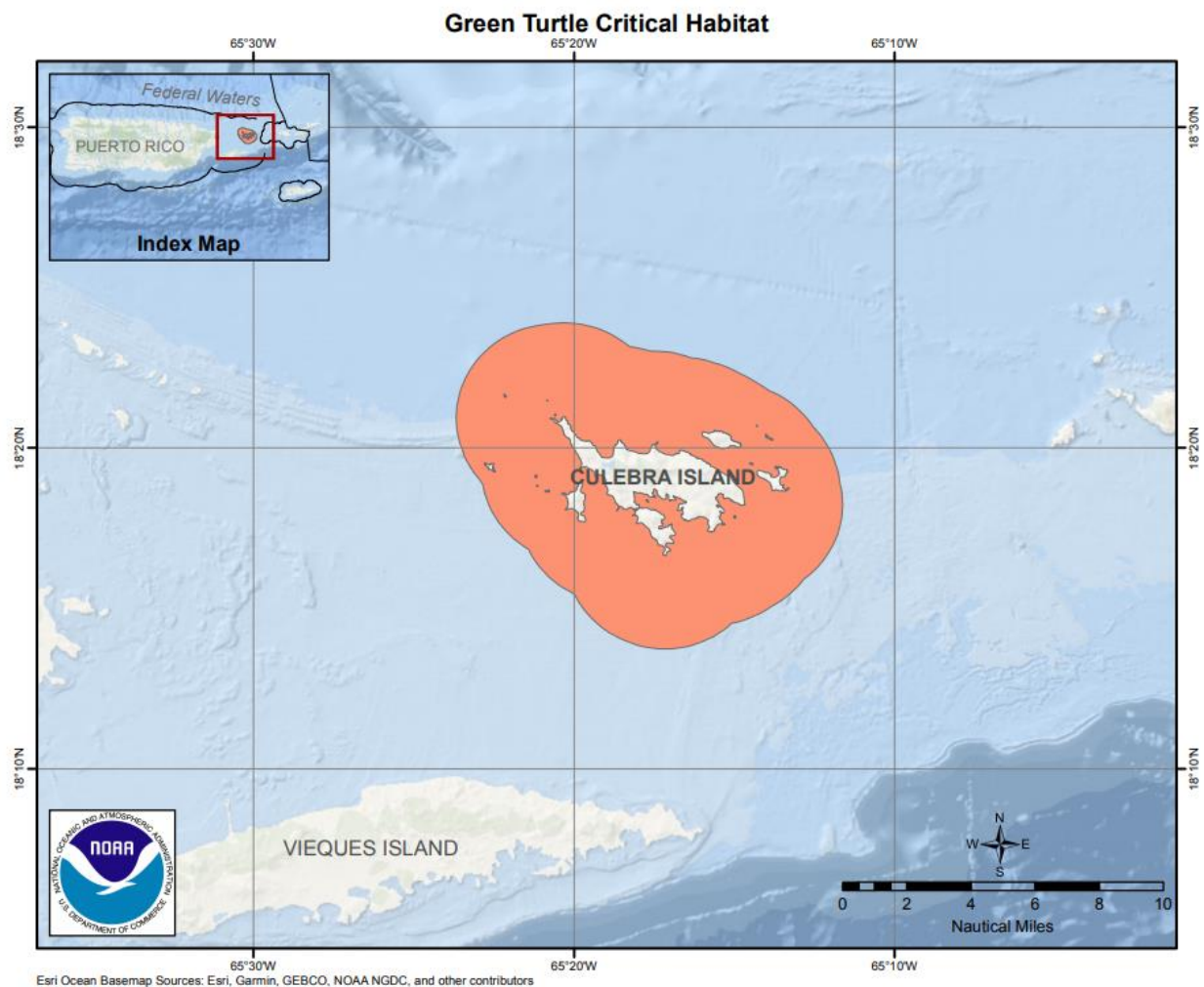


Figure 21. Green sea turtle critical habitat in Puerto Rico.

The coastal waters surrounding Culebra Island are designated as Critical Habitat for green turtles because the seagrass beds in the Culebra archipelago serve as developmental habitat for green turtles, supporting juvenile and subadult green turtle populations along with a small population of adults. The coastal waters of Culebra also support hawksbill and leatherback turtles by providing habitat of nearshore reefs and access to nesting beaches. The closest ODMDS to the Critical Habitat surrounding Culebra is Yabucoa Harbor ODMDS, 28 miles away to the southwest, on the eastern coast of Puerto Rico.

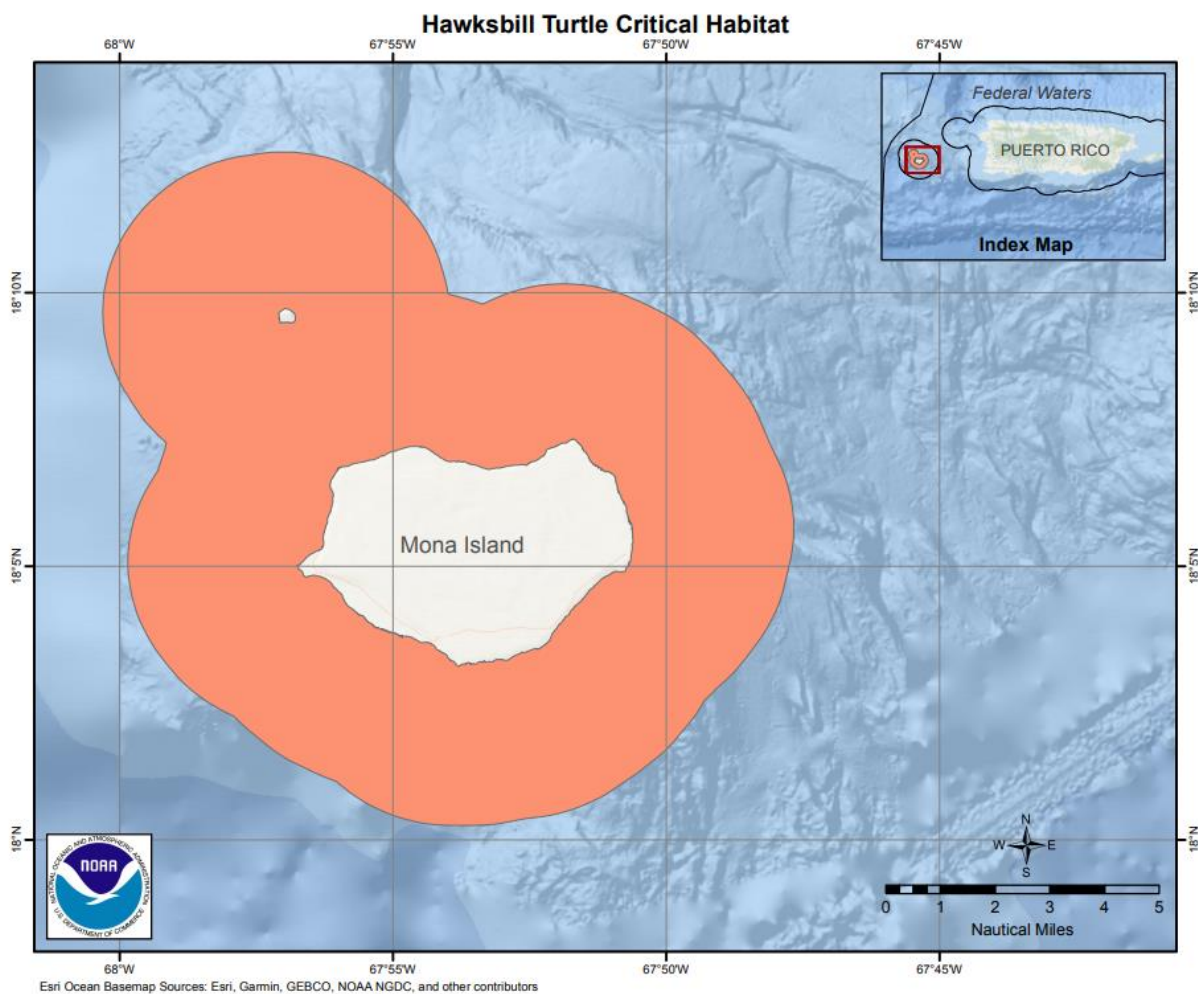


Figure 22. Hawksbill turtle critical habitat in Puerto Rico.

The waters surrounding Mona and Monito Islands are designated as Critical Habitat for the hawksbill turtle. These waters contain coral reefs where hawksbill turtles occur at higher density than elsewhere in the Caribbean. These waters also support a small green turtle population. The Critical Habitat area around Mona and Monito Islands is located 38 miles southwest of Mayagüez Harbor ODMDS. Because beaches along the northern west coast of Puerto Rico are important nesting sites for hawksbill and leatherback sea turtles (and Mona Island is a primary nesting area for hawksbill), their incidence in deeper nearshore areas, like the Mayagüez ODMDS, can be expected to be accordingly higher during the

nesting season-which extends from March to August (information taken from Dow et al. (2007) Sea Turtle Nesting in the Wider Caribbean Region. WIDECAST Technical Report No. 6).

EPA and the U.S. Army Corps of Engineers recognize that in addition to unobstructed sandy beaches for egg-laying, sea turtles need healthy coral reef, seagrass and hard-bottom habitats for food and refuge.

Conclusions regarding ESA-listed mammals and turtles

The results of this review support the potential presence of ESA-listed marine mammals and turtles along the transit routes to the ODMDs and within the ODMDs. The review however also establishes that the ODMDs are not located in an area in which these species are expected to occur in other than a transitory manner (i.e. they do not aggregate at the ODMDs).

Nevertheless, EPA and the U.S. Army Corps of Engineers recognize the need to protect ESA-listed marine mammal and turtle species from dredged material disposal-related risks and have incorporated provisions into the SMMP to provide such protections. Specifically, the SMMP requires that an ESA-certified observer accompany each scow transiting between the project area and an ODMD. This trained observer is authorized and required to halt operations if any of ESA-species is observed during loading, transit, or disposal operations. Operations are to remain suspended until the animal has left the project area on its own. Furthermore, the SMMP incorporates as an attachment and requires adherence to the latest version of NOAA/NMFS Southeast Region's guidance document "Vessel Strike Avoidance Measures and Reporting for Mariners."

The SMMP requirement to compel dredging contractors to employ trained ESA observers and to adhere to the vessel strike avoidance guidelines will minimize the risk to marine mammals and turtles. In addition, measures to avoid impacts to shelf edge habitat will have secondary benefits to turtles and manatees by avoiding further degradation of this habitat due to dredged material transport operations.

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