OCS EIS/EA
BOEM 2013-01140

Lease Issuance for Marine Hydrokinetic Technology Testing on the Outer Continental Shelf Offshore Florida

Revised Environmental Assessment

U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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Published by

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August 2013

FINDING OF NO SIGNIIFCANT IMPACT

Lease Issuance for Marine Hydrokinetic Technology Testing on the Outer Continental Shelf Offshore Florida

INTRODUCTION

The United States Department of the Interior (USDOI), Bureau of Ocean Energy Management (BOEM) prepared an environmental assessment (EA) to determine whether the issuance of a lease that would authorize technology testing within an area offshore Florida would have a significant effect on the environment and whether an environmental impact statement (EIS) must be prepared. BOEM conducted its analysis to comply with the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, the Council on Environmental Quality (CEQ) regulations at 40 CFR 1501.3(b) and 1508.9, DOI regulations implementing NEPA at 43 CFR 46, and USDOI Manual (DM) Chapter 15 (516 DM 15).

On April, 25, 2012, BOEM published a Notice of Availability (NOA) of the *Outer Continental Shelf (OCS) Renewable Energy Program Leasing for Marine Hydrokinetic Technology Testing Offshore Florida Environmental Assessment* (2012 EA) *(*77 FR 24734) for a 30-day comment period (see Section 4.1, Public Involvement). A public information meeting was held in Fort Lauderdale, Florida on May 9, 2012, to provide stakeholders an additional opportunity to offer comments on the EA. To address the comments received and consider new information and additional activities associated with the proposed action, BOEM has revised the 2012 EA (as summarized in Section 4.1.3 of the revised EA). This finding is accompanied by and cites the revised EA.

PURPOSE AND NEED

The purpose of issuing a lease to Florida Atlantic University Southeast National Marine Renewable Energy Center (FAU SNMREC) for OCS Blocks 7003, 7053, and 7054 is to authorize installation and operation of experimental devices and deployment of infrastructure to: (1) evaluate environmental and resource effects of operating ocean current turbines (OCT); (2) demonstrate and evaluate technology needs for further marine hydrokinetic (MHK) development; (3) develop and evaluate methodologies and procedures to safely and responsibly test experimental commercial devices; and (4) develop and refine tools to characterize performance, effects, and technologies necessary for MHK progress (Section 1.2, FAU, 2011). The proposed activities are needed to inform the future deployment of commercial-scale MHK energy production on the OCS, in this instance using the Florida Current.

NATURE OF THE ANALYSIS IN THE EA

The revised EA analyzes the reasonably foreseeable consequences of the following in the proposed OCS lease blocks (Figure 2.1):

(1) Site characterization surveys (i.e., biological and archeological surveys) that the lessee would undertake on the lease (which includes the use of vessels and equipment that would be necessary to conduct them);

(2) The lessee's installation, relocation and removal of mooring systems, which would utilize anchors, cables, and buoys; and

(3) The lessee's technology testing activities, which would involve turbine tow testing, deployment, maintenance, operations, relocation, and recovery.

BOEM's primary strategy for minimizing impacts to offshore cultural resources and biologically sensitive habitats has been and will continue to be avoidance. Based on the analysis in the EA (Section 3) and consultations (Section 4.3), several standard operating conditions are to be incorporated as lease stipulations to reduce or eliminate the potential environmental risks to or conflicts with individual environmental and socioeconomic resources. These standard operating conditions were developed through the analyses presented in Section 3.1 and through consultation with other Federal and state agencies. The revised EA considers the standard operating conditions to be part of the proposed action and alternatives (Section 2.1).

ALTERNATIVES CONSIDERED

Alternative A – Full Leasing of the OCS Blocks (the Proposed Action)

Alternative A (Section 2.1) is the proposed action which would authorize technology testing in the entirety of OCS Blocks 7003, 7053, and 7054 for limited term of five years. Under the proposed action, FAU SNMREC would first deploy a single-anchor mooring attached to a mooring and telemetry buoy (MTB), and test, for limited periods, equipment designed to use the Florida Current to generate electricity. The MTB, similar to NOMAD weather buoys, would be deployed at variable intervals throughout the year. FAU SNMREC then intends to deploy two additional MTBs at a later time during the lease period. The additional MTBs would be operational simultaneously with the first MTB. This would result in three total technology testing facilities operating on the leasehold at any one time.

The anticipated localized and temporary impacts to environmental and socioeconomic resources are detailed in Section 3.1 and include air quality (Section 3.1.1.1); water quality (Section 3.1.1.2); coastal habitats (Section 3.1.2.1); benthic habitat (Section 3.1.2.2); marine mammals (Section 3.1.2.3); sea turtles (3.1.2.4); avian resources (Section 3.1.2.5); bats (Section 3.1.2.6); fish and essential fish habitat (3.1.2.7); cultural resources (Section 3.1.3.1); commercial and recreational fishing activities (Section 3.1.3.2); recreational resources (Section 3.1.3.3); demographics and employment (Section 3.1.3.4); environmental justice (Section 3.1.3.5); and other uses of the OCS (Section 3.1.3.6). Impacts would range from negligible to minor due to the limited nature of the proposed activities (i.e., small project footprint and short duration) and efforts to identify and avoid sensitive seafloor habitats and cultural resources. These impact levels are from a four-level classification scheme to characterize the impacts predicted if the proposal is implemented and activities occur as described. This classification scheme is defined in the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (USDOI, MMS, 2007).

Prior to deployment of the MTB for in situ OCT testing, FAU SNMREC proposes to conduct tow testing of a small-scale experimental OCT concurrent with survey activities. Tow testing would take place in two phases. Phase 1of tow testing would evaluate simulated OCT behavior using the main body of the turbine, but replacing the rotor with a 1.5 meter (5 ft.) radius drogue chute. During Phase 2 of tow testing the electrical generation performance and system integration will be evaluated. Therefore, the electrical generator would be installed along with all control and monitoring equipment and a rotor. The likely location of both phases of towed testing is offshore Fort Pierce, Florida which is near FAU's Harbor Branch Oceanographic Institute (HBOI) campus.

Alternative B – Removal of High Vessel Traffic Area

Alternative B (Section 2.2) would exclude the high vessel traffic area in the northernmost 12 aliquots in OCS Block 7003, as identified by the Automatic Identification System (AIS) vessel tracking data set, and only authorize technology testing in OCS Blocks 7053 and 7054 and in the remaining 4 aliquots of OCS Block 7003. Removing the 12 aliquots amounts to a 25 percent reduction in the size of the proposed lease area compared to Alternative A. Under Alternative B, the testing facilities would not be located within the high vessel traffic area in the northern portion of OCS Block 7003, and therefore would pose no risk of any obstruction to navigation in that area. The risk of an allision with a MTB during this project would be reduced because an MTB would no longer be located in the area where the highest density of vessel traffic occurs. The risk of a collision with a survey or deployment vessel would also be slightly reduced due to the 1-3 percent reduction in survey vessel activity in the entire proposed lease area. Finally, under Alternative B, reducing the number of vessels trips (8 less) associated with geophysical surveys would result in a slight to no reduction in the negligible to minor impacts on the environmental and socioeconomic resources described under Alternative A.

Alternative C – Removal of Aliquot Containing High Slope Hardbottom Area (Preferred Alternative)

Alternative C (Section 2.3) would exclude aliquot 7054N and authorize technology testing in OCS Blocks 7003 and 7054 and in the remaining 15 aliquots of OCS Block 7054. Under Alternative C, the MTBs would not be located and OCT testing would not occur within aliquot 7054N because more than 50% of the seafloor contains high slope hardbottom area. While lease stipulations require the lessee to avoid potential sensitive benthic habitat, the exclusion of this aliquot would eliminate the risk of impacts to potentially sensitive high slope benthic habitats in that aliquot or a risk of obstruction to navigation from the MTBs, support vessels, and survey vessels. Due to the reduction of vessel traffic associated with less geophysical surveys there would also be a reduction in impacts from emissions and potential vessel strikes to protected resources compared to Alternative A.

Given the high density of high slope hardbottom habitat in aliquot 7054N and avoidance that BOEM would require, it is unlikely the excluded aliquot would contain sufficient area for mooring deployment. As a result BOEM has identified Alternative C, with the removal of aliquot 7054N, as the preferred alternative.

Alternative D – No Action

Alternative D (Section 2.4) is the no action alternative in which the proposed lease would not be issued and technology testing would not be authorized on the proposed leasehold at this time. Therefore, activities necessary to inform the future deployment of commercial-scale MHK energy production on the OCS, using the Florida Current, and any potential environmental and socioeconomic impacts from these activities would not occur at this time under this alternative.

SUPPORTING DOCUMENTS

The following environmental documents are available upon request or at www.boem.gov/:

Lease Issuance for Marine Hydrokinetic Technology Testing on the Outer Continental Shelf Offshore Florida, Revised Environmental Assessment. (USDOI, BOEM, OCS EIS/EA BOEM 2013-01140) (attached)

Atlantic OCS Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Draft Programmatic Environmental Impact Statement. (USDOI, BOEM, OCS EIS/EA BOEM 2012-005)

Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement. (USDOI, MMS, OCS EIS/EA 2007-046)

CONCLUSION

I have thoroughly considered the prominent issues and concerns identified in the EA and by the public and cooperating and consulting agencies in their comments, as well as the evaluation of the potential effects of the proposed action and alternatives in the attached EA. It is my determination that there are no substantial questions regarding the reasonably foreseeable impacts of the proposed action or alternatives, and that no reasonably foreseeable significant impacts are expected to occur as the result of the preferred alternative or any of the alternatives contemplated in the EA. It is therefore my determination that implementing the proposed action or any of the alternatives would not constitute a major federal action significantly affecting the quality of the human environment under Section 102(2)(C) of the National Environmental Policy Act of 1969. As a result, an EIS is not required, and I am issuing this finding of no significant impact.

8/8/2013
Date

Michelle Morin
Chief, Environment Branch for Renewable Energy
Office of Renewable Energy Programs

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1. INTRODUCTION

1.1. BOEM Authority and Regulatory Process

Subsection 8(p)(1)(C) of the Outer Continental Shelf (OCS) Lands Act (43 U.S.C. § 1337(p)(1)(3)), which was added by section 388 of the Energy Policy Act of 2005 (EPAct), gave the Secretary of the Interior the authority to issue leases, easements and rights-of-way on the OCS for activities which produce or support the production, transportation, or transmission of energy from sources other than oil and gas. This authority has been delegated to the Bureau of Ocean Energy Management (BOEM), formerly the Minerals Management Service (MMS) and the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE).

Leases issued under the interim policy, as described in the Notice of Intent (NOI) (76 FR 30184), are limited to the installation of meteorological, marine, or other resource data collection facilities and associated data collection activities, and the installation and operation of technology testing facilities. If an interim policy lease is issued, it would grant Florida Atlantic University's (FAU) Southeast National Marine Renewable Energy Center (SNMREC) the exclusive right, subject to the terms and conditions of the lease, to conduct data collection and technology testing activities only. FAU SNMREC would have a limited term (five years) for activities on the OCS and would retain no priority rights to subsequent development of a renewable energy facility for commercial-scale generation. FAU SNMREC does not intend to further develop the proposed project location for future commercial-scale energy production or for testing technologies requiring cabling. Any BOEM authorizations for commercial-scale renewable energy facilities would be processed independently in accordance with subsection 8(p) of the OCS Lands Act and the associated implementing regulations by BOEM.

1.2. Development of the Proposed Action

EPAct requires BOEM to issue renewable energy leases competitively, unless the agency determines, after public notice of a proposed lease area that no competitive interest exists. In 2007, BOEM published a Request for Information and Nominations (72 FR 62673, November 6, 2007) to solicit nominations of interest for potential projects under the interim policy, to which FAU SNMREC responded by nominating 20 OCS blocks for an ocean current testing. After assessing responses to an additional *Federal Register* notice to solicit both comments and competing nominations (73 FR 21152, April 18, 2008), BOEM announced that there was no competitive interest in FAU SNMREC's originally proposed lease area.

On August 23, 2011, FAU SNMREC submitted an application to BOEM for a lease to conduct marine hydrokinetic (MHK) technology testing on the OCS in Official Protraction Diagram NG 17–06, Blocks 7003, 7053, and 7054, located approximately 16.7 to 27.8 kilometers (km; 9.0 to 15.0 nautical miles [nm]) offshore of Fort Lauderdale, Florida (*see* Figure 2.1).

This area is a subset of the 20 OCS lease blocks that were available to FAU SNMREC for leasing. These three lease blocks were selected due to the presence of acceptable current velocities between 0.5 to 2.0 m/s (Section 1.3.1, FAU, 2011) and avoidance of sensitive benthic marine habitats to the east on the escarpment of the Miami Terrace (*see* Section 3.1.2.2). These OCS blocks were chosen by FAU SNMREC because:

1. They are located near the core of the Florida Current;

2. The location is offshore FAU's SeaTech campus in Dania Beach, thus providing ready access to and monitoring capabilities for all offshore activities. This location also allows for quick response from shore to the lease area;
3. The location is outside of shipping lanes, military reservations, and other high-use areas;
4. Preliminary surveys of the area suggest that the anchor can be located in a recessed area on the Miami Terrace with low benthic populations; and
5. The bottom in the initially proposed location is relatively flat and appears to be largely sandy, soft-bottom habitat.

The proposed project would focus on the testing of technologies that take advantage of ocean currents. Submerged turbines, similar in function to wind turbines, would capture energy through the processes of hydrodynamic, rather than aerodynamic, lift or drag (USDOI, MMS, 2007). The proposed lease would specifically authorize FAU SNMREC to deploy three single-anchor moorings systems attached to mooring and telemetry buoys (MTBs), and test, for limited periods, equipment designed to use the Florida Current to generate electricity on the proposed leasehold. These MTBs are similar to the Navy Oceanographic Meteorological Automatic Device (NOMAD) weather buoys currently deployed throughout U.S. waters.

1.3. Purpose and Need

The purpose of issuing a lease to FAU SNMREC for OCS Blocks 7003, 7053, and 7054 is to authorize installation and operation of experimental devices and deployment of infrastructure to: (1) evaluate environmental and resource effects of operating ocean current turbines (OCT); (2) demonstrate and evaluate technology needs for further MHK development; (3) develop and evaluate methodologies and procedures to safely and responsibly test experimental commercial devices; and (4) develop and refine tools to characterize performance, effects, and technologies necessary for MHK progress (Section 1.2, FAU, 2011). The proposed activities are needed to inform the future deployment of commercial-scale MHK energy production on the OCS, in this instance using the Florida Current.

1.4. Objective of the Environmental Assessment

Pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, and the Council on Environmental Quality (CEQ) Regulations at 40 CFR 1501.3, the environmental assessment (EA) was prepared to determine whether or not the proposed action - issuance of the lease - would have a significant effect on the human environment and whether an environmental impact statement (EIS) must be prepared.

The activities associated with issuing a lease, as proposed by FAU SNMREC and reasonable alternatives, are described in Section 2 of the EA and include: (1) site characterization surveys (i.e., biological and archeological surveys) that the lessee would undertake on the lease (which includes the use of vessels and equipment that would be necessary to conduct them); (2) the lessee's installation, relocation and removal of mooring systems, which would utilize anchors, cables, and buoys; and (3) the lessee's technology testing activities, which would involve turbine deployment, maintenance, operations, and recovery. Section 3 of the EA considers the reasonably foreseeable environmental consequences of these activities, considers reasonable alternatives to FAU SNMREC's proposal, and analyzes the reasonably foreseeable environmental consequences associated with those alternatives.

On April 25, 2012, BOEM released an EA for a 30-day public review (77 FR 24734). During the comment period, BOEM held a public information meeting in Fort Lauderdale, Florida on May 9, 2012 to provide stakeholders an additional opportunity to offer comments on the EA. After the comment period closed, FAU SNMREC proposed to also conduct OCT tow tests concurrent with survey activities (*see* Section 2.1.1 of this EA). To address the comments received and consider additional activities associated with the proposed action, BOEM has revised the EA. *See* Section 4.1.3 for additional information.

Information considered in this EA includes:

1. Public response to the June 24, 2011, NOI to prepare an EA (76 FR 30184);
2. Public response to the April 25, 2012, NOA of an EA (77 FR 24734);
3. BOEM research and review of current relevant scientific and socioeconomic literature;
4. Consultations with other Federal agencies including the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), the U.S. Coast Guard (USCG), and others;
5. Consultations with the U.S. Department of Energy (USDOE) Wind and Water Power Technologies Office (WWPTO) who is proposing to provide federal funding to FAU SNMREC to support the at sea testing (tow test) of FAU SNMREC's experimental current generation turbine and the deployment and operation of the small-scale OCT test berth (a single-anchor mooring attached to a MTB);
6. Relevant material from *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* (Vinick *et al.*, 2012);
7. Relevant material from the *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement* (Programmatic EIS)(USDOI, MMS, 2007); and
8. Relevant material from the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia Final Environmental Assessment* (USDOI, BOEM, 2012a).

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Table 2.1

Alternatives Considered

Alternative	Description
Alternative A – The Proposed Action	Technology testing would be authorized in the entirety of OCS Blocks 7003, 7053, and 7054.
Alternative B – Removal of High Vessel Traffic Area	Technology testing would be authorized in OCS Blocks 7003, 7053, and 7054, expect in the 12 northernmost aliquots in OCS Block 7003 containing high vessel traffic area identified by the Automatic Identification System (AIS) vessel tracking data set.
Alternative C – Removal of Aliquot Containing High Slope Hardbottom Area (Preferred Alternative)	Technology testing would be authorized in OCS Blocks 7003, 7053, and 7054, expect for aliquot 7054N in which the *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* (Vinick *et al.*, 2012) identified a high density of high slope hardbottom area that may contain potential sensitive benthic habitat.
Alternative D – No Action	The proposed lease would not be issued and technology testing would not be authorized on the proposed leasehold at this time.

2.1. Alternative A– The Proposed Action

Overview

The proposed action is the issuance of a lease to FAU SNMREC under BOEM's Interim Policy, authorizing technology testing on OCS Blocks 7003, 7053, and 7054, located on the OCS offshore Florida. The proposed lease area is approximately 16.7 to 27.8 km (9.0 to15.0 nm) offshore of Fort Lauderdale, Florida (Figure 2.1), and ranges in depth from 262.0 meter (m) (859.6 feet (ft)) in OCS Block 7053 to 366.0 m (1,200.9 ft) in the southern half of OCS Block 7054. Located in the extreme southern end of the South Atlantic Bight (an embayment encompassing the coastline to the edge of the continental shelf from Miami to Cape Hatteras) on a sub-marine landform called the Miami Terrace, the proposed lease blocks were chosen by FAU SNMREC, in part, due to their location within the Florida Current, part of the Gulf Stream System (Gyory *et al.*, 2008). *See* Section 1.2.

Under the proposed action, FAU SNMREC would first deploy a single-anchor mooring attached to a MTB, and test, for limited periods, equipment designed to use the Florida current to generate electricity. The MTB, similar to NOMAD weather buoys with a history of excellent

long-term survivability in severe seas, would remain deployed at variable intervals throughout the year (USDOC, NOAA, NBDC, 2012). FAU SNMREC then intends to deploy two additional MTBs at a later time during the lease period. The additional MTBs would be operational simultaneously with the first MTB. This would result in three total technology testing facilities operating on the leasehold.

The initial proposed mooring location for the technology testing facility would be at 26.042 deg N, 79.92 deg W, in 267.0 m (876.0 ft) of water (Figure 2.1). FAU SNMREC selected the proposed MTB mooring location based upon several criteria including site-specific bottom type and slope, location of potential coral communities and benthic habitat, and oceanographic conditions (Section 1.3, FAU, 2011). The mooring locations for the two additional MTBs would be selected by FAU SNMREC using the same criteria upon the completion of site characterization surveys. The additional site characterization surveys will include sediment samples in order to determine bottom type. Previous work in the area, as well as information from the U.S. Department of Energy's siting report (Vinick *et al.*, 2012), indicate coarse sediments in the three OCS blocks that are suitable for the proposed mooring system. Under Alternative A, the additional mooring locations would be in the proposed lease blocks ranging from 262 m in depth in Block 7053 to 366 m in the lower half of Block 7054 (FAU, 2011).

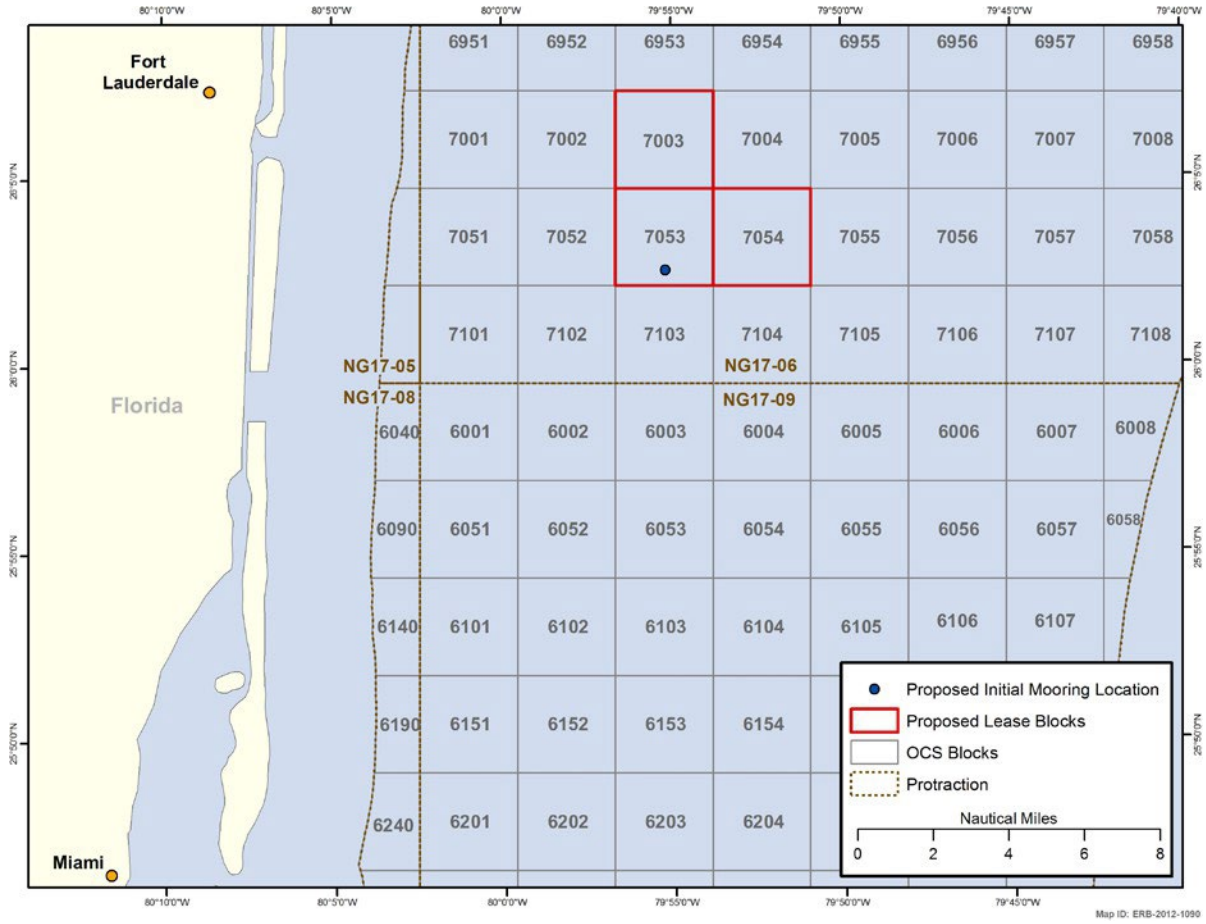


Figure 2.1. Alternative A and initial mooring location.

As part of the proposed action, the EA assumes that FAU SNMREC would deploy the original MTB buoy four to five times in different locations over the 5-year lifespan of the project. The two additional MTBs would be deployed three to four times each (three to four different locations) over the 5-year lifespan of the project. A total of 10-13 MTB deployments would occur over the lifetime of the project. FAU SNMREC would deploy each MTB at a separate mooring location, and each MTB would require installation, operation, and decommissioning. FAU SNMREC proposes 12-24 annual in situ OCT test sessions (up to five days duration each, with a minimum one day duration) for each MTB. The OCT device would be equipped with three underwater video cameras, arranged to observe in front on the device as well as to the rear (Figure 2.2). This video would be recorded for archival and review purposes. The cameras would be low-light, black and white, and displayed in real time on the support vessel during both moored and towed operation and testing of the OCT devices. No overnight turbine operations would occur (Coley, personal communication, October 5, 2012). However if at a later time during the lease period FAU SNMREC determines that nighttime operations are required, BOEM will require the submission of a monitoring plan that must be approved by BOEM in consultation with NMFS and USFWS.

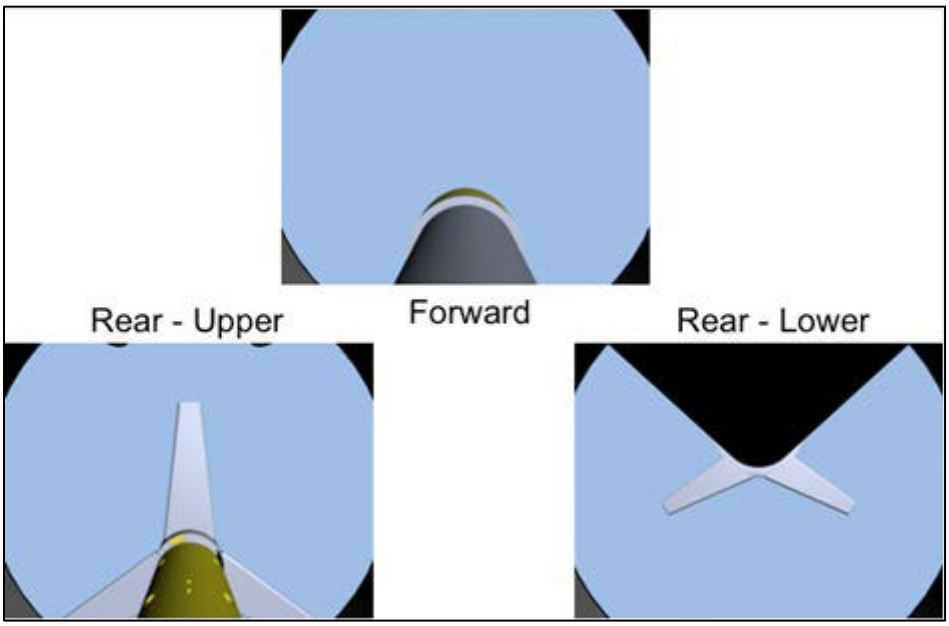


Figure 2.2. The views from the three underwater video cameras.

2.1.1. Tow Tests

FAU SNMREC is constructing an experimental small-scale turbine which imitates the major functional systems of a generic OCT. Sub-system and component manufacturers will use this turbine to evaluate the effectiveness of early stage designs.

The U.S. Department of Energy (USDOE), through its Wind and Water Power Technologies Office (WWPTO), is proposing to provide Federal funding to FAU SNMREC to support the tow tests of FAU SNMREC's experimental current energy generation turbine. FAU SNMREC would conduct 12-18 tows in two phases over the course of a day, concurrent with survey activities. The proposed USDOE-funded tow test activities are summarized below and

described in more detail in Appendix B, "NOAA/NMFS Sec. 7 Determination Document for Ocean Current Turbine Tow Tests."

The likely location for tow testing is offshore Fort Pierce, Florida which is near FAU's Harbor Branch Oceanographic Institute (HBOI) campus (*see* Figure 2.3). However, tow tests could occur in the three proposed OCS lease blocks as well. The Fort Pierce location is preferred because the majority of fabrication, subsystem testing, and onshore support is located at HBOI campus. The seafloor offshore Fort Pierce is generally flat and sandy, and depths are shallow, with the 30 m (100 ft) depth contour located about 20 km (10.8 nm) from the shoreline. The proposed test location area is 22 km (11.8 nm) east of the Fort Pierce inlet and is approximately 70 square kilometers (20 sq. nm).

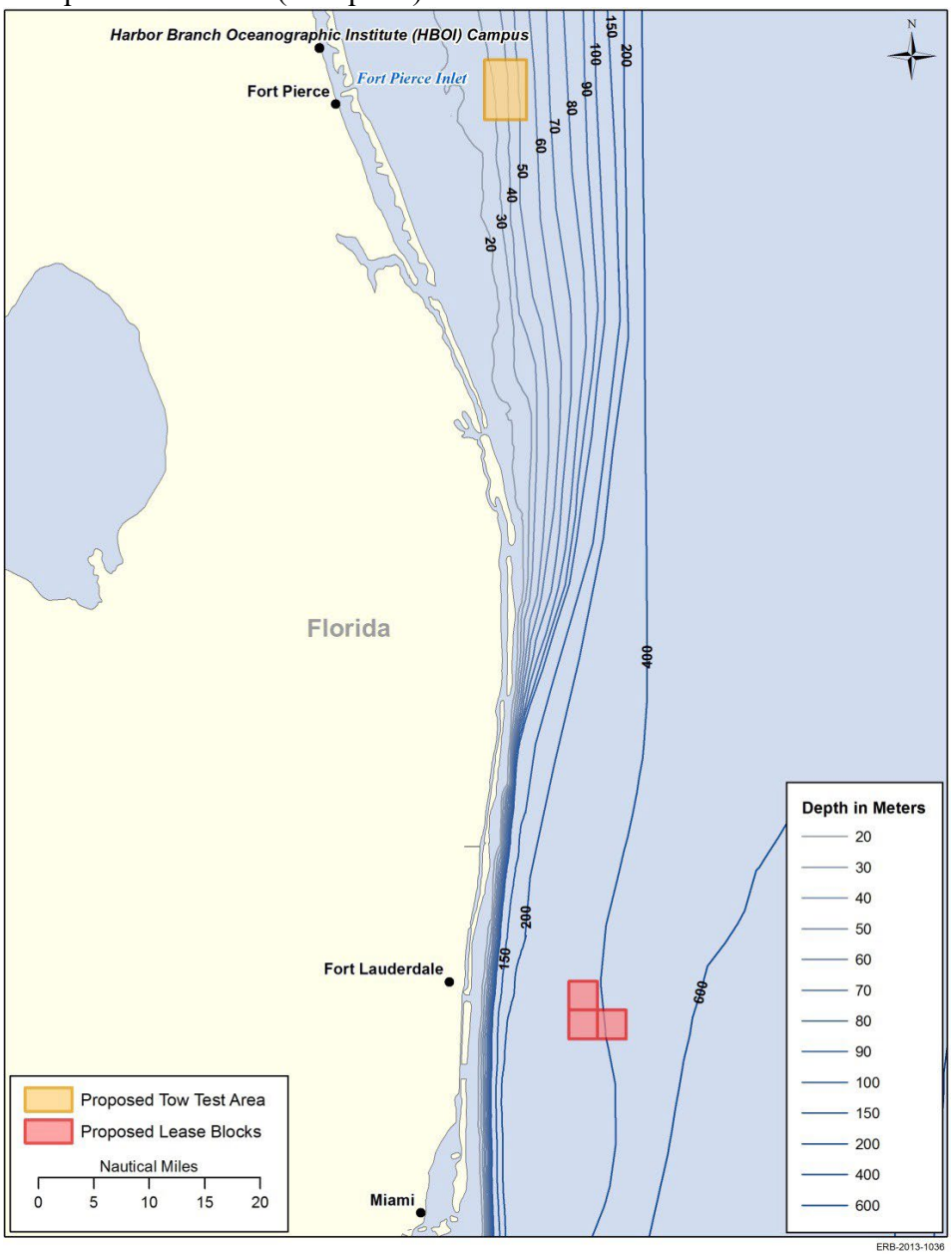


Figure 2.3. Proposed tow test area.

Phase 1of tow testing would evaluate simulated OCT behavior using the main body of the experimental turbine, but replacing the rotor with a 1.5 meter (5 ft) radius drogue chute, also called a "sea anchor" (*see* Figure 2.4(a)). The turbine would be connected to the vessel by a 80-ft (24.4-m) cable and the chute would be connected to the turbine by a 20-ft (6.1-m) cable. The drogue chute is similar to a parachute, but is conventionally used to create desired hydrodynamic drag for vessel and ship-keeping purposes. When towed through the water, the chute would act as an equivalent drag source that a rotor would impart on the OCT due to passing flow. The electrical generator would not be installed during Phase 1 towed testing. Towing the OCT rather than deploying it from a mooring enables the test to be fully controlled, including "all stop" conditions, via the tow ship. Additionally, without the added complications of handling an OCT with a rotor, it is safer to assess handling procedures for lowering and recovering a turbine into the water.

Phase 1 would consist of six tows (*see* Table 2.2 below). If the first tow experiment during Phase 1 results in adjustments that would benefit from additional verification, then there is a possibility of a second tow experiment conducted, resulting in six additional tows.

Table 2.2

Approximate Calculated Distances Travelled During Tow Tests at Various Proposed Speeds

Speed (kts)	Time (min)	Distance (m)
1	10	308.4
2	10	616.8
3	10	925.2
4	10	1233.6
5	10	1542.0
6	10	1850.4

During Phase 2, the electrical generation performance and system integration would be evaluated. Therefore, the electrical generator would be installed along with all control and monitoring equipment and a rotor (Figure 2.4(b)). All other turbine characteristics and equipment for tow testing would be identical to Phase 1 operations, including the range of tow speeds, depths, location, and duration. Phase 2 would also consist of six tows at 10 minutes per tow (*see* Table 2.2 above).

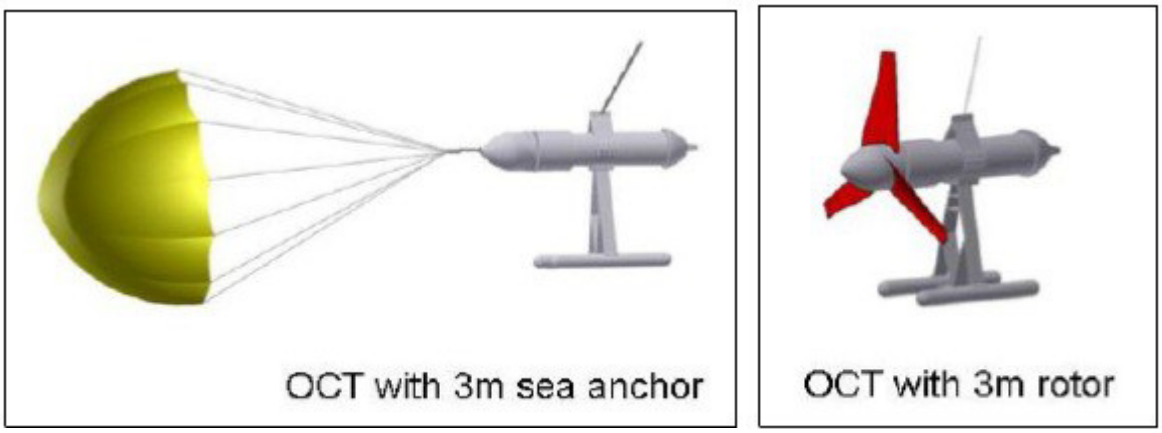


Figure 2.4(a). Phase 1 of tow testing using a drogue chute in place of rotor blades.
Figure 2.4(b). Phase 2 of tow testing includes rotor blades.

Tow tests of full-scale OCTs may also occur, but will only be conducted on OCTs that have not been previously tested by manufacturers. If necessary, tow testing would occur before the in situ testing of an OCT. Prior to conducting additional tow test activities FAU SNMREC would consult with BOEM to ensure compliance with consultations and lease stipulations. For the purposes of this analysis, BOEM assumes that testing of a full-scale OCT would be similar to that of the small-scale experimental turbine described above.

BOEM revised this EA to consider the reasonable foreseeable impacts of tow testing. The impact producing factors and activities associated with tow testing of the small-scale, experimental turbine or a full-scale OCT are the same as those that would be associated with in situ testing (e.g., vessel traffic and turbine operations). Due to the short duration of tow testing (i.e., one day), impacts associated with tow testing fall within the range of reasonably foreseeable impacts already analyzed for in situ testing (i.e., attraction of marine life and blade strikes). Throughout the remainder of this document, OCT testing refers to both tow testing and in situ operations unless explicitly differentiated. The environmental and socioeconomic consequences of resources potentially impacted by tow testing are detailed in the following sections: Coastal Habitats 3.1.2.1, Benthic Habitat 3.1.2.2, Marine Mammals 3.1.2.3, Sea Turtles 3.1.2.4, and Fish and Essential Fish Habitat 3.1.2.7.

2.1.2. Onshore Activity and Vessel Traffic

The proposed action (Alternative A) includes surveying and technology testing activities, including the installation, operation, relocation, and removal of MTBs. BOEM estimates that between 275 and 475 total vessel trips would occur as a result of these activities over the 5-year lease term. This is based on an estimation of 2–3 vessel trips for OCT tow testing, 10–13 vessel trips for the installation of the MTBs, an additional 10–13 trips for the relocation and removal of the MTBs, 180–360 vessel trips for testing of the various turbines at all MTB locations in total, and 73–86 vessel trips for survey activities as described below.

Port Everglades would be the primary port used by vessels supporting the proposed action. The application indicates that one of the potential support vessels receives onshore support from the Port of Miami, located in Dade County, Florida (FAU, 2011). This vessel, the R/V F.G. *Walton Smith*, would conduct remotely operated vehicle (ROV) surveys and assist with mooring recovery. It would conduct approximately 60-79 trips, representing up to 22 percent of the total

vessel traffic estimated for the proposed action. Pursuant to Florida state and local laws, FAU SNMREC will observe established speed limits for operation of their vessels within Manatee Protection Zones (50 CFR 17.108 and FWC, 2011a). Vessel speed restrictions in these zones range from idle speeds up to 22 knots (40.2 km/h) depending on the area. In addition, BOEM will also require through lease stipulations the following vessel strike avoidance measures to reduce or eliminate impacts to all protected species within, and outside of, these zones.

Lease Stipulations for Vessel Strike Avoidance Measures

Although BOEM will require that the lessee comply with the following requirements, the exact terms of these requirements are subject to change, and will be finalized in the lease. BOEM will require the lessee to abide by standard vessel strike avoidance measures similar to those issued in the BOEM's Notice To Lessees and Operators (NTL) of Federal Oil, Gas, and Sulphur Leases in the OCS, Gulf of Mexico OCS Region on *"Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"* (NTL 2012-JOINT-G01) (http://www.bsee.gov/Regulations-and-Guidance/Notices-to-Lessees-and-Operators.aspx). The NTL is based upon the NMFS Southeast Region's Vessel Strike Avoidance Measures and Reporting for Mariners. If BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee at a later stage, after the Federal consultations have concluded and prior to lease signing. These stipulations would be required for all vessel activity under the proposed action, including the towed testing of the OCT. At a minimum, BOEM will require the lessee to abide by the following:

- All vessels associated with site characterization activities performed in support of plan (i.e., SAP and/or COP) submittal comply with the vessel-strike avoidance measures specified below, except under extraordinary circumstances when the safety of the vessel or crew are in doubt or the safety of life at sea is in question.
- All vessel operators and crews maintain a vigilant watch for cetaceans, sirenians, pinnipeds, and sea turtles and must slow down or stop their vessel to avoid striking these protected species.
- All vessel operators must comply with 10 knot (18.5 km/hr) speed restrictions in any Dynamic Management Area (DMA). In addition, the Lessee must ensure that all vessels operating from November 1 through April 30, operate at speeds of 10 knots (18.5 km/hr) or less.
- All vessel operators are briefed to ensure they are familiar with the requirements specified herein.
- North Atlantic right whales.
    - The Lessee must ensure all vessels maintain a separation distance of 500 m (1,640 ft) or greater from any sighted North Atlantic right whale. The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 500 m (1,640 ft) of a right whale(s):
        - The Lessee must ensure that while underway, any vessel must steer a course away from the right whale(s) at 10 knots (18.5 km/h) or less until the 500 m (1,640 ft) minimum separation distance has been established (unless (ii) below applies).
        - The Lessee must ensure that when a North Atlantic right whale is sighted in a vessel's path, or within 100 m (328 ft) to an underway vessel, the underway vessel must reduce speed and shift the engine to

neutral. The Lessee must not engage the engines until the right whale(s) has moved outside of the vessel's path and/or beyond 100 m (328 ft).
    - The Lessee must ensure that if a vessel is stationary, the vessel must not engage engines until the North Atlantic right whale(s) has moved beyond 100 m (328 ft), at which time refer to point 3(b)(i).

- Non-delphinoid cetaceans other than the North Atlantic right whale.
    - The Lessee must ensure all vessels maintain a separation distance of 100 m (328 ft) or greater from any sighted non-delphinoid cetacean(s):
    - The Lessee must ensure that the following avoidance measures are taken if a vessel comes within 100 m (328 ft) of a non-delphinoid cetacean:
        - The Lessee must ensure that when a non-delphinoid cetacean(s) (other than a North Atlantic right whale) is sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean(s) has moved outside of the vessel's path and/or beyond 100 m (328 ft).
        - The Lessee must ensure that if a vessel is stationary, the vessel must not engage engines until the non-delphinoid cetacean(s) has moved out of the vessel's path and beyond 100 m (328 ft).

- Delphinoid cetaceans.
    - The Lessee must ensure that all vessels maintain a separation distance of 50 m (164 ft) or greater from any sighted delphinoid cetacean.
    - The Lessee must ensure that the following avoidance measures are taken if the vessel comes within 50 m (164 ft) of a delphinoid cetacean(s):
        - The Lessee must ensure that any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. Course and speed may be adjusted once the minimum separation distance has been established and/or the delphinoid cetacean(s) has moved abeam of the underway vessel, when practicable.
        - In addition, the Lessee must ensure that any vessel underway reduces vessel speed to 10 knots (18.5 km/h) or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Course and speed may be adjusted once the minimum separation distance has been established and/or the delphinoid cetaceans have moved abeam of the underway vessel, when practicable.

- West Indian Manatees
    - Pursuant to Florida state and local laws, the Lessee will observe established speed limits for operation of their vessels within Manatee Protection Zones (50 CFR 17.108 and FWC, 2011a). Vessel speed restrictions in these zones range from idle speeds up to 22 knots (40.2 km/h), depending on the area.
    - Outside of established Manatee Protection Zones, the Lessee must ensure all vessels reduce their speed to less than 10 knots (18.5 km/h) and maintain a separation distance of 50 m (164 ft) or greater from any sighted manatees.

- Sea turtles, pinnipeds and smalltooth sawfish.
    - The Lessee must ensure all vessels maintain a separation distance of 50 m (164 ft) or greater from any sighted sea turtle, pinniped, or smalltooth sawfish.

- Reporting.
    - The observer must report any observations concerning impacts on Endangered Species Act listed marine mammals, sea turtles, or fish to the Lessor and NMFS within 48 hours. Any observed Takes of listed marine mammals, sea turtles, or fish resulting in injury or mortality must be reported within 24 hours to the Lessor and NMFS.
    - The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals or sea turtles) are reported to the NMFS Southeast Region's Stranding Hotline (877-433-8299 or current) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must ensure that the Lessor is notified of the strike within 24 hours.
    - The notification of such strike must include the date and location (latitude/longitude) of the strike, the name of the vessel involved, and the species identification or a description of the animal, if possible. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS.
    - Data on all protected-species observations must be recorded using standard marine mammal observer data collection protocols by the protected species observer. This information must include: dates, times, and locations of survey operations; time of observation, GPS coordinates for location, sea state, water conditions, and weather; details of marine mammal sightings (e.g., species, numbers, behavior such as feeding, shallow diving, swim speed and tail slaps); and details of any observed Taking (e.g., behavioral disturbances or injury/mortality).

2.1.3. Surveys

In its application, FAU SNMREC discusses various surveys to identify biological and archeological resources, collectively referred to as "site characterization" surveys. These surveys would be conducted prior to deployment of the MTBs. Pursuant to lease stipulations described below, BOEM will require the lessee to submit survey information for those areas that would be disturbed by the proposed action to ensure avoidance of sensitive benthic habitats and archeological resources. This EA analyzes the environmental effects of these surveys based on the lessee conducting the maximum number of surveys within the three proposed lease blocks which would give the lessee the maximum flexibility when selecting mooring locations. This maximum surveying includes acoustic surveys (echosounder and/or side-scan sonar, and sub-bottom profiling) of the three proposed lease blocks to determine locations to be further investigated through ROV surveys. Site-specific ROV surveys are included in the maximum surveying assumption and would be conducted for all possible mooring locations. The extent that the lessee surveys less than 100 percent of their leasehold area is the same extent to which the environmental effects associated with site characterization activities would be less than what is analyzed in the EA.

Archaeological Resources

There is the potential for the presence of archaeological resources within the lease blocks associated with the proposed action and alternatives as demonstrated by information provided by the Florida State Historic Preservation Officer (SHPO) and through a BOEM cultural resource baseline study prepared for the Atlantic OCS (TRC, 2012). As a Federal agency, BOEM is required to consider the effects of its actions on historic properties (including archaeological sites) under Section 106 of the National Historic Preservation Act (NHPA). BOEM recommends avoidance as the primary strategy to ensure that cultural resources on the OCS are not impacted by the activities over which it has regulatory authority. BOEM has prepared a Finding of No Historic Properties Affected (*see* Section 4.3.4 and Appendix A of this EA) and determined that no archaeological sites will be impacted by the proposed action and alternatives so long as: 1) an archaeological survey is conducted to identify any potential archaeological resources and 2) if identified, any potential archaeological resources will be avoided. These conditions of identification and avoidance will be enforced by BOEM through lease stipulations as described below. BOEM will ensure that cultural resources are not impacted through a review of the lessee's archaeological identification survey results and report. If BOEM concludes that a potential archaeological resource may be present or impacted by the undertaking, BOEM will specify a minimum avoidance buffer around the resource and BOEM will require the lessee to relocate the proposed seafloor disturbing activity a sufficient distance in order to avoid any impacts to cultural resources. The size of the avoidance buffer will be determined by BOEM and will be established by taking into consideration both the characteristics of the potential resource and the potential for anchor chain drag and variances in the positioning of the proposed mooring system during installation.

Lease Stipulations for Archaeological Resources

BOEM will require the lessee through lease stipulations to conduct an archaeological identification survey within all areas of proposed seafloor-disturbing activities associated with the proposed action. This requirement will take the form of site-specific surveys at each of the proposed mooring locations that must be sufficient enough to provide complete survey coverage of the entire area that could potentially be impacted by the mooring system. The surveys will take the form of either: (1) a side scan sonar survey conducted at no greater than a 30-meter line spacing and following general technical guidance for side scan sonar surveys provided in the most recent version of BOEM's *Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 585* (USDOI, BOEM, 2012); or (2) an ROV survey using an ROV equipped with sector-scanning sonar technology and digital recording capabilities. If conducted, a professional marine archaeologist must be present to direct, observe, and monitor the ROV investigation. Any additional remote sensing data that is gathered (e.g. sub-bottom profiler or multibeam echosounder) should also be used to inform the results of the site-specific archaeological identification surveys. BOEM will require that the results of these surveys are submitted by the lessee to BOEM in the form of Archaeological Assessment Reports included with the Project Plan or any subsequent Project Plan modifications. BOEM will require the lessee to abide by a "chance finds" clause describing the procedures the lessee must follow if an unanticipated archaeological resource is discovered while conducting any activity related to the proposed undertaking. If BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee at a later stage prior to lease signing, but at a minimum, the "chance finds" clause will state that:

If the lessee discovers a potential archaeological resource while conducting surveys, construction activities, or any other activity related to the lessee's project, all must:

- Immediately halt all seafloor-disturbing activities within the area of the discovery;
- Notify the Lessor within 24 hours of discovery;
- Notify the Lessor in writing via report to the Lessor within 72 hours of its discovery;
- Keep the location of the discovery confidential; and
- Not take any action that may adversely affect the archaeological resource until BOEM has made an evaluation and told the lessee how to proceed.

Per the lease stipulation, if the site has been impacted by the lessee's project activities, BOEM may require the lessee to conduct additional investigations in order to allow the agency to determine if the resource is eligible for listing in the National Register of Historic Places under 36 CFR 60.4. If further investigations indicate that the resource is potentially eligible for listing on the National Register, BOEM will tell the lessee how to protect the resource, or how to mitigate adverse effects to the site. If the Lessor incurs costs in protecting the resource, under Section 110(g) of the National Historic Preservation Act, the Lessor may charge the Lessee reasonable costs for carrying out preservation responsibilities under the OCS Lands Act (30 CFR 585.802(c-d)).

Biological Resources

The lease blocks have been identified as containing sensitive benthic habitat by NMFS and the South Atlantic Fishery Management Council (SAFMC). Thus, in order to properly evaluate the placement of the mooring system, BOEM will require site-specific survey results to be provided by the applicant as part of the Project Plan. This data ensures consistency with BOEM's determinations pursuant to NEPA, and the Essential Fish Habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act.

Acoustic Surveys

Used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (USDOI, MMS, 2007), an acoustic survey system, such as a side-scan sonar, consists of a top-side processor, tow cable and towfish with transducers (or 'pingers') located on the sides, which generate and record the returning sound that travels through the water column at a known speed. Side scan sonar surveys will be conducted at a minimum of 30.0-m (98.4-ft) line spacing (*see Guidelines for Providing Geological and Geophysical, Hazards, and Archaeological Information Pursuant to 30 CFR Part 285* (USDOI, BOEM, 2011)). These acoustic surveys would take approximately 33 vessel trips to complete. The lessee may decide to undertake additional sonar surveys, perhaps echosounder surveys in small discrete areas to refine choices for mooring placement (Appendix D, FAU, 2011).

<u>Lease Stipulations for Acoustic (Electromechanical) Survey Protocols for Benthic Habitat</u>

The following acoustic protocols for benthic habitat offshore Florida are adopted from Vinick *et al.*, 2012. See Figures 2.5(a) and 2.5(b) for visual aid. These protocols will be required of the lessee as a condition of the lease. The exact terms of these requirements are subject to change, and will be finalized in the lease.

- The Lessee shall conduct high-resolution multibeam or side-scan sonar geophysical survey (HRG Survey) to assist with site selection in order to avoid or minimize impact to possible hard-bottom habitat. Such surveys will provide data to eliminate

unsuitable areas, such as obvious high-relief features, from consideration and permit focusing on areas potentially suitable for the deployment of the MTB. The geophysical survey should provide full coverage of the areas of interest including the entire area of potential affect plus a minimum 1,000 ft (304.8 m) buffer around the area of potential affect. Survey lines should have sufficient overlap to provide the most precise results, avoid data gaps, and provide cross-checking between lines for quality control. For dual-frequency sidescan surveys, line spacing must provide suitable overlapping coverage for both the low and high-frequency data channels.

- Surveys should collect both bathymetry and backscatter information. The bathymetry will provide depth information, whereas the backscatter will provide some indication of seafloor hardness. This may be helpful in distinguishing low-relief hard-bottom from unconsolidated sediments in some cases. Data should be provided in vector and raster forms. Vector data should be processed to generate high-resolution images in standard GIS formats (e.g., geotif). Bathymetric data should be used to create high-resolution digital elevation models (DEMs) and hillshaded scenes to visualize topography. DEMs can be used to visualize backscatter data, create contours, and illustrate seafloor profiles.
- The Lessee shall conduct a shallow-penetration sub-bottom survey (e.g. Chirp sub-bottom profiling system) to encompass at a minimum the estimated 355 m by 355 m project footprint (see Figures 2.5 (a) and (b)). The results will be used to verify sediment thickness at the proposed mooring site prior to deployment of the mooring system.

<u>Lease Stipulations for High Resolution Geophysical (HRG) surveys for Marine Mammals, Smalltooth Sawfish, and Sea Turtles</u>

In order to further minimize the risk of causing sounds that might disturb or harass marine mammals and sea turtles, BOEM will require that the lessee comply with the following lease stipulations for acoustic surveys in which one or more active acoustic sound sources will be operating at frequencies below 200 kHz and broadband source levels not exceeding 226 dB (dB re 1 uPA at 1m). Sound above 200 kHz is outside the hearing range for both sea turtles and marine mammals. Generally, side scan and multibeam sonar operate at frequencies above 200 kHz. Side scan sonars may have frequency settings at around 100 kHz which is at the high end of the hearing range for odontocetes. Chirp sub-bottom profiling systems operate at frequencies between 500 Hz and 24 kHz which is within the hearing range of mysticetes, odontocetes and sea turtles. These stipulations have been developed through several previous consultations with NOAA's NMFS pursuant to Section 7 of the Endangered Species Act (ESA) (*see* Section 4.3, Consultations). The measures below are considered standard operating conditions for reducing acoustic disturbance to marine fauna, especially marine mammals, smalltooth sawfish, and sea turtles. Additional standard operating conditions, including those that may be developed during the ESA Section 7 consultation process for this action, may be included in the lease. These measures and those that may ultimately be required through the ESA consultation process would be included as stipulations in the BOEM lease. Any acoustic electromechanical survey instruments operating above these described thresholds must be approved by BOEM in consultation with NMFS prior to their use.

- <u>Visibility</u>. The Lessee must not conduct HRG surveys in support of plan at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevents visual

monitoring of the HRG survey exclusion zone. If the Lessee intends to conduct HRG survey operations in support of a plan at night or when visual observation is otherwise impaired, it must submit to the Lessor an alternative monitoring plan detailing the alternative monitoring methodology (e.g. active or passive acoustic monitoring technologies). The Lessor may, after consultation with NMFS, decide to allow the Lessee to conduct HRG surveys in support of plan submittal at night or when visual observation is otherwise impaired using the proposed alternative monitoring methodology.

- Protected Species Observer. The Lessee must ensure that the exclusion zone for all HRG surveys performed in support of a plan is monitored by a NMFS-approved protected species observer. The Lessee must provide to the Lessor a list of observers and their résumés no later than 45 calendar days prior to the scheduled start of surveys performed in support of a plan. The résumés of additional observers must be provided 15 calendar days prior to each observer's start date. BOEM will send the observer information to NMFS for approval.
- Optical Device Availability. The Lessee must ensure that reticle binoculars and other suitable equipment are available to each observer to adequately perceive and monitor protected species within the exclusion zone during surveys conducted in support of a plan (i.e., SAP and/or COP).
- High-Resolution Geophysical (HRG) Surveys. Stipulations specific to HRG surveys (e.g. side scan sonar, multibeam sonar, sub-bottom profilers, and depth sounder) operating at frequencies below 200 kHz and broadband source levels not exceeding 226 dB (dB re 1 uPA at 1m) conducted in support of a plan are provided below:
    - Establishment of Default Exclusion Zone. The Lessee must ensure a 500 m default exclusion zone for cetaceans, pinnipeds, smalltooth sawfish, and sea turtles. The Lessee must ensure that the exclusion zone will be monitored by a protected species observer around the electromechanical sound source survey equipment. The Lessee may not use HRG survey devices that emit sound levels that exceed the 160 dB Level B harassment zone boundary without approval by the Lessor. As a condition of approval, the Lessor may impose additional, relevant requirements on the Lessee, including but not limited to, required expansion of this exclusion zone.
    - Modification of Exclusion Zone Per Lessee Request. The Lessee may use the field-verification method described below to request modification of the exclusion zone for specific HRG survey equipment under consideration. Any new exclusion zone radius proposed by the Lessee must be based on the most conservative measurement of the 160 dB Level B harassment zone. This modified zone must be used for all subsequent use of field-verified equipment and may be periodically reevaluated based on the regular sound monitoring described below. The Lessee must obtain Lessor approval of any new exclusion zone before it may be implemented.
    - Field Verification of Exclusion Zone. If the Lessee wishes to modify the existing exclusion zone, the Lessee must conduct field verification of the exclusion zone for specific HRG survey equipment. The results of the sound measurements from the survey equipment must be used to establish a new exclusion zone, which may be greater than or less than the existing exclusion zone depending on the results of

the field tests. The Lessee must take acoustic measurements at a minimum of two reference locations. The first location must be at the exclusion zone boundary and the second location must be as close to the sound source as technically feasible. Sound measurements must be taken at the reference locations at two depths (i.e., a depth at mid-water and a depth at approximately 1 meter above the seafloor). Sound pressure levels must be measured and reported in the field in dB re 1 μPa rms (impulse).

- Clearance of Exclusion Zone. The Lessee must ensure that active acoustic sound sources will not be activated until the protected species observer has reported the exclusion zone clear of all cetaceans, pinnipeds, smalltooth sawfish, and sea turtles for 60 minutes.
- Electromechanical Survey Equipment Ramp-Up. The Lessee must ensure that when technically feasible, a ramp-up of the electromechanical sound source survey equipment occurs at the start or re-start of HRG survey activities. A ramp-up would begin with the power of the smallest acoustic equipment for the HRG survey at its lowest power output. The power output would be gradually turned up and other acoustic sources added in a way such that the source level would increase in steps not exceeding 6 dB per 5-min period.
- Shut Down for Non-Delphinoid Cetaceans, Smalltooth Sawfish and Sea Turtles. If a non-delphinoid cetacean, smalltooth sawfish or sea turtle is sighted at or within the exclusion zone, an immediate shut-down of the electromechanical sound source survey equipment is required. The vessel operator must comply immediately with such a call by the observer. Any disagreement should be discussed only after shut-down. Subsequent restart of the electromechanical sound source survey equipment must use the ramp-up provisions described above and may only occur following clearance of the exclusion zone of all cetaceans, pinnipeds, and sea turtles for 60 minutes.
- Power Down for Delphinoid Cetaceans and Pinnipeds. If a delphinoid cetacean or pinniped is sighted at or within the exclusion zone, the electromechanical sound source survey equipment must be powered down to the lowest power output that is technically feasible. The vessel operator must comply immediately with such a call by the observer. Any disagreement or discussion should occur only after power-down. Subsequent power up of the electromechanical survey equipment must use the ramp-up provisions described above and may occur after (1) the exclusion zone is clear of a delphinoid cetacean and/or pinniped or (2) a determination by the protected species observer after a minimum of 10 minutes of observation that the delphinoid cetacean and/or pinniped is approaching the vessel or towed equipment at a speed and vector that indicates voluntary approach to bow-ride or chase towed equipment. An incursion into the exclusion zone by a non-delphinoid cetacean or sea turtle during a power-down requires implementation of the shut-down procedures described above.
- Pauses in Electromechanical Survey Sound Source. The Lessee must ensure that if the electromechanical sound source shuts down for reasons other than encroachment into the exclusion zone by a non-delphinoid cetacean, smalltooth sawfish, or sea turtle, including, but not limited to, mechanical or electronic failure, resulting in the cessation of the sound source for a period greater than 20

minutes then, the Lessee must restart the electromechanical survey equipment using the full ramp-up procedures after the observer has observed clearance of the exclusion zone of all cetaceans, pinnipeds, and sea turtles for 60 minutes. If the pause is less than 20 minutes the equipment may be re-started as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of cetaceans, pinnipeds, smalltooth sawfish, and sea turtles. If visual surveys were not continued diligently during the pause of 20-minutes or less, the Lessee must restart the electromechanical survey equipment using the full ramp-up procedures after the observer has observed clearance of the exclusion zone of all cetaceans, pinnipeds, smalltooth sawfish and sea turtles for 60 minutes.

- Reporting Requirements.
    - The observer must report any observations concerning impacts on Endangered Species Act listed marine mammals or sea turtles to the Lessor and NMFS within 48 hours. Any observed Takes of listed marine mammals or sea turtles resulting in injury or mortality must be reported within 24 hours to the Lessor and NMFS.
    - The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals or sea turtles) are reported to the NMFS Southeast Region's Stranding Hotline (877-433-8299 or current) within 24 hours of sighting. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS.
    - Data on all protected species observations must be recorded based on standard marine mammal observer collection data by the protected species observer. This information must include: dates, times, and locations of survey operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed Taking (e.g., behavioral disturbances or injury/mortality).
    - The Lessee must provide the Bureau with annual reports and a final report summarizing all protected species sightings and actions taken in response to those sightings.

ROV Surveys

In addition to acoustic surveys BOEM will require, through lease stipulations, FAU SNMREC to conduct additional site-specific videographic/photographic surveys for proposed anchor locations prior to deployment. These surveys would be used to verify bottom types and identify any potential deepwater coral habitat. Video and photographic surveys from a submersible, such as a remotely operated vehicle (ROV), equipped with ultra-short baseline (USBL) positioning, will be used to document and characterize the benthic habitat and biota at all mooring locations. The video benthic mapping protocols below are derived from Vinick *et al.*, 2012. See Figures 2.5(a) and 2.5(b) for visual aid.

BOEM would include in the lease a stipulation requiring that, site-specific surveys minimally provide complete coverage of the entire area that could potentially be impacted by the mooring installation, operation and removal. This area of potential effect is considered to be a maximum of a 355 m by 355 m box (126,025 m^2, 12.6 hectares). BOEM will require that the ROV survey

cover the entire 126,025 m^2 box plus an additional 152.4 m (500 ft) buffer. This area of potential effect is based on a 70 m (229.7 ft) drop radius for the anchor (total potential distance of 140 m (459.4 ft)), plus 15 m for the maximum anchor drag embedment distance, plus up to seven 90 ft shots of chain/wire (27.4 m x 7 = 192 m rounded up to 200 m). This results in a total North-South distance of 355 m. The East-West boundary is also approximately 355 m based upon a 20° arc either side of the anchor drop location (a total 40° potential arc). When taking into account the 10-13 total anticipated mooring locations under the proposed action, the total survey area comes to 1,260,250 m^2 to 1,638,325 m^2 (126.0 to 163.8 hectares) which represents 1.8 – 2.4 percent of the proposed lease area. ROVs would be used in order to conduct these surveys. ROVs tethered to vessels would travel at 0.5 m/s (FAU, 2011). This EA assumes that vessels will conduct 12 hour work days with 10 daylight hours on site plus one hour transit time to and from the site. It is anticipated that this effort could take up to 40 – 53 days to conduct ROV surveys over all potential mooring system locations over the 5-year lease term.

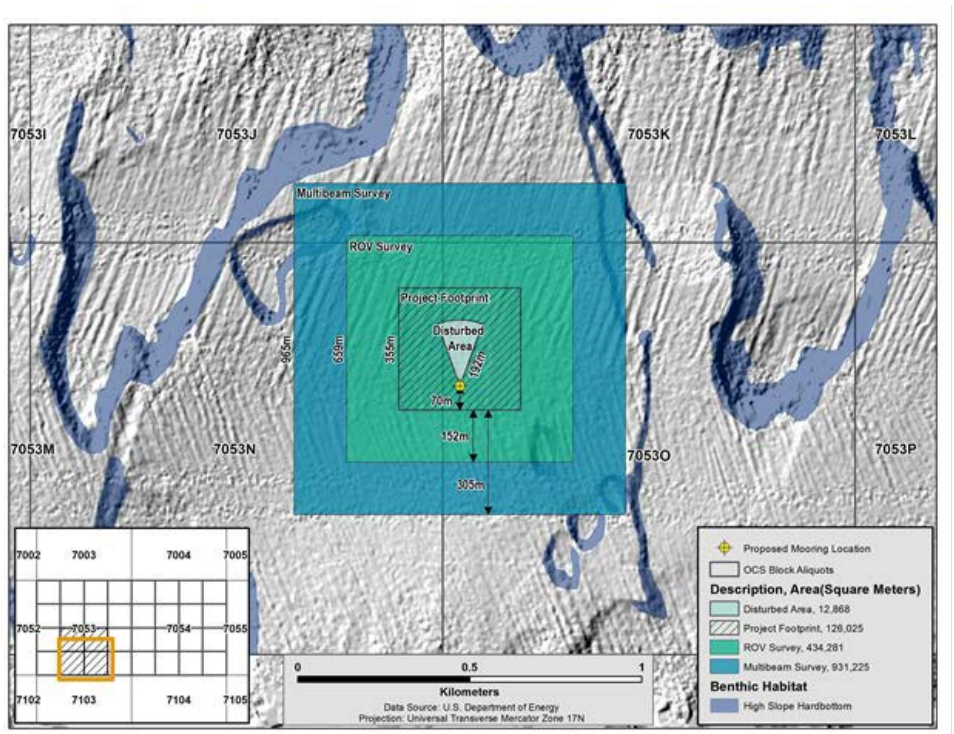
Lease Stipulations for ROV surveys for Biological Resources

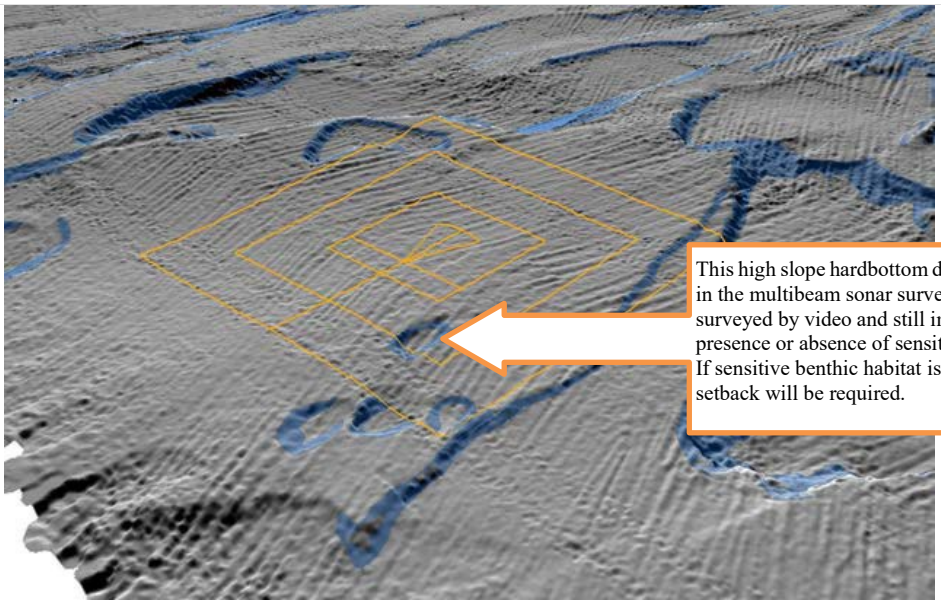
The proposed lease area is located within Habitat Areas of Particular Concern (HAPC) for both tilefish (golden and blueline) and live/hardbottom, and corals (*see* Section 3.1.2.2). In order to minimize any possible effects to these important benthic habitats, if BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee after the Federal consultations have concluded prior to lease signing, but at a minimum, BOEM will require the lessee to abide by the following:

- The biological resources shall be identified and characterized within a minimum of 126,025 m^2 (126.0 hectares) for each mooring location;
- Seafloor video imagery should be continuous along each transect and be taken from no more than 1-2 meters off the seafloor;
- Seafloor imagery shall include still imagery of at least 1 MB in quality of biological targets. Biological target shall include hard corals, octocorals, fish and invertebrates, and tilefish habitat (troughs and terraces intermingled with sand, mud, or shell hash);
- Still images should be captured at 5 min intervals while over unconsolidated sediment habitat and continuously over all hard-bottom habitats (no less than 3 images per minute);
- Images must be georeferenced and stored in digital format for analysis;
- Digital still images should be analyzed using CPCe software (or similar) to determine percent cover of hardbottom substrates and major taxonomic groups in areas of biological interest;
- Images should be analyzed in greater detail to determine faunal composition and organism densities in areas of biological interest. Field notes and video/photo data should be reviewed and summarized to identify habitats and faunal distributions;
- Summaries should be compiled in GIS format and used to produce habitat maps;
- At least one NMFS-approved protected species observer must be on watch during daylight hours to monitor and report any marine mammal, smalltooth sawfish, and sea turtle sightings during ROV operations. Observers must report any observations concerning impacts on Endangered Species Act listed marine mammals, sea turtles, or smalltooth sawfish to the Lessor and NMFS within 48 hours. Any observed Takes of listed marine mammals, sea turtles, or smalltooth sawfish resulting in injury or mortality must be reported within 24 hours to the Lessor and NMFS;

- The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals, sea turtles, or smalltooth sawfish) are reported to the NMFS Southeast Region's Stranding Hotline (877-433-8299 or current) within 24 hours of sighting. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS;
- Data on all protected species observations must be recorded based on standard marine mammal observer data collection protocols by the protected species observer. This information must include: dates, times, and locations of survey operations; time of observation, location and weather; details of species sighted (e.g., species, numbers, behavior); and details of any observed Taking (e.g., behavioral disturbances or injury/mortality); and
- The Lessee must provide the Bureau with annual reports and a final report summarizing all protected species sightings and actions taken in response to those sightings.

These requirements were based on activities proposed in FAU's application, and recommendations from NMFS submitted in response to the NOI (USDOC, NOAA, NMFS, 2011a) and Vinick *et al.*, 2012. These surveys will aid the assessment of impacts to essential fish habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act.





Figures 2.5(a) and 2.5(b). The proposed initial mooring location.

These figures show the proposed initial mooring location with the multibeam sonar data from Vinick *et al.*, 2012. These figures further show the minimum sonar coverage of a proposed site, followed by the minimum video/still imagery for a proposed site, followed by the area of potential effect (project footprint) for the project, followed by the actual anticipated area of disturbance once the mooring system is deployed.

2.1.4. Mooring System

Installation

FAU SNMREC may not commence installation activities until an adequate Project Plan, that includes the results of the required surveys, is submitted to and reviewed by BOEM (72 FR 71152). After BOEM acknowledges receipt of a complete Project Plan, BOEM would have 60 calendar days to raise any objections to the plan if the information is determined to be beyond the impacts assessed in this EA and the pursuant regulations (e.g., ESA, NHPA, Magnuson-Stevens Conservation and Management Act, etc). If BOEM raises objections to the Project Plan during the review period, then FAU SNMREC may not proceed with installation activities under their lease until subsequent modifications to the Project Plan satisfy BOEM's initial objections. If BOEM does not raise objections during the 60-day review period, then the Project Plan is considered adequate and FAU SNMREC may conduct activities under the lease.

Once a Project Plan is deemed adequate by BOEM, the first phase of installing the proposed offshore technology testing facility would be deployment of the mooring system. The anchor, chain, mooring line, and mooring buoy would be deployed and then left in place for several days to allow the anchor to settle fully into position and ensure all components are functioning properly. The expertise of the FAU SNMREC staff and the capabilities of the vessel operators participating in deployment activities can be found at http://snmrec.fau.edu.

The MTB would be anchored to the ocean floor by a conventional faired mooring line attached to a 1,360.8 kg (3,000 lb) or 2,722.0 kg (6,000.0 lb) drag-embedment anchor, most likely a Danforth. The anchoring system for the MTB mooring was designed to hold the buoy and support vessel in the Florida current at water speeds up to 2.0 m/s (Figure 2.6). The anchor would be deployed by a vessel that would navigate to the precise deployment location and would then be released from the surface and allowed to fall to the bottom. The MTB would be towed behind the deployment vessel, the mooring line would be laid out to the rounded 200 m (656.2 ft) chain and anchor, and then upon reaching the deployment site, the anchor would be released, pulling the chain along with it and pulling the buoy along the surface until it becomes moored in location. Upon landing on the seafloor the anchor would drag an estimated 15 m (49.2 ft) then the flukes of the anchor would embed under a layer of sediment, providing up to 20 times the weight of the anchor in holding power (Naval Facilities Engineering Command, 2005). Given the weight of the anchor and chain, the entire mooring system would fall essentially vertically to the bottom and land in a close proximity (±~70.0 m (229.7 ft)) to the planned anchor location. Based upon adding the 15 m (49.2 ft) anchor drag distance and the rounded 200 m (629.9 ft) length of chain that could sweep the seafloor, the maximum North-South distance of actual seafloor disturbance is 215 m (705.4 ft). The area of actual seafloor disturbance is 12,877.2 m^2 (1.29 hectares). This is a subset of the total area of potential affect (126,025 m^2) discussed in Section 2.1.3 in this document (*see* Figures 2.5(a) and 2.5(b) for visual aid). Design calculations indicate the MTB, support vessel, and OCT would impose a drag force on the mooring of up to 10,000 lb during maximum current and wave loads for operations, and mooring wire itself may add another 4,000 lb in these conditions (API, 2005). During installation of the mooring system, FAU SNMREC will comply with the lease stipulations below in order to avoid impacting archeological resources and/or sensitive benthic habitats.

Section 4(e) of the OCS Lands Act extends the U.S. Army Corps of Engineers' (USACE) authority to prevent the obstruction to navigation in the navigable waters of the U.S. from OCS facilities, including the installation of the proposed MTBs. The USACE has developed standard conditions for in-water work that will serve to reduce the likelihood of vessel impacts to

manatees (http://www.saj.usace.army.mil/Divisions/Regulatory/DOCS/endangered/2011_StandardConditionsForIn-waterWork.pdf). Conditions a, b, d, and e from the USACE standard conditions would be applicable to the proposed lease and vessel transit areas, and in addition to the Manatee Protection Zone requirements.

The proposed MTBs would act as both a sensor and measurement platform and as a mooring point for vessels. The steel hulled MTB measures 6.4 m (21.0 ft) long by 3.0 m (10.0 ft) wide with an overall height above the mean water line of approximately 5.8 m (19.0 ft). The MTB has 6,804.0 kg (15,000 lb) reserve buoyancy with a 1,588.0 kg (3,500.0 lb) payload. The MTB contains solar, wind, and water power devices as well as current measurement package, batteries, communications hardware, lights and navigation aids.

The USCG considers the proposed MTBs to be Private Aids to Navigation (PATON), which are regulated by the USCG under 33 CFR 66 (USDHS, USCG, 2011a). For the initial MTB, FAU SNMREC submitted a PATON application to USCG, which was approved on October 30, 2008 (USDHS, USCG, 2008). BOEM presumes that the conditions under which the authorization was issued for the initial MTB would be the same for the additional MTBs. In accordance with these conditions, all MTBs deployed by FAU SNMREC will contain three all-around yellow lights (with a visible range of at least 5.6 km (3.0 nm)) as markers on the line connecting the MTB and a moored testing vessel (or tender platform) located at 22.9, 45.7, and 68.6 m (75.0, 150.0, and 225.0 ft) aft of the MTB at a 1.8-m (6.0-ft) height above the mean water line.

Lease Stipulations for Mooring System Installation for Benthic Habitat and Archaeological Resources

If BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee following the Federal consultation process prior to lease signing, but at a minimum, BOEM will require the lessee to abide by the following to ensure that the lessee avoids any possible impacts to sensitive benthic habitats and archaeological resources:

- The lessee shall avoid placement of the mooring system on sensitive benthic habitats. These sensitive benthic habitats are defined in this document as: troughs and terraces intermingled with sand, mud, or shell hash at depths of 150-300 m associated with golden tilefish essential fish habitat areas of particular concern (EFH-HAPC); rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, and rocky reefs associated with blueline tilefish (EFH-HAPC); and high density deepwater coral communities including stony coral, gorgonian corals, black corals, and hydrocorals.
- The lessee shall avoid sensitive benthic habitat by establishing a minimum 152 m (500 ft) buffer/exclusion from the area of potential effect (APE). The APE includes area potentially affected by the mooring and associated appurtenances (e.g., shock chain, ADCPs, etc.). On a case-by-case basis BOEM may require up to an additional 152 m (500 ft) up to 305 m (1,000 ft) setback from the identified sensitive bottom habitat;
- The lessee has the option to demonstrate, through additional investigations, that sensitive benthic habitat either do not exist or would not be adversely affected by the seafloor/ground-disturbing activities; and
- If BOEM has specified a minimum avoidance buffer zone around a potential archaeological resource (as described in Section 2.1.3, Archaeological Resources) then the lessee will not conduct any ground disturbing activities within that buffer.

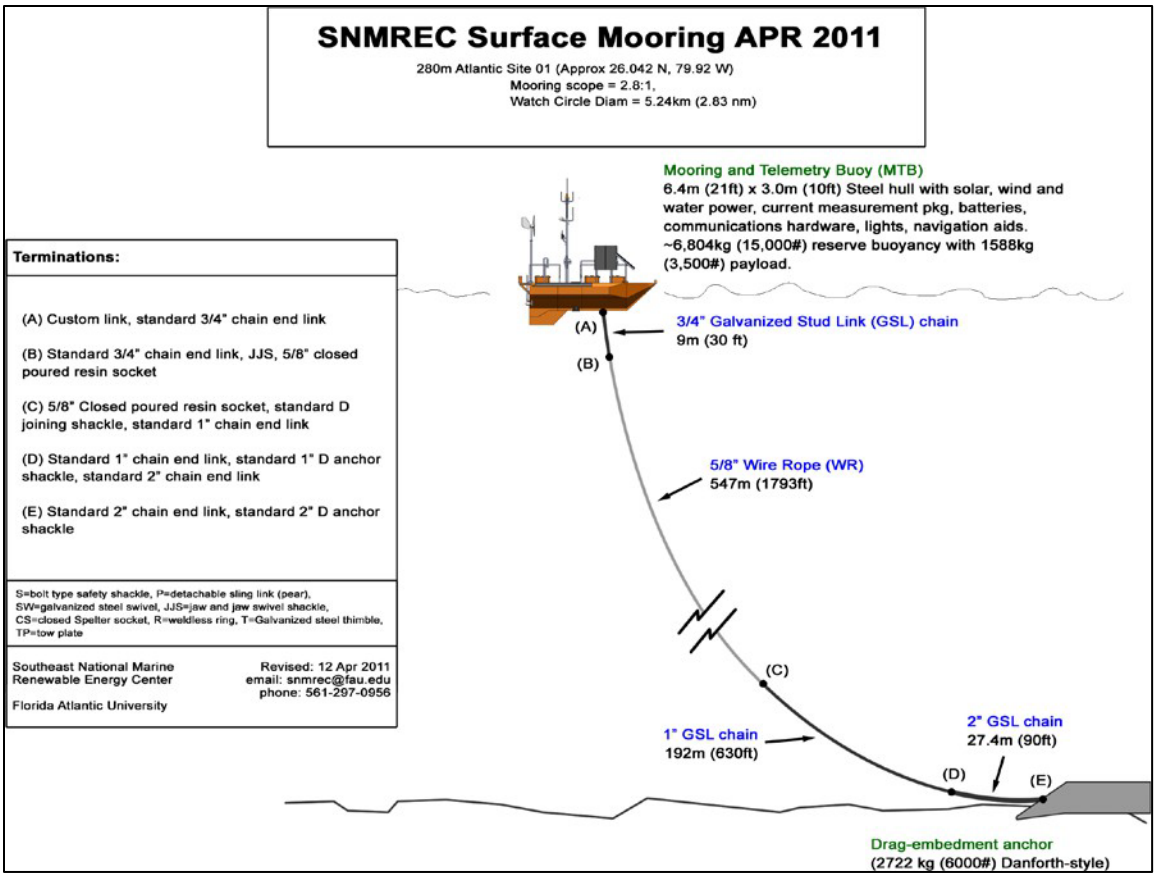


Figure 2.6. MTB mooring system.

These requirements were based on activities proposed in FAU's application, recommendations from NMFS submitted in response to the NOI regarding potential impacts to sensitive deepwater coral and hardbottom features, and the BOEM Notice to Lessees for Deepwater Benthic Communities (NTL No. 2009-G40).

Operation

The mooring would interact with, and remain fixed to the seafloor due to the embedment of the anchor into the sediment layer which consists primarily of sand. The chain would lay out from the anchor downstream, absorbing the mooring loads from the wire and buoy. The main mooring line itself is 1.6 cm (0.625 in) conventional galvanized wire rope common to most deep water moorings with the upper half faired with hydrodynamic foils to reduce drag and anchor-line strum. Due to the high-current environment, a ratio of approximately 3:1 will be used to help minimize anchor size and line loading (Section 2.1, FAU, 2011). The line will typically be taut due to the drag loading on the MTB. However, because the current meanders in the vicinity of the mooring, the line loading may occasionally decrease such that the line lies on the bottom. To mitigate potential scouring of the bottom in this circumstance, approximately 16 cable floats spaced at 9 m will be placed along the mooring line at several locations to ensure that the line

does not touch the seabed. The cable floats are made of syntactic foam, and are pressure resistant so that they retain their displacement and buoyancy, when submerged. The floats clamp onto the cable using a latching system. Each float provides approximately 75 lbs. of buoyancy. The number of floats currently proposed provides additional buoyancy to insure the cable end and acoustic release are floated to the surface. If the cable length needs to be increased, the number of floats will be adjusted accordingly. In the unforeseen event of a mooring line break; the flotation attached to the mooring line will keep it off the bottom, and when it is released it will float to the surface. Since the bottom type is important to the mooring holding power, a level, sandy area is preferred over a rough, high slope type seafloor (FAU, 2011). The mooring system would be the fixed component of the testing system, which also includes a support vessel and an axial flow turbine device.

Removal

A work vessel (anticipated to be a 29.3 m (96 ft) vessel) along with an ROV will be used to recover the MTB and anchor. The work vessel would remain on the project site for 3 days in order to complete mooring system removal. The ROV, which may be deployed from a separate vessel, will dive to the anchor and attach recovery gear to it. The vessel used for anchor removal would not require anchors to hold position over the worksite, so no additional bottom disturbance would occur as a result of anchor recovery.

The MTB mooring is proposed to consist of several hundred meters of mooring wire, with a diameter of approximately 3/4", approximately 16 cable floats, an acoustic release, and up to 8 shots (90 ft per shot) of various size chain connected to the anchor. In order to minimize the amount of bottom disturbance or potential effect on any biological resources, the MTB mooring is designed to be disconnected close to the seafloor by means of an acoustic release and then rises to the surface using floats attached to the bottom of the mooring wire. The acoustic release would be connected between the end of the mooring wire and a 30 m length of wire attached to the anchor chain and anchor. The acoustic release would be triggered by an acoustic signal from the surface, it would disconnect from the wire and anchor chain near the seafloor, and the released end of the mooring wire would float to the surface (due to the cable floats installed just above the release). This results in the entire length of mooring wire, approximately 530 m, rising into the water column and floating with the current, with one end supported by the MTB and the other end supported by the cable floats. Meanwhile, a short length of wire, the anchor chain, and the anchor would remain on the seafloor. If for some reason the acoustic release does not operate, the purpose for the wire rope below the acoustic release and above the chain is so that it could be cut with a ROV; thereby, releasing the cable from the chain and anchor. At that point, the floats would then raise the cable end and acoustic release to the surface. This procedure would reduce the amount of bottom disturbance from a linear distance of approximately 784 m to only 254 m. A support vessel would then recover the MTB and mooring cable, and the mooring wire could then be reused if still in good condition. In order to remove the anchor chain and anchor, a ROV would be used. Each length of chain on the anchor would be connected by a short length of wire rope (about 5 meters each) so that the ROV could cut the wire and then recover each segment of chain, reducing the weight of each recovery from a total chain weight of approximately 20,000 lb to less than 4,000 lb per lift. This would reduce the size of the recovery ship and equipment needed, and would reduce the amount of chain dragging on the seafloor since shorter length of chain could be removed instead of dragging the entire length to the ship

during recovery. Recovery of the chain and anchor will depend on conditions (i.e., growth on these surfaces) observed at the time and on appropriate procedures in the regulations at the time.

2.1.5. In Situ Testing Device

Deployment

The second phase would be the deployment of the testing device. The testing device(s) to be deployed would be up to 100.0-kilowatt (kW) power extraction and 7.0 m- (23.0 ft-) diameter rotor(s) (Figure 2.6). Initially, FAU SNMREC proposes to deploy an experimental demonstration device with 20.0 kW maximum power and a 3 m- (9.8 ft-) diameter rotor from a deployment vessel moored to the MTB (*see* Figure 2.7). While various testing devices would be used during the 5-year lease period, the basic layout of all the testing devices would be the same. The deployment vessel would be used to ferry the testing device from Port Everglades to the mooring location, where it will then lower the device into the current. The deployment vessel is anticipated to be a 25.9 m (85.0 ft) vessel (FAU, 2011).

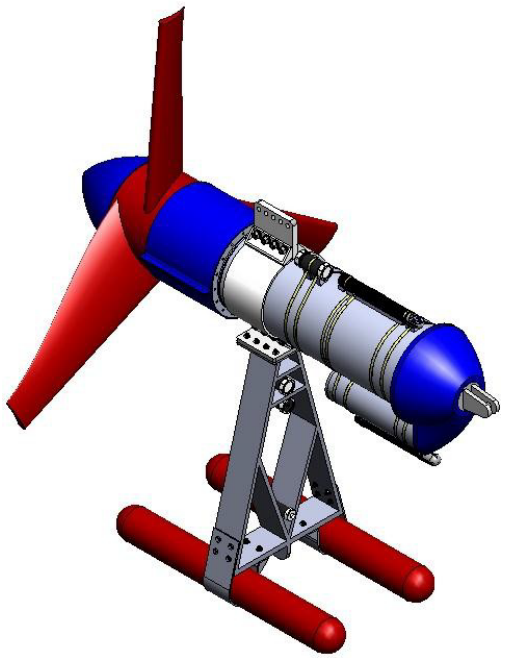


Figure 2.7. Testing device.

Operation

The turbine would remain attached to the deployment vessel by a cable. The cable would perform multiple functions, including deployment and recovery of the turbine; holding the turbine in place during testing; providing power and communications to monitor and control the turbine; and transmitting power from the turbine.

The generators and onboard electronics would be housed within a negative-pressure system, with redundant watertight seals. The bearings supporting the drive shaft that connects the rotor blades to the gearbox/generator would be housed in a lubricant-filled section with redundant

dynamic seals between the seawater and the lubricant to prevent leakage. All lubricants used will be bio-degradable. The system(s) that contain lubricant will be ferried out to location for each deployment and all maintenance of lubricant systems will be completed at port.

The turbine would operate at depths of 5.0 to 50.0 m (16.4 to 164.0 ft). It is estimated that the turbine would operate in current speeds that would average approximately 1.7 to 2.0 m/s (5.6 to 6.6 ft/s). On average, the power produced by the 7.0-m (23.0-ft) system will be less than 60.0 kW, spiking to ~80.0 kW on occasion. The rotation rate of the 3- and 7-m (9.8- and 23.0-ft) turbine at the average current velocity would be 45 revolutions per minute (rpm) and 20 rpm, respectively, with maximum values of 70 rpm and 35 rpm occurring during rare, high-speed events. The resulting blade tip speeds would be similar for all turbine sizes on average, approximately 7.0 and up to 11 m/s (23.0 to 36.1 ft/s) at peak.

As this is strictly a technology testing project, the turbine would not be connected to a power cable to shore. The testing device would only be deployed for periodic testing and all power produced during testing would be dissipated locally. Power generated by the turbine (AC voltage) would be brought to the surface via armored underwater cable, conditioned (converted to DC voltage) and then dissipated through an air-heat exchanger located on the deployment vessel.

The deployment vessel would remain at the project location for 1-5 days during each of the 180-360 test sessions. Three turbines could be tested concurrently (with a vessel deployed for each) in the vicinity of each other or spread throughout the proposed leasehold. OCT testing operations would be occurring between 3 – 33 percent of the time over the 5-year lease term. It is estimated that 12-24 round trips would be made per deployment vessel per year for a total of 180-360 round trips (FAU, 2011).

Lease Stipulations for OCT Testing/Operation

In order to avoid impacts to protected species, BOEM will require the Lessee to comply with construction conditions partially derived from NOAA's sea turtle and smalltooth sawfish construction conditions (http://sero.nmfs.noaa.gov/pr/endangered%20species/Sea%20Turtle%20and%20Smalltooth%20Sawfish%20Construction%20Conditions%203-23-06.pdf) and *Standard Manatee Conditions for In-water Work* (FWC 2011 c). These are basic operating conditions in order to minimize or eliminate impacts to protected species (e.g., marine mammals and threatened and endangered species). If BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee at a later stage, after the Federal consultations have concluded and prior to lease signing. These stipulations would be required for all vessel activity under the proposed action, including the towed testing of the OCT. In the case of the OCT towed testing the vessel strike avoidance measures (see Section 2.1.2) would also apply. At a minimum, BOEM will require the lessee to abide by the following:

- The lessee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with protected species. All personnel are responsible for observing water-related activities for the presence of these species;
- The lessee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing protected species, which are protected under the ESA of 1973 and the Marine Mammal Protection Act (MMPA);

- At least one NMFS-approved protected species observer must be on watch during daylight hours to monitor and report any protected species sightings during OCT testing operations;
- If a North Atlantic right whale is seen within a 100 m (328 ft) radius of the active daily OCT testing/operation equipment, the OCT device must be shut down and all appropriate precautions shall be implemented to ensure the whale's protection (Section 2.1.5). Activities may not resume until the exclusion zone (100 m / 328 ft) between the North Atlantic right whale and the OCT testing/operation equipment has been recovered; and the exclusion zone has been clear of protected species for at least 30 minutes;
- If a protected species (other than a North Atlantic right whale) is seen within 100 m (328 ft) of the active daily OCT testing/operation equipment, all appropriate precautions shall be implemented to ensure those species protection (Section 2.1.5). These precautions shall include immediate cessation of operation of the OCT device if a protected species is seen within a 15.2 m (50 ft) radius of the equipment. Activities may not resume until (1) the protected species has moved at least 100 m (328 ft) away from the OCT testing/operation equipment of its own volition, and the 100 m (328 ft) zone has been clear of protected species for at least 30 minutes; or (2) a determination by the protected species observer, after a minimum of 10 minutes of observation, that the protected species is remaining between 15.2 m (50 ft) and 100 m (328 ft) of the OCT testing/operation equipment of the animal's own volition.
- The Lessee must not conduct OCT testing at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevents visual monitoring of the exclusion zone;
- The observer must report any observations concerning impacts on Endangered Species Act listed marine mammals, sea turtles or smalltooth sawfish to the Lessor and NMFS within 48 hours. Any observed Takes of listed marine mammals or sea turtles resulting in injury or mortality must be reported within 24 hours to the Lessor and NMFS;
- The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals, sea turtles or smalltooth sawfish) are reported to the NMFS Southeast Region's Stranding Hotline (877-433-8299 or current) within 24 hours of sighting. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS;
- Data on all protected-species observations must be recorded based on standard marine mammal observer data collection protocols by the protected-species observer. This information must include: dates, times, and locations of survey operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed Taking (e.g., behavioral disturbances or injury/mortality);
- The Lessee must provide the Bureau with annual reports and a final report summarizing all protected species sightings and actions taken in response to those sightings;
- The Lessee must provide the Bureau, USFWS, and NMFS with annual reports summarizing all video recorded responses of animals to underwater OCT testing, and provide video footage upon request.

Recovery

Upon completion of the testing period, the deployment vessel would recover the testing device by removing it from the water. All cables would be recovered at this time as well. All recovery, decommissioning and site clearance activities will be in accordance with BOEM's Renewable Energy Regulations at 30 CFR Part 585 which includes the submission of a decommissioning application that must be approved by BOEM prior to execution.

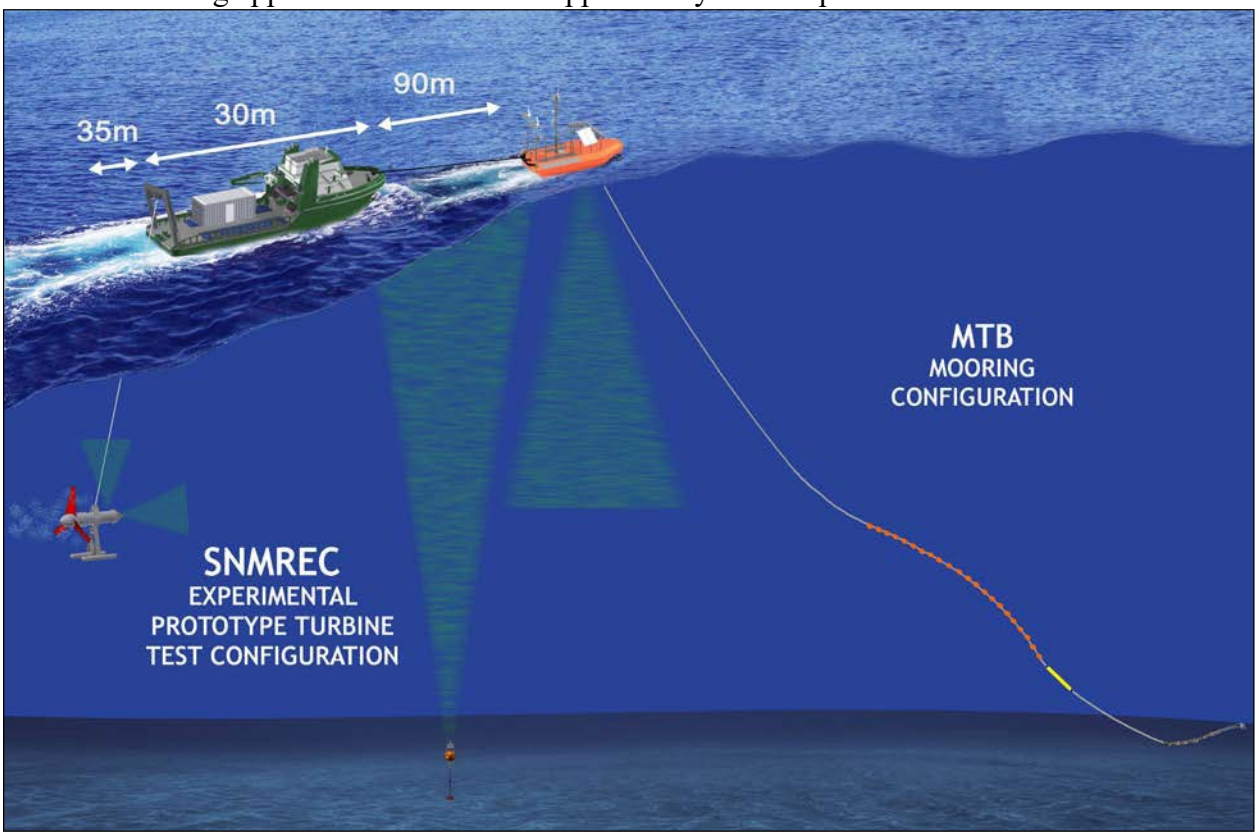


Figure 2.8. Complete turbine test configuration.

2.2. Alternative B – Removal of High Vessel Traffic Area

A high volume of vessel traffic, particularly cargo and large passenger vessel traffic, including over 150 passenger vessels per year going to and from Port Everglades, Florida, traverses the northernmost 12 aliquots (1/16th of an OCS block) of OCS Block 7003 (*see* Figures 2.8, 2.9 and 2.10 below). Under Alternative B, these 12 aliquots would be excluded from the lease (Figure 2.11). OCS Blocks 7053 and 7054 would continue to be considered for lease issuance under Alternative B. Overall this amounts to a 25 percent reduction in the size of the proposed lease area compared to Alternative A (the Proposed Action). The reasonably foreseeable impacts of Alternative B (Removal of High Vessel Traffic Area) on the environment are described in detail in Section 3.2 of this EA.

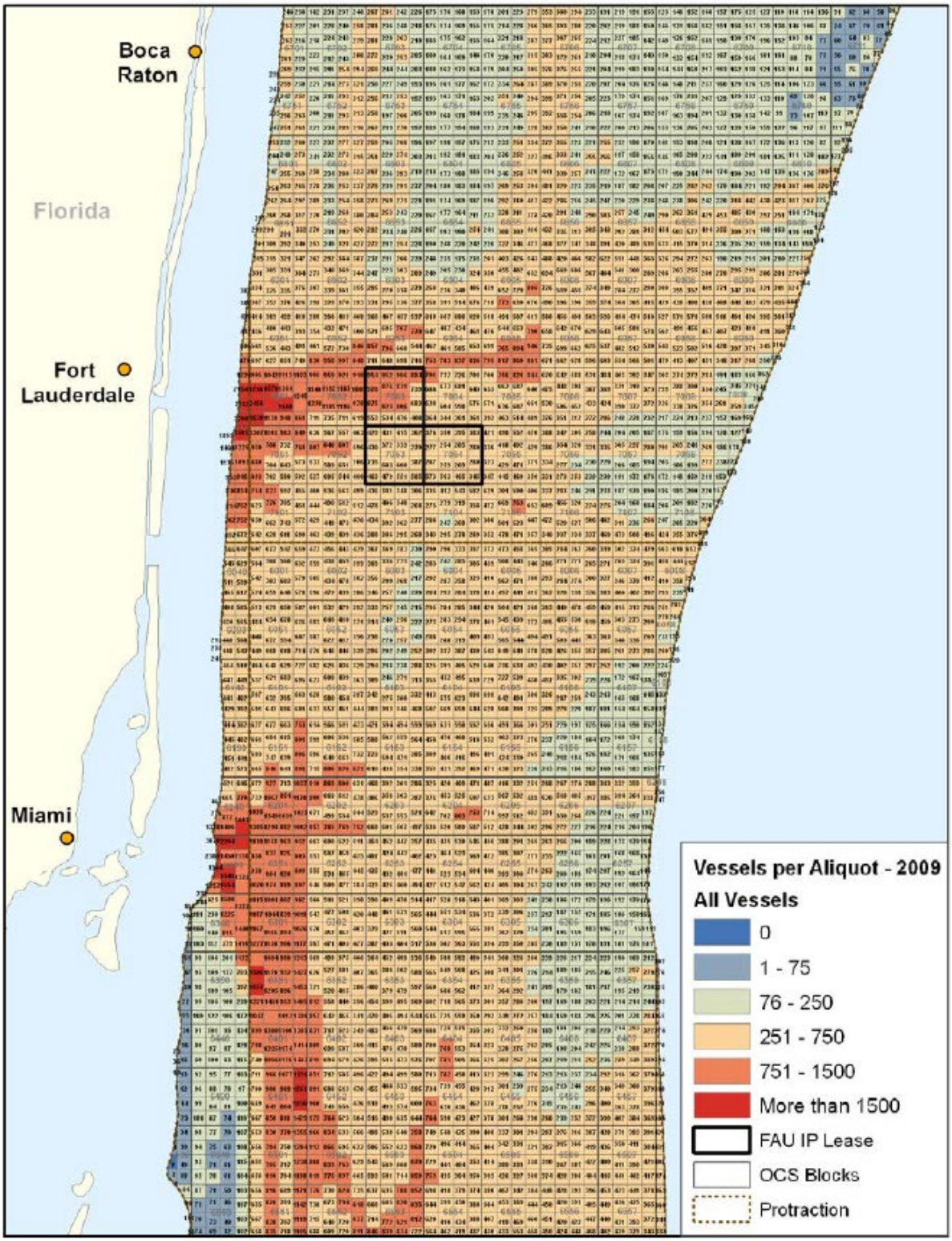


Figure 2.9. AIS data for all vessel traffic for 2009.

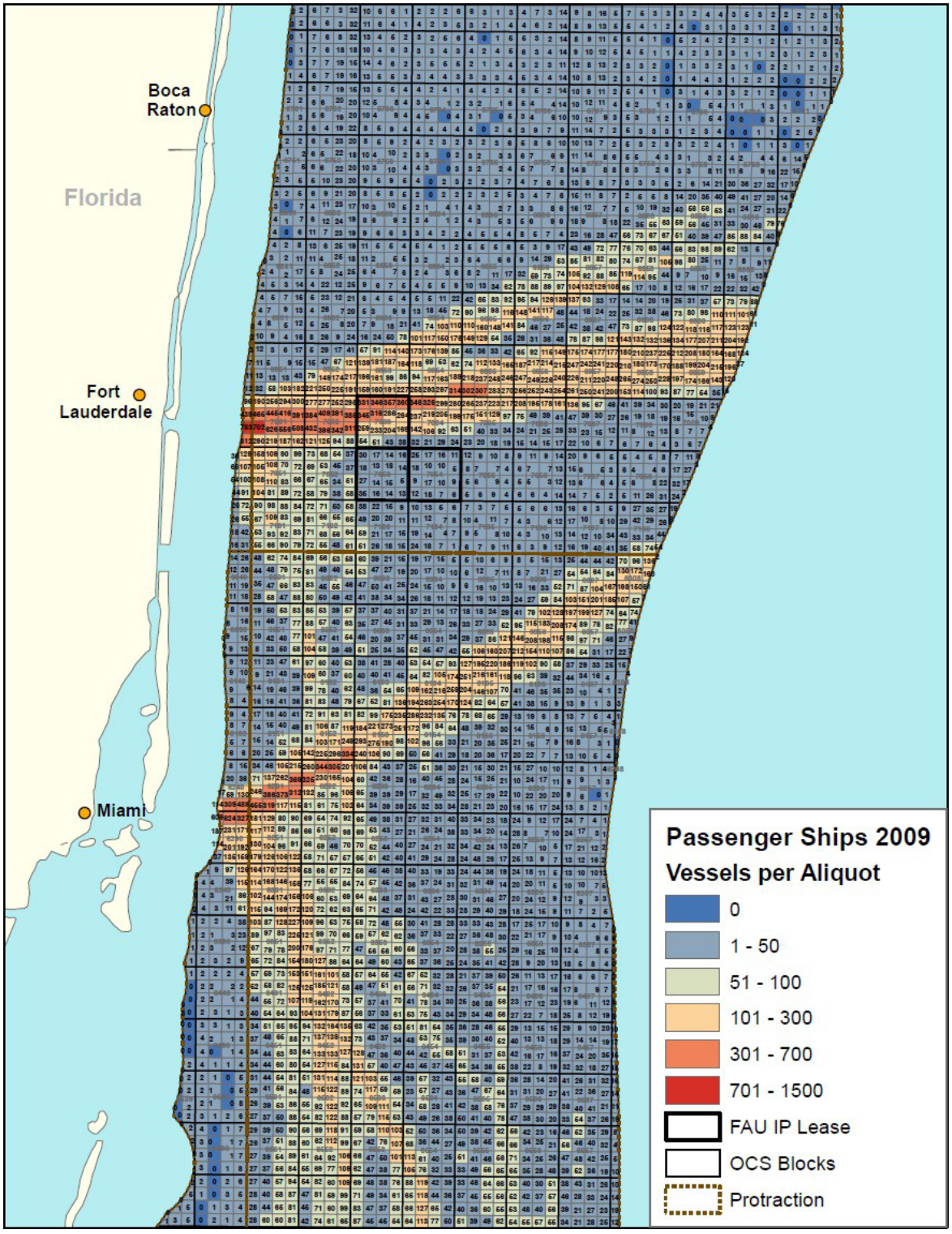


Figure 2.10. AIS data passenger vessel traffic for 2009.

Figure 2.11. AIS for cargo vessel traffic data for 2009.

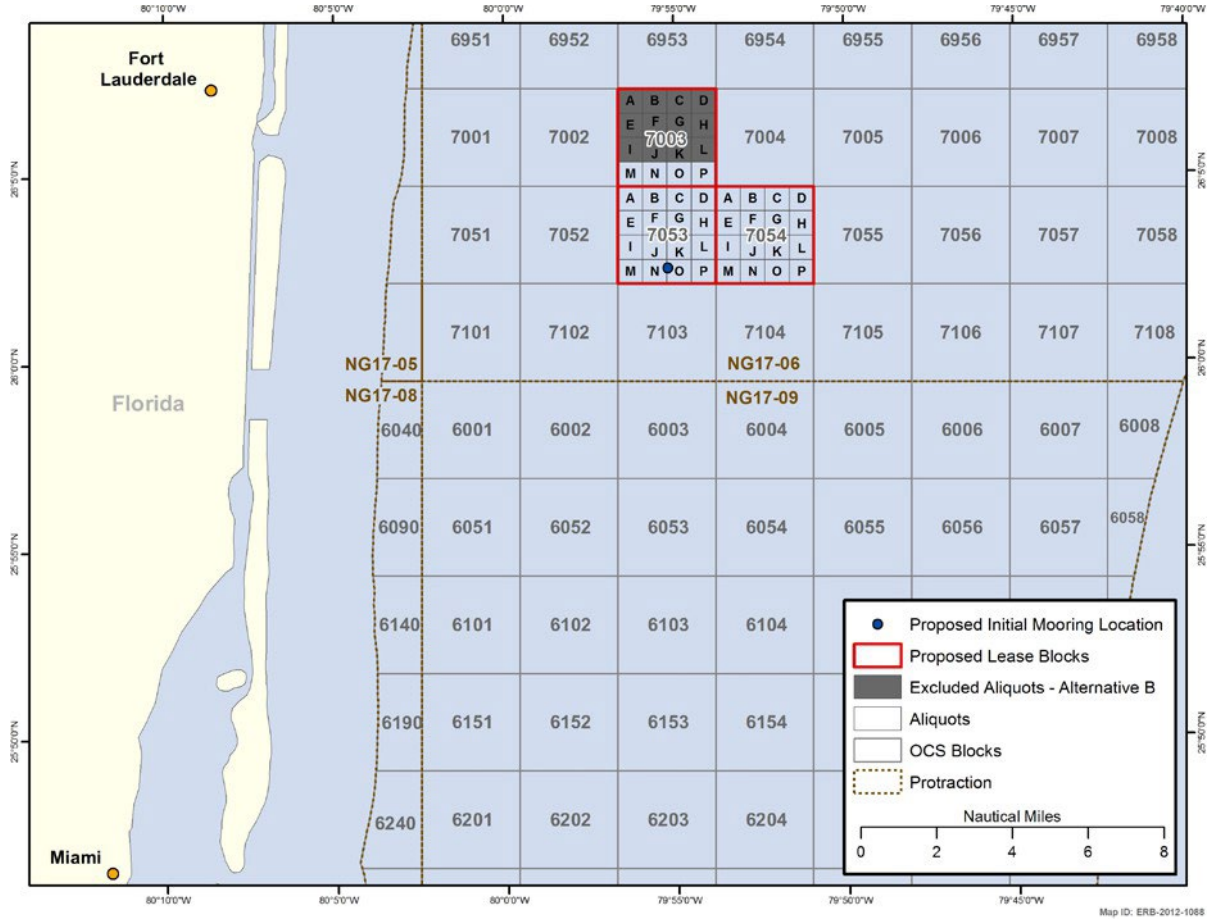


Figure 2.12. Alternative B – Removal of High Vessel Traffic Area.

2.3. Alternative C – Removal of Aliquot Containing High Slope Hardbottom Area (Preferred Alternative)

In the EA published for comment on April 25, 2012, (77 FR 24734), BOEM identified the Proposed Action (the issuance of a lease for the entirety of OCS Blocks 7003, 7053, and 7054) as the preferred alternative. *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* (Vinick *et al.*, 2012) identified high slope hard-bottom areas in OCS Blocks 7053 and 7054 that are likely to contain sensitive benthic habitat. OCS Block 7003 was not surveyed as a part of the study. Based on this study and public comments received on the previous version of the EA, BOEM has added Alternative C, Removal of Aliquot Containing High Slope Hardbottom Area. Under this alternative a lease would be issued to FAU SNMREC authorizing technology testing on OCS Blocks 7003, 7053, and 7054 with the exception of aliquot 7054N because more than 50% of the aliquot contains high slope hardbottom using the protocol established by Vinick *et al.*. (2012) (*see* Figure 2.12 below).

Regardless of the alternative chosen the lease stipulations for mooring system installation require the lessee to avoid potential sensitive benthic habitat by establishing a minimum 152 m (500 ft) buffer/exclusion from the estimated area of potential effect. This area includes the mooring and associated appurtenances (*see* Section 2.1.4 of this EA). Given the high density of

high slope hardbottom habitat in aliquot 7054N and avoidance that BOEM would require, it is unlikely the excluded aliquot would contain sufficient area for mooring deployment. As a result BOEM has identified Alternative C as the preferred alternative. The reasonably foreseeable impacts of Alternative C, Removal of Aliquot Containing High Slope Hardbottom Area, on the environment is described in detail in Section 3.3 of this EA.

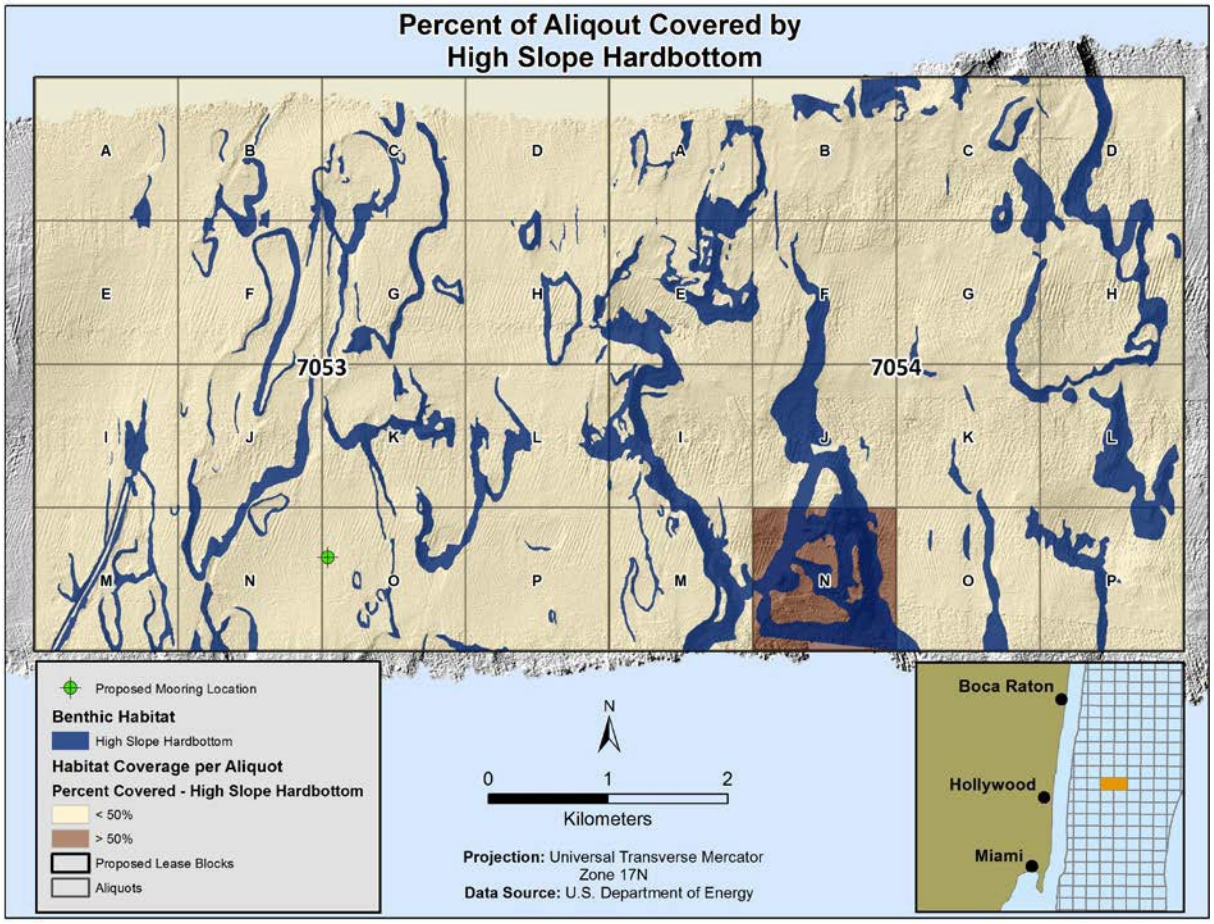


Figure 2.13. Aliquot 7054N in which more than 50% of the aliquot contains high slope hardbottom area.

2.4. Alternative D – No Action

Under the No Action Alternative, the proposed lease would not be issued and technology testing would not be authorized on the proposed leasehold at this time. In addition, under the no-action alternative, DOE would not authorize the expenditure of federal funds by FAU SNMREC for their experimental current generation turbine and the deployment and operation of the Small-Scale Ocean Current Turbine Test Berth. The reasonably foreseeable impacts of Alternative D (No Action) on the environment are described in Section 3.4 of this EA.

2.5. Non-Routine Events

Chapter 5.2.24 of the Programmatic EIS discusses in detail potential non-routine events and hazards that could occur during data collection activities. The primary events and hazards are:

(1) severe storms such as hurricanes and extratropical cyclones; (2) collisions between the structure or associated vessels with other marine vessels or marine life; and (3) spills from collisions or during generator refueling. This is a summary of these events and hazards.

Storms

Severe weather events have the potential to cause structural damage and injury to personnel. The Atlantic Ocean hurricane season is June 1 – November 30 every year with a peak in September. According to the National Hurricane Center's Tropical Cyclone Climatology, September and October are the months when hurricane tracks are most likely to impact the southern Florida outer-continental shelf.

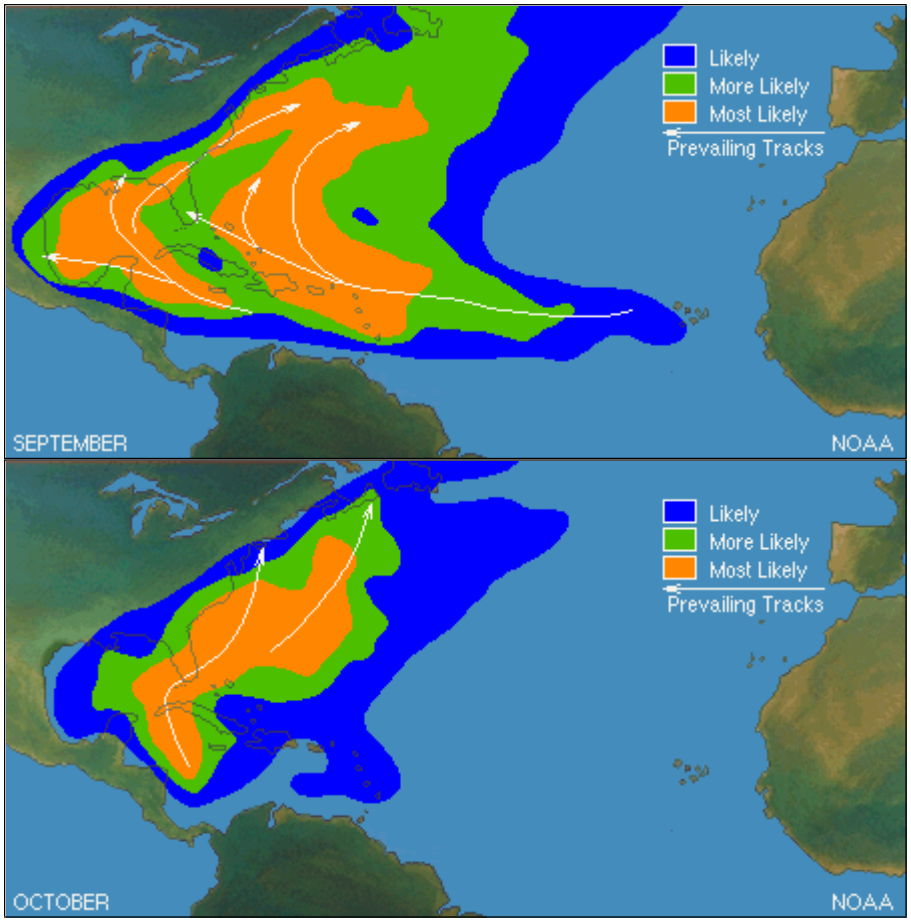


Figure 2.14. The zones of origin and tracks for the month of September and October during the hurricane season.
(Note: This figure only depicts average conditions. Hurricanes can originate in different locations and travel much different paths from the average; Source USDOC, NOAA, NHC, 2012)

Allisions and Collisions

A MTB or anchored vessel located on the OCS could pose a risk to navigation. An allision between a ship and MTB could result in the loss of the entire facility and /or the vessel, as well as loss of life and spill of diesel fuel. When a vessel hits a buoy system, it could damage the buoy hull so the buoy loses its buoyancy and sinks, or damages the equipment or its supporting

structure. Vessels associated with OCT testing or site characterization activities could collide with other vessels and experience accidental capsizing or result in a fuel spill.

Collisions and allisions are considered unlikely since vessel traffic is controlled by multiple routing measures, such as safety fairways, TSSs, and anchorages. Risk of allisions with MTBs would be further reduced by USCG-required marking and lighting.

Spills

A diesel fuel spill could occur as a result of collisions, accidents, or natural events. The amount of diesel fuel that could be released by a marine vessel involved in a collision would depend on the type of vessel and severity of the collision. Diesel fuel is a refined petroleum product that is lighter than water. It may float on the water's surface or be dispersed into the water column by waves. Diesel is a distillate of crude oil and does not contain the heavier components that contribute to crude oil's longer persistence in the environment. If a diesel spill were to occur, it would be expected to dissipate very rapidly and would then evaporate and biodegrade within a few days (USDOI, MMS, 2007). Vessels that contain oil are expected to comply with USCG requirements relating to prevention and control of oil spills. Equipment on the MTBs would be powered by batteries charged by small wind turbines and solar panels. The batteries are installed inside the MTB in one of three watertight compartments, and are housed in battery boxes with latching closures that prevent the boxes from opening allowing the batteries to fall out. If a lubricant spill were to occur from the OCT it would be expected to dissipate very rapidly and biodegrade within a few days as all test turbine lubricants used would be biodegradable and/or biobased hydraulic fluids which use vegetable oils such as canola, rapeseed, sunflower or soybean as the base oil and are non-toxic (FAU, 2011). Impacts from spills would depend greatly on the material spilled, the size and location of a spill, the weather conditions at the time and the speed with which cleanup plans and equipment could be deployed.

3. ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

3.1. The Proposed Action (Alternative A)

3.1.1. Physical Resources

3.1.1.1. Air Quality

3.1.1.1.1. Description of the Affected Environment

The Clean Air Act Amendments (CAAA) of 1970, 42 U.S.C. §§ 7401-7671q, directed the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that are listed as "criteria" pollutants because there was adequate reason to believe that their presence in the ambient air "may reasonably be anticipated to endanger public health and welfare." The NAAQS apply to sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb) (40 CFR Part 50). The primary standards are set at levels to protect public health with an adequate margin of safety. The EPA has designated secondary standards to protect public welfare. All of the standards are expressed as concentration in air and duration of exposure. Many standards address both short- and long-term exposures. Any individual state may adopt a more stringent set of standards.

The proposed lease area is located offshore Broward County. Broward County is classified by the USEPA as a maintenance area for the pollutant O_3. A maintenance area is an area previously classified as non-attainment – meaning that the area has pollutant levels above the thresholds set by the EPA – but has reduced pollutant concentrations to below the standard. These areas must maintain some of the non-attainment area plans to stay in compliance with the standards. Broward County is in attainment for all other criteria pollutants.

There are three Class I Areas in southern Florida near the proposed lease area and principle ports. Class I areas are federally-owned lands where very little air quality degradation is allowed. In these areas, air quality related values, including visibility, are protected. Class I areas have stringent incremental limits for NO_2, SO_2 and PM_{10}. Class I Areas are defined in Sections 101(b)(1), 169A(a)(2), and 301(a) of the CAAA, as amended (42 U.S.C. 7401(b), 7410, 7491(a)(2), and 7601(a)). The Everglades National Park, Biscayne National Park, and the Loxahatchee National Wildlife Refuge are all Class I areas. The potential emissions associated with the proposed action fall below incremental limits for the mentioned pollutants (*see* Section 3.1.1.1.2), and therefore will not cause degradation to air quality, including visibility.

The proposed action could affect the air quality onshore at the principle ports (Port Everglades and the Port of Miami); in state waters, which would be transited by vessels associated with the proposed action; and in the proposed OCS lease blocks. Vessel engine emissions would be the source of air quality impacts during surveying, installation, operations, decommissioning and buoy relocation activities. There is also the potential for impacts to air quality due to vessel fuel spills.

Section 328 of the Clean Air Act Amendments of 1990 (CAAA 1990) establishes a unique treatment for vessels associated with OCS facilities (42 U.S.C. 7627). With respect to calculations of a facility's Potential to Emit (PTE), the EPA counts emissions from vessels that

are servicing or associated with the operations of OCS facilities as direct emissions from the OCS source when those vessels are at the source, en route to or from the source as long as they are within 46.3 km (25.0 nm) of the source (40 CFR Part 55). The potential emissions associated with the proposed action fall below thresholds that would require an air permit (*see* Section 3.1.1.1.2).

3.1.1.1.2. Impact Analysis of the Proposed Action

Routine Events

The primary emission sources associated with the proposed action would be from internal combustion engines burning diesel fuel associated with vessel traffic, during: 1) site characterization surveys; 2) the installation, relocation and removal of MTBs; and 3) operations of the MTBs and testing devices. This would include primarily nitrogen oxides NO_x and carbon CO, lesser amounts of volatile organic compounds (VOCs) and PM (mostly in the form of $PM_{2.5}$), and negligible amounts of sulfur oxides (SO_x).

Site Characterization Surveys

Survey vessels would emit pollutants both in state waters and in waters of the OCS while traveling to and from the proposed lease blocks and while conducting site characterization surveys within the proposed lease blocks. Impacts from pollutant emissions associated with these vessels would very likely be localized. Prevailing westerly (west to east flow) winds would prevent substantial quantities of pollutant emissions from traveling from offshore areas to onshore areas.

Total estimated vessel traffic associated with geophysical surveys would amount to a very small contribution to the annual average port activity. In fiscal year 2010, Port Everglades reported a total of 4,079 ships at call (Port Everglades, 2010) and the Port of Miami reported a total of 2,441 cargo and cruise ships docked in 2010 (Port of Miami, 2012), compared with approximately 17 estimated annual roundtrips added from geophysical survey work (*see* Section 2.1.3 of this EA). Geophysical surveys within the proposed lease blocks would cover a maximum of 2,778.0 km (1,500.0 nm). Biological surveys conducted by ROVs would cover a total of 730,000.0 to 949,000.0 square m (7,857,654.6 to 10,214,957 square ft). An estimation of emissions of criteria air pollutants from geophysical surveys and biological surveys are summarized in Tables 3.1 and 3.2, respectively. This effort will take 40 – 53 vessel trips at 12-hour work days to complete.

Table 3.1

Vessel Emissions Associated with Geophysical Surveys in Tons for the 5-Year Life of the Proposed Action

PM	SOx	NOx	VOC	CO
0.081	0.015	0.558	0.091	0.246

Table 3.2

Vessel Emissions Associated with Biological Surveys in Tons for the 5-Year Life of the Proposed Action (5 years)

PM	SOx	NOx	VOC	CO
0.106	0.060	2.270	0.109	0.794

Pollutant emissions from vessel traffic conducting survey activities would be equivalent to approximately 1.07 percent of the total recorded Port Everglades and Port of Miami 2010 ship traffic. Once these surveys of the lease area are complete, these emissions would cease. Therefore, due to the nearly one percent contribution of additional vessel traffic and the low total pollutant emissions over a short period of time, the impacts to air quality from site characterization surveys will likely be negligible.

Installation, Relocation and Removal of the MTBs

The proposed action will have potential impacts on ambient air quality during installation, relocation and removal of the MTBs. These impacts to ambient air quality would be minor due to the short duration of these activities (one day of operations per installation, relocation or removal of MTB) and the location of these activities offshore. There will be 10 – 13 vessel trips to install and relocate each mooring buoy over the five year lease period. Estimated emissions of criteria air pollutants from installation; relocation and removal of all mooring systems are summarized in Table 3.3. The pollutant emissions totals assume 12-hour work days.

Table 3.3

Vessel Emissions Associated with the Installation, Relocation and Removal of Each Mooring Telemetry Buoy System in Tons for the 5-Year Life of the Proposed Action

PM	SOx	NOx	VOC	CO
0.024	0.036	0.339	0.027	0.073

Emissions associated with the installation, relocation and removal of the anticipated mooring systems would be negligible. The majority of these emissions would occur within the proposed lease blocks, and would not affect onshore air quality.

Operations and Testing

Under the proposed action, equipment on the mooring and telemetry buoys would be powered by batteries charged by small wind turbines and solar panels and therefore would not contribute to air pollution. The batteries are installed inside the MTB in one of three watertight compartments, and are housed in battery boxes with latching closures that prevent the boxes from opening and allowing the batteries to fall out. Vessels onsite at each turbine test location would emit pollutants. The power generated by the turbines during the operational phase would be dissipated through an air-heat exchanger located on the deployment vessel in order to provide heating and/or cooling to the vessel. Vessels would be onsite for one to five days at a time, 12-24 times per year over the course of the five-year lease period. At most, there will be three

vessels on the OCS at one time testing turbines. Pollutant emissions for operations for a single mooring and telemetry buoy system are shown in Table 3.4. Due to the distance from shore, prevailing winds, and the small amount of emissions that would be associated with generators, the use of diesel generators in the proposed lease blocks would not impact onshore air quality.

Table 3.4

Operational Emissions Totals per Mooring Telemetry Buoy System in Tons per Year

Year	PM	SOx	NOx	VOC	CO
1	0.34	0.75	6.37	0.37	1.38
2	0.33	0.71	6.06	0.36	1.32
3	0.33	0.71	6.06	0.36	1.32
4	0.33	0.71	6.06	0.36	1.32
5	0.35	0.79	6.71	0.39	1.46

Adapted from Appendix C, FAU, 2011.

Support vessels traveling to and from shore and in harbor or port areas, would make approximately 20-26 trips over five years. This would have a negligible effect on onshore air quality. Impacts from additional pollutant emissions associated with the proposed action in the already relatively busy ports and harbors would be negligible. Estimated emissions of criteria air pollutants from support activities are summarized in Table 3.5 below.

Table 3.5

Vessel Emissions Associated with Support Activities in Tons for the 5-Year Life of the Project

PM	SOx	NOx	VOC	CO
0.064	0.011	0.440	0.072	0.194

Class I Areas have stringent incremental limits for NO_2, SO_2 and PM_{10}. All of these pollutant emissions estimated for the proposed action fall well below limits of concern for visibility and therefore impacts to air quality would be negligible for the Class I Areas.

Non-Routine Events

The most likely impact to air emissions from non-routine activities would be caused by vapors from fuel spills resulting from vessel collisions or while servicing equipment on the

buoys, such as generators. If a vessel spill were to occur, the estimated spill size would be approximately 333.1 liters (88.0 gallons) based on the average spill size for vessels other than tank ships and tank barges (USDHS, USCG, 2011b). If such a spill were to occur, it would be expected to dissipate very rapidly and then evaporate and biodegrade within a few days (USDOI, MMS, 2007). Air emissions from a diesel spill would be minor and temporary. A diesel spill is not projected to have significant impacts because of the estimated size of a spill prevailing atmospheric conditions, and because diesel is lighter than water allowing it to dissipate rapidly. In the unlikely event of a spill occurring while en-route to and from the proposed lease area, which include harbor and coastal areas, the event is not anticipated to have significant impacts on onshore air quality. If such a spill were to occur, the impacts to local air quality would be minor and temporary.

Conclusion

Due to the low level of emissions associated with routine activities, potential impacts to onshore ambient air quality from the proposed action would be negligible. Prevailing westerly (west to east flow) winds would prevent pollutant emissions from drifting to onshore non-attainment areas from offshore areas and the proposed lease blocks. Emissions from vessel traffic associated with the proposed action in ports and harbors would be negligible, if detectable, due to the low volume of vessel activity in comparison to the volume of pollution emitted by existing vessel activity in and around these areas. If a non-routine event, such as a fuel spill, minor and temporary impacts on air quality in a localized area may occur. Neither routine activities nor non-routine events in coastal waters or in the proposed OCS lease blocks would significantly impact onshore air quality, including the Class I Areas for which pollutant emissions for the proposed action fall well below limits of concern for visibility.

3.1.1.2. Water Quality

3.1.1.2.1. Description of the Affected Environment

For the purposes of this EA, water quality is a measure of the biogeochemical and geophysical characteristics of a body of water with respect to the suitability of the given area for a particular purpose, or beneficial use (Mann and Lazier, 2006). Water quality within coastal and marine environments is directly influenced by the constituents these environments receive from surrounding river and stream drainage basins, urban storm water runoff, recreational and commercial uses of the area, biological effects (algal blooms, fish kills, and degradation of particulate organic matter), and the quantity and composition of wet and dry atmospheric deposition. Human activities affecting coastal and marine water quality include discharges from vessel traffic and commercial and recreational activities, burning of manmade and natural refuse, dumping of dissolved and particulate waste, and vessel release of pollutants. Long-term physical effects due to climate, heat transport, thermohaline convection, turbulent mixing, and horizontal convection/lateral mixing from current flow may also impact water quality.

The proposed action could affect the water quality in coastal waters surrounding the principle ports, Port Everglades and the Port of Miami, in waters offshore southern Florida traversed by project-related vessels, and within the proposed lease area. The primary impact to water quality during staging activities at Port Everglades and/or the Port of Miami is that attributable to non-point source pollution, or runoff, which originates from more than one activity that may be detrimental to water quality. Vessel discharges are expected to be the primary impacts to water

quality during site surveys and assessments. Additionally, sediment disturbance to water quality may take place during the anchoring, installation, and operation of mooring/telemetry buoys and experimental energy turbines associated with the project, as well as buoy/turbine relocation and decommissioning

Coastal Waters

The water-quality status of coastal surface waters in Broward County, Florida, is generally good, according to the Broward County, Florida, *Environmental Benchmarks Report of 2010* (Environmental Protection and Growth Management Department, Broward County Board of Commissioners, 2010). Since 2005, non-point sources of nutrient runoff (composed primarily of nitrogen and phosphorus species) have consistently measured within the acceptable standards outlined by state and federal regulations. Within Miami-Dade County, water quality is within state and Federally-acceptable levels; out of twenty parameters detected during water quality sampling within the county, all are below the maximum contaminant levels allowed (Miami-Dade County Water and Sewer Department, 2010). According to the U.S. Environmental Protection Agency's National Coastal Condition Report III (USEPA, 2008a) the coastal water quality index in south Florida monitoring locations are rated "Good". This is based on a water quality index derived from measurements of dissolved inorganic nitrogen concentrations, dissolved inorganic phosphorus concentrations, chlorophyll a concentrations, water clarity and dissolved oxygen levels.

Based on regular state monitoring data for 2010, both Broward and Miami-Dade counties generally meet "good" beach quality standards with very few advisories or warnings issued (http://esetappsdoh.doh.state.fl.us/irm00beachwater/default.aspx).

Marine Waters

There are few detrimental impacts to water quality that originate from source activities conducted within the marine environment. Vessel discharges and effluent from wastewater treatment facilities located on the nearby Florida coast are responsible for the majority of contaminants affecting the marine environment. 33 CFR 151 prohibits the discharge of any water substances or bilge water that produces a sheen or contains concentrations of 15 parts per million or greater within 12 nautical miles of Florida coastline or inland navigable waters. Marine waters beyond 5.6 km (3.0 nm) offshore typically have very low concentrations of suspended particles, generally less than 1.0 milligram per liter (Louis Berger Group, 1999). However, particulate waste entrained within the Florida Current or within eddies dislodged from the Gulf Stream has been documented (Yanagi, 1999). Bottom currents may be responsible for higher particulate loads near the sea floor, and, in more shallow areas of the marine environment, wind events may resuspend bottom sediment and increase turbidity and the amount of suspended particles within the water column for several days after an event has occurred. Strong internal tidal currents at the foot of the shelf slope have been observed off the Atlantic coast of Florida, within or nearby the proposed lease area. Occurring near the seafloor, these strong internal tidal currents can affect the sedimentation process and can result in coarse sand occupying the top layer of sediment in these areas (Yanagi, 1999). Sand, the predominant sediment type in the area, does not typically retain contaminants, thus resuspension of sediments is not a potential source of pollution. The distance of the OCS lease blocks from the coast limits the potential influence of land-based contaminants.

3.1.1.2.2. Impact Analysis of the Proposed Action

Routine Activities

The routine activities associated with the proposed action that would impact coastal and marine water quality include vessel discharges (including bilge and ballast water and sanitary waste); sediment disturbance caused by the installation, relocation, and removal of MTBs; and flow disturbance caused by operation of experimental turbine generators.

Onshore Discharges

All point-source discharges are regulated by the USEPA, the agency responsible for coastal water quality, or the USEPA-authorized state agency. The USEPA National Pollutant Discharge Elimination System (NPDES) storm-water effluent limitation guidelines control storm-water discharges from support facilities such as ports and harbors. Activities associated with staging and fabrication of the MTBs would account for a very small amount of activity at existing port facilities during the short duration of staging. Therefore, the proposed action is not anticipated to increase runoff or onshore discharge into harbors, waterways, coastal areas or the open ocean environment.

Vessel Discharges

Vessel discharges associated with the proposed action, including bilge and ballast water, and sanitary waste, may affect water quality when vessels are traveling to and from the MTBs and the experimental turbine systems, and during site characterization activities in the proposed lease area. Bilge water, which is often contaminated by oil that leaks from the machinery within the vessel, is water that collects in the lower part of a ship. The discharge of any oil or oily mixtures is prohibited under 33 CFR 151.10; however, discharges may occur in waters greater than 22.2 km (12.0 nm) from shore if the oil concentration is less than 100 parts per million (ppm). Regulations that set limits for oil in bilge water minimize the impact to water quality.

Ballast water is less likely to contain oil but is subject to the same limits. Ballast water is used to maintain stability of the vessel and may be pumped from coastal or marine waters. Generally, the ballast water is pumped into and out of separate compartments and is not usually contaminated with oil; however, the same discharge criteria apply as for bilge water (33 CFR 151.10). Ballast water may be subject to the USCG Ballast Water Management Program to prevent the spread of aquatic nuisance species. In coastal waters, bilge and ballast water may be discharged with an oil content of 15 ppm or less. The discharges may affect the water quality locally and temporarily, but the potential impacts would be minor.

A marine sanitation device (MSD) is required under 33 CFR 159 to treat sanitary waste generated on service vessels so that surrounding waters are not impacted by possible contamination of micro-organisms within the waste. All vessels with toilet facilities must have a MSD that complies with 40 CFR 140 and 149. These systems are designed to retain or treat the waste until it can be disposed of at the proper facilities on shore. As confirmed in the project application, discharges during on-site offshore operations associated with the planned activity will be limited to disposal of human waste, and all proposed deployment vessels are equipped with MSDs to ensure the treatment of such waste is compliant with all state and federal regulations.

State and local governments regulate domestic or gray water discharges. However, a State may prohibit the discharge of all sewage within any or all of its waters. Domestic waste consists of all types of wastes generated in the living spaces on board a ship including gray water that is

generated from dishwasher, shower, laundry, bath and washbasin drains. Gray water from vessels is not regulated outside state waters. Vessel operators may dump gray water outside state waters.

The discharge of trash and debris is prohibited in the sea, or into the navigable waters of the United States (33 CFR 151.51-77), unless it is passed through a comminutor and can pass through a 25.0-mm (1.0-in) mesh screen. All other trash and debris must be returned to shore for proper disposal with municipal and solid waste. Therefore, any discharge of trash and debris from the proposed activity would result in a negligible environmental impact to the proposed leasing area.

The USEPA Vessel General Permit (VGP) applies to vessel discharges incidental to the normal operation of all non-recreational, non-military vessels of 21.3 m (70.0 ft) or greater in length which discharge in waters of the United States. Additionally, these provisions apply to ballast water discharges from any non-recreational vessel of less than 21.3 m (70.0 ft) or commercial fishing vessel of any size that discharges ballast water within the United States. Federal permit guidelines state that vessels greater than or equal to 304.8 metric tons (300.0 gross tons) or vessels with the capacity to hold or discharge more than 8.0 cubic m (2,113 gal) of ballast water must submit a complete and accurate notice of intent to hold or discharge such ballast water (USEPA, 2011). USEPA modeled how these vessel types may impact water quality and determined that vessels discharging to a relatively large water body were not likely to exceed National Recommended Water Quality Criteria (USEPA, 2010). However, there is the potential for these discharges to cause impacts to water quality on small spatial and temporal scales. Metals are frequently found in bilge water samples. The volume and make-up of gray water discharge varies by vessel type, but potable freshwater is usually bunkered in port (service water). Because it is common practice for vessels to use service water collected at port, BOEM anticipates that vessels associated with the proposed action will also follow this exercise, especially as the applicant does not plan to exceed five days at a time at any site. Therefore, impacts from vessel discharges associated with the proposed action on harbors, ports, coastal areas, and within the proposed location of the mooring/telemetry buoy and the experimental turbine systems would be minor, if detectable.

Sediment Disturbance

The proposed sites for anchoring the MTBs depends upon the depth and availability of a seafloor composed of a sand layer (at least 0.5 m [1.6 ft]) sufficient for anchor holding power. Anchoring buoys, anchor removal, and chain sweep would cause intermittent disturbance of the seafloor, with movement of sediment into the water column followed by sedimentation. An area of approximately 73,000.0 square m (785,765.5 square ft) will compose the proposed mooring site, with a coverage radius of 152.0 m (498.7 ft). Each deployment and subsequent removal of the anchors may result in sediment disturbance. Up to three MTBs would be installed at one time, during which contact of the shock chain with the seafloor (e.g. chain sweep) will result in sediment disturbance. The seafloor disturbance area for mooring installation is roughly 6,000.0 square m (64,583.5 square ft). The ideal sediment type for the anchoring activity is sand, and disturbances to sand do not cause significant turbidity due to the size of the sand grains. Therefore, sedimentation within the water column and associated increased turbidity is expected to be minimal. The amount and duration of increased turbidity would be dependent upon the activity, the sediment grain size, water current velocity, and water depth. Anchoring and removal are short processes; therefore, sediment is expected to settle within a few minutes of

disturbance. In addition, short-term impacts to turbidity and water clarity are expected to be confined to the anchor area within the proposed lease area, therefore these impacts are anticipated to be minor. Observations within the Florida Straits and at the locations of the proposed MTBs reveal a current structure that consists of rapid (over 2.5 m/s [8.2 ft/s]) speeds near the surface to currents moving only a few centimeters per second near the bottom. Because of the extremely slow rate of current flow near the seafloor, it is expected that any new sediment transport patterns associated with the proposed activity would be quite minimal.

Flow Disturbances

Any flow disturbance would occur at the same depth of, and downstream from, the experimental turbine system, during the testing periods of turbine deployment. It is proposed that there would be a maximum of 12-24 annual test sessions (up to five days duration each, with a minimum one day duration) for each MTB. Observations of current speed measured from an acoustic current meter moored under the core of the Florida Current (Figure 2, FAU, 2011) suggest that there are significant spatial and temporal changes in the measured flow of the undisturbed current. This natural variability is much larger than would be introduced by the deployment of the proposed experimental turbines. Therefore, flow disturbances caused by the test turbine would be insignificant; however current meters as well as turbulence instruments will be deployed at the turbine and downstream to obtain data (Section 1.3.4, 3. Flow disturbances, FAU, 2011).

Non-Routine Events

During travel to and from the principle ports (Port Everglades and the Port of Miami) for site characterization activities within the proposed locations of the MTBs and experimental turbine systems, and operations of the experimental turbines, multiple sources of diesel fuel would be present on vessels, buoys, and perhaps turbines. Spills could occur during refueling or as the result of an allision, (the striking of one ship by another) or collision.

A vessel allision with the buoy or collision with other vessels may result in the spillage of diesel. Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. To date, approximately 10 percent of vessel allisions with fixed structures on the OCS caused diesel spills. From 2000 to 2009, the average spill size for vessels other than tank ships and tank barges was 88.36 gallons (USDHS, USCG, 2011b). Tank sizes of the vessels proposed for surveys range from 151.0 to 26,497.9 liters
(40.0 to 7,000 gallons) (FAU, 2011). If a diesel spill of this size were to occur, it would be expected to dissipate very rapidly in the water column of the open ocean, then evaporate and biodegrade within a few days. Additionally, vessels containing oils are expected to comply with USCG requirements relating to prevention and control of oil spills.

The mooring/telemetry buoys could also serve as attractants for marine life, which in turn attracts recreational fishermen to the area. Charter fishing and diving vessels, as well as diesel-fueled cargo ships, are common to this area and therefore, there is some potential for collisions with recreational fishing boats and accidental release of diesel fuel. Should this occur, the spill would be similarly small, and would dissipate and biodegrade in the same manner discussed above.

Storms may also cause allisions and collisions that could result in a spill, yet the storm conditions would cause the spill to dissipate faster due to mixing in the water column. As a result, the impacts to the environment that could result from an oil spill associated with the

proposed action are expected to be both minor and temporary. Test turbine lubricant spills are considered to be unlikely because the system(s) that contain lubricant would be ferried out to the project location for each deployment and all maintenance of lubricant systems would be completed at port (FAU, 2011). If a lubricant spill were to occur it would be expected to dissipate very rapidly and biodegrade within a few days as all test turbine lubricants used would be biodegradable and/or biobased hydraulic fluids which use vegetable oils such as canola, rapeseed, sunflower or soybean as the base oil and are non-toxic (FAU, 2011).

Litter could impact coastal and marine water quality. Due to the limited nature of the proposed activities and their distance from shore, it is unlikely that recreational beaches in Florida would be impacted by waterborne trash as a result of the proposed action. Any beached litter and debris as a result of the proposed action is unlikely to be perceptible to users or reported by state and Federal monitoring programs given the amount of vessel traffic currently traversing the coastal areas of Florida.

Conclusion

Impacts to coastal and marine waters from vessel discharges associated with the proposed action would be minimal, if detectable. Impacts from marine trash and debris are possible but unlikely. If any impacts due to trash and debris do occur they would be minimal. Sediment disturbance resulting from the placement and removal of anchors would be short-term and minimal, temporarily impacting local turbidity, and water clarity. Since collisions and allisions occur infrequently and rarely result in a spill, the risk of a spill would be small. In the unlikely event of a fuel spill, minimal impacts would result since the spill would very likely be small, and would dissipate and biodegrade within a short time. Therefore, vessel discharges, sediment disturbance, and potential spills associated with the proposed action in harbors, ports, coastal areas and the open ocean would not cause a significant impact to water quality.

3.1.2. Biological Resources

3.1.2.1. Coastal Habitats

3.1.2.1.1. Description of the Affected Environment

Port Everglades, the adjacent primary entrance inlet (hereafter, 'Inlet'), and the surrounding area will be transited by vessels associated with the project and will be used to facilitate access to shore-based and support vessel resources. FAU SNMREC's application indicates that one of the potential support vessels receives onshore support from the Port of Miami, located in Miami-Dade County, Florida (FAU, 2011). Also, prior to deployment activities in the proposed lease area, FAU SNMREC would conduct small-scale experimental turbine tow testing in the coastal waters of Fort Pierce. The beaches of Broward and Miami-Dade Counties are typical of southeast Florida beaches that receive the full impact of wind and wave action (USACE, 2003). The diversity of species that can survive in this high-energy environment is low, however, the population of the few resident species that are specialized to survive in this high-energy environment is usually very high (USACE, 2003). In the surf zone, coquina clams (*Donax* spp.) and mole crabs (*Emerita talpoida*) typically dominate the beach fauna (USACE, 2003). Along Florida's shores, salt marshes and mangrove forests provide important habitats to numerous species (WRI, 2011). As a result of heavy coastal development, the region's coastal habitats are

under intense pressure from many sources, such as recreational and commercial uses, coastal development and runoff, and maritime industries.

Port Everglades Inlet and Surrounding Area

The Port Everglades Inlet is a man-made inlet created in 1926 (FL DEP, 1999) that allows access to the Port Everglades Harbor. The Harbor is one of only a few major deepwater seaports on the Atlantic coast, and the deepest port in Florida. The Port Everglades harbor and entrance channel are described in detail in Section 3.1.3.6 of this EA. A small area of vegetated estuarine wetlands surrounding Port Everglades Inlet is limited in size due to the extensive development of the Port and adjacent urban areas, absence of stable substrate, and excessive water depth (USACE, 2003). The entrance channel is a seashore barrier, with all sand moving south being accreted on beaches north of the northern jetty, or moving into the channel itself (USACE, 2003). The south shoreline of the inlet is chronically eroded as a result. The Port currently has a 24.3-hectare (ha; 60.0-acre [ac]) conservation easement and anticipates creating 6.7 ha (16.5 ac) of mangrove wetlands on the uplands enhancement site adjacent to the Turning Notch in exchange for releasing 3.5 ha (8.7 ac) of the existing Conservation Easement at the west end of the existing notch (USEPA, 2004). Southeast of Port Everglades is the John U. Lloyd (JUL) Beach State Park. The JUL is on a barrier island that extends south approximately 4.8 km (3.0 mi) from the Port Everglades' entrance channel (FERC, 2004). The JUL is vegetated with mangroves and upland species, which include coastal hardwood hammocks, and exotics such as Australian pines and Brazilian peppers (USACE, 2003). Additionally, sand replenishment for the JUL beach has historically come from dredging of the Port Everglades Inlet. Vessel traffic will likely pass near the JUL in order to gain access to and from the Port during operations.

Port of Miami

The Port of Miami is in Biscayne Bay, a shallow salt-water sound approximately 37.0 km (23.0 mi) south of Port Everglades in Miami-Dade County, Florida. A narrow chain of small islands, known as keys, separates Biscayne Bay from the Atlantic Ocean. Government Cut, an artificial cut through this chain of islands, forms the primary entrance to the main ship channel leading to Miami Harbor (USACE, 2004). Biscayne Bay Aquatic Preserve includes most of Biscayne Bay and larger areas to the south; the chain of keys to the east of the Port of Miami form the eastern border of the northern section of the preserve, and residential developments along the mainland shore form the western border. The construction of the Port of Miami has altered the northern portion of the Bay's coastal habitats (FLDEP, 2011). However, small areas with seagrass beds and mangrove fringe forests persist in certain areas of Biscayne Bay despite heavy coastal development (City of Miami Parks and Recreation Department, 2011). According to the Project Plan (FAU, 2011), one vessel, the *R/V F.G. Walton Smith*, would rely on onshore support out of the Port of Miami and likely pass through Government Cut and Biscayne Bay to access the Port of Miami.

Fort Pierce

The Fort Pierce harbor and inlet is an actively managed inlet within the Indian River Lagoon system. The inlet has been managed through regular inlet dredging since 1921 when the jetties were first installed. Since the jetty installation beach re-nourishment projects have been necessary to mitigate erosion south of the jetty. Florida maintains the Fort Pierce Inlet State Park at the mouth of the inlet. The seafloor offshore Fort Pierce is generally flat and sandy, and

depths are shallow, with the 30 m (100 ft) depth contour located about 20 km (10.8 nm) from the shoreline. The proposed test location area is 22 km (11.8 nm) east of the Fort Pierce inlet and is approximately 70 square kilometers (20 sq. nm). Figure 2.3 shows the proposed tow test area and its proximity to shore with various depth contours (soundings in meters).

3.1.2.1.2. Impact Analysis of the Proposed Action

Routine Activities

The total vessel traffic anticipated to occur in connection with the proposed action is approximately 275 – 475 vessel trips over a 5-year period (*see* Section 2.1.2 for additional information). BOEM has reviewed the existing port statistics and USCG Automated Identification System (AIS) vessel traffic usage in the area and projections for future increases for Port Everglades and the Port of Miami. Large cargo and cruise vessels frequent both Ports on a regular basis. The average size vessel that called on U.S. ports in 2010 was 48,617.8 metric tons (53,592.0 deadweight tons (DWT)) (USDOT, MARAD, 2011), or 'Handymax' naval size classification, which are typically up to 200.0 m (656.0 ft) in length. These vessels are much larger than the largest vessel anticipated to be used in the proposed action (the largest vessel identified in the proposed action is 29.3 m (96.0 ft) in length) (FAU, 2011).

The vessel traffic anticipated to occur near Port Everglades in connection with the proposed action is relatively small in relation to the vessel sizes and amount of vessel traffic (roughly 20,000 vessels over a typical 5-year period; see Table 3.17 in Section 3.1.3.6 [*Marine Transportation*]) that already occurs within Port Everglades, the Port Inlet and surrounding area, and between Port Everglades and the proposed OCS lease blocks. The vessel traffic associated with the proposed action out of Port Everglades will be approximately 78 percent of the total vessel traffic for the proposed action.

The vessel traffic anticipated to occur in connection with the proposed action is relatively small in relation to the similar vessel sizes and amount of vessel traffic typical near the Port of Miami (roughly 12,500 vessels over a 5-year period based on cargo and cruise vessels data) (Port of Miami, 2012). The one support vessel anticipated to transit the Port of Miami (the R/V *F.G. Walton Smith)* would conduct approximately 60-79 trips, representing up to 22 percent of the total vessel traffic for the proposed action. Additionally, there would be one vessel trip associated with the small-scale experimental turbine tow testing.

Pursuant to local laws and port regulations, vessel traffic associated with the proposed action must follow normal port procedures, including the use of established nearshore traffic lanes, and port speed limits. In addition, there would be vessel speed restrictions ranging from idle speeds up to 22 knots (40.2 km/h)) in the manatee protection zones established in both Broward and Miami-Dade counties adjacent to and in the principle ports (*see* Section 2.1 of this EA). Given these speed restrictions, there would be a small increase in the amount of wake erosion in the harbor areas on coastal habitats from the vessels transiting between Port Everglades and the Port of Miami and the proposed lease blocks, however, this is unlikely to be distinguishable or perceptible from existing vessel traffic effects on the area, especially when compared to effects caused by larger vessels.

Non-Routine Activities

Spills could occur during refueling at port or as a result of a collision between vessels or an allision between a vessel and the MTB. Non-routine activities, such as the accidental discharge of fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three are discussed

in Section 3.1.1.2.2 of this EA. Since the proposed project location is 16.7 to 27.8 km (9.0 to15.0 nm) from shore, if a diesel spill were to occur in the proposed lease blocks, it would be expected to dissipate very rapidly and biodegrade within a few days and is unlikely to reach the shore and impact coastal habitats. In the case of accidental leakage of ship lubrication systems, all lubricants anticipated to be used onboard would be specifically chosen to be environmentally friendly and biodegradable, as described in the project application (FAU, 2011). Since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they were dissipated. Therefore, it is anticipated that impacts to coastal habitats from non-routine activities would be negligible.

Conclusion

Routine activities may cause additional wake-induced erosion by vessel traffic in support of the proposed action, however, given existing vessel speed restrictions and the volume and nature of existing coastal traffic in these areas, this proportionally small increase would have negligible impacts on coastal habitats. A non-routine event, such as a diesel spill or leakage of ship lubrication systems, could occur as a result of the proposed action. Impacts from such a non-routine event would be negligible and are not anticipated to create any significant impacts to coastal habitats due to the distance of the proposed lease area from shore and the use of environmentally friendly and biodegradable lubricants.

3.1.2.2. Benthic Habitat

This section describes and evaluates reasonably foreseeable impacts that would occur from the proposed action on benthic (seafloor) habitat in the offshore and coastal environments.

3.1.2.2.1. Description of the Affected Environment

Offshore

The primary area of potential effect to benthic habitats from the proposed action is approximately 16.7 to 27.8 km (9.0 to15.0 nm) southeast of Port Everglades, Florida in lease blocks 7003, 7053, and 7054. This location is arguably in the extreme southern end of the South Atlantic Bight (an embayment encompassing the coastline to the edge of the continental shelf from Miami to Cape Hatteras) on a sub-marine landform called the Miami Terrace. The Miami Terrace is a 65. km (40.4-mi) long carbonate platform that lies between Boca Raton and South Miami at depths of 200 m – 400 m (656.2 to 1,312.3 ft) in the northern Straits of Florida. It consists of high-relief Tertiary limestone ridges, scarps and slabs that provide extensive hardbottom habitat (Uchupi, 1966, 1969; Kofoed and Malloy, 1965; Uchupi and Emery, 1967; Malloy and Hurley, 1970; Ballard and Uchupi, 1971; Neumann and Ball, 1970, as cited in Reed, 2004).

The proposed lease blocks cover approximately 70 km^2 (27 mi^2) of seafloor and range in depth from 262.0 to 366.0 m (859.6 to 1,200.9 ft) from west to east. The proposed lease blocks have been preliminarily surveyed by the applicant and shown to have areas of wide, flat unconsolidated sand overburden that would facilitate placement of a mooring system. Areas of hardbottom and high relief are undesirable locations for siting the mooring system. Thus sensitive, biologically diverse habitat types are avoided not only because of biological considerations but also due to engineering constraints on the project. The preferred mooring site is situated approximately 7.4 to 9.3 km (4.0 to 5.0 nm) from the eastern edge/escarpment of the

Miami Terrace in approximately 267.0 m (876.0 ft) of water on unconsolidated sand (FAU, 2011).

The proposed lease blocks are within an area identified by the SAFMC as HAPC for live/hardbottom and coral (*see* Section 3.1.2.7 for more discussion of the HAPC designation). Surveys to the east of the proposed lease blocks on the Miami Terrace escarpment have identified *Lophelia pertusa* coral, stylasterine hydrocoral (*Stylasteridae*), bamboo coral (*Isididae*), and various sponges and octocorals (Reed *et al.*, 2004b; Reed and Wright, 2004 as cited in Reed, 2004). Deepsea corals are especially sensitive to disturbance since they exhibit very slow growth rates - on the order of a couple of centimeters per year (SAFMC, 2011). Other motile invertebrates identified in the general area of the proposed action include *Asteroporpa sp*. ophiuroids, *Stylocidaris sp*. urchins, Mollusca, Actiniaria, and Decapoda crustaceans (*Chaceon fenneri* and *Galatheidae*). Deepwater corals provide essential habitat for many fish and invertebrate species and have shown to have potential pharmaceutical benefits due to the chemical compounds they produce in order to adapt to their deep water environment.

Coastal

The description of the affected coastal benthic habitats is restricted to the immediate vicinity of Port Everglades,Port of Miami, and Fort Pierce in Florida. Port Everglades is the primary port to be used by the project applicant for vessels departing to the offshore lease blocks where the mooring locations would be located for testing the OCTs. In addition to Port Everglades the applicant also anticipates that some vessels will utilize the Port of Miami. Fort Pierce will be used as the point of departure for the towed testing of FAU SNMREC's small-scale experimental turbines as it is more closely located to the HBOI facilities. A full description of the industrial ports at Port Everglades, Miami, and Fort Pierce can be found in Section 3.1.2.1, Coastal Habitats, of this EA.

Although the principal ports for staging activities are heavily industrialized ports, they are also home to small patches of submerged aquatic vegetation (seagrasses and macroalgae). Seagrasses may occur within the estuary of Port Everglades, Port of Miami, and Fort Pierce as well seaward of the beaches north and south of the ports' entrances. Seagrass beds provide important nursery grounds for fish as well as forage for sea turtles and manatees. Seagrass species that may be found within the area of the principal ports include the Johnson's seagrass (*Halophila johnsonii*), which is listed as threatened under ESA; shoalgrass (*Halodule wrightii*); and widgeon grass (*Ruppia maritima*). No critical habitat for Johnson's seagrass is located in the vicinity of Port Everglades or within the Port of Miami (USDOI, USFWS, 2012).

In addition to submerged aquatic vegetation, shallow-water corals are also found in the immediate vicinity of Port Everglades,Port of Miami, and Fort Pierce. Common shallow-water corals off of southeastern Florida include most hermatypic (i.e., reef-building hard coral) species at the northern end of their range and ahermatypic species, such as sea fans and sea whips. In fact, north of the entrance to Port Everglades and directly offshore the Port of Miami there is critical habitat designated for two species of endangered coral; staghorn coral (*Acropora cervicornis*) and elkhorn coral (*Acropora palmata*). Staghorn and elkhorn coral can support a diverse assemblage of other invertebrates and fish. Since the 1980s these zones have been largely transformed into rubble fields with few, isolated living colonies. Populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. This species is also particularly susceptible to damage from sedimentation (USDOC, NOAA, NMFS, 2012).

There is no designated critical habitat for coral within the harbor or immediately offshore Fort Pierce. However within the harbor there is critical habitat for the previously mentioned Johnson's seagrass (*Halophila johnsonii*).

3.1.2.2.2. Impact Analysis of the Proposed Action

Offshore – Routine Activities

The primary impacts to offshore benthic habitats are anticipated to be a result of the deployment and retrieval of the mooring system. Impacts to the benthic environment from survey activity is anticipated to be negligible due to the very limited physical contact that some survey equipment, such as ROVs, autonomous underwater vehicles (AUVs), and acoustic Doppler current profilers (ADCPs) will have with the seafloor. As described in the Proposed Action (Section 2.1) the mooring system consists of a 2.7-metric ton (3.0-ton) drag embedment anchor. The mooring system would be deployed 10-13 times, in potentially 10-13 different locations, over the 5-year lease period. The applicant anticipates that the anchor can be deployed within 70.0 m (229.7 ft) of the target area. This estimate is based on previous experience the applicant has had in deploying ADCPs in the proposed lease blocks. The anchor would then be set in place by dragging it up to 15 m to embed into the seafloor (*see* Section 2.1.4). The applicant estimates the total area of potential effect from the deployment of the mooring system is approximately 12.6 ha (126,025 m^2) per deployment or up 163.8 ha for 13 mooring sites over the 5-year lease period. This is a very conservative estimate of the entire APE from the deployment of the entire mooring system. The area of potential recurring disturbance is a much smaller subset of this area of approximately 1.29 ha (*see* Section 2.1.4 and Figures 2.5(a) and 2.5(b) in Section 2.1.3 for visual reference).

Until the mooring system is removed, sessile benthic invertebrates within the footprint of the anchor and chain sweep could be lost and not recovered. As described in the affected environment above, the deepwater coral populations are denser along high-relief ridges and the Miami Terrace escarpment. The flat sandy bottom targeted for deployment of the mooring systems is expected to be more sparsely populated than the high relief zones but likely to have outlying low density to solitary occurrences of soft and hard coral species and sponges. Sedimentation of filter feeding benthic invertebrates downstream of the deployment site are expected to be minimal and very localized due to low flow rates on the seafloor (Section 1.3.4, FAU, 2011). Natural sunlight does not penetrate to the deployment depth so species would not be impacted by any occlusion of sunlight that might occur with suspended sediment at shallower depths. The removal of the anchoring system would have impacts similar to that of deployment. A work vessel (anticipated to be a 96 ft vessel) along with an ROV will be used to recover the anchor. The work vessel would remain on the project site for 3 days in order to complete mooring system removal (*see* full discussion in Section 2.1.4)

Another operational impact to the seafloor is the colonization by small benthic invertebrates and algae of the anchor and shock chain. Given enough time the hard structure of the mooring system could act like an artificial reef for fish and shellfish. However, given the general availability of hardbottom habitats, on the Miami Terrace, it is not expected that the introduction of hard surfaces via the mooring system and the anticipated fouling and artificial reef effects of the mooring system would have any ecological or population-level impacts to the surrounding marine fauna.

Impacts to sensitive benthic habitats such as hard and soft corals from the mooring system will be avoided by the standard operating conditions that are described in Section 2.1.4 of this

document. Specifically, impacts to sensitive habitats will be avoided by the required setback/buffer from the resource of 152 m. The presence of the any sensitive benthic habitat will be verified by the biological resource characterization that will be part of the Project Plan.

Offshore - Non-routine Activities

Although the applicant will be required by BOEM to survey the proposed site and avoid hardbottom and deepwater coral habitat (Section 2.1.4), there is the possibility that the area targeted for deployment may be missed and a sensitive benthic habitat damaged. In the rare case the deployment of the mooring system causes damage to deepwater coral, the damage would be limited to coral within the mooring system footprint.

In addition to misplacement of the mooring system, another non routine event that could impact the benthic environment would be an accidental discharge of fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three. The chance of an accidental discharge is considered low due to the safety procedures put in place by FAU's Center for Ocean Energy Technology (COET) (Section 2.11, FAU, 2011). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would remain in the upper water column until they dissipated (*see* Section 3.1.1.2.1, Water Quality). Accidental discharge of lubricants from the OCT would have a greater chance of reaching the seafloor as it would be located between 5.0 to 50.0 m (16.4 to 164.0 ft) of the sea surface. However, the devices bearings would be housed in a lubricant-filled section with redundant dynamic seals between the seawater and the lubricant to prevent leakage and will meet EPA requirements. According to the lease applicant, all lubricants used will be environmentally friendly and bio-degradable. The system(s) that contain lubricant will be ferried to and from the location for each deployment and all maintenance of lubricant systems will be completed at port, therefore discharge of lubricants into the benthic environment is not anticipated to occur.

Coastal – Routine and Non-Routine Activities

As described above, the coastal benthic environment includes seagrass and coral communities. Vessel traffic in nearshore coastal areas could potentially cause wake-effect erosion, propeller scarring and/or propeller wash scars. However, it is not expected that the maximum estimated 475 trips over 5 years between the project site and Port Everglades or Miami and the turbine tow testing off Fort Pierce would cause any additional impacts to the coastal benthic communities in the vicinity of the ports than is caused by existing vessel traffic. This conclusion is based on the fact that Port Everglades alone hosts over 4,000 ship calls (primarily cruise ships and container ships) per year or 20,000 over five years. At a maximum the vessel traffic could increase by approximately 2 percent for the 5-year period (*see* Section 3.1.3.6, Other Uses of the OCS).

Since Port Everglades is a busy seaport, there is the potential for vessel collisions in and out of the port causing the accidental discharge of fuels and lubricants that could potentially impact coastal benthic resources. However, given the volume of traffic the port currently manages, the additional vessel trips for the deployment of the MHK test devices is not expected to increase the chance of accidents into and out of the port.

Conclusion

The impacts of the proposed action to offshore benthic habitats are expected to affect, but not cause a significant adverse effect to the quality and quantity of benthic habitat available on the

65-km (40.4-mi) long Miami Terrace. Specifically, the offshore locations targeted for buoy deployment are expected to be flat sand overlay of the carbonate platform and will avoid sensitive benthic habitats such as deepwater coral and hardbottom as defined in Section 2.1.4 of this assessment. Portions of the Miami Terrace contain sensitive benthic habitats such as coral and hardbottom communities and entire areas of the proposed location have been identified as HAPC by NMFS and the SAFMC. Impacts to EFH are discussed more fully in Section 3.1.2.7. Impacts to the seafloor are expected during the actual deployment of the mooring system, especially within the mooring system footprint. Periodic impacts to the seafloor would be limited to contact of the shock chain with the seafloor (e.g. chain sweep). The total potential area of disturbance over the 5-year lease period is estimated at 163.8 ha which is a negligible percentage of the total area of the Miami Terrace. Nevertheless, FAU will be required to complete video surveys that would be conducted prior to deployment of the mooring systems in order to identify sensitive benthic habitats and avoid these sensitive benthic habitats per BOEM lease stipulations (*see* Section 2.1). FAU has had experience deploying ADCPs in the area have the proven capability to deploy the mooring system within 70.0 m (229.7 ft) of the target site. As a result of these well-defined and targeted deployments, impacts to sensitive benthic habitats, and the benthic environment as a whole are expected to be minimal (*see* Figures 2.5(a) and 2.5(b) in Section 2.1.3 for a visual aid).

The impacts of the proposed action to the coastal benthic resources are expected to be minimal to non-existent. The industrialized ports of Port Everglades, Port of Miami, and Fort Pierce are expected to easily handle additional traffic from project vessels and tow testing operations in the case of Fort Pierce. And although the ports are adjacent to critical habitat for coral and seagrass, normal vessel operations are not expected to impact these resources.

3.1.2.3. Marine Mammals

3.1.2.3.1. Description of the Affected Environment

The Programmatic EIS (USDOI, MMS, 2007) gives an overview of the life histories of the marine mammal species outlined in this section and is incorporated by reference and not repeated in its entirety herein. The area for potential effect of the proposed action is the coastal (principal ports) and offshore continental shelf habitats (mooring locations) and the transit area between the two, offshore southeast Florida in the South Atlantic Bight. Prior to deployment activities in the proposed lease area, FAU SNMREC would conduct small-scale experimental turbine tow testing offshore Fort Pierce.

The South Atlantic Bight's marine mammals are represented by members of the taxonomic orders Cetacea, Sirenia, and occasionally Pinnipedia. The order Cetacea includes the mysticetes (the baleen whales) and the odontocetes (the toothed whales, including the sperm whale, dolphins, and porpoises). Occurrence of cetacean species is generally widespread along the U.S. Atlantic coast; many of the large whales and populations of smaller toothed whales undergo seasonal migrations along the length of the U.S. Atlantic coast. The order Sirenia is represented by the West Indian manatee, which occurs on the East Coast of Florida including the principal ports of Port Everglades, Miami, and Fort Pierce. The order Pinnipedia includes four species of seal, which are mainly found in the Northeast and are considered rare or uncommon in the proposed action area off of Florida. However two seals, the harbor seal (*Phoca vitulina*) and the hooded seal (*Cystophora cristata*) have been known to stray into the South Atlantic (Michel,

2013). Table 3.6 lists the species likely to occur in or near the action area and their current status.

Table 3.6

Marine Mammals of Southeast Florida

Common Name	Scientific Name	Status	Habitat
Manatees	*Sirenia*		
West Indian Manatee	*Trichechus manatus*	endangered	coastal
Baleen Whales	*Mysticeti*		
North Atlantic Right Whale	*Eubalaena glacialis*	endangered	coastal/shelf/slope
Sei Whale	*Balaenoptera borealis*	endangered	shelf/slope
Fin Whale	*Balaenoptera physalus*	endangered	coastal/shelf/slope
Humpback Whale	*Megaptera novaeangliae*	endangered	coastal/shelf/slope
Bryde's Whale	*Balaenoptera brydei*		coastal/shelf/slope
Blue Whale	*Balaenoptera musculus*	endangered	coastal/shelf/slope
Minke Whale	*Balaenoptera acutorostrata*		coastal/shelf/slope
Toothed Whales	*Odontoceti*		
Sperm Whale	*Physeter macrocephalus*	endangered	slope
Bottlenose Dolphin	*Tursiops truncatus*	depleted	coastal/shelf/slope
Pantropical Spotted Dolphin	*Stenella attenuata*		slope
Atlantic Spotted Dolphin	*Stenella frontalis*		slope
Spinner Dolphin	*Stenella longirostris*		slope
Striped dolphin	*Stenella coeruleoalba*		slope
Rough Toothed Dolphin	*Steno bredanensis*		slope
Pygmy Sperm Whale	*Kogia breviceps*		slope
Dwarf Sperm Whale	*Kogia sima*		slope
Beaked Whales (5 species)	*Ziphiidae*		slope
Killer Whale	*Orcinus orca*		slope
False Killer Whale	*Pseudorca crassidens*		slope
Pygmy Killer Whale	*Feresa attenuata*		slope
Melon-Headed Whale	*Peponocephala electra*		slope
Short-finned pilot whale	*Globicephala macrorhynchus*		shelf/slope

Adapted from Programmatic EIS (USDOI, MMS, 2007); USDOC, NOAA, NMFS, 2011; and FAU, 2011).

As described above, the action area includes the proposed offshore lease blocks, the transit corridor to and from the principal ports, as well as, offshore Fort Pierce. Thus, the affected

environment includes nearshore/coastal species such as manatees all the way to beaked whales which are more common on the slope of the continental shelf to beyond the shelf break. Species noted by a coastal habitat reference in the above table are likely only to be affected by activities involving the transit of vessels to and from the proposed lease blocks. Species with shelf or slope habitat preference may occur in the proposed lease blocks. These offshore species likely occur in, or adjacent to, the proposed lease blocks on a seasonal basis and may use the habitat for foraging, mating and/or calving.

Marine mammal hearing ranges vary based on the species group. In general baleen whales sounds are concentrated at frequencies less than 1 kHz (Richardson *et al.*, 1995), although humpback whales can produce songs up to 8 kHz (Payne and Payne 1985). Toothed whales can be split into mid and high frequency hearing groups with an estimated range of 150 Hz to 160 kHz for mid-frequency cetaceans and 200 Hz to 180 kHz for high frequency cetaceans (Southall *et al.*, 2007).

3.1.2.3.2. Impact Analysis of the Proposed Action

The primary impact producing factors from routine activities for marine mammals from the proposed action include: vessel strikes from transiting vessels, acoustic harassment from surveys and testing operations, and blade strikes from the test turbines. In order to reduce potential impacts no overnight turbine operations would occur (Coley, personal communication, October 5, 2012). However if at a later time during the lease period FAU SNMREC determines that nighttime operations are required, BOEM will require the submission of a monitoring plan that must be approved by BOEM in consultation with NMFS and USFWS. In order to monitor protected species (e.g. marine mammals, sea turtles, etc.) interactions with an OCT the device would be equipped with three underwater video cameras, arranged to observe in front on the device as well as to the rear (*see* Figure 2.2). This video would be recorded for archival and review purposes. The cameras would be low-light, black and white, and displayed in real time on the support vessel. These cameras will be functional during both the moored and towed testing/operation of the OCT devices.

Routine Activities

Vessel Strikes

Vessel strikes are always a concern for large cetaceans on the coastal shelf. Manatee collisions, also a great risk, are more common in shallow estuaries close to shore. Whale strikes have occurred with a wide variety of vessel types, including Navy vessels, container and cargo ships, freighters, cruise ships, and ferries (Jensen and Silber, 2004), all of which are already present in the area of potential effects. Collisions with vessels greater than 80.0 m (260.0 ft) in length are usually either lethal or result in severe injuries (Laist *et al.*, 2001), although no project vessels are anticipated to be larger than 29.0 m (95.144 ft). Regarding manatees, vessel collisions constitute the greatest human-related threat. Injury and death occur as a result of propeller lacerations and impact trauma (USDOI, USFWS, 2007). Pursuant to Florida state and local laws, FAU SNMREC will observe established speed limits for operation of their vessels within Manatee Protection zones (50 CFR 17.108 and FWC, 201la). Vessel speed restrictions in these zones range from idle speeds up to 22 knots (40.2 km/h) depending on the area. In addition, BOEM will also require, through lease stipulations, the additional vessel strike avoidance measures outlined in the EA (*see* Section 2.1.2) to reduce or eliminate impacts to all protected

species within and outside of the Manatee Protection Zones. To further protect the manatee, BOEM will require FAU SNMREC to adhere to the applicable conditions outlined in the *Standard Manatee Conditions for In-water Work* (FWC 2011 c) for all in-water activity.

As detailed in Section 2.1, it is estimated that the deployment vessel, anticipated being a 30.0 m (98.425 ft) research vessel, would make between 12-24 deployments on an annual basis for each of the three moored sites for a maximum total of 360 deployments over 5 years. One additional vessel trip is expected from the day of tow testing offshore Fort Pierce, survey activity for the 10-13 deployment areas for an estimated maximum of 475 total trips for both surveys and deployments. Port Everglades alone hosts over 4,000 ship calls (primarily cruise ships and container ships) per year or 20,000 over five years. At a maximum, the vessel traffic could increase by approximately 2 percent for the 5-year period (*see* Section 3.3.2.1, Other Uses of the OCS, of this EA). It is not expected that a 2 percent increase in vessel traffic would increase the risk of vessel strikes to whales, dolphins, or manatees beyond current conditions. Fort Pierce is approximately 80.5 km (50 mi) south of right whale critical habitat and Port Everglades is located approximately 281.6 km (175.0 mi) south of right whale critical habitat, which extends just south of Cape Canaveral, Florida. The Port of Miami is even further removed to the south. Fort Pierce, Port Everglades, nor the Port of Miami are subject to NOAA NMFS's seasonal management area (SMA) speed restrictions to protect right whale calving and nursery grounds. The port of Jacksonville, FL, to the north of Port Everglades, is the closest port subject to those seasonal management measures. The Florida Fish and Wildlife Conservation Commission (FWC) keeps detailed records on manatee mortalities along the coast. Several manatee mortalities have been recorded in Fort Pierce, Port Everglades and the Port of Miami between 1974 and 2010 (FWC, 2011a). The vessel transits estimated for the proposed action are not anticipated to increase collision risk to manatees present in the principal ports as the increase in trips above status quo is negligible (*see* Section 3.1.3.6 of this EA). Additionally, vessel strike avoidance measures and manatee protection zones reduce the likelihood of impacts from vessel operations (*see* Section 2.1.2 for these requirements). Therefore, the proposed activity including the required operating conditions reduce the potential impact trauma of a vessel collision via reduced speeds, and allow greater time for collision avoidance by the vessel operator and the marine mammal.

As also detailed in Section 2 of this document, the proposed action will include benthic and biological surveys. The benthic surveys would primarily consist of video/photographic surveys from a tethered (ROV) or untethered (AUV/manned submersible) underwater vehicle. It is not anticipated that these surveys would negatively impact marine mammals other than the slight acoustic disturbance from the surface vessel engine noise (see Acoustic Harassment discussion below).

Sound/Noise Exposure

It is anticipated that some exposure to noise may occur during survey activity and during testing operations. The aerial biological surveys, by including marine mammals as a target of the survey (Section 2.4, FAU, 2011), are designed in such a manner as to reduce negative impacts to the animal being surveyed. Thus, the proposed aerial surveys are not likely to result in harassment of marine mammals, but should result in a better understanding of the distribution and abundance of marine mammals in the project area. In addition, BOEM anticipates the applicant may conduct site-specific geophysical sonar surveys. These surveys are likely to be limited to single beam echosounders, multi-beam echo sounders, side-scan sonars, and sub-

bottom profiling (Chirp) surveys. In general, these sources are of low power and transmit very short pulses. High frequency sources attenuate in sea water more quickly than low-frequency sources (Lurton and DeRuiter, 2011). Low frequency shallow-penetration sub-bottom profilers (Chirp systems) are anticipated to attenuate to below 160 dB within the 500 m exclusion zone. The test turbines and/or the MTB would also likely employ a forward facing active sonar system that would allow operators to detect fish, sea turtles, marine mammals, and large debris that may be approaching the test turbine up current (Section 2.4, FAU, 2011). This type of sonar is expected to have an acoustic signature similar to that of the echosounders described above with a frequency of around 200 kHz. The frequency is also thought to be above the hearing range of most baleen whales and at the upper end of the range for toothed whales. The existing measures described in Section 2.1 of this document require a 500 m (1,640 ft) exclusion zone around echosounder/geophysical survey activity that is below 200 kHz.

Operational impacts from the deployment of the test turbine will include noise from the turbine, vessel, and the mooring line. It is expected that when the deployment vessel is moored to the MTB and the test turbine is deployed the mooring line will become taught. This could create what is called a "strum effect" from the current rushing past the mooring line and causing it to vibrate and hum. The noise from the strum could disturb marine mammals or mask marine mammal calls in the immediate vicinity of the mooring line. In order to decrease the strum effect, the applicant has indicated they will be placing hydrodynamic foils on the upper half of the mooring line (Section 2.1, FAU, 2011). This should mitigate any negative acoustic impacts from the mooring line strum. An additional noise source would be from the rotation of the turbine itself. It is expected that the maximum rotations per minute (rpm) would be between 35.0 and 70.0 rpm depending on the design and blade length. This would equal a blade tip speed of between 7.0 and 11.0 m/s (23.0 and 36.1 ft/s). Although the operational sound pressure levels and frequencies for the test turbines is unknown, a range can be derived from Verdant Power's Roosevelt Island Tidal Energy Project (RITE Project) located in the East River of New York City which also utilized an axial flow turbine design (Verdant Power, 2010) with 40 rotors reaching 40 rpm and blade tip speeds of 10.5 m/s (34.4 ft/s). Although a frequency range for the sound source was not specified in the report, sound pressure levels of approximately 145dB re 1µPa RMS at 1.0 m (3.3 ft) were reported within the 6-turbine array. It should also be noted that the deployment site in the East River of New York is much shallower and confined (and therefore a very sound reflective environment) compared to the FAU deployment sites off of Florida. Therefore, this measurement likely reflects a maximum value of operational sound pressure levels for the axial flow turbines that would be deployed under the proposed action. NMFS currently uses thresholds for determining impacts to marine mammals that typically center around root-mean-square (RMS) received levels of 180 dB re lµPa for potential injury (Level B harassment as defined under the MMPA), 160 dB re 1µPa for behavioral disturbance/harassment from a non-continuous noise source, and 120 dB re 1µPa for behavioral disturbance/harassment from a continuous noise source (Level B harassment as defined in the MMPA). The project applicant will be using video equipment as well as sonar imaging equipment to screen for species interactions and to monitor the turbine during operational periods (Section 2.4, FAU, 2011). The existing operating conditions and measures for marine mammals are discussed in Section 2.1 of this EA and require a 100 m (328 ft) exclusion zone for North Atlantic right whales, a 100 m monitoring zone, and a 15.24 m (50 ft) exclusion zone for all other marine protected species, for OCT testing activity (*see* Sections 2.1.1 and 2.1.5). These

proposed measures and operating conditions for protected species are anticipated to reduce any possible acoustic impacts to discountable levels.

Blade Strikes

In addition to acoustic impacts there is the potential for direct interaction between marine mammals and the rotating turbine blade. To date the only studies to be conducted evaluating the interactions between marine mammals and submarine turbines are at the SeaGen test turbine in Strangford Lough, Ireland (Sparling, 2011). The SeaGen test turbine consists of two 16m diameter rotors with a max blade tip speed of 12.0 m/s (39.4 ft/s). The SeaGen marine mammal monitoring program monitored for harbor seals and harbor porpoise both visually, and using acoustic detections (TPODs) and telemetry respectively. This 5-year monitoring program was able to document that there was generally low-impact from the test turbine on marine mammal populations. Specifically they found: 1) local redistribution of harbor seals; 2) small reduction in seal transit rate while turbine operating; 3) variation in harbor porpoise acoustic detections in relation to installation and operation; and 4) small changes in harbor porpoise acoustic detections when the turbine was actually turning (Sparling, 2011). It should be noted that SeaGen's operational protocol was to shut down when marine mammals approached the turbine, thus monitoring of interactions between marine mammals and operational rotors was not possible. Although some behavioral change in seals and porpoises was noted, abundance of animals did not change during the monitoring period. Although none of the marine mammals in the SeaGen operating area occur in the proposed deployment areas under the proposed action, the project does support the theory that marine mammals would likely avoid the area around proposed activity during deployment periods. In the highly unlikely event that a marine mammal does come in contact with the test turbine during operation there is the potential that the blade strike could result in injuries ranging from lacerations to blunt force trauma of various degrees. Due to the highly complex circumstances regarding the size, species, and health of the animal, and the operational conditions/design of the turbine it is not possible to speculate with any accuracy about what the disposition of a marine mammal would be following contact with this test turbine in the project area. The existing operating conditions and measures for marine mammals are discussed in Section 2.1 of this EA and require a 100 m (328 ft) exclusion zone for North Atlantic right whales, a 100 m (328 ft) monitoring zone, and a 15.24 m (50 ft) exclusion zone for all other marine protected species, during OCT testing activity (*see* Sections 2.1.1 and 2.1.5). In addition to those lease stipulations the lessee has also indicated that FAU SNMREC will develop and implement best management practices that involve temporal, spatial, mechanical, and behavioral methods to prevent interactions between the gear and protected species (e.g. marine mammals and sea turtles). This may include modifications to structures that would reduce, prevent or minimize protected species-equipment interactions and/or interference (FAU, 2011).

Non-Routine Activities

Non-routine events that could impact marine mammals would be an accidental discharge of solid wastes, fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three. Marine mammals could be adversely impacted by ingestion of solid or liquid discharges, or entanglement with solid debris. Marine mammals that have ingested debris, such as plastic, may experience intestinal blockage, which in turn may lead to starvation, while toxic substances present in the ingested materials (especially in plastics) could lead to a variety of lethal and sub-lethal toxic effects. Entanglement in plastic debris can result in reduced mobility, starvation,

exhaustion, drowning, and constriction of, and subsequent damage to, limbs caused by tightening of the entangling material. The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by BOEM (30 CFR Part 585.105(a) and the USCG (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). In compliance with these regulations entanglement in or ingestion of OCS-related trash and debris by marine mammals would not be expected during normal operations.

As specified in Section 3.1.1.2, the chance of an accidental discharge is considered low due to the safety procedures in place by FAU's COET (Section 2.11, FAU, 2011). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they were dissipated. The devices' bearings would be housed in a lubricant-filled section with redundant dynamic seals between the seawater and the lubricant to prevent leakage and will meet EPA requirements. All lubricants used will be environmentally friendly and bio-degradable (Section 2.11, FAU, 2011). The system(s) that contain lubricant will be ferried out to location for each deployment and all maintenance of lubricant systems will be completed at port therefore discharge of liquid or solid debris into the marine environment which may impact marine mammals is not anticipated to occur.

Conclusion

As previously stated the primary impact producing factors from routine activities in the proposed action to marine mammals include: vessel strikes from transiting vessels, acoustic harassment from surveys and testing operations, and blade strikes from the test turbine. Due to the limited number of vessel transits to and from the highly trafficked principal ports, and required vessel strike avoidance measures, the additional risk posed to marine mammals from vessel strikes is expected to be negligible. Vessel and turbine noise at the deployment site(s) is expected to be audible to marine mammals and may result in sound pressure levels that constitute harassment using the sound pressure thresholds established by NMFS. However, the likelihood of marine mammals being exposed to harassing level of sound is negligible due to the lease stipulations included in the proposed action that establish an exclusion zone and require monitoring. These operating conditions will ensure that any harassment of mammals will be avoided, and thus will not cause a significant impact to marine mammals. In addition the same measures will reduce the likelihood of any direct impact between the marine mammal and the turbine blade. The anticipated impacts in consideration of existing operating conditions and lease stipulations (*see* Section 2.1 of this EA) are expected to be discountable and insignificant and thus not likely to adversely affect threatened or endangered marine mammals.

3.1.2.4. Sea Turtles

3.1.2.4.1. Description of the Affected Environment

The Programmatic EIS (USDOI, MMS, 2007) gives an overview of the life histories of the sea turtles outlined in this section and is incorporated by reference and not repeated in its entirety herein. There are five species of sea turtles that potentially occur in the proposed action area, all of which are listed as endangered or threatened under the ESA (*see* Table 3.7 below). These five species are all highly migratory and occupy different habitat niches at various life stages, so they would be found from the offshore proposed lease area to the near-shore coral reef/seagrass habitat adjacent to the principal ports (*see* Programmatic EIS (USDOI, MMS, 2007) for more information on life history). There is no formally designated critical habitat for sea turtles in the

proposed OCS lease blocks, coastal beaches adjacent to the principal ports of Fort Pierce, Port Everglades and the Port of Miami. USFWS has recently published a proposed rule to designate critical habitat to protect nesting beaches for the Northwest Atlantic Ocean Distinct Population Segment of the loggerhead sea turtle in North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi (78 FR 18000, March 25, 2013). Although the ports proposed to be used in this study fall within the designated counties and no activities will be conducted involving the beaches proposed for critical habitat designation, BOEM will take the final rulings into consideration when they become available. The applicant intends to gather further information regarding temporal and spatial occurrence within the proposed lease blocks in order to assess potential interaction between sea turtles and the test turbine (Section 2.4, FAU, 2011).

The hearing capability of sea turtles is poorly understood, however several studies (Ridgeway et 1969; Lenhardt 1994; and Bartol *et al.*, 1999) indicate a functional hearing range between 80-1000 Hz, however unlike for marine mammals there have not been any sound pressure thresholds established by NMFS that would constitute harassment for sea turtles at these, or any other frequencies. NMFS, however, has applied the sound pressure thresholds established for marine mammals to sea turtles for the purposes of assessing impacts under ESA.

Table 3.7

Sea Turtles of Southeast Florida

Primary Species (nesting beaches adjacent to either side inlet)		
Common Name	***Scientific Name***	**Status**
Loggerhead Sea Turtle	*Caretta caretta*	threatened
Green Sea Turtle*	*Chelonia mydas*	endangered
Hawksbill Sea Turtle	*Eretmochelys imbricata*	endangered
*The Florida breeding population of green turtles is listed as endangered		
Secondary Species (not identified on beaches adjacent to inlet)		
Common Name	***Scientific Name***	**Status**
Leatherback Sea Turtle	*Dermochelys coriacea*	endangered
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	endangered

Note: The table is categorized by sea turtles with identified nesting beaches adjacent to Port Everglades, Florida.
Sources: USDOI, MMS, 2007 and USDOC, NOAA, NMFS, 2011.

3.1.2.4.2. Impact Analysis of the Proposed Action

Based on the location of the proposed action and operations from March to October annually, feeding, mating, and nesting of sea turtles could potentially be impacted. There is no literature supporting sea turtle attraction to the specific devices to be used in this survey (e.g. mooring, telemetry buoy, or the platform offshore Florida). However, in a study to assess sea turtle by-

catch in purse-seine fisheries that make use of deliberately set fish aggregating devices (FADs), it is noted that 'marine turtles are also attracted by floating devices such as FADs (Clermont *et al.* 2012). It is also noted that these FADs usually have pieces of net hanging below them, in which turtles may become entangled for a long time and mortality may occur by drowning (Clermont *et al.,* 2012). An unknown percentage of drifting FADs get lost due to currents, creating 'ghost fishing phenomena' (Chanrachkij and Loog-on 2003). The mooring, telemetry buoy and platform used in this survey will not have any nets or ropes hanging down from them, therefore presenting no entanglement risks to sea turtles. However, it has been hypothesized that they may in fact provide protection or food for juvenile marine turtles in their drifting pelagic phase (Clermont *et al.,* 2012). As described above regarding the OCT, the MTB itself will likely act as a FAD. Marine animals, primarily fish, are reported to congregate around NOAA's buoys offshore Florida's East Coast (Florida Sport Fishing Association 2012). If the MTB or OCT attract their prey, that may attract sea turtles. Leatherbacks can dive up to 1,000 m and typically feed on cnidarians and tunicates. Green turtles may dive up to 110 m and adults typically eat algae and seagrass, while young turtles eat molluscs, polychaetes, amphipods, sardines, and anchovies. Loggerheads are relatively shallow divers, typically staying at 2-5 m, but may dive as deep as 230 m. They typically feed on benthic invertebrates such as gastropods, molluscs, and crustaceans. Hawksbill sea turtles are also shallow divers (7-10 m) but can dive to 100 m, and typically eat sponges. Kemp's ridley sea turtles may dive up to 50 m and typically eat benthic invertebrates, particularly crabs. Sea turtles typically mate in the waters off of the beaches where they nest, which typically occurs between March and November (each species has average peak nesting in different months). Of the five species of sea turtles, based on distribution, location, and timing, loggerheads would most likely be impacted. The primary impact-producing factors for sea turtles from the proposed action include: vessel strikes from transiting vessels, acoustic harassment from surveys and testing operations, blade strikes from the test turbines, entanglement in sea anchor chute/chords and MTB mooring lines and electrical emissions during OCT tests. Recent research by Foley *et al.* (in review) has shown that satellite tagged post-nesting loggerhead sea turtles off of Florida's east coast generally migrate along the continental shelf in waters less than 200 m in depth. The proposed lease blocks range in depth from 262-366 m in depth, thus the likelihood of occurrence of post-nesting loggerheads in the action area is greatly reduced at the outset. The impacts discussed below should be understood in that context.

In order to reduce potential impacts, no overnight turbine operations would occur (Coley, personal communication, October 5, 2012). However if at a later time during the lease period FAU SNMREC determines that nighttime operations are required, BOEM will require the submission of a monitoring plan that must be approved by BOEM in consultation with NMFS and USFWS. In order to monitor sea turtle and other marine mammal interactions with an OCT, the device would be equipped with three underwater video cameras, arranged to observe in front on the device as well as to the rear (*see* Figure 2.2). This video would be recorded for archival and review purposes. The cameras would be low-light, black and white, and displayed in real time on the support vessel.

Routine Activities

Vessel Strikes

While sea turtles are subject to injury and death from vessel strikes when they are resting at the surface, the risk of a proposed action related vessel colliding with a sea turtle is low due to

the limited number of trips that would occur over the five-year lease term (275-475 total trips). In order to avoid causing injury or death to sea turtles, BOEM will require vessel strike avoidance measures that are derived from NMFS vessel strike avoidance measures and reporting for mariners (*see* Section 2.1.2 of this document).

Acoustic Harassment

Potential acoustic impact sources for sea turtles are anticipated to be caused by survey geophysical surveys and turbine testing/deployment. As mentioned previously, sea turtle hearing is poorly understood and current NMFS established thresholds are derived from protections for marine mammals. As mentioned in the marine mammal section (*see* Section 3.1.2.3), potential acoustic sources from survey activity is expected to be limited to single beam echosounders, multi-beam echosounders, side-scan sonars, and shallow-penetration sub-bottom profiler surveys. In general, these sources are of low power and transmit very short pulses. High frequencies attenuate in sea water more quickly than low-frequency sources (Lurton and DeRuiter, 2011). Low frequency shallow-penetration sub-bottom profilers (Chirp systems) are anticipated to attenuate to below 160 dB within the 500 m exclusion zone. The test turbines and/or the MTBs would also likely employ a forward facing active sonar system that would allow operators to detect fish, sea turtles, marine mammals, and large debris that may be approaching the test turbine up current (Section 2.4, FAU, 2011). This type of sonar is expected to have an acoustic signature similar to that of a depth sounder with a frequency of around 200 kHz. With the exception of the shallow-penetration sub-bottom profiler (Chirp system), the frequencies described herein are believed to be well beyond the hearing range of sea turtles. The sound from the sub-bottom profiler is expected to attenuate to below 160 dB within the 500 m exclusion zone. Acoustic disturbance from vessel operations (propeller cavitation/engine noise) and from OCT testing may be in the hearing range of sea turtles as they are expected to produce noise across a much broader frequency band. Although exact source levels of the test turbine are not known, other under water turbines have documented source levels of approximately 145 dB (RITE Project). The turbine sound source is anticipated to be present for only 3-33 percent of the time over the 5-year lease period for durations up to 5 days at a time for each of the 3 mooring locations. In order to reduce potential harassment, including acoustic harassment of sea turtles from the turbine operations, a baseline exclusion zone of 50.0 ft (15.24 m) is required for both inshore and offshore activity. If a sea turtle comes within 50.0 ft (15.24 m) of the turbine, operations would need to cease. The project applicant has committed to using video equipment as well as sonar imaging equipment to screen for species interactions and to monitor the turbine during operational periods (Section 2.4, FAU, 2011). To reduce acoustic impacts from geophysical surveys, BOEM will require a 500 m (1,640 ft) exclusion zone around the acoustic source for frequencies below 200 kHz (within sea turtle hearing range). Section 2.1 of this document describes the exclusion zones for OCT testing and geophysical survey activity more fully.

Blade Strikes

The potential for direct interaction between sea turtles and the test turbines is not well understood. As described in Section 3.1.2.7 on Fish and EFH, the device could act as a fish aggregating devices (FAD) that could in turn attract predators including sea turtles. In the event that a sea turtle comes in contact with a test turbine during operation there is the potential that the blade strike could result in injuries ranging from lacerations to blunt force trauma of various

degrees. Risk of impact from turbine blade strikes is anticipated to be present for only 3-33 percent of the time over the 5-year lease period for durations up to 5 days at a time for each of the 3 mooring locations. As mentioned previously, the blade tip speed for the 2-3 blade rotor design is expected to be between 7.0 and 11.0 m/s (2.1 and 3.3 ft/s). The turbine is turned by the force of the current on the blades. Other rotors that are often, perhaps mistakenly, used for comparison such as vessel propellers or dam turbines differ in significant ways. For example, vessel propellers such as the cruise ships that frequent this same area (*see* 3.1.2.1) are far larger and rotated by a propulsion system (*see* Figure 3.1 below). Generally, hydroelectric dams force water through a penstock to turn a turbine. This forcing of water through penstock to the turbine rotor is what causes animals to become entrained and then impinged in the turbine. This forcing does not exist for the open ocean free flow OCT under evaluation in this assessment.

In order to minimize potential impacts from the test turbine, FAU will be required through a lease stipulation to establish a baseline exclusion zone of 15.24 m (50.0 ft). If a sea turtle comes within 50.0 ft (15.24 m) of the turbine operations, FAU would be required to cease operations. The project applicant has committed to develop and implement best management practices that involve temporal, spatial, mechanical, and behavioral methods to prevent interactions between the gear and sea turtles. This may include modifications to structures that would reduce, prevent or minimize sea turtle-equipment interactions such as using video equipment as well as sonar imaging equipment to screen for species interactions and to monitor the turbine during operational periods (Section 2.4, FAU, 2011).

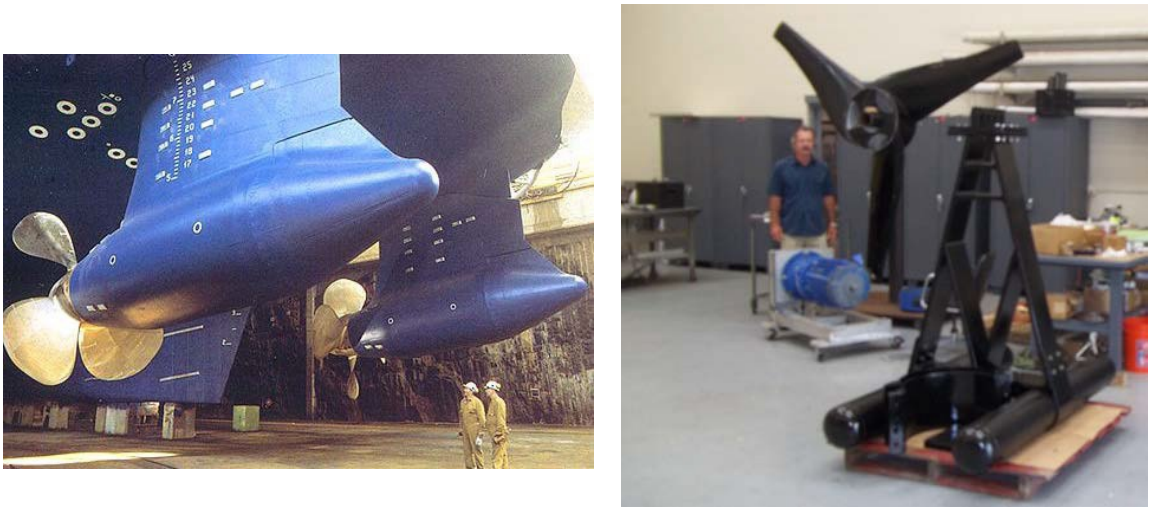


Figure 3.1. Cruise ship Carnival Elation propeller compared to OCT test turbine blades.

Electrical Emissions

The BOEM-funded study *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species* (Normandeau *et al.*, 2011) evaluated the state of knowledge regarding the effects of electromagnetics and geomagnetics on sea turtles. Although this study was in respect to undersea power for commercial scale cables, it may still apply to the operation of an OCT which will have between 5 – 50 m of armored underwater cable transmitting AC current. The study estimates that magnetic fields from AC power cables diminishes to 0.22 μT 10 meters from the cable. The earth's magnetic field within the U.S. is 50 μT. Regarding sea turtle EMF sensitivity the study states that "sea turtles are known to possess geomagnetic sensitivity (but not electro sensitivity) that is used for orientation, navigation, and migration. Sea turtles are able to use the Earth's magnetic fields in two ways: 1) for directional or compass-type information to maintain a heading in a particular direction and 2) in a more complex way for positional, or map-type information to assess a position relative to a specific geographic destination (Lohmann *et al.*, 1997). In one study, loggerhead turtle hatchlings were tracked from Florida, and continued on the same seaward heading even after entering offshore waters where wave directions no longer coincided with their established course (Lohmann *et al.*, 1997). As stated by Normandeau *et al.*, (2011), "these results indicate that loggerhead hatchlings can orient to the Earth's magnetic fields, suggesting the use of magnetic compass orientation (Lohmann *et al.*, 1997)." The study concluded that, "Sea turtles can sense magnetic fields and use the earth's magnetic field (as well as other cues) for long range navigation, migration, and orientation. However, conclusions about the effects of magnetic fields from power cables [OCTs] are still hypothetical as it is not known how sea turtles detect or process fluctuations in the earth's magnetic field. In addition, some experiments have shown an ability to compensate for 'miscues,' so the absolute importance of the geomagnetic field is unclear." Experiments with hatchlings have shown that during daylight conditions the effects of pulsed magnetic fields of 0.04 μT did not affect loggerhead hatchling orientation (see Lohmann 2005 as cited in

Normandeau *et al.,* 2011). Given the ability of sea turtles to re-orient themselves using visual cues, and the exclusion zone of 15.24 m (50 ft) around the OCT for protected species, including sea turtles, the likelihood of protected species being exposed to strong magnetic fields that could cause anything other than temporary disorientation from the power cable is negligible.

Other Potential Interactions

During the OCT tow tests there is the possibility of interaction between sea turtles and the vessel and the towed equipment (drogue chute and OCT). However, the potential for interaction in this situation is greatly reduced by the vessel strike avoidance measures (*see* Section 2.1.2 of this document) and the OCT operation exclusion zone of 15.24 m (50 ft). Furthermore, the short duration of the 12-18 small-scale experimental turbine tow tests (10 min each over the course of one day) and the slow speed (up to 6 knots (11 km/h)) reduce the likelihood of interactions between the vessel, towed equipment, and sea turtles. As with in situ testing, the following mitigation measures are expected to minimize or prevent any potential impacts to sea turtles during tow tests, including the lack of nighttime operations, video footage from the front and rear of the test turbines, vessel strike avoidance measures, exclusion zones (15.2 m around the OCT and test turbines) and the short duration of the tow test period (1 day with 12-18 tows each lasting approximately 10 minutes). Due to these factors, entanglement in the experimental turbine sea anchor chute/chords is highly unlikely. In addition, the MTB mooring line, a conventional galvanized wire rope common to most deep water moorings (1.6 cm/0.625 inches, in diameter), will typically be taut due to the drag loading on the MTB and is thus unlikely to pose any entanglement threats to protected species.

Non-Routine Activities

Non-routine events that could impact sea turtles would be an accidental discharge of solid wastes, fuel and/or lubricants from the attending vessels, the MTBs, and the OCTs. Ingestion of plastic and other non-biodegradable debris has been reported for almost all sea turtle species and life stages (USDOC, NOAA, 2003). Ingestion of waste debris has resulted in gut strangulation, reduced nutrient uptake, and increased absorbance of various chemicals in plastics and other debris (USDOC, NOAA, 2003). Sub-lethal quantities of ingested plastic debris can result in various effects including positive buoyancy, making sea turtles more susceptible to collisions with vessels, increasing predation risk or reducing feeding efficiency (Lutcavage *et al*., 1997). Some species of adult sea turtles, such as loggerheads, appear to readily ingest plastic debris that is appropriately sized. In oceanic waters, floating or subsurface translucent plastic material and sheeting may be mistaken for gelatinous prey items such as jellyfish. Entanglement in debris (such as rope) can result in reduced mobility, drowning, and constriction of and subsequent damage to limbs (Lutcavage *et al*., 1997). Accidental discharges of solid or liquid pollutants could also end up on sea turtle nesting beaches adjacent to the ports which could potentially contaminate nest sites and/or lower the availability of nest sites lowering the reproductive success of sea turtles on those beaches.

The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by BOEM (30 CFR Part 585.105(a) and the USCG (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Assuming compliance with these regulations and laws and only accidental releases, very little exposure of sea turtles to solid debris generated during proposed activities is anticipated.

As specified in Section 3.1.1.2.1, Water Quality, the chance of an accidental discharge of pollutants is considered low due to the safety procedures in place by FAU's COET (Section 2.11, FAU, 2011). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they were dissipated. The devices' bearings would be housed in a lubricant-filled section with redundant dynamic seals between the seawater and the lubricant to prevent leakage and will meet EPA requirements. All lubricants used will be environmentally friendly and bio-degradable (FAU, 2011). The system(s) that contain lubricant will be ferried out to location for each deployment and all maintenance of lubricant systems would be completed at port. As a result of these precautions impacts to sea turtles from accidental discharges is anticipated to be negligible.

Conclusion

As previously stated the primary impact producing factors from routine activities for sea turtles from the proposed action include: vessel strikes from transiting vessels, acoustic harassment from surveys and testing operations, blade strikes from the test turbines, and electromagnetic fields. Due to the limited addition of vessel traffic to and from the highly trafficked principal ports, the additional risk posed to sea turtles is expected to be negligible and not adversely affect sea turtles. Vessel and turbine noise at the deployment site(s) is expected to be audible to sea turtles, however, operating conditions will ensure that any sound impacts will be minimal. The operating conditions applicable to sea turtles, discussed in Section 2.1 of this EA, also require vessel strike avoidance measures during transit and OCT turbine testing, and exclusion zones during operational activity and during high resolution geologic surveys. These measures will reduce the likelihood of sound exposure and reduce the likelihood of any direct impact between sea turtles and the turbine blade during test operations. There is very little data regarding the impact of electromagnetic fields from power cables on sea turtles in a non-laboratory setting. However, given the short, vertical orientation of the cable, the small area of magnetic fields around the cable, exclusion zones during turbine testing, and the limited time in the water, it is anticipated that impacts to sea turtles from the magnetic fields of the cable are discountable. Operational monitoring will include video and sonar imaging data. This data will be useful for helping determine the impacts from future OCT deployments and could aid in identifying mitigation measures. In addition to the above, the principal activity of proposed action will occur in deep water (262-366m) where loggerhead sea turtles are less likely to occur (Foley *et al.,* in review) , Based upon the analysis above, BOEM concludes that sea turtles may be affected but are unlikely to be adversely affected by the proposed project. Neither routine, nor non-routine activities associated with the proposed action are anticipated to affect beaches adjacent to the principal ports that would impact sea turtle nesting sites. The anticipated impacts, when assessed together with the existing measures, are expected to be discountable and insignificant and thus not likely to adversely affect threatened or endangered sea turtles.

3.1.2.5. Avian Resources

3.1.2.5.1. Description of the Affected Environment

Birds present in the coastal areas surrounding the proposed onshore support facilities (Port Everglades and Port of Miami) and the proposed lease area could be affected by the proposed action. A listing of Florida's imperiled species is available on the Florida Fish and Wildlife Conservation Commission website that includes several federally listed threatened/endangered

bird species, state-designated threatened species, and state species of special concern in or near Broward and Miami-Dade counties, Florida (FWC, 2011b).

Endangered and Threatened Birds

Audubon's crested caracara (*Polyborus plancus audubonii*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and the wood stork (*Mycteria americana*) occur in Broward and Miami-Dade counties (USDOI, USFWS, 2012) which are the closest counties to the project area. However, these species live inland in Everglades National Park and are separated from the Atlantic coast by a 20 mile wide swath of dense urban development. There are incidental sightings of wood storks, snail kites, and caracaras within the urban areas of Broward and Miami-Dade counties (eBird, 2012), so it is possible that individual birds may stray into the port and staging areas associated with the project.

Individuals from the threatened Atlantic population of piping plovers (*Charadrius melodus*) over-winter in the neighboring Miami-Dade and Palm Beach counties during the non-breeding season (USDOI, USFWS, 2012), and there are incidental sightings of piping plovers in Miami-Dade County near the port and on the keys (eBird, 2012). Therefore, it is possible that some piping plovers may pass over the project area during the spring and fall migration periods to and from the Bahamas. The Caribbean population of roseate terns (*Sterna dougallii dougallii*) extends to the Florida Keys, but no terns nest on mainland Florida (USDOI, USFWS, 2010), and no incidental sightings were reported along the coast of Broward and Miami-Dade counties (eBird, 2012). However, it is possible that non-breeding roseate terns may incidentally travel over the project area.

Bald and Golden Eagles

The Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d) prohibits the take and trade of bald and golden eagles. Take is defined by the Act as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Bald and golden eagles do occur in Florida, and Florida has one of the largest populations of bald eagles in the contiguous United States with over 1,100 nesting pairs (USDOI, USFWS, 2011). There are records of golden eagles wintering in Florida but none in Broward or Miami-Dade counties (Millsap and Vana, 1984; eBird, 2012). Therefore, golden eagles are not expected to occur in or near the project area. Bald eagles forage and nest along rivers and bays and at times fly along the shore line. In Broward County, there are records of 2 nests located in National Everglades Park (FWC, 2012). In Miami-Dade County, there are records of 3 nests, 2 located west of Miami and a coastal nest east of Miami that has been inactive since 1987. Incidental observations of bald eagles have been documented near the ports associated with the proposed project (eBird, 2012). Bald eagles are not expected to occur in the project area, and with the exception of immediate bay or harbor areas, are not expected to occur where vessels associated with the proposed action would be traveling.

Migratory Birds

The Atlantic Flyway, which encompasses all of the areas that could be potentially affected by the proposed action, is a major route for migratory birds. Section 4.2.9.3 of the Programmatic EIS discusses the use of Atlantic Coast habitats by migratory birds. In a broad sense, birds may be in the affected environment for many reasons. For instance, many birds are neo-tropical migrants that fly at high altitudes usually at night during the spring and fall migration periods.

Other birds passing through the area fly at lower altitudes (e.g., pelicans, cormorants, and gulls) and may rest on the water or feed on the surface of the water and/or dive for food under the surface. In addition, birds may wander or commute through the area or follow boats.

Migratory birds are protected under the Migratory Bird Treaty Act of 1918 (MBTA), and the official list of over 800 birds protected under the MBTA, and the international treaties that the MBTA implements, is found in 50 CFR 10.13. The MBTA makes it illegal to "take" migratory birds, their eggs, feathers or nests. Under the MBTA, take is "construed to mean pursue, hunt, shoot, capture, collect, kill" or any attempt to undertake such actions. The USFWS's implementing regulations further defines the term "person" to mean "any individual, firm, corporation, association, partnership, club, or private body, anyone at all, as the context requires." In addition, Executive Order (EO) 13186 directs departments and agencies to take certain actions to further implement the MBTA. Under section 3 EO 13186, BOEM and USFWS established a MOU on June 4, 2009 that identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats. For a copy of the MOU, see http://www.fws.gov/migratorybirds/Partnerships/MMS-FWS_MBTA_MOU_6-4-09.pdf. The purpose of the BOEM and USFWS MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies (MOU Section A). One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MOU Sections C, D, E(1), F(1-3, 5), G(6)).

3.1.2.5.2. Impact Analysis of the Proposed Action

Onshore Activities

Several bird species, including the bald eagle, snail kite, wood stork, Audubon's crested caracara, and piping plover, would be present in the coastal areas surrounding the proposed onshore support facilities (Port Everglades and Port of Miami). Due to the limited use and no expansion of these facilities (*see* Section 2.1.2), no impacts to these birds are expected from onshore activities associated with the proposed action.

Discharge of Liquid and Solid Wastes

Marine and coastal birds could be exposed to operational discharges or accidental releases of solid debris. Many species of birds (such as gulls) often follow ships and forage in their wake on fish and other prey injured or disoriented by the passing vessel. In doing so, these birds may be affected by discharges of waste fluids (such as bilge water) generated by the vessels. Operational discharges from vessels would be released into the open ocean (*see* Section 3.1.1.2.1) where they would be rapidly diluted and dispersed, or collected and taken to shore for treatment and disposal. Sanitary and domestic wastes would be processed through on-site waste treatment facilities before being discharged overboard. Deck drainage would also be processed prior to discharge. Thus, potential impacts to marine and coastal birds from waste discharges from vessels are expected to be negligible. Marine and coastal birds may become entangled in or ingest floating, submerged, and beached debris (Heneman and the Center for Environmental Education, 1988; Ryan, 1987 and 1990).

Entanglement in trash and debris may result in strangulation, the injury or loss of limbs, entrapment, or the prevention or hindrance of the ability to fly or swim, and all of these effects may be considered lethal. Ingestion of debris may irritate, block, or perforate the digestive tract,

suppress appetite, impair digestion of food, reduce growth, or release toxic chemicals (Dickerman and Goelet, 1987; Derraik, 2002).

The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by the USCG (MARPOL, Annex V, Public Law 100–220 (101 Stat. 1458)). Thus, entanglement in or ingestion of OCS-related trash and debris by marine and coastal birds is not expected, and potential impacts to marine and coastal birds associated with project debris, if any, would be negligible. Because of the limited amount of vessel traffic associated with the placement of three buoys and testing of renewable energy devices, the release of wastes, debris, hazardous materials, or fuels would occur infrequently and cease entirely following completion of the activity.

Geophysical and Biological Surveys

Multiple surveys are anticipated prior to the deployment of the MTBs (*see* Section 2.1.3). These daytime surveys would involve using equipment to describe underwater features in the proposed lease area. It is possible that some birds (like gulls) may approach to investigate, follow, or land on survey boats, neither of these activities, pose any threat to birds, and thus the potential impacts conducting surveys in the proposed lease area on birds would be negligible.

Presence of MTBs, Vessel Deployment and Testing Devices

It is possible that some migratory birds may approach to investigate deployment vessels and buoys. Buoys and deployment vessels would be close to the water's surface. Most migratory passerines would be flying well above the buoys and deployment vessels during the spring and fall migration. Other migratory birds including marine birds, coastal shore birds, and non-ESA listed birds would rarely encounter these structures or vessels due to the considerable distance from shore. Therefore, buoys, as well as vessel activities within the proposed lease area would not likely affect migratory birds (e.g., Petersen *et al.*, 2006; Paton *et al.*, 2010; NJDEP, 2010). In addition, the number of bird species also declines with distance from shore. For example, of the 160 bird species that use the Atlantic flyway, a total of 55 species use offshore (5-20 km from shore) and pelagic environments, and the remaining 105 species use bays, coastlines, and near shore environments (Watts, 2010).

During the day, the presence of buoys and development vessels would not pose any threat to birds, because birds are likely to see the structures and avoid collision. Thus, the potential impacts from buoys and deployment vessels in the affected environment on birds would be negligible. Since the lease would require the lessee to conduct all activities in the leased area in accordance with all applicable laws, rules and regulations, BOEM assumes the applicant would comply with all USCG lighting requirements as described in pages 46-47 of their August 23, 2011 application (FAU, 2011). At night or during periods of inclement weather that reduce visibility, it is possible that birds in transit may be attracted to the vessel lights, and in some cases, collide with vessels (e.g., Bocetti, 2011). However, testing operations will only occur during 3-33 percent of the lease term (even if all three buoys are deployed simultaneously). The lighting from buoys and deployment vessels will likely be overshadowed by the well-lit backdrop of mixed urban and industrial development and the passage of cargo and brightly lit cruise ships. Thus, the potential impacts from lighting on buoys and deployment vessels in the affected environment on birds are expected to be negligible.

The OCT would operate between 5 and 50 m below the mean sea surface from March to October during daytime hours (FAU, 2011). It is hypothetically possible that the deployed OCTs

could impact diving birds at those depths (Table 3.8). For example, a diving bird could pursue prey into a device and get struck by the rotating blades of an underwater turbine or a diving bird may be attracted to bubbles and eddies created by the turbine that may be mistaken by diving birds for fish activity. A camera monitoring system would be installed in the device to determine diving bird response to the operating turbine. This system would be comprised of three underwater video cameras, arranged to observe in front of the device as well as to the rear. In addition, no overnight turbine operations would occur (Coley, personal communication, October 5, 2012). However if at a later time during the lease period FAU SNMREC determines that nighttime operations are required, BOEM will require the submission of a monitoring plan that must be approved by BOEM in consultation with NMFS and USFWS.

Table 3.8

Maximum dive depths of bird species known to occur in project area

Species	Max. depth (m)	Reference
Greater Shearwater	18	Ronconi *et al*., 2010
Northern Gannet	22	Garthe *et al*., 2000
Audubon's Shearwater	35	Burger, 2001
Sooty Shearwater	67	Weimerskirch and Sagar, 1996

The abundance of diving birds is likely to be diminished in the project area during the turbine testing period from March to October. For example, Alcids (Dovekie, Common Thick-billed Murres, Razorbill, Black Guillemot, and Atlantic Puffin), though rare, are not likely to be present from March to October in BOEM's South Atlantic Planning Area, which includes Florida (Michel, 2013). Although Northern Gannets are likely to be present during the testing period, Northern Gannets are likely to be relatively rare when compared to the abundance in the winter months (Michel, 2013). In addition to being uncommon and rare, Sooty and Manx Shearwaters scored low in vulnerability to tidal turbine impacts (*see* Table 1 in Furness *et al.*, 2012). Some diving birds may be attracted to the testing site. For example, the Double Breasted Cormorant is a shallow diving bird (< 10 m) that frequently use buoys for perching. Although some diving bird species (Greater and Audubon's Shearwaters) are relatively common from March to October (Michel, 2013), it is worth noting that given the worldwide testing of these devices and the monitoring of birds near these devices (e.g., NYSERDA, 2011), there has been no documented evidence (scientific or otherwise) to date of these devices inflicting direct harm to birds. Thus, the potential impacts from an OCT in the affected environment on diving birds would be negligible.

Finally, buoys and deployment vessels may attract birds by providing perching opportunities for diving birds including cormorants and non-diving species like gulls. However, these perching opportunities pose no threat to the birds, and thus the potential impacts of buoys and deployment vessels on birds are expected to be negligible.

Endangered and Threatened Birds

The handful of incidental sightings of wood storks, snail kites, and caracaras within the urban areas of Broward County (eBird, 2012) support the claim that the wood stork, snail kite, and caracara would only rarely be near the existing onshore facilities. However, given that these are

terrestrial animals, vessel trips in coastal waters should pose no threat to these animals and impacts to these species habitat would not be expected. Further, none of these species will encounter the buoys and deployment vessels in the affected environment and thus the likelihood of an impact to these bird species is near zero.

Potential impacts are conceivable to the ESA-listed roseate tern and piping plover if these species fly through the project area during spring and fall migration (*see* Buoys and Deployment Vessels above). However, the simultaneous presence of all three buoys with the full complement of deployment vessels would likely appear to a bird as a relative speck in the backdrop of 92.6 square km (27.0 square nm) of the affected environment dotted with cargo and cruise ships. Therefore, the buoys, including activities, within the proposed lease area are expected to have a negligible effect, if any, on endangered and threatened birds.

Bald and Golden Eagles

The buoys and testing facilities would be at least 14.5 km (9.0 nm) offshore (OCS Blocks 7003 and 7053), thus the buoys including activities within the proposed lease area would not affect bald and golden eagles or their habitat. As described above (*see* Section 3.1.2.5.1), golden eagles are not expected to be near the proposed port facilities or the proposed lease area. Bald eagles may migrate and forage over the immediate bay or harbor areas that would be used by the proposed action. However, onshore activities associated with the proposed action are not expected to impact bald eagles due to the relative light vessel traffic associated with the proposed action compared to the existing traffic at these heavily-used ports.

Conclusion

Due to the limited use and no expansion of the proposed support facilities, no significant impacts to birds are expected from onshore activities associated with the proposed action. For birds in flight and migrating, there is no potential for discharges to impact these birds. Because of the amount of vessel traffic associated with the placement of three buoys and testing of OCTs, the release of wastes would occur infrequently and the impact to birds on the water will be negligible. The MTBs and project vessels will have a low impact because they will be present during the five year project period in the lease area infrequently, at most only 33 percent of the time, and possibly as little as 3 percent of the time. Thus, the impact of lighting from deployment vessels and buoys would likely be negligible on birds compared to other sources of light. The OCT will be tested during a time period when many diving birds are either absent, rare or uncommon and similar devices have a long history of operation without incident. While buoys and deployment vessels would provide perching opportunities which could attract birds to the testing site, direct harm to birds is unlikely.

Proposed Mitigation Measures

Although no significant impacts to birds are expected from the proposed action, BOEM proposes that the following mitigation measures be incorporated as lease stipulations to reduce or eliminate the potential for adverse impacts to birds (*see* Section 5.2.9.6, USDOI, MMS, 2007). To reduce the potential to attract and/or disorientate birds at night during fog and rain, BOEM would require the lessee to leave non-hazard/navigation lights on only when necessary and hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters. Second, to discourage diving birds from using the general area, particularly

during testing and operations of OCTs, BOEM would require the lessee to install anti-perching devices on the buoys as a precautionary measure.

3.1.2.6. Bats

3.1.2.6.1. Description of the Affected Environment

Bats present in the coastal areas surrounding the proposed onshore support facilities (Port Everglades and Port of Miami) and the proposed lease area could be affected by the proposed action.

There are several species of bats that historically or currently occur in south Florida including areas surrounding the proposed onshore support facilities (Port Everglades and Port of Miami) where they may forage for insects around street lights (Table 3.9). While migration patterns of bats are not well-documented offshore Florida, some bat species are known to fly along the Atlantic coast. For instance, on the Mid-Atlantic coast, the eastern red, hoary, and silver-haired bats, fly along the Assateague Island National Seashore, a barrier island off the coast of Maryland during migration (Johnson *et al.*, 2011). The New Jersey Ecological Baseline Study reported the mean distance bats were observed from shore was 8.4 km (5.2 nm), with the farthest distance being 16.7 km (10.4 nm) (Vol. I, Appendix B, NJDEP, 2010). In addition, bat migration over the open ocean has also been documented. For example, the hoary bat on Southeast Farallon Island, approximately 48.0 km (29.8 mi) west of San Francisco, migrates to the mainland in fall (Cryan and Brown, 2007) and several bat species in Europe fly at altitudes <10.0 m (32.8 ft) above the sea surface while crossing the Baltic Sea in migration between southern Sweden and Denmark (Ahlén *et al.*, 2009). Thus, it is reasonable to assume that bats fly along the south Florida coast and may occasionally fly over the proposed lease area.

The Florida bonneted bat, *Eumops floridanus*, is a candidate for being listed as federally endangered (77 FR 60705). The Florida bonneted bat roosts year round and is thus not migratory (Timm and Genoways, 2004), and would not be present in the proposed lease area. It is anticipated that Port Everglades in Broward County would be the primary onshore support base for this project. A female Florida bonneted bat with young was found in Fort Lauderdale, Broward County (USDOI, USFWS, 2011). In addition, Florida bonneted bats are known to be in Miami-Dade County (USDOI, USFWS, 2011), and FAU SNMREC's application also indicates that one of the potential support vessels receives onshore support from the Port of Miami, located in Dade County, Florida (FAU, 2011).

Table 3.9

Bat Species Present in Southern Florida, Except the Florida Keys

Common name	Scientific name
Cave Bats*	
Rafinesque's big-eared bat	*Corynorhinus rafinesqii*
Big brown bat	*Eptesicus fuscus*
Tri-colored bat	*Perimyotis subflavous*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Tree Bats	
Florida bonneted bat	*Eumops floridanus* [C*]
Eastern red bat	*Lasiurus borealis* [s]
Northern yellow bat	*Lasiurus intermedius* [s]
Seminole bat	*Lasiurus seminolus* [s]
Evening bat	*Nycticeius humeralis* [*]

Note: based on information from Florida Bat Conservancy, 2011.
[*] May nest in tree cavities and/or man-made structures.
[C] Candidate for Federal listing as endangered-(see 77 FR 60750-60776).
[s] Forages for insects around street lights.

3.1.2.6.2. Impact Analysis of the Proposed Action

Several species of bats, including the candidate species, the Florida bonneted bat, would be present in the coastal areas surrounding the proposed onshore support facilities (Port Everglades and Port of Miami). Due to the limited use and no expansion of these facilities (*see* Section 2.1.2), no impacts to bats are expected from onshore activities associated with the proposed action.

Bats are nocturnal, thus daytime activities such as geophysical surveys would not impact bats. It is assumed that if there are any nighttime activities associated with the proposed action they would be limited to the proposed lease area. Only lit structures or vessels on the water surface have a potential to impact bats, because they may attract insects for bats to eat. Since bats forage on flying insects, a non-routine event, such as a diesel spill on or below the water surface, would not impact bats.

The Florida bonneted is non-migratory (Timm and Genoways, 2004), and would not be present in the proposed lease area. In addition, it is unlikely that other bat species would routinely forage or migrate through the project area due to its distance from shore. It is possible that these mammals may on occasion be driven to the project area by prevailing winds and weather. MTBs and project vessels will have a low impact because they will be present during the five year project period in the lease area infrequently, at most only 33 percent of them time, and possibly as little as 3 percent of the time. If the bats and project activities are present during these limited periods, it is conceivable that a bat may forage on insects drawn to lighting of the MTBs or vessels. However, these bats would quickly return inland to forage on more abundant insects found near swamps.

Conclusion

Due to the limited use and no expansion of the proposed onshore support facilities, no impacts to bats are expected from onshore activities associated with the proposed action. Since bats forage on flying insects, there is no potential for an accidental spill to impact bats. The proposed action may occasionally provide forage opportunities in the rare event that bats migrate through the proposed lease area while possible nighttime project related-activities are occurring. However, in the rare event that bats are attracted to the offshore area associated with the proposed action, any effects on bats would be negligible.

Proposed Mitigation Measures

Although no significant impacts to bats are expected from the proposed action, proposed lighting restrictions discussed in Section 3.1.2.5 of this EA may also reduce or eliminate any potential impacts to bats.

3.1.2.7. Fish and Essential Fish Habitat

3.1.2.7.1. Description of the Affected Environment

Fish

The area of potential effects for fish and fish habitat (including NOAA NMFS designated EFH), which consists of both the inshore port and vessel transit areas and offshore mooring sites, could be affected by routine and non-routine activities under the proposed action. Routine activities related to the proposed action is limited to the proposed lease area and offshore Fort Pierce where tow testing activities will occur, while non-routine impacts, such as accidental discharges or waste and/or pollutants, could also potentially occur along vessel transit routes and at the principal ports (Port Everglades,Port of Miami, and Fort Pierce). Since the anticipated impacts are expected to be primarily restricted to the offshore environment, the discussion below is restricted to benthic and pelagic fish and fish habitat in the offshore environment from Fort Pierce to the Port of Miami.

The proposed action area includes habitat occupied by several demersal (bottom dwelling) and pelagic fish species for one or more of their life stages. Many of these fish have a high commercial and recreational fishing value. Commercial and recreational fisheries are discussed in Section 3.1.3.2. Additionally, benthic habitat and non-commercially important benthic invertebrates are described in Section 3.1.2.2 of this EA.

Ross (2006) identified at least 57 unique taxa of fish in deep-water coral habitats of the South Atlantic Bight from video analyses. The proposed lease area is arguably at the extreme southern end of the South Atlantic Bight. While the greatest species richness was within prime reef or transition habitats (36 and 35 species, respectively) (Table 3.10), the soft substrate off reef habitats also supported a different but well developed fauna. It is the soft substrate, off-reef habitat that would likely be impacted by the proposed action. The off-reef areas were characterized as having shortbeard codling, pluto skate, hagfish, and offshore hake, with the hake and skates never occurring on prime reef. Blackbelly rosefish was also observed away from prime reef habitat, in such cases it was usually near whatever structure was available (anemones, depressions). The large, commercially important wreckfish occurs over several deep-sea coral habitats from the base of mounds on rubble areas with little profile to the tops of ledges (Ross 2006). Additionally, the NMFS (USDOC, NOAA, NMFS, 2011a) identified that the proposed lease blocks contain important benthic habitats that the SAFMC has designated as EFH and

HAPC for species managed under the Snapper-Grouper Fishery Management Plan, such as snowy grouper, golden tilefish, and blueline tilefish; the Golden Crab Fishery Management Plan; the Shrimp Fishery Management Plan; and the Coral, Coral Reefs, and Live/Hardbottom Fishery Management Plan. Fish and shellfish in these plans are included in Table 3.10. Species of fish that may occur in the action area are presented in Table 3.11 and 3.12.

Table 3.10

Demersal Fish and Commercially Important Demersal Shellfish that Occur in Deep-water Habitats of the South Atlantic Bight

Demersal Fish	
Myxinidae (mixed Myxine glutinosa and Eptatretus	hagfishes
Laemonema barbatulum	shortbeard
Helicolenus dactylopterus	blackbelly
Fenestraja plutonia	pluto skate
Merluccius albidus	offshore hake
Polyprion americanus	wreckfish
Lopholatilus	golden tilefish
Caulolatilus microps	blueline tilefish
Hyporthodus niveatus	snowy grouper
Commercially Important Demersal	
Chaceon fenneri	golden crab
Pleoticus robustus	royal red shrimp

Adapted from Ross, 2006 and USDOC, NOAA, NMFS, 2011a.

NMFS also identified several pelagic species that have a life stage associated with the habitat (live/hardbottom habitats, coral and coral reefs) within or adjacent to the proposed action area. These include dolphin (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), cero mackerel (*Scomberomorus regalis*), cobia (*Rachycentron canadum*), and little tunny (*Euthynnus alletteratus*).

Endangered and Species of Concern

Although not a designation under the Magnuson-Stevens Fishery Conservation and Management Act but rather the ESA, NMFS has identified marine fish species that are endangered and of concern that may be found in or adjacent to the proposed action area. The sole endangered species is the smalltooth sawfish, and the species of concern include: two shark species - the dusky shark and the night shark; three grouper species – Nassau grouper, Warsaw grouper, and the speckled hind; striped croaker; and the Atlantic bluefin tuna (USDOC, NOAA, NMFS, 2011b). An additional fish species whose status is under review is the American eel, for which USFWS is the lead Federal agency responsible for conservation.

The original listing document for smalltooth sawfish identified their habitat as "very close to shore in muddy and sandy bottoms, seldom descending to depths greater than 32 ft (10 m). They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths."

According to the NMFS 2010 status review (USDOC, NOAA, NMFS, 2010) new data has shown that "smaller smalltooth sawfish occur in shallower water, and larger sawfish occur regularly at depths greater than 32 ft (10 m). Poulakis and Seitz (2004) reported that almost all of the sawfish <10 ft (3 m) in length were found in water less than 32 ft (10 m) deep and 46 percent of encounters with sawfish >10 ft (3 m) in Florida Bay and the Florida Keys were reported to occur at depths between 200 to 400 ft (70 to 122 m). The status review (USDOC, NOAA, NMFS, 2010) did not have new offshore data to support this species occurrence in the area proposed for lease on Florida's east coast over 60 miles northeast of the Florida Keys.

The dusky shark may be found in the South Atlantic, occurring from the surf zone to well offshore, and from surface waters to depths of 39.6 m (129.9 ft). The dusky shark is not commonly found in estuaries due to a lack of tolerance for low salinities. This species migrates northward in summer and southward in fall. The night shark is a deep-water species that occurs in the South Atlantic at depths between 275-365 m (900-1200 ft) during the day migrating up in the water column to 185 m (610 ft) during the night. Both shark species have depleted populations due to historical fishing pressure and low fecundity. The three grouper species (Warsaw grouper, Nassau grouper, and speckled hind) occur in the South Atlantic at depths overlapping with those of the proposed action area (262 to 366 m [859.6 to 1,200.8 ft]). Similarly, the striped croaker is found off southeastern Florida at depths occupied by the proposed mooring system. The grouper species and striped croaker are generally associated with hardbottom/reef features and are thus more likely to occur in areas adjacent to the proposed mooring site. The Atlantic bluefin tuna (*Thunnus thynnus*) is a highly migratory, pelagic species that is found from the Gulf of Mexico to Newfoundland in coastal and open ocean environments. Spawning is principally in the Gulf of Mexico and in the Florida Straits (USDOC, NOAA, NMFS, 2011b).

American eel (*Anguilla rostrata*) are found in fresh, brackish, and coastal waters from the southern tip of Greenland to northeastern South America. American eels begin their lives as eggs hatching in the Sargasso Sea. They take years to reach freshwater streams where they mature, and then they return to their Sargasso Sea birth waters to spawn and die. They are the only species of freshwater eels in the Western Hemisphere. Threats to American eel include habitat loss, including riverine impediments, pollution and nearshore habitat destruction; and fishing pressure (Greene *et al.*, 2009).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires regional fishery management councils to: 1) describe and identify EFH in their respective regions; 2) specify actions to conserve and enhance that EFH; and 3) minimize the adverse effects of fishing on EFH. The Act requires Federal agencies to consult on activities that may adversely affect EFH designated in fishery management plans. Section 4.2.11.3 of the Programmatic EIS also provides a broad overview on EFH in the Atlantic.

NMFS has noted that the proposed action area has been designated as EFH for several species. Notably the hardbottom area within and adjacent to the proposed action area has been designated as EFH for stony corals, octocorals, and black corals (USDOC, NOAA, NMFS, 2011). The mooring sites within the proposed lease blocks would likely be unconsolidated bottom comprised of sand and muddy sand. The SAFMC designates offshore, unconsolidated bottom at these depths as EFH for golden crab and royal red shrimp. The entire area is also

designated as EFH under the Snapper-Grouper FMP. In particular, wreckfish, have been identified by NMFS as utilizing the habitat within that designation.

BOEM has also determined that EFH has been designated for the following species (Tables 3.11 and 3.12) for one or more life stages in the proposed action area:

Table 3.11

South Atlantic Species

Almaco jack	Gray triggerfish	Rock sea bass
Atlantic spadefish	Graysby	Rock shrimp
Banded rudderfish	Greater amberjack	Sailfish
Bank sea bass	Hogfish	Saucereye porgy
Black grouper	Jolthead porgy	Scamp
Black margate	King mackerel	Schoolmaster
Black sea bass	Knobbed porgy	Scup
Black snapper	Lane snapper	Sheepshead
Blackfin snapper	Lesser amberjack	Silk snapper
Blue striped grunt	Little tunny	Snowy grouper
Bluefish	Mahogany snapper	Spanish mackerel
Blueline tilefish	Margate	Speckled hind
Brown shrimp	Misty grouper	Spiny lobster
Cero	Mutton snapper	Tiger grouper
Cobia	Nassau grouper	Tomtate
Coney	Ocean triggerfish	Vermilion snapper
Cubera snapper	Pink shrimp	Wahoo
Dog snapper	Queen snapper	Warsaw grouper
Dolphinfish	Queen triggerfish	Weakfish
French grunt	Red drum	White grunt
Gag grouper	Red grouper	White shrimp
Golden crab	Red hind	Whitebone porgy
Golden tilefish	Red porgy	Wreckfish
Goliath grouper	Red snapper	Yellowmouth grouper
Gray snapper	Rock hind	Yellowtail snapper

Table 3.12

Highly Migratory Species and Billfish

Albacore tuna	Longfin mako	Bigeye Sixgill Shark
Atlantic angel shark	Porbeagle	Caribbean Sharpnose
Atlantic bigeye tuna	Sand tiger shark	Galapagos Shark
Atlantic bluefin tuna	Sandbar shark	Narrowtooth Shark
Atlantic sharpnose	Scalloped hammerhead	Sevengill Shark
Atlantic skipjack	Shortfin mako	Sixgill Shark
Atlantic swordfish	Silky shark	Smooth Hammerhead
Atlantic yellowfin tuna	Thresher shark	Smalltail Shark
Basking shark	Tiger shark	Smooth Dogfish
Blue marlin	White marlin	Longbill Spearfish
Blue shark	White shark	Blacktip Shark
Dusky shark	Bigeye Sand Tiger	

Additionally, fishery management councils identify HAPCs within fishery management plans. HAPCs are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation.

Coral HAPC

The proposed action area lies to the east of the current HAPC for corals defined under the SAFMC's Coral, Coral Reefs, and Live/Hardbottom Habitats of the South Atlantic Region (Coral FMP) Fishery Management Plan (Coral FMP). Specifically the HAPC is defined as offshore (5 to 30 m [16-90 ft]) hardbottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary. On December 30, 2011 (76 FR 82183) NMFS published the final rule implementing the Comprehensive Ecosystem-Based Amendment 1 (CE–BA1) that amended several FMPs including Amendment 7 to the Coral FMP. The Coral FMP Amendment 7/CE-BA1 established the Stetson-Miami Terrace HAPC which encompasses all three of the proposed lease blocks (Figure 3.2). The Stetson-Miami Terrace HAPC was designated as HAPC in part because it supports high relief hardbottom, *Lophelia* coral mounds, octocorals, and sponge communities (SAFMC, 2011). This assessment evaluates the impacts to benthic habitats in general in Section 3.1.2.2 Benthic Habitat.

Tilefish HAPC

The CE-BA1 also amended the Snapper Grouper FMP to designate HAPC for golden tilefish and blueline tilefish (Figure 3.2). HAPCs for golden tilefish includes irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters (492-984 ft) are HAPC. Golden tilefish are generally found in 80-540 meters (262-1771 ft), but most commonly found in 200 meter (656 ft) depths. EFH-HAPCs for blueline tilefish includes irregular bottom habitats along the shelf edge in 45-65 meters (147-213 ft) depth; shelf break; or upper slope along the 100-fathom contour (150-225 meters/492-738 ft);

hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight. Blueline tilefish are associated with hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs (USDOC, NOAA, NMFS, 2011b).

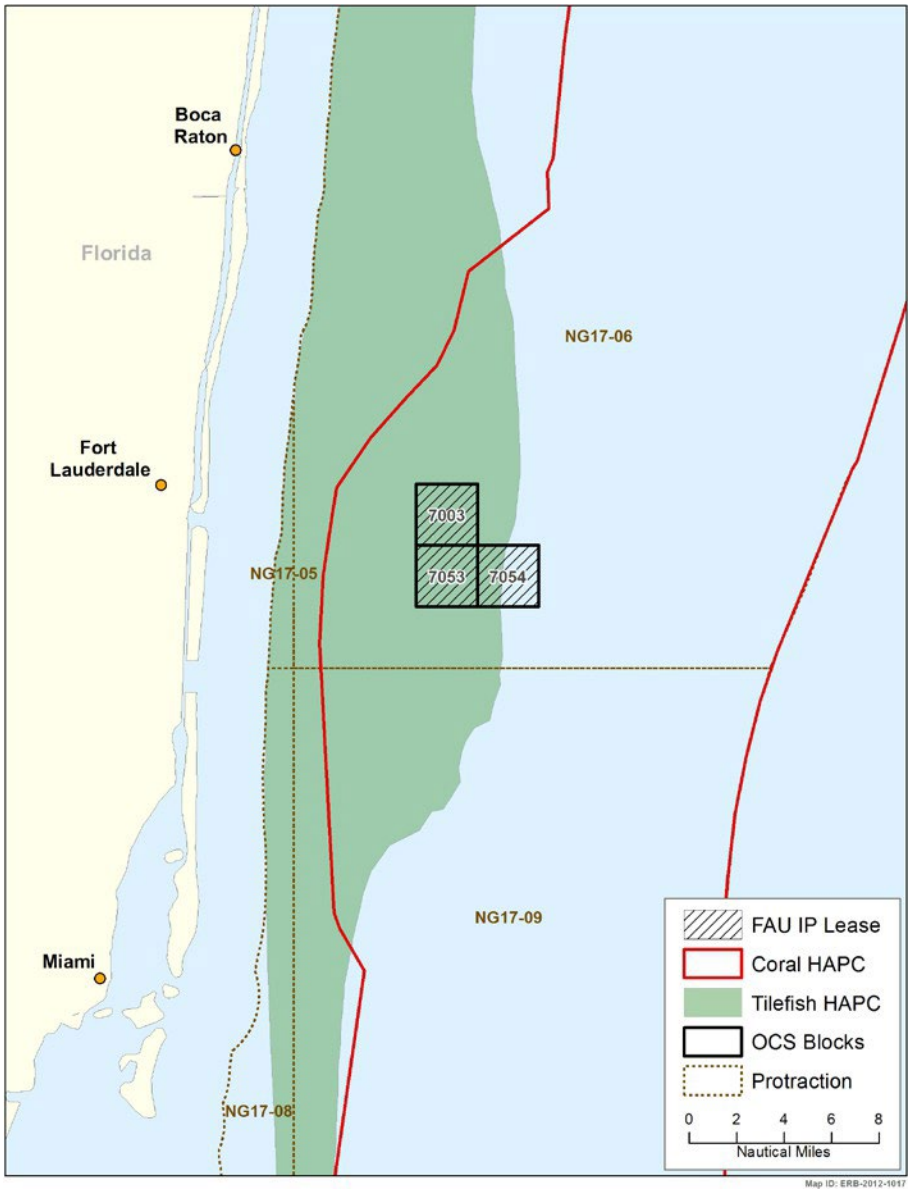


Figure 3.2. Habitat Areas of Particular Concern for Tilefish and Coral, Coral Reefs, and Live/Harbottom Habitat (Stetson-Miami Terrace).

3.1.2.7.2. Impact Analysis of the Proposed Action

Fish

The impact producing factors resulting from routine activities for marine fish include the MTB mooring system and the testing of the OCT. The potential impacts from these activities include physical disturbance from the mooring system and turbine, noise produced by the turbine and deployment vessel, and electromagnetic field (EMF) disturbance from the electrical generator (turbine). Each of these impacts is described below. Generally, physical disturbance, noise, and EMF impacts from the turbine will be limited to pelagic species including such species of concern as bluefin tuna, American eel, and the dusky shark. Physical disturbance and noise from the mooring system will likely impact demersal species including such species of concern as grouper, night shark, and dusky shark.

Physical Disturbance

As discussed in Section 3.1.2.2 Benthic Habitats, the mooring system would impact fish and fish habitat via the disturbance of a small area of seafloor around each of the 13 anchor footprints and the chain sweep of the shock chain for each mooring. Over the 5-year lease term the total area of disturbance from the deployment of the mooring system is approximately 1.29 ha per deployment or up to 163.8 ha over the 5-year lease period. This area is within the 126,025 m^2 area of potential effect for biological resources that is described in Sections 2.1.4 and 3.1.2.2. The difference between these areas and the areas that must be surveyed are presented in Figures 2.5(a) and 2.5(b) in Section 2.1.3. Demersal fish could be impacted in two ways: 1) habitat and forage may be lost within the area; and 2) the hard structure of the mooring system could be colonized by invertebrates which could then have an artificial reef effect by providing forage and refuge for fish. Either scenario is possible, and could occur sequentially, with the mooring system first eliminating forage and habitat and then becoming fouled and act as an artificial reef. In either scenario, given the limited footprint of each individual mooring system, it is not expected that there would be any significant impacts to fish from the mooring system. This is also true in the cumulative scenario of 10-13 deployments over the 5-year period. In the epipelagic and mesopelagic environments it is expected that adult fish will likely avoid the spinning blades of the turbine but may aggregate downstream in the shadow of the turbine or under the turbine and/or the MTB. Although many fish and invertebrates exhibit daily vertical migration through the water column, it is not expected that benthic fish at the anchor depth will have much, if any, interaction with the OCT located 200+ meters above the anchor, since most daily vertical migration occurs in the photic zone well above the seafloor (Cohen and Forward, 2005).

The OCTs, in this case, have an axial-flow, horizontal turbine generator with a blade diameter of 3 to 7 m (9.8 to 23.0 ft), that could cause impacts to pelagic fish. The applicant anticipates the test turbines to be deployed between 5 and 50 m (16.4 and 164 ft) below the sea surface. Data collected from the Verdant Power's Roosevelt Island Tidal Energy Project in New York (RITE project) indicates that there is a limited likelihood of fish harm or mortality from blade strikes or other interaction with the turbine. Furthermore, their limited studies indicated that some fish exhibited avoidance behavior around the turbine (Verdant Power, 2010). As mentioned previously the blade tip speed for the 2-3 blade rotor design is expected to be between 7.0 and 11.0 m/s (23.0 and 36.1 ft/s). If a fish were to be hit by a blade it is difficult to predict the force of the impact of the turbine blade on the fish as the physical characteristics of both the rotor and object with which it collides, as well as details about the collision (time or distance

elapsed during energy transfer) must be known in order to determine the force per-area impact at the suggested blade tip speeds (FAU, 2011). However, considerable research is available for fish mortality and strike(s) from conventional hydropower facilities. Corollary MHK system research suggests a 99-percent (or better) survival rate for tip speeds less than 12 m/s (39.4 ft/s) and with turbine blades with leading edge thicknesses equivalent to or greater than the length of target species (Amaral *et al*., 2010). It is anticipated that blade strikes could be a concern if smaller fish began congregating around the MTB, deployment vessel, and turbine as was observed in the monitoring of the OpenHydro turbine design in the U.K. (OpenHydro, 2011). In this case the MTB, vessel, and/or turbine would be acting as FADs. FADs can change pelagic fish behavior and leave them more susceptible to fishing pressure (Moreno *et al.*, 2007). If the in-water devices were to attract fish then it is foreseeable that larger fish may become more susceptible to impacts from the turbine blade. It is important to note that the OCT is turned by the force of the current on the blades. Other rotors that are often, perhaps mistakenly, used for comparison such as vessel propellers or dam turbines differ in significant ways. For example, vessel propellers such as the cruise ships that frequent this same area (see 3.1.2.1) are far larger and rotated by a propulsion system (*see* Figure 3.1 in Section 3.1.2.4.2). Generally, hydroelectric dams force water through a penstock to turn a turbine. This forcing of water through penstock to the turbine rotor is what causes animals to become entrained and then impinged upon parts of the turbine. This forcing does not exist for the open ocean free flow OCT under evaluation in this assessment.

The potential interaction between fish and the OCT is minimized in the proposed action as the turbine would be continuously monitored while it is deployed so that operations may be modified and fish impacts avoided (*see* Section 2.1). The only surface structure that remains on site continuously is the MTB. The project would monitor changes in the water column continuously during deployment via sonar and cameras (*see* Section 2.1.5). Deployments are planned to be intermittent and of short duration (1-5 days or 3-33 percent of the total time during the 5-year lease term). Due to the short-term deployments and low mortality rates anticipated from an already low probability of a blade strike, the OCT testing would likely not have any long term impacts to fish populations nor ecosystem processes. Physical disturbance from the OCT tow tests as described in Section 2.1.1 are anticipated to be similar to those described above regarding interactions with the turbine. However the water depth and thus fish species present would likely vary. Since the OCT tow tests are anticipated to be limited to 10 minutes per tow at speeds from one to six knots (*see* Table I, Appendix B) the potential for interactions between fish species with the turbine and drogue chute are anticipated to be discountable to insignificant.

Acoustic Disturbance

The test turbines and/or the MTB would likely employ a forward facing active sonar system that would allow operators to detect fish, sea turtles, marine mammals, and large debris that may be approaching the test turbine up current (Section 2.1.5, FAU, 2011). This type of sonar is expected to have an acoustic signature similar to that of a depth sounder with a frequency of around 200 kHz, which is well above frequencies that are likely to be detected by fish which is generally characterized as being between 3 to 4 kHz for hearing specialists and 1 to 2 kHz for hearing generalists (Hastings and Popper, 2005). Fish that are hearing specialists are those characterized by having specific anatomical hearing structures and larger bandwidth detection. Hearing generalists have a narrower bandwidth detection and no specialized hearing structures. It is expected that when the deployment vessel is moored to the MTB and the test turbine is

deployed the mooring line will become taught. This could create what is called a "strum effect" from the current rushing past the mooring line and causing it to vibrate and hum. The noise from the strum could interfere with some behavioral aspects of fish, such as communication with conspecifics, in the vicinity of the strum. In order to decrease the strum effect, the applicant has indicated they will be placing hydrodynamic foils on the upper half of the mooring line (Section 2.1, FAU, 2011). This should mitigate any negative acoustic impacts from the mooring line strum. An additional noise source would be from the rotation of the turbine itself. It is expected that the maximum rotations per minute (rpm) would be between 35 and 70 rpm depending on the design and blade length. This would equal a blade tip speed of between 7.0 and 11.0 m/s (23.0 and 36.1 ft/s). Although the operational sound pressure levels and frequencies for the test turbines is unknown, a range can be derived from the RITE Project which also utilized an axial flow turbine design (Verdant Power, 2010) with 40 rotors reaching 40 rpm and blade tip speeds of 10.5 m/s (34.4 ft/s). Although a frequency range for the sound source was not specified in the report, sound pressure levels of approximately 145dB re 1µPa RMS at 1m were reported within the 6 turbine array. It should also be noted that the deployment site in the East River of New York is much shallower and confined -and therefore a very sound reflective environment- compared to the FAU deployment sites off of Florida. Therefore, this measurement likely reflects and maximum range of operational sound pressure levels for an axial flow turbine that would be deployed under the proposed action. These reported sound pressure levels are below the 150dB re 1µPa RMS thresholds that NMFS has been increasingly using for behavioral effects to listed marine fish (FHWG, 2008).

Electromagnetic Fields

EMF would be generated within the turbine nacelle and the power export cable that would extend from the turbine nacelle to the deployment vessel, likely following the tether from the turbine to the vessel. On the deployment vessel the electricity would be dissipated via a heat exchanger. The voltage of the electricity that would be generated is currently unknown. Some fish, primarily sharks and rays have been well documented to be electroreceptive and magnetoreceptive (Normandeau *et al*., 2011). However Normandeau *et al*. (2011) also identified 183 other fish species that may also be sensitive to EMF. However, the ability to detect EMF does not translate into positive or negative impacts to the species able to detect the fields. It is anticipated that the impacts of EMF generated by the turbine would be negligible due to the fact that exposure to EMF would be restricted to the temporary deployments of the turbines when the turbine is operational and the short distance of the cable actually submerged in the water (< 50 m). In the limited occasions when the turbine is operational and generating electricity the impact is expected to be similar to the impact of FADs as fish may be attracted to the EMF around the export cable both when it is active and inactive. This is true with each individual turbine as it would be with up to three turbines operating at the same time as it is assumed that the operational distance required between each mooring and deployment vessel would be great enough as to preclude any EMF interaction between multiple deployed turbines.

Essential Fish Habitat

The impact of the proposed action on EFH and HAPC for demersal fish, such as juvenile and adult stages of fish included in the Snapper-Grouper FMP, and EFH and HAPC for corals and live/harbottom in the Coral FMP, is expected to be primarily restricted to impacts from the mooring system. As also discussed in Section 3.1.2.2 Benthic Habitats, the applicant estimates

the total area of disturbance from the deployment of the mooring system is approximately 1.29 ha per deployment or up to 163.8 ha over the 5-year lease period. It is anticipated that there will be temporary loss of EFH for demersal fish species resulting from the setting of the mooring anchor. The sandy, unconsolidated sediment that is targeted by the applicant for deployment of the mooring system would result in the temporary suspension of sediments that would settle out near the mooring location. BOEM is requiring sub-bottom profiling to determine sediment thickness necessary to hold the mooring system is present within the mooring location. For the purposes of this analysis it is conservatively assumed that the area under the chain sweep would be lost as EFH as the motion of the chain would likely disturb normal fish interaction with the seafloor (e.g. foraging behavior). Also, as mentioned in the Benthic Habitat Section, the anchor system has the potential to be colonized by invertebrates and provide forage and refuge for fish and invertebrates. In this case the anchor system would provide additional habitat to demersal fish. The impacts of deepwater artificial reefs, the effects of which may be mimicked by the mooring system, are not well understood since most artificial reefs are located in shallow water habitats. However, it is expected that demersal fish would use it as shelter for juvenile and adult stages of their life history. Impacts to HAPC for tilefish will be avoided by BOEM's lease stipulation requiring avoidance of sensitive benthic habitats which includes the definition of blueline and golden tilefish HAPC (*see* Section 2.1.4 of this document). Furthermore, since tilefish show place-based affinity, their presence in the area should be reflected in the imagery surveys conducted by the lessee and presented to BOEM in the Project Plan. Impacts to the Stetson-Miami Terrace HAPC are expected to be restricted to sandy unconsolidated sediment, and not the hard and soft coral outcrops and live/hardbottom that HAPC was designated to protect. The proposed seafloor impacts within the Stetson-Miami Terrace HAPC are anticipated to be less than 0.002% of the 59,250 km^2 total HAPC area. Surveys and setbacks/buffers from sensitive benthic habitats will ensure that impacts to these resources are negligible (*see* Section 2.1.4).

EFH designated in the water column would be for egg and larval stages of both demersal and pelagic species and the juvenile and adult stages for pelagic species. Larval species identified in plankton tows near the action area included crab, lobster, skipjack tuna, snapper, and other tuna species (Hirons *et al.*, 2010). As described in the previous section the MTB, deployment vessel, and OCT could all act as a FAD. However, of the three, only the MTB would likely be located at the mooring site for longer than a 1- to 5-day testing period. The test turbines and deployment vessels would only be on site during the period of the test. The applicant is required to conduct video monitoring which will detect impacts with detectable juvenile and adult life stages of fish in the water column (*see* Section 2.1.4)

Non-Routine Activities

Non-routine events that could impact fish and essential fish habitat would be an accidental discharge of solid wastes, fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three. Fish could be adversely impacted by ingestion of, or entanglement with, solid debris. Fish that ingest debris, such as plastic, may experience intestinal blockage, which in turn may lead to starvation, while toxic substances present in the ingested materials (especially in plastics) could lead to a variety of lethal and sub-lethal toxic effects. Entanglement in plastic debris can result in reduced mobility and starvation. The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by BOEM (30 CFR Part 585.105(a) and the USCG (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Due to the expectation of

compliance with these regulations, entanglement in, or ingestion of, OCS-related trash and debris by fish would not be expected during normal operations.

The chance of an accidental discharge of pollutants is considered low due to the safety procedures in place by FAU's COET (Section 2.11, FAU, 2011). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they were dissipated. The devices' bearings would be housed in a lubricant-filled section with redundant dynamic seals between the seawater and the lubricant to prevent leakage and will meet EPA requirements. All lubricants used will be bio-degradable (*see* Section 2.1.5). The system(s) that contain lubricant will be ferried out to location for each deployment and all maintenance of lubricant systems will be completed at port.

Conclusion

BOEM anticipates the primary adverse impacts to benthic fish habitat will result from the deployment of the mooring system. Approximately 163.8 ha over the five-year lease period would experience loss of habitat. However, this area represents less than 0.002% of the Stetson-Miami Terrace HAPC (59,250 km^2). Thus, the habitat loss will not result in significant losses to fish populations on the Miami Terrace. Seafloor imagery of the proposed mooring locations would be provided in the applicant's Project Plan in order to verify the presence or absence of sensitive benthic habitat as specified in Section 2.1.4 of this document. In the epipelagic and mesopelagic environments it is expected that adult fish will likely avoid the spinning blades of the turbine but may aggregate downstream in the shadow of the turbine or under the turbine and/or the MTB. In the cases where the turbine blade is not avoided, blade strike mortality is expected to be very low. This potential interaction is further mitigated by the temporary (~ 5 days) deployment periods of the test turbines. The only sea surface structure that remains on site continuously is the MTB. The project would monitor objects in the water column continuously during turbine deployment via sonar and video imagery. Thus physical disturbance to fish and essential fish habitat in both the benthic and pelagic zones is expected to result in negligible to minor adverse impacts.

Sound pressure levels of up to approximately 145 decibels (dB) re 1 micro Pascal (µPa) from the test turbines are likely to be heard by fish, but are not anticipated to adversely impact fish. Noise produced from the mooring line is unknown but mitigated by hydrodynamic foils. Sonar is likely above the hearing range of most fish. Sound exposure to fish and fish habitat is expected to be below existing behavioral sound exposure thresholds established by NMFS for fish and result in minor disturbance and/or avoidance behavior during the temporary deployments of the test turbine and during operation of the vessel.

It is anticipated that the impacts of EMF generated by the turbine would be negligible due to the fact that exposure to EMF would be restricted to the temporary deployments of the turbines when the turbine is operational and then only submerged up to 50 m in the water column. In the limited occasions when the turbine is operational and generating electricity the impact is not expected to result in any direct species mortality. Non-routine impacts such as accidental discharges of waste and/or pollutants could potentially occur along vessel transit routes and the principal ports, but due to safety measures put in place by the applicant the likelihood of such impacts are negligible to fish and essential fish habitat.

Thus, all the impact producing factors described in this assessment that could affect benthic and pelagic fish, including the identified species of concern, are not expected to singularly or cumulatively result in significant adverse impacts to fish populations and the availability of fish

habitat. BOEM further concludes that the proposed action is anticipated to impact the quality and quantity of EFH from the moorings and general test operations. However, given the limited spatial extent and limited periods of turbine deployment, it is not likely that the impacts would be more than temporary and not substantially affect the quality and quantity of EFH and the populations of fish in the area. Impacts to the tilefish and Stetson-Miami Terrace HAPCs are expected to be negligible due to the standard operating procedures specified in BOEM's lease stipulations in Section 2.1 of this document. Impacts to the ESA-listed smalltooth sawfish are anticipated to be discountable to insignificant and thus not likely to adversely affect this species. This is based upon the lack of overlap with the existing habitat use patterns of the species with the areas proposed for lease, the limited duration and impact of the OCT tow tests, and the operation's standard operating conditions. These conditions include vessel strike avoidance measures (e.g. 50 m (164 ft) separation distance from a sighted smalltooth sawfish) and measures requiring the turbine to be shut down when a smalltooth sawfish is sighted within 15.24 m (50 ft) of the turbine.

3.1.3. Socioeconomic Conditions

3.1.3.1. Cultural Resources

3.1.3.1.1. Description of the Affected Environment

Cultural resources potentially affected by the proposed action include offshore historic properties such as archaeological sites (shipwrecks and submerged pre-contact sites) located within the proposed lease area, and onshore historic properties such as historic structures and buildings, traditional cultural properties, and historic districts whose viewshed might potentially be impacted by the proposed activities. An overview of cultural resources on the Atlantic OCS can be found in Section 4.2.19 of the Programmatic EIS.

BOEM has reviewed existing and available information regarding cultural resources that may be present within the proposed OCS lease blocks. These sources include information from the Florida Division of Historical Resources Master Site File, and information gathered for an updated study of archaeological resource potential on the Atlantic OCS that compiles information on historic shipwrecks and models the potential for pre-European contact sites based on reconstruction of past landscapes, human settlement patterns, and site formation and preservation conditions (TRC, 2012).

To date, no site-specific archaeological identification surveys have been conducted, and no cultural resources have been identified, within OCS Blocks 7003, 7053, and 7054. One reported shipwreck is potentially located to the south of the proposed lease blocks in the vicinity of OCS Block 7103. This tug, the *Nancy Moran*, was sunk in 1941 after a collision with the US submarine chaser PC 451.

Based on available information, the proposed lease blocks are located in a region that is considered to have the potential to contain historic period archaeological resources in the form of shipwrecks. The diverse maritime history of Florida is represented in known shipwrecks located offshore the southern Atlantic coast of Florida ranging from 18th century Spanish vessels to early 20th century recreational vessels. Based on the location of the proposed lease blocks in proximity to historic shipping routes, and because it has been demonstrated that archaeological sites have been identified in this general region and in similar settings, there is the potential for

the presence of historic period cultural resources to be located within the OCS lease blocks associated with the proposed action and alternatives.

The location of the proposed lease area in water depths in excess of 260.0 m (853.0 ft) places the project within a region that is considered to have no potential for the presence of landforms that were subaerial (located on or near the surface of the earth) at any point during the Last Glacial Maximum (LGM) (c. 20,000 years before present) (TRC 2012:133). Because these proposed lease blocks have not been exposed as dry land during the past 20,000 years, there is considered to be no potential for the presence of cultural resources associated with Native American occupation or habitation within the proposed action area.

3.1.3.1.2. Impact Analysis of the Proposed Action

Section 5.2.19 of the Programmatic EIS discusses impacts to cultural resources that could occur from technology testing and site characterization. The following impact analysis incorporates requirements developed for the agency's compliance with Section 106 of the NHPA (*see* Sections 2.1 and 4.3.4 of this EA).

Routine Activities

Installation of the proposed MTBs would directly impact the seafloor. FAU SNMREC proposes to employ a single drag-embedment anchor to moor each of the MTBs. Taking into consideration the landing location of the anchor on the seafloor, the drag distance necessary to embed the anchor, and the portions of chain that may contact the seafloor during installation, the area of seabed that could potentially be directly impacted by the proposed mooring installation activities is estimated to encompass approximately a rectangular area 355m (492.0-ft) by 355m (126,025 m^2, 12.6 hectares). If archaeological resources are present in these areas, the impacts from the anchor installation activities would result in the direct damage or destruction of a resource or the removal of archaeological materials from their primary context. Therefore, as discussed in Section 2.1.3, BOEM will include lease stipulations requiring the lessee to conduct an archaeological identification survey and submit the results of the survey for BOEM's review prior to any installation activities. If BOEM concludes that a potential archaeological resource may be present and has the potential to be impacted by the proposed activities, BOEM will specify a minimum avoidance buffer around the resource and BOEM will require the lessee to relocate the proposed seafloor disturbing activity a sufficient distance in order to avoid any impacts to cultural resources. The size of the avoidance buffer will be determined by BOEM and will be established by taking into consideration both the characteristics of the potential resource and the potential for seafloor disturbances by the installation, operation, and removal of the MTBs. Therefore, the proposed action will avoid any impacts to archaeological resources.

Visual impacts to potential onshore cultural resources could result from the shore-based visibility of vessel traffic and MTBs associated with the proposed action. Visual impacts from vessel traffic would be limited and temporary in nature and would be indistinguishable from existing vessel traffic in the area. The proposed MTBs measure 6.4 m (21.0 ft) long by 3.0 m (10.0 ft) wide with an overall height above the mean water line of approximately 5.8 m (19.0 ft). The MTBs may be visible from shore, however, effects to onshore historic properties are not anticipated based on the height of the proposed equipment, the distance of the proposed installations from shore, the cumulative number of MTBs which will be deployed at any given time, and the short-term (up to five years) placement of the structures. Therefore, the proposed action would have little to no visual impact on onshore cultural resources.

Existing ports and other onshore infrastructure are capable of supporting the proposed action with no expansion and there are no additional anticipated impacts to cultural resources from routine activities associated with the proposed action or alternatives.

Non-Routine Events

Diesel spills could occur due to vessel collisions (*see* Section 3.1.1.2.1 of this EA). If a diesel spill were to occur, it would be expected to dissipate very rapidly and not reach the seafloor or the coast and would not likely impact offshore cultural resources.

It is possible that an anchorage from the MTBs may be unintentionally dragged across the seafloor in a storm event. BOEM would review the Project Plan to ensure that appropriately-weighted anchorages would be used for the buoys to minimize this possibility. In addition, the results of site-specific surveys would provide the information needed to allow for a sufficient avoidance buffer to be placed around any potential cultural resources prior to anchor placement. Therefore, it is unlikely that an anchor drag from a storm event would impact offshore cultural resources.

Conclusion

Although the proposed action has the potential to affect cultural resources, those effects will be avoided through lease stipulations that require relocation of project components. Bottom-disturbing activities that may have impacted offshore archaeological sites (shipwrecks) will be relocated to areas within the leaseholds where offshore cultural resources are not located. Secondly, vessel traffic and lighted MTBs that may have visually impacted onshore historic properties) would be indistinguishable from other vessel traffic, and their effects will be minor and temporary in nature. Finally, there is considered to be no potential for the presence of submerged, pre-contact archaeological sites within the proposed action area. Therefore, while the potential exists for historic properties in the form of shipwrecks to be located within the proposed project area, and vessel traffic and MTBs to be visible from onshore historic properties, there exists little to no potential for those resources to be affected.

3.1.3.2. Commercial and Recreational Fishing Activities

3.1.3.2.1. Description of the Affected Environment

Offshore, the entire east coast of Florida, including the proposed lease area, is used for both commercial and recreational fishing. According to NMFS, the major commercial fishing ports on Florida's east coast are Fernandina Beach, Cape Canaveral, and Fort Pierce. The transit routes from the principal ports (Port Everglades and Miami) to the proposed lease area and activity within the principal ports themselves are not expected to impact commercial and recreational fisheries as the transit activity is not anticipated to increase substantially (~2 percent, *see* Section 3.1.3.6.2, Other Uses of the OCS) over the status quo. Additionally, commercial and recreational vessels do not utilize the same ports. An overview of commercial and recreational fishing for the entire Atlantic region is discussed in Sections 4.2.23.1 and 4.2.23.2 of the Programmatic EIS, respectively. Primary gear types used within the proposed lease blocks include handline/electric reel and trolling (*see* Table 3.12). The species targeted and caught within the general area of the proposed lease blocks include barracudas, bluefish, sharks, dolphin, drum, eels, grunts, herrings, jacks, sea basses, snappers, tunas and mackerels, and tilefish (ACCSP, 2009). Section 3.1.2.7 of this EA discusses fish and fish habitat.

Recreational Fishing

The area consisting of the proposed lease blocks support recreational fishing activities. Although spatial angling data from private fishing vessels is not systematically collected, the general recreational fishing activities that occur in the proposed lease area can be described. Most of the recreational fishing activity in the proposed lease area is deep-drop hook and line fishing for tilefish (golden, blueline, etc.) and groupers, and trolling for highly migratory species such as dolphin, wahoo, tunas, jacks, and billfish. There are approximately 1.5-2 million anglers that fish onshore and offshore of Florida's east coast every year according to NOAA Fisheries Office of Science and Technology (http://www.st.nmfs.noaa.gov/st1/recreational/queries/index.html). East Florida for hire recreational trips averaged about 150,000 per year for the 7-year period between 2005 and 2011 (USDOC, NOAA, NMFS, 2011a).

Commercial Fishing

The area of the proposed lease blocks is designated as deepwater coral HAPC under the SAFMC's Fishery Management Plan for Coral/Coral Reefs and Live/Hardbottom Habitats. As a result, the amount of commercial fishing allowed within the proposed lease blocks is limited to fishing gear that would not damage deep-sea coral. Specifically, the regulations at 50 CFR Part 622.35(n)(2)(i-iii) prohibit the use of a bottom longline, trawl (mid-water or bottom), dredge, pot, or trap gear with the deepwater coral HAPC. Additionally, fishing vessels may not anchor, use an anchor and chain, or use a grapple and chain. Lastly, persons may not fish for coral or possess coral in or from the CHAPC on board a fishing vessel. Golden crab and royal red shrimp fisheries do not take place within the proposed lease blocks. Commercial trolling for king mackerel, barracuda, tunas, and billfish, and hook and line fishing for wreckfish, barrelfish, and tilefish, are more likely. Table 3.12 describes the number of commercial trips by gear type in the proposed action area from 2004-2008. The prohibitions protecting deepwater coral did not go into effect until July 22, 2010 (75 FR 35330; published June 22, 2010) thus some of the gear types represented in the table are no longer permitted in the proposed lease blocks. Figure 3.2 shows the total annual trolling effort along Florida's southeast coast. Figure 3.3 shows the total annual handline/electric reel fishing effort along Florida's southeast coast.

The total commercial value harvested from NMFS statistical area 741, which encompasses or transects the proposed lease blocks, was $24,538,000 for the 5-year period 2006-2010. This averages out to be approximately $5 million per year. Approximately 7,137,275.9 kg (15,735,000.0 lb) of fish extracted from the same area over 5 years. It is not possible to apportion the catch from statistical area 741 to individual lease blocks from publicly available catch data.

Table 3.13

Number of Fishing Trips and Vessels in Lease Block 7053 for the Period 2004-2008

Fishing Gear	Number of Trips	Number of Vessels
Dive	302	37
Gillnet and Seine	11	9
Longline	275	17
Handline and Electric Reel	12378	596
Trolling	5266	249
Other	806	85

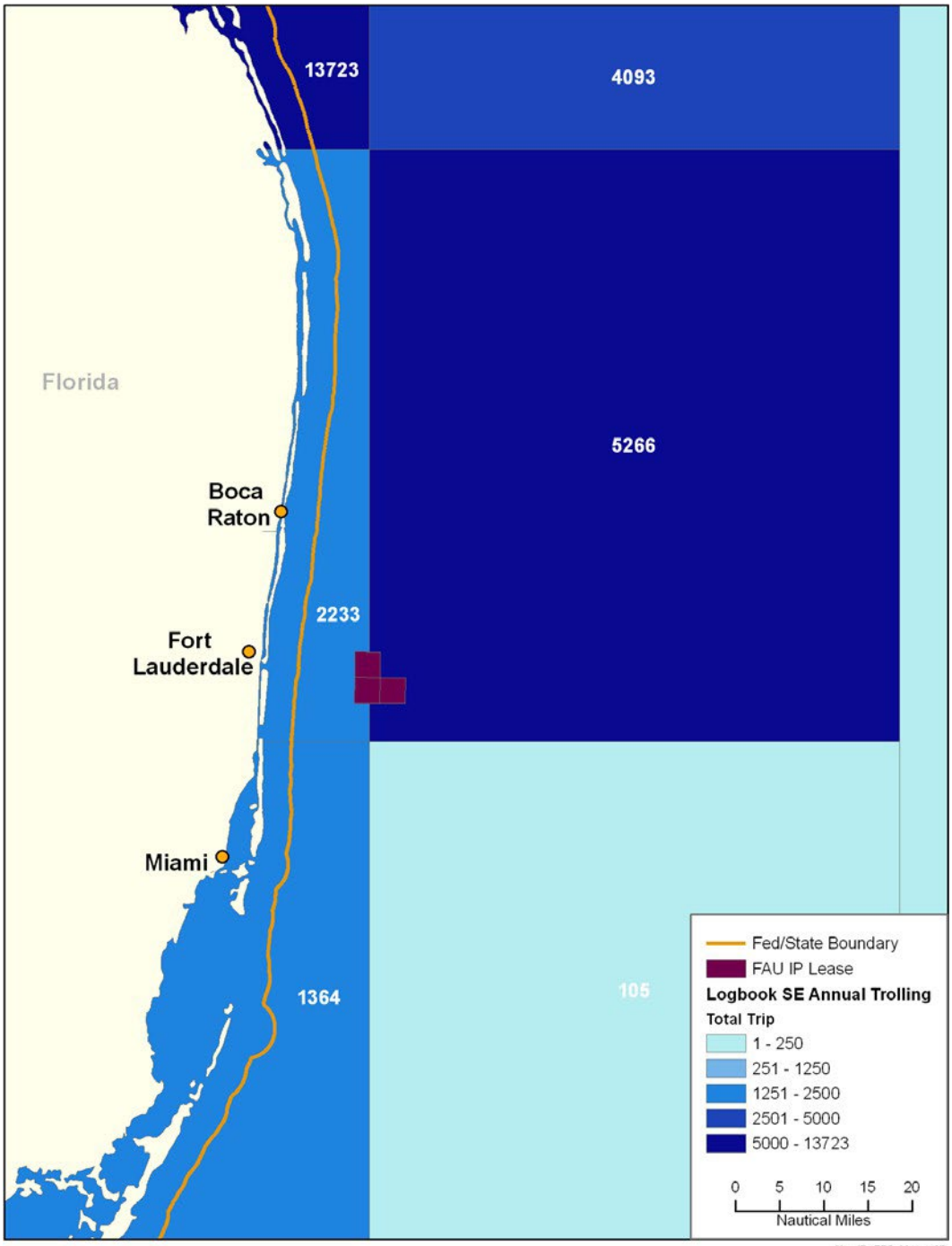


Figure 3.3. Annual total fishing trips for commercial troll gear for the period 2004-2009.
(Notes: Effort blocks equal one degree square (~60 nautical miles). Lease blocks are three miles square.)

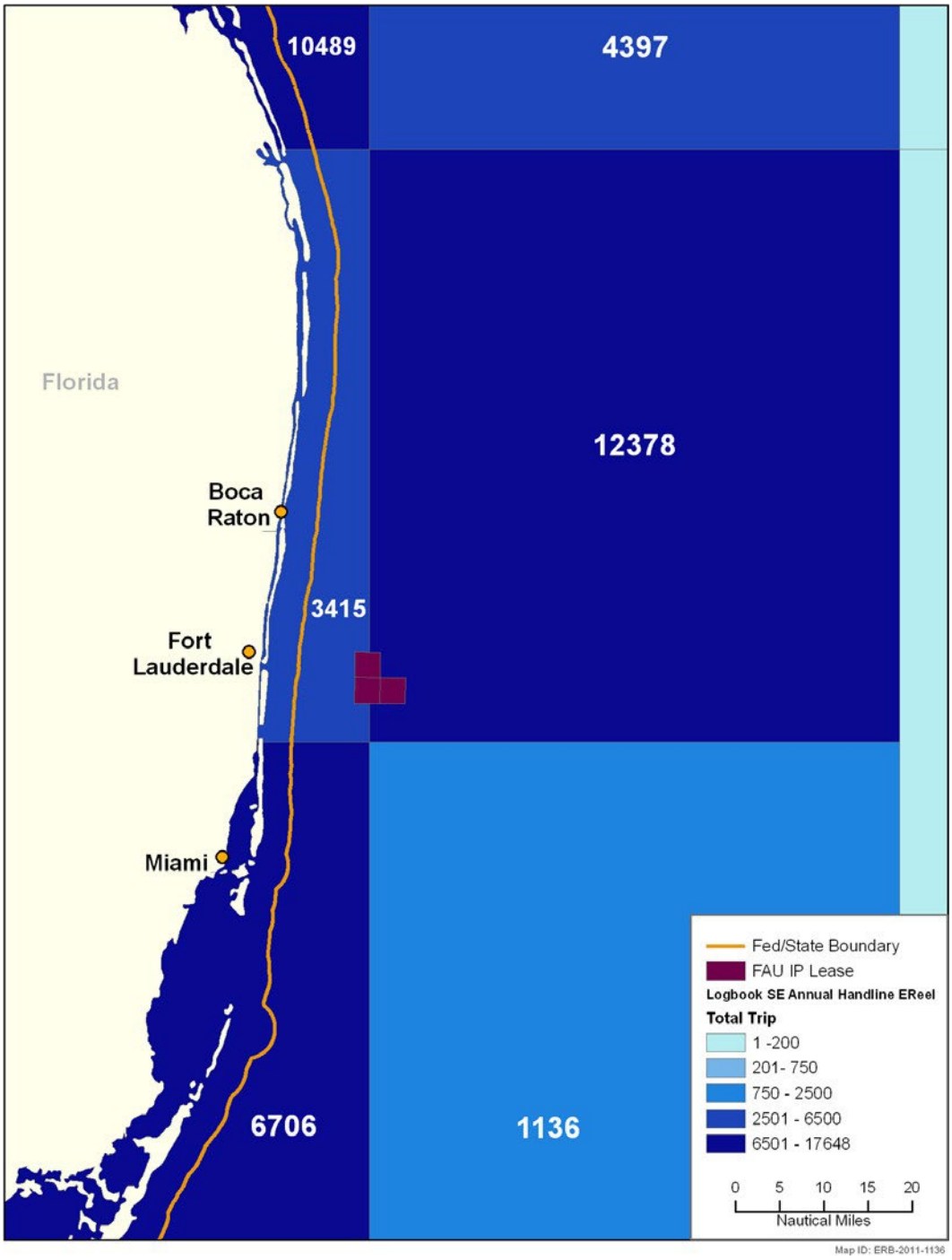


Figure 3.4. Annual total fishing trips for commercial handline and electric reel gear for the period 2004-2009.
(Notes: Effort blocks equal one degree square (~60 nautical miles). Lease blocks are three miles square.)

3.1.3.2.2. Impact Analysis of the Proposed Action

Recreational Fishing

Direct impacts to fish and EFH from routine activities are addressed in Section 3.1.2.7, Fish and Essential Fish Habitat. The analysis of impacts in Section 3.1.2.7 does not indicate that there would be significant adverse impacts to fish and fish habitat that could then impact the availability of fish to recreational fishers. In fact it is anticipated that the MTB may act as a FAD and as a result recreational fishers may see higher catches in the vicinity of the MTB. Some fishing activity, although not explicitly excluded, is not expected to be compatible with the activities during the 1-5 day deployments of the test turbines. Specifically, mobile gear would not be able to cross perpendicular to the MTB, deployment vessel, and test turbine. This total distance is estimated at approximately 160.0 m (524.9 ft) given MTB length (6.0 m [19.7 ft]), ship and MTB separation (90.0 m [295.3 ft]), ship length (30.0 m [98.4 ft]), and turbine trailback (35.0 m [114.8 ft]). It is expected that this 1-5 day exclusion would be a minor inconvenience as fishing vessels may have to modify their course to run parallel to or around the moored vessels. The applicant anticipates that between 12-24 turbine test sessions per MTB location would occur on an annual basis for each of the three mooring sites for a maximum total of 360 deployments over the 5 year lease term. Additionally, it is expected that during survey activity for the 10-13 deployment areas, recreational vessels would have to fish or transit around the activity. Overall, access to fishing areas is not likely to be greatly reduced in space (160.0 m [524.9 ft] line) or in time (no more than 5 days at a time).

Non-routine activities, such as the accidental discharge of fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three are discussed in Section 2 of the Project Application (FAU, 2011). The chance of an accidental discharge is considered low due to existing regulations prohibiting discharges (*see* Section 3.1.1.2.1, Water Quality). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they dissipated (*see* Section 3.1.1.2.1). Thus, it is anticipated that impacts to recreational fishing activities from non-routine activities would be negligible.

Commercial Fishing

Impacts to commercial fishing are expected to be similar to impacts to recreational fishing. The analysis of impacts in Section 3.1.2.7 does not indicate that there would be significant adverse impacts to fish and fish habitat that could then impact the availability of fish to commercial fishers. In fact it is anticipated that the MTB may act as a FAD and as a result greater catches for pelagic gear in the vicinity of the MTB. Some fishing activity, although not explicitly excluded, is not expected to be compatible with the activities during the 1-5 day deployments of the test turbines. Specifically, mobile gear would not be able to cross perpendicular to the MTB, deployment vessel, and test turbine – a distance of approximately 160.0 m (524.9 ft). It is expected that this 1-5 day exclusion would be a minor inconvenience as fishing vessels may have to modify their course to run parallel to or around the moored vessels. The applicant anticipates that 12-24 deployments would occur on an annual basis for each of the three mooring sites for a maximum total of 360 deployments over 5 years. Additionally, it is expected that during survey activity for the 10-13 deployment areas recreational vessels would have to fish or transit around the activity.

According to NMFS, the top commercial ports on Florida's east coast are Feranandina Beach, Cape Canaveral, and Fort Pierce. Thus commercial fishing vessels may see increased traffic from the tow testing but not from support activity originating from Port Lauderdale and Port Miami. Even if commercial fishing vessels were to use the principal ports, vessel traffic around Port Everglades and Port of Miami is not expected to increase more than 2 percent for the 5-year period (*see* Section 3.1.3.6.2, Other Uses of the OCS). Given the areas of high relief, coral, and hardbottom located throughout the Miami Terrace it is not expected that up to 3 individual MTB moorings would provide new or altered habitat substantial enough to impact fish availability/catchability over the Miami Terrace, for demersal fish. It is also expected that during survey activity in the deployment areas commercial vessels would have to fish or transit around the activity resulting in temporary inconvenience.

Non-routine activities, such as the accidental discharge of fuel and/or lubricants from the attending vessel, the MTB, the OCT, or all three are discussed in Section 3.1.1.2. The chance of an accidental discharge is considered low due to the safety procedures in place by FAU's COET (Section 2.11, FAU, 2011). In addition, since most of the petroleum-based fuels and lubricants are lighter than seawater, they would likely remain in the upper water column until they were dissipated (*see* Section 3.1.1.2.1, Water Quality). Thus, it is anticipated that impacts to fishing activities from non-routine activities would be negligible.

Conclusion

The deployment and operation of MHK test sites in the proposed lease blocks is not expected to have a significant adverse impact on recreational or commercial fishing activity in the areas of turbine deployment, surveys, or vessel transit. Impacts from routine activities are anticipated to temporarily exclude small discrete areas during survey and testing activities. Disruption of fishing vessel activity resulting from transit of deployment and survey vessels to and from the ports to the deployment sites is anticipated to be negligible. The impact to recreational and commercial fisheries from non-routine activities (e.g. accidental discharge of fuel, lubricants, etc.) is expected to be rare due to the safety protocols followed by the project applicant. In the instance of accidental spills, the impact is expected to be temporary in nature. Thus, overall the impact of routine and non-routine activities from the proposed action is not anticipated to significantly impact commercial and recreational fishing activity.

3.1.3.3. Recreational Resources

3.1.3.3.1. Description of the Affected Environment

The annual economic use value of the Florida coast for recreational activities ranges from $5 – $23 billion (Pendleton, 2009). Table 3.13 shows the range of estimated economic use values for various coastal recreational activities in Florida.

Table 3.14

Economic Use Values for Coastal Recreation Activities in Florida (2005)

Activities	Estimated Range (millions)
Beach-going	$886 – $8,858
Wildlife Watching	$780 – $7,795
Snorkeling and Scuba Diving	$321 – $1,469
Recreational Fishing	$3,377 – $5,629
Total	$5,362 – $23,751

Source: Pendleton, 2009.

The beaches of Florida are a major recreational resource that attracts tourists and residents to the coastal counties for swimming, sunbathing, wildlife watching, and other activities. Florida's 770 miles of coastline, including the Gulf, Atlantic, and Caribbean coasts, is the most visited in the nation, with almost 10 percent of Americans visiting the Florida coasts in 2000 (Pendleton, 2009). The proposed action would require various support services within Broward County and Miami-Dade County, Florida, where there are 19 and 17 beaches respectively (USEPA, 2008b).

Coral reefs and underwater archeological resources are key factors in attracting visitors to the Florida coast, especially those who participate in diving activities (both scuba and snorkeling). These features are present in the proposed lease area where bottom disturbing activities would occur, as well as, coastal waters which would be transited by vessels associated with the proposed action. In 2008, tourism and recreation involving ocean related activities employed 296,914 in Florida, 22,656 in Broward County, and 42,964 in Miami-Dade County (National Ocean Economics Program, 2008). Recreational fishing also occurs in these areas and is discussed in Section 3.1.3.2 of this EA.

3.1.3.3.2. Impact Analysis of the Proposed Action

Routine Activities

While unlikely, the proposed action could cause impacts to recreational resources in connection with onshore activities, vessel traffic to and from the proposed lease area, the presence of MTBs and deployment vessels, and potential disturbance of underwater features important to recreation users.

Onshore Activities

As discussed in Section 2.1.2, onshore activities would be limited to existing ports or industrial areas that are expected to be used by vessels associated with the proposed action. Expansion of these existing facilities is not anticipated. Therefore, there would be no impact from onshore activities to nearby recreational resources, such as beaches.

Vessel Traffic

It is most likely that the relatively small amount of vessel traffic associated with the proposed action would use established nearshore traffic lanes (*see* Section 3.1.3.6). Section 5.2.22 of the Programmatic EIS concluded that, as there have been no negative impacts on tourism and recreation reported from military, commercial, and recreational water and air vessels that currently traverse coastal areas, it is unlikely that there would be any detrimental impact on

tourism and recreation from the comparatively insignificant amount of vessel traffic associated with the proposed action.

Presence of MTBs and Deployment Vessels

Visual impacts to recreational resources could result from the shore-based visibility of vessel traffic and MTBs associated with the proposed action. Visual impacts from vessel traffic would be limited and temporary in nature and would be indistinguishable from existing vessel traffic in the area. Due to the distance to shore of the proposed lease area and the low profile of the MTBs, it is estimated that testing facilities would not be visible from shore. Therefore, the proposed action would have little to no visual impacts on onshore recreational resources.

Due to their limited presence (3-33 percent of the five year lease term) and small footprint, technology testing activities would not significantly restrict the use of the proposed lease area by recreational users.

Bottom Disturbance

Bottom disturbing activities would occur as a result of the proposed action. These activities have the potential to interact with coral communities and underwater archeological resources, particularly shipwrecks, which are important to recreational users. Although extremely unlikely due to the survey work that would be conducted prior to bottom disturbing activities, and the lease stipulations applied that would require relocation of project components to avoid these resources, direct contact with coral communities and/or archeological resources could result in damage to, or destruction of, those resources. BOEM will require avoidance to ensure that harm or damage to benthic resources (*see* Section 3.1.2.2) as well as historic properties (*see* Section 3.1.3.1) would be minimized or non-existent. If BOEM would offer a lease to FAU SNMREC, specific lease stipulations would be drafted and negotiated with the lessee at a later stage prior to lease signing (*see* Section 2.1).

Non-Routine Events

The potential impacts of non-routine events on water quality are discussed in Section 3.1.1.2.1 of this EA. Spills could occur during refueling and collisions at port, during transit to and from the proposed lease area, and while operating in the proposed lease area. If a diesel spill were to occur, it would be expected to dissipate very rapidly and biodegrade within a few days. From 2000 to 2009, the average spill size for vessels other than tanker ships and tank barges was 88.36 gallons (USDHS, USCG, 2011b).

Test turbine lubricant spills are considered to be unlikely because the system(s) that contain lubricant would be ferried out to the project location for each deployment and all maintenance of lubricant systems would be completed at port (FAU, 2011). If a lubricant spill were to occur it would be expected to dissipate very rapidly and biodegrade within a few days as all test turbine lubricants used would be biodegradable (FAU, 2011).

Litter on recreational beaches adversely affects the ambience of the beach environment, detracts from the enjoyment of beach activities, and increases administrative costs to maintain beaches. Due to the limited nature of the proposed activities, and their distance from shore, it is unlikely that recreational beaches in Florida would be impacted by waterborne trash as a result of the proposed action. Any litter and debris resulting from the proposed action is unlikely to be perceptible to beach users or administrators given the amount of vessel traffic currently traversing the coastal areas of Florida.

Conclusion

Due to the distance of the proposed lease area from shore, the fact that no new coastal infrastructure would be necessary, and the relatively small amount of vessel traffic associated with the proposed action, impacts to coastal recreational resources are considered to be unlikely. Spills, although very unlikely, would dissipate very rapidly and not impact recreation users. While impacts could occur from marine trash and debris, it is unlikely that they would be perceptible. Due to extensive surveys of potential testing facility locations and lease stipulations that would require relocation of project components to avoid these resources, bottom disturbing activities associated with the proposed action would have minimal or no impacts on benthic and/or archeological resources that are important to recreation users. Due to their limited timeframe and small footprint, technology testing activities would not significantly restrict the use of the proposed lease area by recreational users. Potential impacts to recreational fishing are discussed in Section 3.1.3.2.2 of this EA.

3.1.3.4. Demographics and Employment

3.1.3.4.1. Description of the Affected Environment

Socio-economic data for Broward County and Miami-Dade County, Florida, where the onshore activities associated with the proposed action would occur, is presented in Table 3.14 below.

Table 3.15

2009 Socio-economic Data for Broward County, Miami-Dade County, and Florida

Area	Population	Establishments	Employment	Persons Below Poverty Level (%)	Median Household Income
Broward County	1,748,066	55,289	930,782	13.0	$51,731
Miami-Dade County	2,496,435	72,673	808,269	17.7	$41,367
Florida	18,801,310	491,249	8,954,735	15.0	$44,755

Source: U.S. Census Bureau, 2010

3.1.3.4.2. Impact Analysis of the Proposed Action

The proposed action would require various support services primarily within Broward County, Florida. The potential exists for some support services to occur within nearby ports outside of Broward County. However, due to the short duration of survey, installation, operation, relocation, and removal activities, any benefit to the population and economy would be short-term. Survey, installation, operation, relocation, and removal activities are not expected to employ many workers relative to the existing employment numbers (*see* Table 3.14 above). Once installed, little, if any, activity is associated with maintenance of the MTBs.

Conclusion

The proposed action is expected to have negligible but positive impacts on the population and employment of Broward County, Florida, which would provide the majority of support services for the proposed action, and to a lesser extent the population and employment of Miami-Dade County, Florida.

3.1.3.5. Environmental Justice

3.1.3.5.1. Description of the Affected Environment

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629 (February 11, 1994)), requires Federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations (*see* Programmatic EIS for a complete description of method of analysis (USDOI, MMS, 2007, pp. 4-114 to 4-115)). Population data for Broward County and Miami-Dade County, Florida, where the onshore activities associated with the proposed action would occur, is presented in Tables 3.14 and 3.15. Both Broward County and Miami-Dade County, Florida have minority populations that exceed 50 percent of the counties' overall population and also have a higher percentage of minority populations then the state of Florida. In addition, according to U.S. Census Bureau data (*see* Table 3.15), Miami-Dade County has a median household income that is below average for the state of Florida and the percentage of the population that is below the poverty line is above average for the state of Florida. However, Broward County, Florida, has a median household income that is above average for the state of Florida and the percentage of the population that is below the poverty line is below average for the state of Florida. Per Executive Order 12898, Section 1-101, both counties are considered to have minority populations, while only Miami-Date County is considered to have low-income populations.

Table 3.16

2010 Population Data for Broward County, Miami-Dade County, and Florida

Race	Broward County	Miami-Dade County	Florida
White Persons (Non-Hispanic)	43.5%	15.4%	57.9%
Black Persons	26.7%	18.9%	16.0%
Persons of Hispanic or Latino Origin	25.1%	65.0%	22.5%
Asian Persons	3.2%	1.5%	2.4%
American Indian or Alaskan Native Persons	0.3%	0.2%	0.4%
Native Hawaiian and Other Pacific Islander	0.1%	0.0%	0.1%

Source: U.S. Census Bureau, 2010

3.1.3.5.2. Impact Analysis of the Proposed Action

Given the proposed project area's distance from shore, the site characterization surveys and the operation of technology testing facilities within the proposed lease area would not have the potential to have disproportionately high or adverse environmental or health effects on minority or low-income populations of Broward County or Miami-Dade County. Existing fabrication sites, staging areas, and ports in Broward County and Miami-Dade County would support survey, installation, operation and decommissioning activities as discussed in Section 2.1.2 of this EA. Since no expansion of these existing onshore areas is anticipated to support the proposed action, there is no potential to impact minority or low-income populations.

Conclusion

Per Executive Order 12898, Section 1-101, both counties are considered to have minority populations, while only Miami-Date County is considered to have low-income populations. However, due to the distance from shore and the use of existing facilities, the proposed action is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income populations.

3.1.3.6. Other Uses of the OCS

3.1.3.6.1. Description of the Affected Environment

The vessel traffic associated with the proposed action could pose a conflict with other existing and future uses of the OCS, including marine transportation, dredging activities, military activities, and commercial and recreational fishing. These activities are discussed below with the exception of commercial and recreational fishing, which are discussed in Section 3.1.3.2 of this EA.

Marine Transportation

Port Everglades is the main port that would be used as a base for activities associated with the proposed action as described in the project application (FAU, 2011). One vessel, the *R/V F.G. Walton Smith*, is anticipated to have onshore support out of the Port of Miami in Miami-Dade County. Vessels using both Port Everglades and the Port of Miami include military, commercial, recreational, cruise ships, and miscellaneous other small and large vessel types.

Port Everglades, located on Florida's east coast, is the deepest port in Florida and has one of the shortest, straightest entrance channels along the east coast (Broward County, 1997). Nearshore anchoring occurs north of the shipping lane into Port Everglades entrance channel. Anchoring south of the entrance channel is restricted by the U.S. Navy to protect undersea cables (FERC, 2004). The Port Everglades Master Vision Plan, updated in 2011, (Broward County, 2011) calls for expansion of current port facilities and access channels to accommodate larger, deeper draft 'post-Panamax' class cargo ships. These larger ships are anticipated to frequently call to Port Everglades in the future following completion of the Panama Canal expansion project in 2014. The updated plan will also increase the number and length of cruise and cargo berths, and deepen and widen port channels (Broward County, 2011). These activities would likely occur concurrently with the proposed action in the area between the proposed action and shore.

Table 3.17

Port Everglades Total Ship Calls for FY 2010

Ship Type	Ship Calls
Container	1830
Cruise	1015
Petroleum Tanker/Barge	661
Other (bunker/tugs)	431
Cargo	113
Navy/ USCG	29

Source: Port Everglades, 2010.

Port Everglades' experiences high annual amounts of commercial maritime traffic, in particular from large cargo vessels and passenger cruise ships (*see* Table 3.17 above). In 2010, Port Everglades was the second busiest cruise passenger ship departure port in North America (Greater Fort Lauderdale Chamber of Commerce, 2011). It is also the eastern seaboard's second largest destination for refined petroleum products (FERC, 2004). According to Broward County port statistics, total vessel calls to Port Everglades averaged 5,376 per year during the period of 2000 – 2010. In 2010, there were 4,079 ship calls to the port, with over half of the total calls from cruise and container ships (*see* Table 3.17 above).

The Port of Miami, one of only three deepwater ports in Florida (in addition to Port Everglades), is located south of Port Everglades in Biscayne Bay, Miami-Dade County. Under the new Port of Miami Deep Dredge Project, the port will increase channel depth in order to accommodate larger 'Post-Panamax' class vessels (USACE, 2004). The activities to deepen the port would likely occur concurrently with the proposed action and slightly increase the amount of vessel traffic in the Port of Miami.

Similar to Port Everglades, the Port of Miami also experiences high amounts of commercial maritime traffic annually, in particular large cargo vessels and passenger cruise ships. In 2010, the Port of Miami was the busiest cruise departure port in the United States (Port of Miami website, 2012). In 2010, the Port of Miami was the nation's ninth largest port for container vessels (767 calls) and the tenth largest port for roll-on roll-off ('RoRo') vessels (201 calls) (USDOT, MARAD, 2011). In 2010, there were 1,663 cargo vessel calls and 778 cruise ship vessel calls (Port of Miami, 2012). The Port is also designated a 'clean port' (the designation of a seaport that does not handle bulk cargoes or potential dangerous or hazardous cargoes such as fuel oils); it only handles palletized, 'RoRo', and containerized cargo (as well as significant cruise traffic) (USACE, 2004). Additionally, the Port of Miami will be one of only five East Coast ports (in addition to Baltimore, Norfolk, New York and Port Everglades) that will be able to accommodate the new larger cargo vessel classification 'Post-Panamax' vessels that will pass through the expanded Panama Canal in 2014 (Port of Miami, 2012). The larger 'Post-Panamax' class ships would likely traverse the Port during the 5-year period of the proposed action.

Dredging Activities

Dredging activities are anticipated from the Port Everglades Expansion Project during the time period of the proposed action. Designated in 2005, the Port Everglades Ocean Dredged Material Disposal Site (ODMDS) is approximately 3.4 square km (1.0 square nm) in size and

located roughly 7.4 km (4.0 nm) east-northeast of the Port Everglades Harbor. Based on modeling results, the existing ODMDS does not have the capacity to accommodate anticipated levels of material from the proposed expansion for Port Everglades Harbor to support the planned harbor expansion (USACE, 2011). As a result, the USACE and USEPA (Region 4) have determined the need for expanding the existing ODMDS (USACE, 2011). Increases in vessel traffic and vessel re-routing are likely to occur as a result of expanding the ODMDS, which is located between the proposed lease blocks and the entrance channel to the Port. The potential exists for conflict with the vessel traffic associated with the proposed action and the vessel traffic associated with supporting both the construction and expansion of Port Everglades Harbor and the ODMDS.

Military Activities

Port Everglades has been a popular liberty port of call for U.S. Naval vessels for many years. The port is a site for official ceremonies and a location for operational exercises in conjunction with the port-located U.S. Navy's South Florida Testing Facility (SFTF) (USACE, 2003). The port's deep harbor is the only commercial port south of Norfolk, VA, that can handle aircraft carriers at its docks, making it an ideal stop for military vessels operating in Atlantic and Caribbean waters (USACE, 2003).

The U.S. Navy range is located immediately south of the Port Everglades Inlet and the JUL Beach State Park. The South Florida Ocean Measurement Facility (SFOMF) of the SFTF performs activities that evaluate mine detection, countermeasures and mine response; perform acoustic measurements; and acquire radar cross section and infrastructure signatures (USEPA, 2004). The primary mission of the SFOMF is to perform electromagnetic signature tests and evaluate these test results. It is possible but unlikely that the testing activities associated with the proposed action could produce acoustic noise or electromagnetic energy that may affect the ability of the SFOMF to perform certain activities of its mission.

3.1.3.6.2. Impact Analysis of the Proposed Action

Section 5.4.17 of the Programmatic EIS discusses the impacts that ocean current energy development could have on marine traffic. Increased vessel traffic from survey activities (*see* Section 2.1.2) and the installation, operation, relocation and removal of the MTB system and device testing, would increase vessel traffic within the lease blocks, and locally between the lease blocks and shore. This increase in traffic could pose conflict with other uses of the OCS and associated activities. Therefore, survey activities and the installation, operation, relocation and removal of the MTB systems and device testing have the potential to directly impact coastal and offshore vessel traffic and other uses of the OCS as discussed below.

Routine Activities

BOEM analyzed 2009 USCG AIS data and determined higher levels of vessel traffic occur in the upper portion of lease block 7003 than lease blocks 7053 and 7054 (*see* Figure 3.4). Activities associated with the proposed action have the potential to conflict with commercial maritime traffic accessing, or transiting near Port Everglades and the Port of Miami.

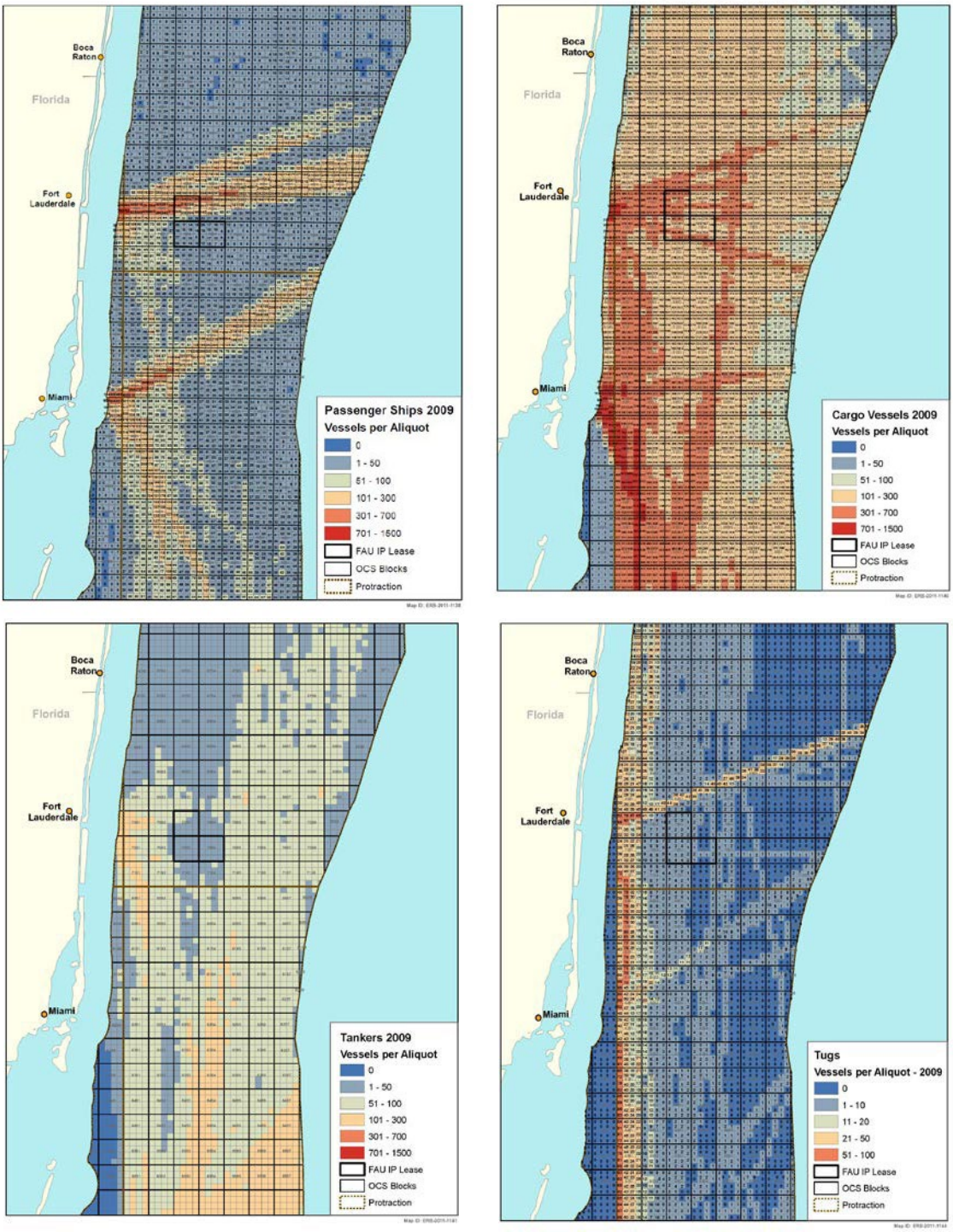


Figure 3.5. AIS data for vessel traffic in the Port Everglades vicinity per OCS aliquot. (Source: USDHS, USCG, 2012)

Vessel Traffic

Direct impacts from routine activities may occur as a result of increased vessel traffic in support of the proposed action. It is expected that the proposed action would result in approximately 275-475 total vessel trips over a 5-year period (*see* Section 2.1.2). Since Port Everglades hosts over 4,000 ship calls per year, it is reasonably foreseeable that the Port can expect to have approximately 20,000 ship calls over the five year period of the proposed action. The proposed action would result in a maximum vessel traffic increase of approximately 2 percent over the 5-year period. Since the Port of Miami hosts 2,441 ship calls per year, it is reasonably foreseeable that the Port can expect to have approximately 12,200 ship calls over the five year period of the proposed action. The proposed action would result in a maximum vessel traffic increase at the Port of Miami of approximately 3 percent over the 5-year period. Because this additional vessel traffic at both ports is relatively small in comparison to current and projected vessel usage levels, it is not reasonably foreseeable that the increase in vessel traffic as a result of the proposed action would cause significant impacts to other vessels in the vicinity of the ports and proposed lease blocks other than those currently present.

Since the lease would require the Lessee to conduct all activities in the leased area in accordance with all applicable laws, rules and regulations, BOEM assumes navigational safety requirements and guidelines published by the USCG would be followed by FAU SNMREC while conducting the proposed activities. According to FAU SNMREC, the MTBs would be equipped with navigational lights with a visible range of at least 9.3 km (5 nm), radar reflectors, active radar transponders, and a Class A AIS beacon transmitter as described in the Project Plan (FAU, 2011). The use of this equipment will greatly reduce any possible adverse effects on marine navigation by increasing visibility and awareness for any mariners in the area of the MTB. The use of USCG designated marking, lighting, and placement on nautical charts has also been used successfully to prevent, or significantly lower, any risks to navigational safety from the placement of an anchored buoy near sea lanes in the past. During the testing of turbine generator devices, when the deployment vessel is attached to the mooring buoy, BOEM assumes FAU SNMREC will follow USCG procedures and publish information in Local Notice to Mariners during the periods of testing in order for other vessels in the area to be aware of the activities occurring in the proposed lease blocks. Additionally, AIS transponders onboard the testing vessels will provide a continuous signal to other mariners in the area during periods of testing devices.

Dredging

Dredging activities are not anticipated to be affected from the proposed project since vessel traffic from the proposed action would be minor in comparison to existing traffic levels that will pass through, or near, the ODMDS expansion project area or the Inlet channel deepening activities associated with the approved port expansion plan.

Military Activities

Since few technical specifications associated with the MHK testing devices are available at this time, the U.S. Department of Defense (USDOD) has identified that there is some risk that the moored vessel or hydrokinetic system being tested could produce acoustic noise or electromagnetic energy that could interfere with the Navy's activities at the SFOMF (DiGiovanni, 2011). The U.S. Navy stated it would monitor the project and inform the applicant if there are any effects that must be mitigated for if any conflicts occur between the project and

naval operations. Therefore, the impact on naval testing activities in the SFOMF area from the proposed action is anticipated to be negligible, if any, based on currently available information.

The DISA proposed cable is a future activity and is unlikely to occur concurrent with the FAU SNMREC proposed lease project activities, therefore no impacts are anticipated to this future proposed activity.

Non-Routine Events

Vessel collisions could occur between vessels transiting between the lease blocks and ports, within the proposed lease blocks, or within the Port Everglades harbor and Inlet area, and the Port of Miami. BOEM assumes that vessels associated with the proposed action would follow speed restrictions in the harbor and the inlet.

The use of navigational lighting, active radar, AIS transponders and flotation devices mounted on the MTB would greatly reduce any potential navigational hazard of a collision or an allision by alerting mariners of the MTB location(s). In the event of a mooring line break that may result in the buoy disconnecting from its mooring, the MTBs would be fitted with a flotation device to support its mooring hardware attached to the mooring line that would keep it off the bottom, and when released it would float to the surface (FAU, 2011).

Conclusion

It is unlikely that vessels would collide with any of the three MTBs or deployment vessels during the installation, operation, relocation and removal of the MTB system and device testing due to compliance with USCG marking and lighting requirements and guidelines, the use of active radar and AIS transponders alerting mariners the presence of an MTB, and publication of testing locations in local Notices to Mariners. Due to the small increase in the amount of vessel traffic associated with the proposed action that would occur in areas of already high vessel traffic levels, no impacts to other uses of the OCS from routine activities or non-routine events are expected. Potential impacts to commercial and recreational fishing and boating are discussed in Sections 3.1.3.2.1 and 3.1.3.3.1, respectively.

Proposed Mitigation Measures

Although no significant impacts to other uses of the OCS, including existing vessel traffic, are expected from the proposed action, BOEM (in consultation with the USCG (USDHS, USCG, 2011c)) proposes that the following mitigation measures be incorporated as lease stipulations to reduce or eliminate the potential for adverse impacts on vessel traffic from the presence of buoys and device testing activities:

- Each deployment vessel should ensure it displays proper navigation lights at night.
- To avoid confusion for mariners, the MTBs should be designated a ‘special marker buoy’ indicating a special area/feature referred to in charts and other nautical publications. The MTBs should be colored solid yellow, and show yellow lights with a slow-flashing rhythm (not a quick-flashing rhythm) with a luminous range of at least 5 nm.
- The deployment vessel should minimize the scope of the mooring line to the buoy to prevent mariners from attempting to pass between the buoy and the vessel or have a yellow lighted buoy placed on the line to alert mariners.

3.2. Alternative B – Removal of High Vessel Traffic Area

Vessels frequently traverse the waters within the northern 12 aliquots of OCS Block 7003, which is proposed for leasing to FAU SNMREC. A high volume of cargo and passenger vessel traffic going to and from Port Everglades, Florida traverses these waters annually (*see* Figures 2.8, 2.9, 2.10 and 2.11 in this EA). According to 2009 AIS data, the high vessel traffic area includes aliquots where over 150 passenger vessels and 455 cargo vessels traversed. Large passenger vessels (cruise ships) and cargo ships comprise a large portion of the vessel traffic in this area. Under Alternative B, these 12 aliquots would be excluded from the lease. OCS Blocks 7053 and 7054 would continue to be considered for lease issuance in their entirety under Alternative B. Overall this amounts to a 25 percent reduction in the size of the proposed lease area compared to Alternative A. All lease stipulations outlined in Alternative A apply to Alternative B.

The following describes the reasonably foreseeable impacts to resources under Alternative B as compared to those analyzed in Section 3.1 of this EA under the proposed action (Alternative A).

Because the high vessel traffic area would not be leased, Alternative B would also result in a 25 percent reduction in geophysical survey and associated vessel traffic compared to the proposed action. This would result in 8 (1-3 percent) less vessel trips. Other site characterization survey activities would remain the same under Alternative B as 10-13 total mooring locations are still anticipated and each location would still require a site-specific survey. Like the proposed action, up to three testing facilities could still occur simultaneously within the remainder of OCS Block 7003 and OCS Blocks 7053 and 7054 (*see* Section 2.1 of this EA). The lease stipulations outlined in Alternative A would still apply to lease activities in Alternative B.

The following describes the reasonably foreseeable impacts to resources under Alternative B as compared to those analyzed in Section 3.1 of this EA under the proposed action (Alternative A). In addition to the reduction in geophysical survey activities in the northern portion of OCS Block 7003, the MTBs and testing facilities would not be located within that same high vessel traffic area, and therefore would pose no risk of any obstruction to navigation in that area. It is assumed the risk of allisions and collisions would be greater in Block 7003, because it already contains a relatively high concentration of vessels. The total risk of an allision with an MTB or collision with a survey or deployment vessel would be reduced under Alternative B. Although the use of navigational lighting, active radar, AIS transponders, and flotation devices mounted on the MTBs and deployment vessels would reduce potential navigational hazards in any location, the lower density of vessel traffic outside of the northern portion of OCS Block 7003 would further reduce this risk.

Under Alternative B, impacts to the following resources would be no different than the impacts reasonably foreseeable under the proposed action. Since the proposed survey activity is expected to have little to no contact with the seafloor, the reduction in survey area would cause no change in impacts to benthic habitats, archaeological and/or cultural resources, fish, and EFH. The existing high amount of vessel traffic in the northern portion of OCS Block 7003 would have limited the use of the OCS block for recreational activities; therefore, there would be no change to impacts on recreational resources as those described for Alternative A. While the proposed activities under Alternative A were not expected to employ many workers relative to the existing employment numbers, the reduced level of site characterization survey activities offshore Florida under Alternative B is expected to produce slightly fewer, if any, new job opportunities for the population of Broward and Miami-Dade Counties.

Due to the 1-3 percent reduction in vessel traffic associated with geophysical surveys, the following resources would experience a slight reduction in impacts. Under Alternative B, there would be a slight reduction in the total pollutant emissions and vessel discharges compared to those assumed under the proposed action. With respect to environmental justice issues, the reduction in the use of existing onshore support bases under Alternative B, due to reduced geophysical survey vessel trips would result in a slightly lower potential for impacts to minority or low-income populations from adverse environmental or health effects. Alternative B would also result in a slightly reduced potential for wake erosion induced from survey-related vessel traffic, and risk of a diesel spill or leakage of ship lubrication systems occurring and contacting coastal habitats along Port Everglades Inlet, the Port of Miami and surrounding waters. For marine mammals and sea turtles, there would also be a slightly reduced risk of vessel strikes, acoustic harassment from the echosounder/geophysical surveys, and impacts from non-routine vessel discharges.

Conclusion

Under Alternative B, the testing facilities would not be located within the high vessel traffic area in the northern portion of OCS Block 7003, and therefore would pose no risk of any obstruction to navigation in that area. The risk of an allision with an MTB during this project would be reduced because an MTB would no longer be located in the area where the highest density of vessel traffic occurs. The risk of a collision with a survey or deployment vessel would also be slightly reduced due to the 1-3 percent reduction in survey vessel activity in the entire proposed lease area. Finally, under Alternative B, reducing the number of vessels trips (8 less) associated with geophysical surveys would result in a slight to no reduction in the negligible to minor impacts on the environmental and socioeconomic resources described under Alternative A.

3.3 Alternative C – Removal of Aliquot Containing High Slope Hardbottom Area (Preferred Alternative)

The Gulf Stream's consistency and current velocities, specifically offshore southeastern Florida in the Florida Current, is a favorable location for the deployment of marine hydrokinetic technologies especially those using OCTs. This location is also known for its diversity of benthic and essential fish habitat. According to the *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* (Vinick *et al.*, 2012) high slope hard-bottom areas in OCS Blocks 7053 and 7054 have been identified and are likely to contain sensitive benthic habitat. Based on this study and public comments received on the previous version of the EA, BOEM has added Alternative C, Removal of Aliquot Containing High Slope Hardbottom Area. Under this alternative a lease would be issued to FAU SNMREC authorizing technology testing on OCS Blocks 7003, 7053, and 7054 with the exception of aliquot 7054N because more than 50% of the aliquot contains high slope hardbottom area. The lease stipulations for mooring system installation require the lessee to avoid potential sensitive benthic habitat by establishing a minimum 152 m buffer/exclusion from the mooring and associated appurtenances (*see* Section 2.1.4). BOEM has identified Alternative C as the preferred alternative because the potentially biologically sensitive high slope hardbottom area has been identified and delineated by Vinick *et al.* (2012) eliminating the need of the Lessee to further investigate that area and for BOEM to further consider it for leasing for the proposed activities. The Lessee would still be bound to do

site characterization activities as described in Section 2.1.3 for the areas remaining for lease consideration. This alternative brings additional surety to the Lessee and BOEM that high slope hardbottom benthic habitats would be avoided in that aliquot. Although Lease Block 7003 was not surveyed by Vinick *et al.* (2012), the survey protocols established by Vinick *et al.* and adopted in this document, along with avoidance set back requirements, would ensure that similar areas in Lease Block 7003 would be avoided.

The following describes the reasonably foreseeable impacts to environmental and socioeconomic resources under Alternative C as compared to those analyzed in Section 3.1 of this EA under the proposed action (Alternative A).

The impacts to potentially sensitive high slope hardbottom benthic habitats is actually not that much different than Alternative A since that Alternative also prohibits activity in high slope benthic habitat. However, Alternative C offers further assurances that high slope benthic habitat will not be impacted in the removed aliquot and reduces the amount of HRG survey effort since further site characterization will not be required in the removed area.

As mentioned, under Alternative C, impacts to the following resources would be no different than the impacts reasonably foreseeable under the proposed action. Since the removal of the aliquot would prevent contact with the seafloor, there would be no impacts to benthic habitats, archaeological and/or cultural resources, fish, and EFH. While the proposed activities under Alternative A were not expected to employ many workers relative to the existing employment numbers, the reduced level of site characterization survey activities is expected to produce slightly fewer, if any, new job opportunities for the population of Broward and Miami-Dade Counties.

Under Alternative C, the following resources would experience a slight reduction in impacts. Although Alternative C would result in a reduction in geophysical survey area and associated vessel traffic activity, other site characterization survey activities would remain the same under Alternative C as 10-13 total mooring locations are still anticipated and each location would still require a site-specific survey. Like the proposed action, up to three testing facilities could still occur simultaneously within the remainder of OCS Block 7054 (*see* Section 2.1 of this EA). The lease stipulations outlined in Alternative A would still apply to lease activities in Alternative C. The reduction in vessel traffic associated with geophysical surveys therefore would cause a slight reduction in the total pollutant emissions and vessel discharges compared to those assumed under the proposed action. With respect to environmental justice issues, the reduction in the use of existing onshore support bases under Alternative C, due to reduced geophysical survey vessel trips would result in a slightly lower potential for impacts to minority or low-income populations from adverse environmental or health effects. Alternative C would also result in a slightly reduced potential for wake erosion induced from survey-related vessel traffic, and risk of a diesel spill or leakage of ship lubrication systems occurring and contacting coastal habitats along Port Everglades Inlet, the Port of Miami and surrounding waters. For marine mammals and sea turtles there would also be a slightly reduced risk of vessel strikes, acoustic harassment from the echosounder surveys, and impacts from non-routine vessel discharges.

Conclusion

Under Alternative C, the MTBs would not be located and OCT testing would not occur within aliquot 7054N because more than 50% of the seafloor contains high slope hardbottom area, and therefore would eliminate impacts to potentially sensitive high slope benthic habitats in that aliquot or a risk of obstruction to navigation from the MTBs, support vessels, and survey

vessels. Due to the reduction of vessel traffic associated with less geophysical surveys there would also be a reduction in impacts from emissions and potential vessel strikes to protected resources.

3.4. Alternative D – No Action

Under the No Action Alternative, the proposed lease would not be issued and technology testing would not be authorized on the proposed leasehold at this time. Any potential environmental and socioeconomic impacts, described in Section 3.1 of this EA, from these activities would not occur or would be postponed. Opportunities would not occur or would be postponed to: (1) evaluate environmental and resource effects of operating OCTs; (2) demonstrate and evaluate technology needs for further MHK development; (3) develop and evaluate methodologies and procedures to safely and responsibly test experimental commercial devices; and (4) develop and refine tools to characterize performance, effects, and technologies necessary for MHK progress (Section 1.2, FAU, 2011). Therefore, activities necessary to inform the future deployment of commercial-scale MHK energy production on the OCS, using the Florida Current, would not occur or would be postponed under this alternative.

3.5 Cumulative Impacts

Cumulative impacts are the impacts on the environment that result from the incremental impact of the proposed action (Alternative A) when added to other past, present, and reasonably foreseeable future actions regardless of what agency, industry, or person undertakes the other actions. *See* 40 CFR 1508.7.

The affected environment for Alternative A reflects the past, present, and reasonably foreseeable human-induced impacts over an extended period of time. This EA has discussed Alternative A in context of these past and present activities, and in the case of navigational safety, future increases in vessel traffic (e.g, increase in shipping in the future, widening of the Panama Canal, etc.). *See* Section 3.1.3.6 of this EA. The following summarizes the cumulative impacts discussed throughout the EA and is focused on the incremental impact of Alternative A when added to other reasonably foreseeable future actions, which include vessel traffic, port usage, buoy deployment, and military activities on the OCS.

Onshore

As discussed in Section 2.1, it is anticipated that Port Everglades and the Port of Miami would be used by vessels supporting the proposed action. Port Everglades is one of only a few major deepwater seaports on the Atlantic coast, and the deepest port in Florida. Roughly 20,000 vessels over a typical 5 year period are served by Port Everglades (Port Everglades, 2010). The Port of Miami is also a heavily used port, serving roughly 12,500 vessels over a typical 5 year period (Port of Miami, 2012).

As discussed in Section 3.1.2.1.1, the beaches of Broward and Miami-Dade Counties are typical of southeast Florida beaches that receive the full impact of wind and wave action (USACE, 2003). Florida has a range of important coastal habitats including salt marshes and mangrove forests, however, much of Florida's shoreline has been altered to some degree and the region's coastal habitats are under intense pressure from many human activities including recreational and commercial uses, coastal development and runoff, and maritime industries.

Both Broward and Miami-Dade counties, where on-shore activities would occur, have heavy coastal development. In 2009, the two counties had populations of over 4 million, contained over 100,000 establishments, and supported over 1.7 million jobs.

Incremental Contribution of Alternative A

Between 275 and 475 total vessel trips would occur as a result of the activities associated with Alternative A over the 5 year lease term. These trips would be divided between Port Everglades and the Port of Miami, with Port Everglades receiving approximately 78 percent (213-393) of total vessel trips and the Port of Miami receiving approximately 22 percent (60-79) of total vessel trips. No expansion of existing facilities is anticipated as a result of the proposed action.

Since Alternative A would be supported by two existing sites located in already heavily impacted areas, and would add a relatively minor amount of additional vessel traffic (approximately 1-2 percent for Port Everglades and less than 1 percent for the Port of Miami), the incremental impacts to coastal habitats and the economy from onshore activities associated with Alternative A would be negligible, if detectable.

Offshore

Of the other activities that would occur offshore Florida during the five year lease term of the proposed action, the chief impact-producing activity is vessel traffic. For example, one of the primary human-induced threats to large cetaceans is collisions with vessels (ship strikes).

With the exception of other renewable energy activities, the past, present and reasonably foreseeable future actions discussed in this section are not unique to the region. Migratory species, which may be impacted by Alternative A, would also experience impacts from other actions while outside of the Florida region. Sections 3.1.2.3 (Marine Mammals) and 3.1.2.4 (Sea Turtles) discuss cumulative impacts specific to those migratory species.

The three proposed lease blocks are located adjacent to the entrance to a major port (Port Everglades) as well as traditional coastwise routes. Like the inland waterways that would support Alternative A, offshore waters from the shoreline to the seaward extent of the proposed lease blocks are also heavily trafficked by commercial, private, or military vessels (*see* Section 3.1.3.6). Tens of thousands of military, commercial and recreational vessel trips are projected to occur in the vicinity of the project area during the proposed five year lease period of Alternative A.

While there are no technology testing facilities currently located within or near the proposed lease blocks, there are 6 lights, signals, daybeacons, buoys, and other aids to navigation located near the Port of Everglades and 16 near the Port of Miami (MMC, 2010).

As described in Section 3.1.3.6.1 of this EA, the Naval Surface Warfare Center, Carderock Division (NSWCCD) operates the SFOMF on the south side of Port Everglades inlet. SFOMF contains the Navy's only shallow and deep water magnetic research and development ranges, and accommodates both surface and submerged operations. In addition, SFOMF is used to test and evaluate mine detection, countermeasures and mine response, perform acoustic measurements, and acquire radar cross section and infrastructure signatures. Although it is not anticipated that the sound footprint for the proposed action and the Navy activity overlap in anyway, this is noted in that it contributes to the overall sound budget in the South Atlantic Bight.

The USDOD Defense Information Systems Agency (DISA) proposes to install a dedicated Submarine Fiber Optic Cable system to connect the Defense Information Systems Network node in Miami, Florida to the node in Guantanamo Bay, Cuba. In February 2013, DISA published a Request for Information in order to assess the technical feasibility, schedule and cost for a "turnkey" construction of the cable. The proposed cable route is expected to go through the northern block of the proposed lease area, OCS Block 7003. The northern 12 aliquots of this OCS Block have already been identified as a High Vessel Traffic Area (*see* Section 2.2) and therefore, it is unlikely that FAU SNMREC will deploy the single-anchor mooring system and MTB in this location. If DISA were to proceed with the installation of the fiber optic cable system, then it is reasonably foreseeable that site characterization surveys may occur concurrent with the proposed action. If this were to occur, it would increase vessel traffic activity in the proposed lease area. If DISA were to begin installation of the fiber optic cable system while FAU SNMREC holds an interim policy lease, it is unlikely that either activity would impact the other due to FAU SNMREC avoiding the northern 12 aliquots of OCS Block 7003.

Incremental Contribution of Alternative A

While between 275 and 475 vessel trips are anticipated from the activities associated with the activities associated with Alternative A over the five year proposed lease period, this is relatively minor when compared to existing vessel traffic. The additional vessel traffic generated by Alternative A, and the environmental consequences associated with this vessel traffic would likely be undetectable compared to the impacts of tens of thousands of military, commercial and recreational vessel trips projected to occur during the same five year period.

Section 2.1 of this EA describes the reasonably foreseeable scenario regarding the placement of technology testing facilities within the proposed lease area, which is projected at a maximum of three. When added to the 22 existing aids to navigation near the Port of Everglades and the Port of Miami (MMC, 2010), the testing facilities associated with Alternative A are not anticipated to result in significant environmental consequences.

Since the offshore activities associated with Alternative A will occur within heavily impacted areas and would add a relatively minor amount of additional activities, the incremental impacts to the offshore environment from the activities associated with Alternative A would be negligible, if detectable.

The sound sources from the proposed action are intermittent and would not overlap with the footprint of the SFOMF. Thus the impacts from sound related to the proposed action are not anticipated to have a cumulative effect on marine fauna (*see* Sections 3.1.2.3, 3.1.2.4, and 3.1.2.7.2 of this EA). When evaluated with the activities associated with SFOMF, the additional sound sources (i.e., site characterization surveys and testing of up to three turbines within the proposed lease area) are not anticipated to result in significant environmental consequences.

Global Climate Change

Cumulative activities, which include Alternative A, could impact global climate change. Chapter 7.6.1.4 of the Programmatic EIS describes Global Climate Change with respect to renewable energy development. The following is a summary of that information and incorporates new information specific to Alternative A.

The temperature of the earth's atmosphere is regulated by a balance between the radiation received from the sun, the amount reflected by the earth's surface and clouds, and the amount of radiation absorbed by the earth and atmosphere. Greenhouse gases (GHG) keep the earth's

surface warmer than it would be otherwise because they absorb infrared radiation from the earth and, in turn, radiate this energy back down to the surface. While these gases occur naturally in the atmosphere, there has been a rapid increase in concentrations of greenhouse gases in the earth's atmosphere from anthropogenic sources since the start of industrialization, which has caused concerns over potential changes in the global climate. The primary anthropogenic greenhouse gases are CO_2, CH_4, nitrous oxide (N_2O), and halocarbons (USDOI, MMS, 2007).

During surveying and technology testing activities, including the installation, operation, relocation, and removal of MTBs, as described in the proposed action, GHG emissions would occur. It is currently beyond the scope of existing science to identify a specific source or discrete amount of GHG emissions and designate it as the cause of specific climate impacts at any particular location (USDOI, SOL, 2008). This is because the nature of the climate change phenomena thus far has precluded the identification of a causal relationship between discrete GHG emissions and specific environmental effects.

In general, while it can be assumed that the GHG emissions associated with Alternative A contribute to the phenomenon of climate change, these contributions are so small compared to the aggregate global emissions of GHGs that they cannot be deemed significant, if their impact could even be detected. The additional 275-475 vessel trips over the proposed 5 year lease period anticipated with Alternative A would have a negligible incremental contribution to existing GHG emissions, and therefore, would have an exceedingly minor effect to the environment via contributions to climate change.

Conclusion

The hallmark of the affected environment considered in this EA is one of past, present, and reasonably foreseeable human-induced impacts over an extended period of time. The incremental contribution of the proposed action and alternatives to other past, present, and reasonably foreseeable actions which may affect the environment would be negligible to minor.

4. CONSULTATION AND COORDINATION

BOEM conducted early coordination with appropriate Federal and state agencies and other concerned parties to discuss and coordinate the development this EA. Formal consultations and cooperating agency exchanges are detailed below.

4.1. Public Involvement

4.1.1. Notice of Intent

On May 24, 2011, BOEM published, in the *Federal Register*, the NOI to prepare an EA for the issuance of a lease authorizing offshore technology testing on the OCS (76 FR 7226). Input on issues and alternatives to be analyzed in the EA were solicited. BOEM accepted comments until June 23, 2011. A total of six comments were received during the 30-day comment period. Issues identified to be analyzed included analysis of conflicts with vessel traffic; presence of coral, coral reefs, and hardbottom within or near proposed lease blocks; lease blocks within EFH for golden crab and royal red shrimp and EFH-HAPC for deepwater coral; avoidance of dredge disposal sites; compatibility with DOD activities; and minimizing impacts to unique and protected resources. The comments can be viewed at http://www.regulations.gov by searching for docket id BOEM-2011-0012.

4.1.2. Notice of Availability

On April 25, 2012, BOEM published an EA for a 30-day public review (77 FR 24734). The EA was posted on BOEM's website at: http://boem.gov/Renewable-Energy-Program/State-Activities/Florida.aspx. Seven comments were received from members of the general public, Federal agencies and the Florida Department of Environmental Protection, and can be viewed by searching for docket id BOEM-2012-0011 at http://www.regulations.gov. During the comment period, BOEM conducted a public information meeting in Fort Lauderdale, Florida on May 9, 2012. This meeting provided stakeholders with an overview of the EA and consultation process, and an additional opportunity to offer comments on the 2012 EA. Attendees included representatives from the public, state and federal agencies, and non-governmental organizations.

Revisions to the Environmental Assessment

As a result of the comments received in response to the NOA and from the consulting agencies, new information that became available, and additional activities associated with the proposed action, the EA was revised. Revisions to the EA include:

- In response to comments regarding expansion of the proposed project area or consideration of other areas, Section 1.2 was expanded to provide additional detail on the development of the proposed action. This includes BOEM's process for determining no competitive interest for the 20 OCS blocks originally nominated by FAU SNMREC, and FAU SNMREC's reasons for proposing a subset (i.e., OCS Blocks 7003, 7053, and 7054).
- The proposed action was expanded to include OCT tow tests that FAU SNMREC may conduct in addition to the in situ OCT testing (*see* Section 2.1.1). Impact producing factors and activities associated with OCT tow test would be the same as those associated with in situ testing (e.g., vessel traffic and turbine operations).

- *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* (Vinick *et al.*, 2012) identified high slope hard-bottom areas in OCS Blocks 7053 and 7054 that are likely to contain sensitive benthic habitat. As a result Alternative C, Removal of Aliquot Containing High Slope Hardbottom Area, was added and identified as the preferred alternative (*see* Sections 2.3 and 3.3). Under this alternative a lease would be issued to FAU SNMREC authorizing technology testing on OCS Blocks 7003, 7053, and 7054 with the exception of aliquot 7054N because more than 50% of its seafloor is covered with high slope hardbottom area.
- Section 2.5, Non-Routine Events, was added to provide a summary of non-routine events and hazards that could be encountered during the proposed activities. How these events and hazards could affect impacts from the proposed action on environmental and socioeconomic resources is discussed throughout Section 3.1.
- Additional detail on the proposed facilities, equipment and activities was added and includes:
    - Anchor selection, installation, and removal for the MTBs (*see* Section 2.1.4);
    - Use, housing and storage of batteries on the MTBs (*see* Sections 2.5 and 3.1.1.1.2);
    - Deployment of current meters and turbulence instruments (*see* Section 3.1.1.2.2);
    - Specifics of test turbine lubricants and hydraulic fluids (*see* Sections 2.5 and 3.1.1.2.2); and
    - Use of a sub-bottom profiler to determine sediment thickness (*see* Section 2.1.3).
- To eliminate or reduce impacts to marine life, the following standard operating conditions as part of the proposed action were revised and clarified:
    - Protected species vessel strike avoidance measures including:
        - Ceasing acoustic surveys and OCT testing when any portion of the exclusion zone is obscured by poor visibility (*see* Sections 2.1.3 and 2.1.5); and
        - Reporting of sightings, observations, injury or mortality of protected species to NMFS and BOEM (*see* Sections 2.1.3 and 2.1.5).
    - Measures to protect marine mammals, sea turtles, and smalltooth sawfish during certain HRG survey activity; and
    - Annual reports to BOEM and USFWS summarizing all video recorded responses of birds to underwater OCT testing, and provide video footage upon request (*see* Section 2.1.5).
- In addition, the EA details the following standard operating conditions identified by FAU SNMREC:
    - Testing operations would only occur during daylight hours and underwater video cameras would be used during testing (*see* Section 2.1);
    - Implementation of survey protocols identified in, *Siting Study for a Hydrokinetic Energy Project Located Offshore Southeastern Florida: Protocols for Survey Methodology for Offshore Marine Hydrokinetic Energy Projects* study funded by the U.S. Department of Energy (Vinick *et al.*, 2012); and
    - In Section 3.1.2.4.2, Sea Turtles, and Section 3.1.2.5.2, Avian Resources, information was added regarding the operating depths of the OCTs and the potential for sea turtles and diving birds to encounter OCTs during testing.

4.2. Cooperating Agencies

Section 1500.5(b) of the CEQ implementing regulations (40 CFR 1500.5(b)) encourages agency cooperation early in the NEPA process. A Federal agency can be a lead, joint lead or cooperating agency. A lead agency manages the NEPA process and is responsible for the preparation of an EA or EIS; a joint lead Agency shares these responsibilities; and a cooperating agency that has jurisdiction by law or special expertise with respect to any environmental issue shall participate in the NEPA process upon the request of the lead agency. The NOI included an invitation to other Federal agencies and State, tribal, and local governments to consider becoming cooperating agencies in the preparation of this EA. Three cooperating agencies participated in the development and review of this EA.

Section 4(e) of OCS Lands Act extends the USACE's authority to prevent the obstruction to navigation in the navigable waters of the U.S. to OCS facilities. In a letter dated May 19, 2011 BOEM invited the USACE to participate as a cooperating agency on this EA. That invitation was accepted by the USACE's Jacksonville District in a letter to BOEM dated December 19, 2011. The USACE is also a co-consulting agency for compliance with Section 106 of the National Historic Preservation Act for this proposed action.

On August 5, 2011, BOEM sent a letter inviting the USCG to participate as a cooperating agency. BOEM requested USCG's assistance in the preparation of the EA due to its jurisdiction and expertise with port usage, lighting requirements/mitigation measures for buoys, impacts to navigation and spill risk and response.

In addition, on April 19, 2013, BOEM requested the participation of the USDOE as a cooperating agency due to their proposal to provide Federal financial assistance to FAU SNMREC's proposed activities considered in this EA. The Wind and Water Power Technologies Office (WWPTO), within USDOE's Office of Energy Efficiency and Renewable Energy (EERE), supports the development, deployment, and commercialization of wind and water power technologies. WWPTO works with a variety of stakeholders to identify and support research and development (R&D) efforts that improve technology performance, lower costs, and—ultimately—deploy technologies that efficiently capture the abundant wind and water energy resources in the United States.

In furtherance of this mission, DOE WWPTO has provided financial assistance in support of preliminary and research based activities by FAU SNMREC and is now considering authorizing the expenditure on demonstration based activities, as described in Section 2 of this EA. Specifically, USDOE funding is being proposed in support of FAU SNMREC's in situ testing of their experimental ocean current turbine and the deployment and operation of the Small-Scale Ocean Current Turbine Test Berth for which the BOEM lease is being requested.

Granting of USDOE financial assistance for this project would constitute a major federal action as defined by NEPA. USDOE must consider the possible environmental impacts from the project before committing to provide funding. In accordance with the provisions of NEPA and USDOE implementing regulations (10 C.F.R. § 1021), USDOE has determined that an EA must be completed for the proposed project to evaluate the potential environmental impacts that could result from the award of the funding. To expedite and satisfy this requirement, BOEM agreed to and invited USDOE to become a cooperating agency in their final preparations of this EA. BOEM and USDOE EERE have an established Memorandum of Understanding (MOU) titled, *Coordinated Deployment of Offshore Wind and Marine and Hydrokinetic Energy Technologies on the United States' Outer Continental Shelf*, signed on June 29, 2010 by representatives of both agencies, that allows collaborative efforts on environmental studies and NEPA compliance

in support of efficient deployment of offshore wind and marine hydrokinetic energy technologies on the OCS.

USDOE's decision whether to provide financial assistance to FAU SNMREC for their proposed project will be made after the completion of this EA and DOE's NEPA review process. Upon completion of this EA, USDOE will assess all comments, BOEM's conclusions and alternative, and all agency recommendations, then issue a NEPA determination. This determination along with the EA will be publically posted at USDOE Golden Field Office's Public Reading Room: http://www.eere.energy.gov/golden/NEPA_FEA_FONSI.aspx.

4.3. Consultations

4.3.1. Endangered Species Act

As required by Section 7 of the ESA, BOEM consulted with NMFS and USFWS on potential impacts from the proposed action on endangered/threatened species and designated critical habitat under their jurisdiction. Based on the analyses in this document, BOEM concludes that the impacts of the proposed action, in consideration of existing operating conditions and lease stipulations (*see* Section 2.1), are expected to be discountable and insignificant and thus not likely to adversely affect ESA-listed sea turtles, marine mammals, fish and birds. In addition, BOEM concludes that the proposed action will have no effect on ESA-listed bats.

Lease stipulations designed to reduce or eliminate potential impacts to ESA-listed species may be modified as a result of the ESA consultation for this action. Development of standard operating conditions, included in the proposed action, have been based on activities proposed in FAU's application, recommendations from NMFS submitted in response to the NOI (USDOC, NOAA, NMFS, 2011a), and previous consultations with NMFS and USFWS, including the biological assessment for Wind Resource Data Collection on the Northeast Atlantic OCS that was concluded in the Spring of 2009 and the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia – Final Environmental Assessment* that was concluded in the summer and fall of 2011 with USFWS and NMFS, respectively. Recently BOEM published a draft programmatic EIS for geological and geophysical activities in BOEM's Mid and South Atlantic OCS Planning Areas (USDOI, BOEM, 2012b) that proposes a high resolution geophysical survey protocol that is reflected in the standard operating conditions.

NMFS submitted a concurrence letter, in accordance with Section 7 of the Endangered Species Act on July 25, 2013 (USDOC, NOAA, NMFS, 2013). NMFS concurs with BOEM's determination that the proposed action may affect, but is not likely to adversely affect five species of sea turtles (all endangered with the exception of the threatened loggerhead sea turtle) and eight species of whales (of which five are endangered). The complete list of assessed marine mammals and their status is found in Table 3.6.. NMFS also concurs that the proposed action may affect, but is not likely to adversely affect the endangered smalltooth sawfish. The USFWS submitted a Section 7 concurrence letter February 27, 2013. The USFWS agrees that the proposed project, "may affect, but is not likely to adversely affect" the endangered West Indian manatee.

4.3.2. Migratory Bird Treaty Act (MBTA)

With respect to migratory birds, USFWS concurs with FAU SNMREC equipping the OCT devices with a camera monitoring system comprised of three underwater video cameras,

arranged to observe diving bird response to the operating turbine. Additionally, it is expected that no overnight turbine operations occur and any future proposed nighttime operations are required to submit a monitoring plan that must be approved by BOEM in consultation with NOAA NMFS and USFWS. To reduce the potential to attract and/or disorientate birds at night during fog and rain, BOEM would require the lessee to leave non-hazard/navigation lights on only when necessary and hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters.

4.3.3. Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, Federal agencies are required to consult with NMFS on any action that may result in adverse effects to essential fish habitat (EFH). OCS activities authorized by BOEM, including this proposed action may, result in adverse effects to EFH, and therefore, required EFH consultation.

BOEM analyzed impacts to EFH and HAPC from the proposed action in this document (Section 3.1.2.7) and initiated consultation with NMFS on April 24, 2012. This revised EA includes the adoption of several of NMFS' EFH conservation recommendations regarding habitat characterization protocols (Section 2.1.3) and coordination of plan reviews and data sharing. BOEM concludes that the proposed action is anticipated to impact the quality and quantity of EFH from the moorings and general test operations. However, given the limited spatial extent and limited periods of turbine deployment, it is not likely that the impacts would be more than temporary and not substantially affect the quality and quantity of EFH and the populations of fish in the area. Impacts to the tilefish and Stetson-Miami Terrace HAPCs are expected to be negligible due to the standard operating conditions specified in BOEM's lease stipulations as described in Section 2.1 of this document.

4.3.4. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be "consistent to the maximum extent practicable" with relevant enforceable policies of the State's federally approved coastal management program (15 CFR 930, Subpart C). Since the proposed action would have direct, indirect, or cumulative effects, the activity is subject to Federal consistency. A consistency review will be performed and a Consistency Determination (CD) prepared for the affected State of Florida. To prepare the CD, BOEM reviewed Florida's Coastal Management Plan (CMP) and contacted Florida's Department of Environmental Protection (DEP) and requested a list of the applicable enforceable policies of Florida's CMP on December 12, 2011. On December 14, 2011, Florida DEP responded with additional information about Florida's CMP as well as the enforceable policies which are applicable to the proposed lease issuance. BOEM will analyze the potential impacts as outlined in this EA as they pertain to the enforceable policies of the CMP. The CD will be sent along with the EA to Florida for review. The EA will provide the comprehensive data and information required under 30 CFR 939.39 to support BOEM's consistency determination. The affected State has 60 days to review the CD and the EA (which provides the supporting information required under 30 CFR 930.39(a)); the State agency has 14 days of receiving this information to identify missing information required by 930.39(a).

4.3.5. National Historic Preservation Act

Section 106 of the NHPA (16 USC 470f), and the act's implementing regulations (36 CFR Part 800), require Federal agencies to consider the effects of their actions on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. BOEM has determined that the issuance of an interim policy lease for offshore data collection and technology testing constitutes an undertaking subject to Section 106 of the NHPA (16 USC § 470f), and its implementing regulations (36 CFR Part 800).

BOEM initiated consultation with the Florida SHPO via a letter dated June 3, 2011. The Florida SHPO responded in letter dated June 21, 2011 with the opinion that the proposed project will have no effect on historic properties. Subsequently, BOEM has prepared a Finding of No Historic Properties Affected (Finding) for the proposed undertaking (*see* Appendix A of this EA). This Finding and supporting documentation outlines BOEM's compliance with Section 106 through a description of the undertaking, a description of the steps that will be taken to identify and avoid historic properties, and the basis for the determination of no historic properties affected.

The Finding and supporting documentation was provided via letter on February 9, 2012 to the Florida SHPO and the ACHP for the opportunity to comment. The Finding has also been shared with the USACE as a co-consulting agency that has jurisdictional interest due to their permitting authority of bottom-founded structures on the OCS (33 USC 403). No comments or objections were received from the parties regarding the Finding. The Finding and supporting documentation is being made available for public inspection prior to BOEM approving the undertaking as an appendix of this EA (*see* Appendix A). Additionally, BOEM consulted with the Seminole Tribe of Florida who stated via letter on October 29, 2012 that the tribe had no objections to the undertaking.

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APPENDIX A

Finding of No Historic Properties Affected

Finding of No Historic Properties Affected
For the
Issuance of an Interim Policy Lease to Florida Atlantic University,
Southeast National Marine Renewable Energy Center
For the
Installation of an Offshore Data Collection and Technology Testing Facility
on the Outer Continental Shelf

Finding

Bureau of Ocean Energy Management (BOEM) has made a Finding of No Historic Properties Affected for this undertaking. To the extent that historic properties are identified within the Area of Potential Effect (APE) through the surveys that will be required by the lease before a Project Plan for construction is submitted, BOEM will require the lessee to relocate project activities so as to fully avoid any historic properties.

Documentation in Support of the Finding

I. Description of the Undertaking

Project Background

Subsection 8(p)(1)(C) of the Outer Continental Shelf Lands Act (43 USC 1337(p)(1)(C)), which was added by section 388 of the Energy Policy Act of 2005 (EPAct), gave the Secretary of the Interior the authority to issue leases, easements, and rights-of-way on the Outer Continental Shelf (OCS) for alternative energy activities. This authority has been delegated to the Bureau of Ocean Energy Management (BOEM). In a Request for Information and Nominations published on November 6, 2007, in the *Federal Register* (72 FR 62673), BOEM (then called the Minerals Management Service and subsequently the Bureau of Ocean Energy Management, Regulation and Enforcement), announced that it had established an Interim Policy under which it would issue limited leases authorizing alternative energy resource assessment, data collection, and technology testing activities on the OCS, and that it was accepting nominations for limited leases to conduct such activities. Limited leases issued under the Interim Policy for energy resource assessment data collection and technology testing activities have a term of five years and do not authorize the production or transmission of energy on a commercial scale.

Florida Atlantic University (FAU) Southeast National Marine Renewable Energy Center (SNMREC) submitted an application for an Interim Policy lease on June 11, 2010. At that time FAU requested BOEM Bahamas lease Block 7055. On February 10, 2011, FAU submitted an addendum to the original application requesting Bahamas lease blocks 7003, 7053 and 7054 instead. On August 23, 2011, FAU submitted a final application that included all revisions and information requests required by BOEM.

BOEM has determined that the issuance of an Interim Policy lease for offshore data collection and technology testing constitutes an undertaking under Section 106 of the

National Historic Preservation Act (16 USC § 470f), and its implementing regulations (36 CFR Part 800). This document outlines BOEM's compliance with Section 106 and documents the agency's Finding of No Historic Properties Affected (Finding) for the proposed undertaking under section 800.4 (d)(1). BOEM has prepared this documentation in support of the Finding following the standards outlined at section 800.11(d).

This Finding and supporting documentation is being provided to the Florida State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). The Finding and supporting documentation will be made available for public inspection prior to BOEM approving the undertaking. The U.S. Army Corps of Engineers (ACOE) is a co-consulting agency and has jurisdictional interest due to their permitting authority of bottom-founded structures on the OCS
(33 USC 403). BOEM is also considering FAU SNMREC's application pursuant to the National Environmental Policy Act (NEPA) (42 USC § 4321 *et seq.*), through an environmental assessment (EA).

Project Location and Description

The proposed lease includes three OCS blocks located approximately nine to 15 nautical miles offshore Fort Lauderdale, Florida (Figure 1). The three blocks are located on the Atlantic OCS in the Official Protraction Diagram NG 17–06 numbered 7003, 7053, and 7054. Water depths within the proposed lease area range from 262 meters (m) (approximately 859 feet (ft)) in Block 7053 to 366m (approximately 1,201 ft) in the southern half of Block 7054.

This proposed lease would grant the proposed lessee, FAU SNMREC, the right, subject to the terms and conditions of the lease, to install offshore data collection and technology testing facilities on the leasehold. FAU SNMREC proposes to deploy a system that includes a single-anchor mooring with a mooring and telemetry buoy (MTB) that is similar in design to the Navy Oceanographic Meteorological Automatic Device (NOMAD) weather buoys (Figure 2). A total of three MTBs will be installed at various locations throughout the leasehold for the purpose of testing equipment designed to use the Florida current to generate electricity. The initial MTB that is installed may be relocated three to four times during the lease term and FAU SNMREC intends to deploy two additional MTBs at a later time during the lease period, each of which may be relocated two to three times during the lease term. This will result in up to three total technology testing buoys operating on the lease hold at a total of 10-13 different locations over the lease term. The proposed undertaking does not include cabling or connection to shore-based facilities.

Area of Potential Effects

As defined at 30 CFR § 800.16(d), the APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

As FAU SNMREC is proposing to conduct site-specific activities and will not be utilizing the entirety of the three OCS lease blocks for the proposed undertaking, BOEM has determined, in consultation with the Florida SHPO, that the APE for the undertaking is defined as the depth and breadth of the seabed that could potentially be impacted by the proposed undertaking. FAU SNMREC proposes to use a single drag-embedment anchor to moor each of the individual MTBs. Taking into account anchor line drag at each mooring, BOEM considers the potentially impacted seabed to encompass approximately a 150-meter (492-ft) radius around each of the various anchoring locations for the MTBs.

Based on the distance from shore and the manner in which the equipment is going to be deployed (i.e., from a vessel), BOEM has concluded that the equipment will be indistinguishable from lighted vessel traffic and has not defined as part of the APE onshore areas from which the data collection and technology testing facility would be visible.

Consultation

BOEM initiated consultation with the Florida SHPO via a letter dated June 3, 2011, (Appendix A) and requested information regarding historic properties within the APE.

The Florida SHPO indicated, in letter dated June 21, 2011, (Appendix B), that:
A review of the information in the Florida Master Site File indicates that there is evidence of shipwrecks in waters offshore of Fort Lauderdale. However, because of the project location and/or nature, it is considered unlikely that historic properties will be affected. Therefore, it is the opinion of this office that the proposed project will have no effect on historic properties listed, or eligible for listing in the *National Register of Historic Places*, or otherwise of historical or archaeological value.

In its June 3, 2011 letter to the Florida SHPO, BOEM asked the SHPO to identify parties, tribes, or members of the public that they believed should be included in consultation. No additional parties were recommended by the Florida SHPO in their June 21, 2011 response letter.

BOEM's May 24, 2011 *Federal Register* Notice of Intent to Prepare an Environmental Assessment (76 FR 30184-5), invited agencies, state and local governments, and tribes to participate in the NEPA process and solicited their comments and information along with that of the public. BOEM received one comment concerning cultural resources from the Florida Department of Environmental Protection. This comment states that the proposed lease area has a moderate to high probability for containing archaeological sites, requests that remote sensing surveys are conducted to identify historic properties prior to any project activities taking place, and requests that BOEM consult with the Florida SHPO.

BOEM was not contacted by any tribes regarding the Notice of Intent. Based on the location of the project area, which is within a region of the OCS that is not considered to have any potential for the presence of landforms that were subareal at any point during the Last Glacial Maximum (LGM), BOEM has determined that there are no historic properties present to which tribes may attach religious or cultural significance.

BOEM will resume consultation in the future as a result of new information or post-review discoveries that would be affected.

II. Description of the Steps Taken to Identify Historic Properties

BOEM has reviewed existing and available information regarding historic properties that may be present within the OCS lease blocks associated with this undertaking. These sources include information from the Florida Division of Historical Resources Master Site File and information gathered by BOEM for an updated study of archaeological resource potential on the Atlantic OCS that compiles information on historic shipwrecks and models the potential for pre-European contact sites based on reconstruction of past landscapes, human settlement patterns, and site formation and preservation conditions (USDOI, BOEM, 2011).

To date, no site-specific archaeological identification surveys have been conducted, and no cultural resources have been identified, within OCS lease blocks 7003, 7053, and 7054. However, based on available information, the lease blocks are located in a region that is considered to have the potential to contain historic period archaeological resources in the form of shipwrecks. The diverse maritime history of Florida is represented in known shipwrecks located offshore the southern Atlantic coast of Florida, ranging from 17th century Spanish vessels to early 20th century recreational vessels. Based on the location of the proposed lease blocks in proximity to historic shipping routes, and because it has been demonstrated that archaeological sites have been identified in this general region and in similar settings, there is the potential for the presence of historic period cultural resources within the OCS lease blocks associated with the proposed undertaking.

The location of the proposed project in water depths in excess of 260m (853 ft) places the project within a region that is considered to have no potential for the presence of landforms that were subareal at any point during the LGM (c. 20,000 years before present) (USDOI BOEM 2011:133). Because these lease blocks have not been exposed as dry land during the LGM, there is considered to be no potential for the presence of cultural resources associated with Native American occupation or habitation within the proposed action area.

Because of the uncertainty in the location of future anchor locations, the lease will require the lessee to undertake further site-specific identification of historic properties before undertaking any activity on the lease that could affect such resources. A lease stipulation will also be added to establish the process for determining whether archaeological resources are present within areas of seafloor-disturbing activities associated with the proposed undertaking, and to outline measures that will be required of the lessee in order to avoid any impacts to cultural resources.

After the lease is issued, the lessee may not commence installation activities until a project plan is submitted to, and reviewed by, BOEM. As part of preparing the project plan, the lessee will be required to conduct an archaeological identification survey providing full coverage of all areas of proposed seafloor-disturbing activities associated with the undertaking. BOEM anticipates this survey may take the form of a side scan sonar survey or

remotely operated vehicles (ROV) survey using an ROV equipped with sector-scanning sonar technology and digital recording capabilities to investigate each location where bottom-disturbing activities are proposed.

For this undertaking, BOEM will consider all potential historic properties identified during the lessee's surveys as potentially eligible for inclusion on the National Register of Historic Places. If BOEM's review of the lessee's survey results indicates that a potential archaeological resource may be present, BOEM will specify a minimum avoidance buffer around the resource and require the lessee to relocate the proposed seafloor disturbing activity a sufficient distance in order to avoid any impacts to cultural resources.

The lease will also include a "chance finds" clause describing the procedures the lessee must follow if an unanticipated archaeological resource is discovered while conducting any activity related to the proposed undertaking.

III. The Basis for the Determination of No Historic Properties Affected

This finding is based on the review conducted by BOEM of existing and available information and the conclusions drawn from this information. The surveys and mandatory avoidance measures that will be included in the lease will ensure that the proposed undertaking will not affect historic properties.

REFERENCES

U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM). 2011. Draft- Prehistoric Site Potential and Historic Shipwrecks on the Atlantic Outer Continental Shelf. Pacific OCS Region, Camarillo, California. Pending publication (Accessed December 2011).

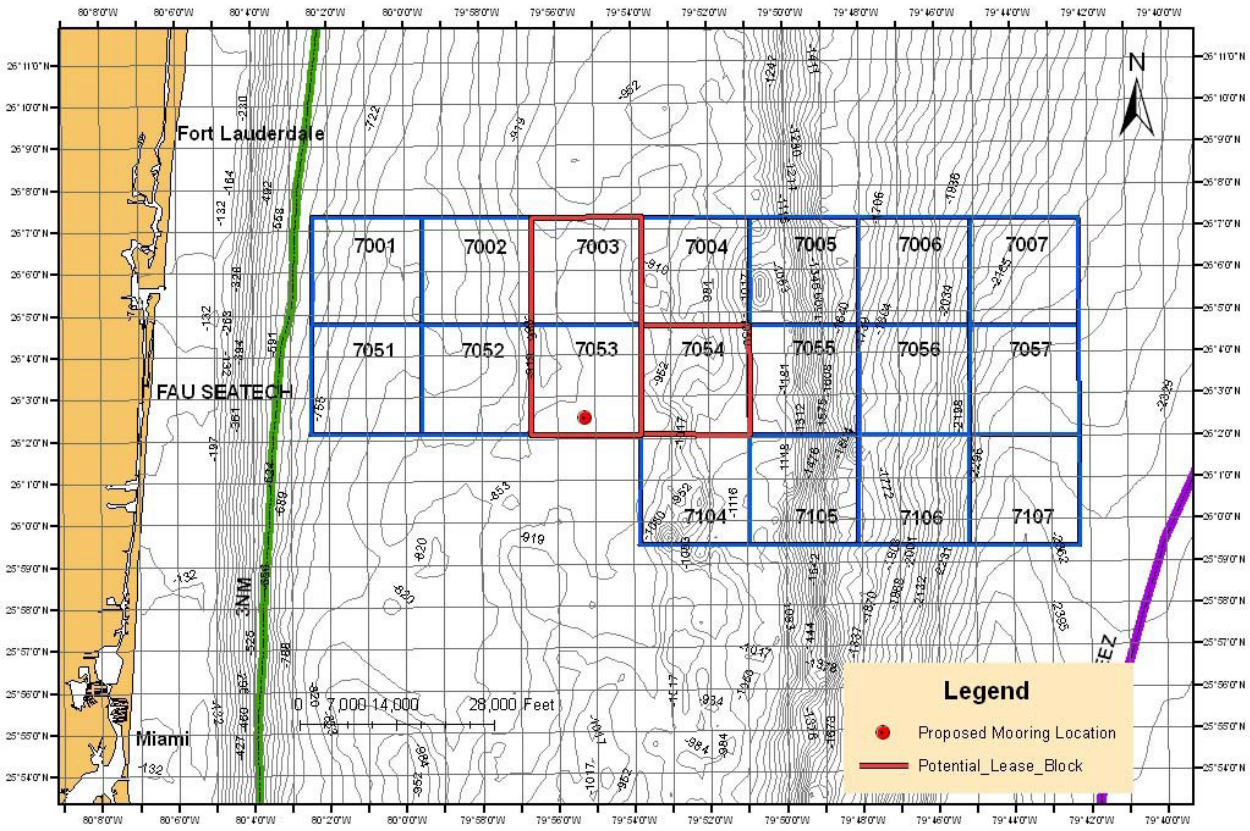

Figure 1: Location of the proposed lease area

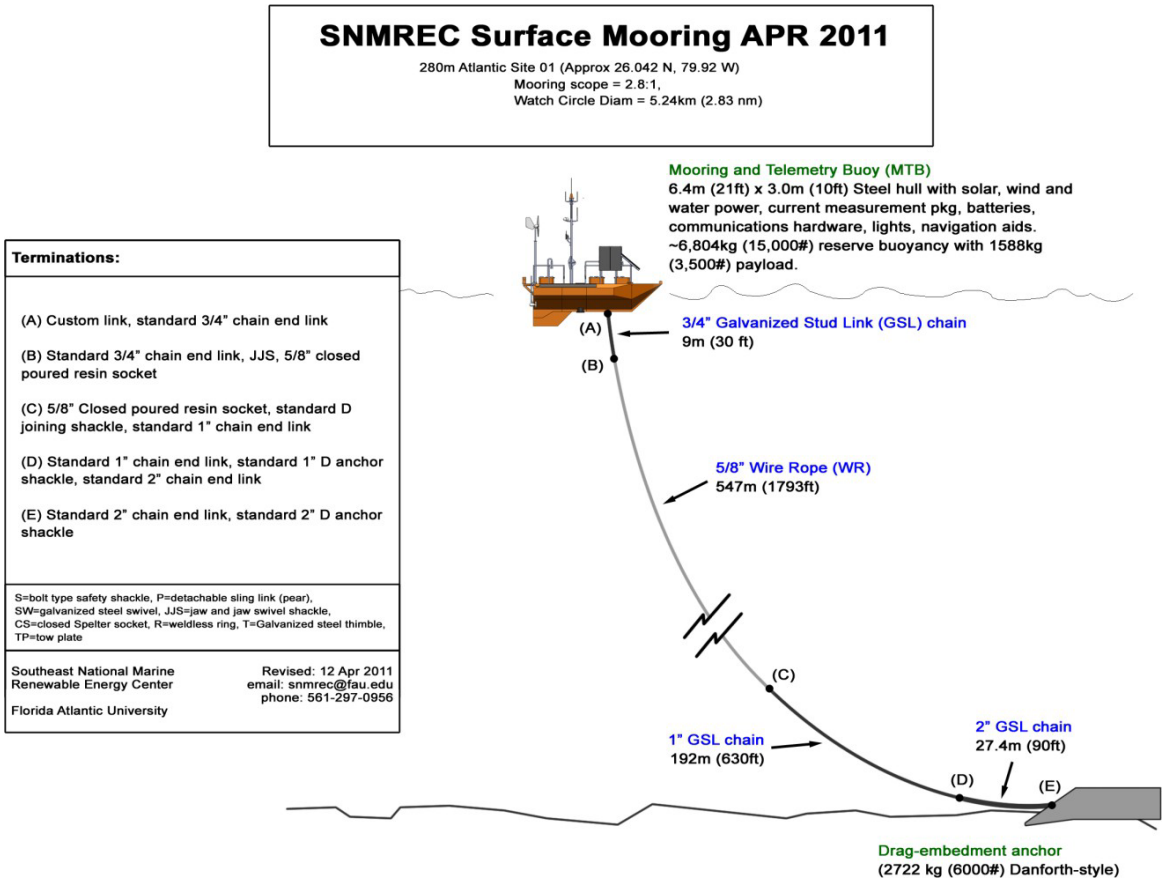

Figure 2: Proposed configuration of the data collection and technology testing buoy.

Appendix A: Correspondence from BOEM to the FL SHPO dated June 3, 2011.

United States Department of the Interior

BUREAU OF OCEAN ENERGY
MANAGEMENT, REGULATION AND ENFORCEMENT

Washington, DC 20240

JUN 3 2011

Mr. Scott M. Stroh III, SHPO
Division of Historical Resources
Department of State
500 South Bronough Street, Room 305
Tallahassee, Florida 32399-0250

Dear Mr. Stroh:

On November 6, 2007, the U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), announced an interim policy for authorizing the issuance of leases for the installation of offshore data collection and technology testing facilities on the Outer Continental Shelf (OCS) (72 FR 62673). A lease application has been submitted pursuant to the interim policy.

On June 11, 2010, Florida Atlantic University's (FAU) Southeast National Marine Renewable Energy Center (SNMREC) submitted an application to lease three OCS blocks. These three blocks are located on the Atlantic OCS in the Official Protraction Diagram NG 17–06 numbered 7003, 7053, and 7054, approximately nine to 15 nautical miles offshore of Fort Lauderdale, Florida, under its original nomination submitted on November 8, 2007. The proposed lease area covers approximately twenty-seven square nautical miles and ranges from a depth of 262 meters (m) in Block 7053 to 366 m in the southern half of Block 7054. This project application was amended on February 10, 2011, and describes data collection and technology testing activities to be conducted on the proposed lease under a 5-year lease term. FAU SNMREC has an existing multi-beam survey available for Blocks 7053 and 7054. Specific anchor location(s) are expected to be surveyed in greater detail utilizing high-resolution remote sensing equipment to assist in documenting potential historic archaeological resources; the depth of the project area precludes any consideration of prehistoric archaeological resources. BOEMRE's current Geological, Geophysical, Hazards and Archaeological Guidelines are available for your review at our web site (http://www.boemre.gov/offshore/RenewableEnergy/PDFs/GGARCH4-11-2011.pdf).

FAU SNMREC intends to initially deploy a single-anchor mooring, with a mooring and telemetry buoy (MTB) (similar to the Navy Oceanographic Meteorological Automatic Device (NOMAD) weather buoys) for the purpose of testing, for limited periods, equipment designed to use the Florida Current to generate electricity on the proposed leasehold. As illustrated in the attached mooring schematic, the applicant proposes to use a 6,000-lb Danforth-style anchor to moor the MTB. According to the project description, the applicant will deploy the anchor within 70 m of the proposed anchor location an

estimates that the anchor line drag will be approximately 80 m radius from the anchor. According to these estimates, BOEMRE proposes to establish the Area of Potential Effect (APE) for the project as a circle of 170-m radius around each proposed anchoring location. BOEMRE would consider deployment of additional single-point mooring anchors of the same class and design to evaluate effects of multiple systems arranged as arrays on the current (wake effects) and to increase testing flexibility and capability for simultaneous device deployment. Up to three additional moorings will be initially considered. Additional locations within the requested block area could also be considered, survey work will be used to establish additional candidate sites for mooring locations. Because of the nature of the project and uncertainty of the future anchor locations, archaeological remote-sensing surveys may occur in a phased manner, but will be required prior to BOEMRE's approval of bottom-disturbing activities related to this project.

BOEMRE intends to prepare an Environmental Assessment (EA) for the purpose of considering the environmental consequences associated with issuing an interim policy lease to FAU SNMREC, which will include impacts that may result from the installation of an MTB, deployment of small-scale ocean current devices, and operations of a deployment vessel on the potential leasehold. The Notice of Intent to Prepare an EA, published in the Federal Register on May 24, 2011 (FR Doc No: 2011-12724) is enclosed.

Although bottom-disturbing activities on the OCS have the potential to affect historic properties, BOEMRE feels that the archaeological and geophysical surveys that the lessee would undertake (in part, to identify these resources on the seafloor in the first instance) would likely assist to avoid or minimize effects of the proposed undertaking on historic properties. Nevertheless, BOEMRE is initiating this formal Section 106 consultation pursuant to 36 CFR 800.2(c)(1) to ensure that a wide range of views and information is taken into consideration as early in the decision-making process as possible.

Although the proposed undertaking is situated in Federal waters, BOEMRE is requesting the views of the State Historic Preservation Officer (SHPO) and your office on further actions to identify the APE and any historic properties that may be affected by the proposed project, as required by 36 CFR 800.4. BOEMRE acknowledges that a SHPO may possess knowledge or special expertise regarding historic properties within the proposed project area. In addition, BOEMRE is requesting any information you may have regarding other parties, tribes, or members of the public you believe should be included in the consultation process as per 36 CFR 800.3(f).

Please find enclosed the necessary documentation regarding the proposed project area for the Federal undertaking, per 36 CFR 800.11. BOEMRE is acting as the lead Federal agency fulfilling the collective Federal responsibilities under 36 CFR 800.2(a)(2), while the U.S. Army Corps of Engineers and the U.S. Department of Energy will act as co-consulting agencies. The U.S. Army Corps of Engineers has jurisdiction due to their permitting authority of bottom-founded structures on the OCS (33 U.S.C. 403).

The U.S. Department of Energy (DOE) has jurisdiction due to Congressionally Directed funding granted through DOE to FAU SNMREC who is proposing to use the funding for the construction and off-shore deployment of the testing facilities.

BOEMRE invites comments regarding any other concerns that the proposed undertaking may raise. Should you have any questions about this undertaking you may me at (703) 787- 1748 or Brian.Jordan@BOEMRE.gov. Correspondence may also be sent to Dr. Jordan at the following address:

Department of the Interior
Bureau of Ocean Energy Management, Regulation
and Enforcement (BOEMRE)
Branch of Environmental Assessment
381 Elden Street, MS-4042
Herndon, VA 20170-4817

Thank you in advance for your timely response and cooperation. I look forward to receiving your response within 30 days of receipt of this submittal in accordance with 36 CFR 800.3(c)(4).

Sincerely,

Brian Jordan, Ph.D.
Federal Preservation Officer
Headquarters Archaeologist

Enclosures:
- Notice of Intent
- Map of Proposed Project Area
- Proposed Mooring Schematic

cc: Dr. Barbara Mattick, Bureau of Historic Preservation
Ms. Laura Kammerer, Bureau of Historic Preservation

Appendix B: Correspondence from the FL SHPO to BOEM June 21, 2011

RECEIVED 7/6/11 IN OAEP

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

June 21, 2011

Brian Jordan, Ph.D.
Federal Preservation Officer
Department of the Interior
Bureau of Ocean Energy Management,
Regulation & Enforcement
Branch of Environmental Assessment
381 Elden Street, MS-4042
Herndon, VA 20170-4817

Re: USDOI - Bureau of Ocean Energy Management, Regulation and Enforcement
Florida Atlantic University – Lease Three OCS Blocks offshore Fort Lauderdale
DHR Project File No. 2011-2364; 2011-2182

Dear Dr. Jordan:

The review of the above referenced document was carried out in accordance with the provisions of Florida's Coastal Zone Management Act and Chapter 267: the Historical Resources Act (*Florida Statutes*), as well as Section 106 of the National Historic Preservation Act of 1966 (Public Law 102-575), as amended in 1992, and 36 C.F.R., Part 800: Protection of Historic Properties. The State Historic Preservation Officer is to advise and assist federal agencies or their designees when identifying historic properties, assessing effects upon them, and considering alternatives to avoid or reduce a project's effect on them.

A review of the information in the Florida Master Site File indicates that there is evidence of shipwrecks in waters offshore of Fort Lauderdale. However, because of the project location and/or nature, it is considered unlikely that historic properties will be affected. Therefore, it is the opinion of this office that the proposed project will have no effect on historic properties listed, or eligible for listing in the *National Register of Historic Places,* or otherwise of historical or archaeological value.

If you have any questions concerning our comments, please do not hesitate to contact Susan Harp at 850.245.6333. Thank you for your interest in protecting Florida's historic resources.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office 850.245.6300 • FAX: 245.6436
☐ Archaeological Research 850.245.6444 • FAX: 245.6452
✓ Historic Preservation 850.245.6333 • FAX: 245.6437

APPENDIX B

NOAA/NMFS Sec. 7 Determination Document for Ocean Current Turbine Tow Tests

Southeast National Marine Renewable Energy Center
Florida Atlantic University

NOAA/NMFS Sec. 7 Determination Document for Ocean Current Turbine Tow Tests

Introduction

The purpose of this document is to provide sufficient detail for a proposed Ocean Current Turbine (OCT) Tow Testing Program in to determine the extent to which this action may affect any threatened, endangered species and designated or proposed critical habitats as specified by the National Marine Fisheries Service (NMFS). In addition, this analysis is provided to comply with statutory requirements to use the best scientific and commercial information available when assessing any risks posed to listed and/or proposed species and designated and/or proposed critical habitat by cognizant federal actions. This document is prepared in accordance with the legal requirements set forth under regulations implementing Section 7 of the Endangered Species Act (50 CFR 402; 16 U.S.C. 1536 (c)).

The proposed tow testing activity is related to, and precedes, proposed subsequent offshore in-place OCT testing at moored deployment site. The U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM), Office of Renewable Energy Programs (formerly the Minerals Management Service), has prepared a draft Environmental Assessment (EA) for a lease to conduct this marine and hydrokinetic (MHK) technology testing on the outer continental shelf (OCS) off the coast of Fort Lauderdale, Florida. That EA addresses the entire ocean energy project activity proposed by Southeast National Marine Renewable Energy Center (SNMREC). The tow testing described here is a component of this activity. (The EA[1] was made available by BOEM for public comment on April 24, 2012.) While the installation and operation for tl1_is project occurs off.5hore Fort Lauderdale, the proposed tow testing discussed here is planned offshore Fort Pierce, Florida. A discussion of the EA and portions relevant to this consultation are provided later in tl1is document. The purpose of this document, however, is to address proposed OCT tow testing offshore Fort Pierce, Florida.

Description of Project

Florida Atlantic University's (FAU) SNMREC was designated by the U.S. Department of Energy (DOE) in 2010 to provide tools, technology, measurements, analysis, and evaluation resources to the MHK industry. The Center is funded by the DOE to undertake research and development of technologies capable of generating renewable energy from ocean currents and ocean thermal energy. SNMREC is collaborating with industry partners to investigate, refine, fabricate, and test promising next-generation water power technologies lo harness the ocean's vast energy potential. The Center's researchers have already begun this work by deploying ocean current observation systems, establishing research on environmental baselines to determine the level of potential effects, and initiating the fabrication of support structures for ocean energy conversion devices. Ultimately, the Center plans to perform full-scale field testing of

[1] See http:/www.boem.gov/Renewable-Energy-Program/State-Activities/Florida.aspx

prototype turbines, an important step toward the successful development of innovative new ocean energy systems. This future work will require additional permit applications and environmental assessments and is not part of the discussion here.

In addition to providing offshore surface-based test capabilities for industry, SNMREC is constructing a commercial system proxy OCT. This small-scale turbine (20kW maximum instantaneous generation and 1.5-meter rotor radius, Figure 1) is not a commercial prototype. Rather, it has been designed to represent common and generic features of proposed commercial turbines. This allows SNMREC to evaluate new subsystem technology research, measure and observe preliminary environmental interactions, and develop offshore testing operation protocols and practices. The OCT consists of an electrical generator housed in an underwater housing, coupled to a 1.5-meter radius rotor that is designed to rotate in a water current, thereby generating electrical power. The OCT also consists of a counterweight frame assembly and mooring attachment that enables it to be suspended from a surface support vessel during testing. Figure 1 is a computer rendering of the OCT.

The majority of the planned OCT testing will occur off of Fort Lauderdale at the location discussed in the BOEM EA, but preliminary towed tests are proposed offshore Fort Pierce. Because many of the OCT's components and support equipment are being fabricated and assembled at FAU's Harbor Branch Oceanographic Institute (HBOI) campus, preliminary offshore towed testing is maximized if this work is located offshore Fort Pierce, approximately 14 miles east of the Fort Pierce Inlet. This proximity also provides a dedicated nearby facility to modify or adjust components based upon testing results, including dockside vessel support and handling equipment.

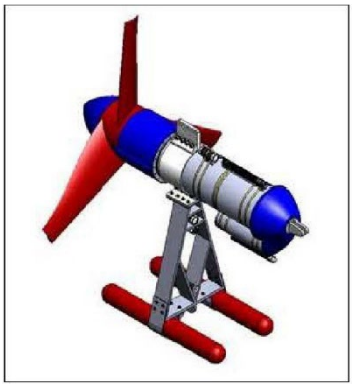

Figure 1.
SNM:REC 's experimental Ocean Current Turbine (OCT).

Preliminary towed testing is standard practice in the marine industry to verify the dynamic behavior and safe handling characteristics of a system before a moored deployment. Towed testing will consist of two phases. The first phase will test the OCT fitted with equipment to simulate hydrodynamic loads on the

OCT, but will not include a generator or a rotor. The second phase will test the OCT in its final deployable configuration (with generator and rotor) prior to moored deployment. A more detailed description of the phasing follows.

Phase 1 Sea Anchor Tow Testing

Tow testing during Phase 1 would evaluate simulated OCT behavior using the main body of the turbine, but replacing the rotor with a 1.5-meter (.5 ft.) radius drogue chute, also called a "sea anchor." The drogue chute is similar to a parachute, but is conventionally used to create desired hydrodynamic drag for vessel and ship-keeping purposes. When towed through the water, the chute would act as an equivalent drag source that a rotor would impart on the OCT due to passing flow. The electrical generator would not be installed during Phase 1 towed testing. Instead, a steel weight would replace it in the housing to simulate the generator's weight and balance characteristics. This arrangement would be towed behind a vessel at various speeds to replicate various current conditions. Towing the OCT rather than deploying it from a mooring enables the test to be fully controlled, including "all stop" conditions, via the tow ship. Additionally, without the added complications of handling an OCT with a rotor, it is be safer to assess handling procedures for lowering and recovering a turbine into the water. Further, this phased approach will reduce the possibility of damaging a rotor during practice operations. Figure 2 shows the sea anchor affixed to the OCT instead of a rotor. Figure 3 illustrates the planned Phase 1 towed test configuration.

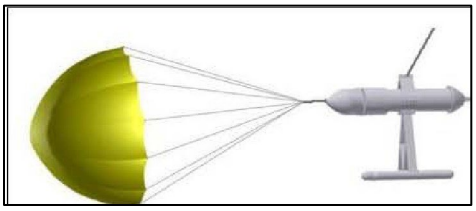

Figure 2
OCT with sea anchor configuration.

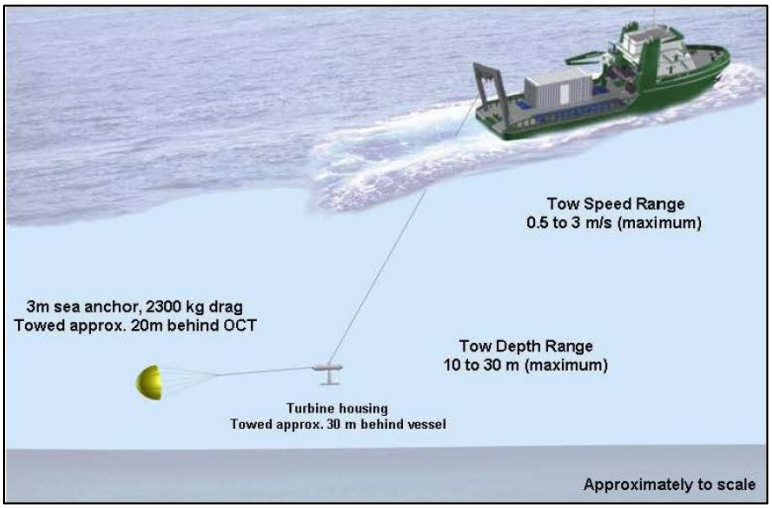

Figure 3
Detailed OCT tow test with sea anchor configuration.

The sea anchor would allow the proper amount of drag, about 2,300 kg (5,000 pounds), to be imparted on the turbine housing and tow cable to simulate how the rotor would behave during moored testing. The sea anchor does not have any rotating parts, any sharp edges, or means to entangle or impinge marine animals. In addition, using the sea anchor would provide an opportunity to evaluate and familiarize the ship's crew with contact avoidance measures for threatened or endangered species prior to rotor-fitted testing in Phase 2.

The distance from HBOI to the tow test site is approximately 30 km (16.2 nm), and the travel time to and from the test site is approximately 2 hours, each way. We calculate that, inclusive of transit time to and from the tow test site, there will remain approximately 8 to 10 hours of daylight for operations during the summer season. Daylight operations allow the OCT and sea anchor to be observed while trailing the ship, and also provides an opportunity to maintain watch for other vessels and marine animals that may be in the area. The OCT is also planned to be equipped with three underwater video cameras and two current-measuring sonar units to both observe the behavior of the device during towing and measure the speed and characteristics of the flow passing past the device. The cameras and sonar units would also permit monitoring for animals in the vicinity of the device while under tow, and would provide video for later review and analysis. While the water in the proposed test area is usually fairly clear with low turbidity, camera range could be reduced to a few meters if conditions happen to be less than ideal during testing. The sonar units, however, would operate effectively regardless of water clarity. While not specifically designed for object detection, these sensors can detect targets as well. Information from both systems would be monitored and recorded during tow testing, and the bridge of the tow vessel would be notified if any animals are detected within predetermined ranges of the OCT following the best management practices outlined in the subsequent section of this document.

The OCT and sea anchor would be towed at several speeds ranging from 0.5 to 3 mis (1 to 6 knots, 1.15 mph to 6.9 mph) for approximately 5 to 10 minutes per tow speed. This range of tow speeds would provide results indicative of the expected window of operational conditions when the device is deployed in the moored configuration offshore Fort Lauderdale, where typical flows range from 1 to 2.5 mis.

During towed testing in this phase, the turbine would be dep toyed and recovered from the vessel to practice handling the device. The OCT would be towed at various depths, from 10 meters deep to a maximum of30 meters (30 to 100 ft). It is expected that sufficient desired data and observations will be gathered at the shallower depths. One tow test event using the sea anchor is planned. However, if the first tow experiment results in adjustments which would benefit from additional verification, there is a possibility of a second tow event being required.

Phase 2 Rotor Tow Testing

Following Phase 1 tow tests to observe OCT dynamics and practice of shipboard handling procedures and post-test analysis of the results, Phase 2 tow tests would begin. In this phase, the electrical generation performance and system integration will be evaluated. Therefore, the electrical generator would be installed along with all control and monitoring equipment and a rotor (Figure 4). All other OCT characteristics and equipment for tow testing would be identical to Phase 1 operations, including the range of tow speeds, depths, location, and duration.

Figure 4
OCT fitted with 1.5-meter radius (3 meter diameter) rotor.

Action Area

The proposed location for both phases of towed testing is offshore Fort Pierce, Florida which is near FAU's HBOI campus. This offshore tow test area was selected first because the area is more benign environmentally and second because the majority of the OCT's fabrication subsystem testing, and onshore support is located at HBOI. The seafloor offshore Fort Pierce is generally flat and sandy, and depths are shallow, with the 30 m (100 ft) depth contour located about 20 km (10.8 nm) from the shoreline. The proposed test location area is 22 km (11.8 nm) east of the Fort Pierce inlet, with the center of the area located at 27° 28.0' North, 80° 2.3' West, and approximately 10 km (5.4 nm) north to south by 7 km (3.7

nm) east to west, or 70 square kilometers (20 sq. nm). Figure 5 shows the proposed tow test area and its proximity to shore with various depth contours (soundings in meters).

The proposed size of the action area is based upon the distance travelled pt:r tow test at a specific speed, for a defined amount of time, typically 10 minutes per tow. Table I was included to indicate the travel distances required at each speed. 111e longest expected distance is while towing at 3 mis (6 kts), resulting in a total of 1.85 km (l nm).

Table I
Approximate calculated distances travelled during towed tests at various proposed speeds.

Speed (kts)	Time(min)	Time(s)	Distance (m)
1	10	600	308.4
2	10	600	616.8
3	10	600	925.2
4	10	600	1233.6
5	10	600	1542
6	10	600	1850.4

The operational area was bow1ded based upon these calculations in the no1th-south direction, and by the distance between the 30- and 50-meter (100 and ISO ft) depth contours in the east-west direction. This area allows for sufficient space to maneuver a vessel and for towing in different directions, based upon prevailing wind and wave conditions during tests.

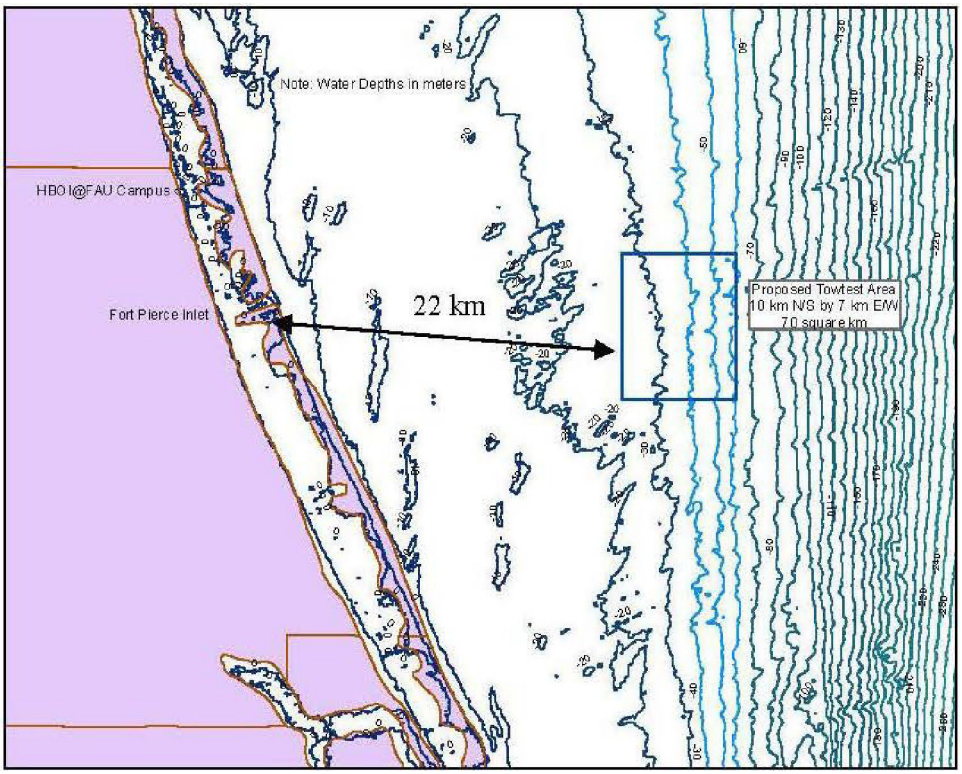

Figure 5
Proposed location of flow testing area offshore Fort Pierce, Florida. Water depth in the area ranges from ~25 m to 60 m (~82 to 200 ft).

Critical Habitat

The proposed activities addressed within this document do not fall within any of the Critical Habitat areas for the Atlantic coast of Florida Figure 6 shows the proposed testing location and nearby Critical Habitat areas, which include:

- *North Atlantic right whale:* Between 31°15 'N (approximately the mouth of the Altamaha River, Georgia) and 30°15'N (approximately Jacksonville, Florida) from the coast out to 27.8 km (15 nm) offshore; the coastal waters between 30°15'N and 28°00'N (approximately Sebastian Inlet, Florida) from the coast out to 9.26 km (5 nm).
- *Johnson's seagrass:* A final rule designating Johnson's seagrass critical habitat was published on April *5,* 2000 (65 FR 17786) in which 10 geographic areas (units) within the range of the species were identified along the east coast of Florida

- *Elkhorn and Staghorn Corals* • All waters in the depths of 30 m (100 ft) and shallower, to the 1 8 m (6 8 ft) contour from Boynton Inlet, Palm Beach County, to Government Cut, Miami-Dade County; and the mean low water line from Government Cut south to 82° W longitude in Monroe Counties. Within these specific areas, the essential feature consists of natural consolidated hard substrate or dead coral skeleton that are free from f1eshy or turf macroalgae cover and sediment cover.

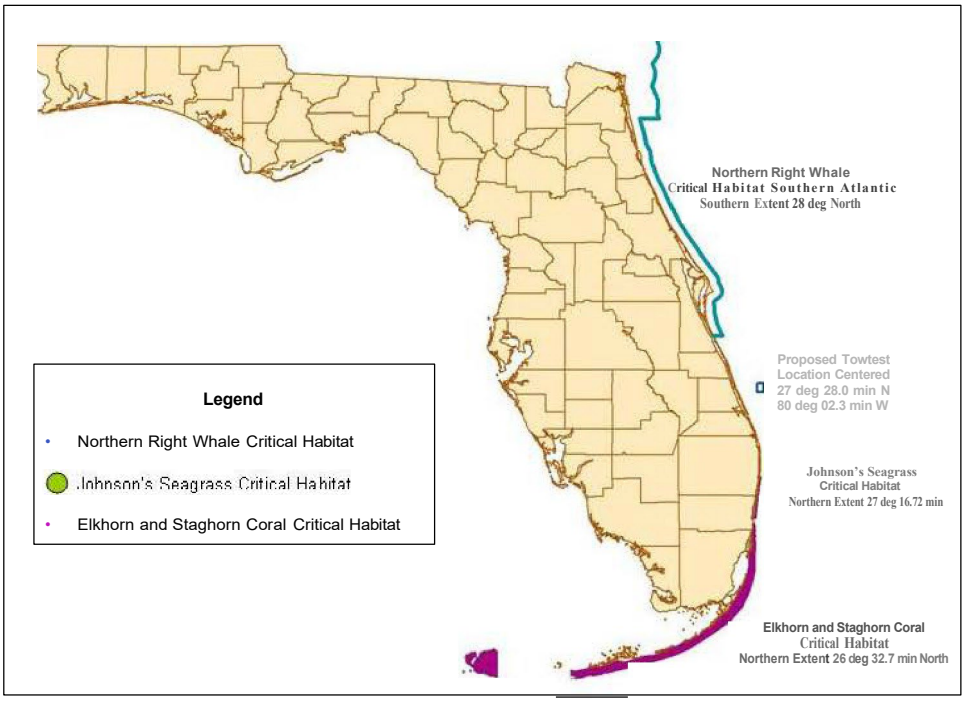

Figure 6
Location of proposed action with respect to listed Critical Habitat areas. The Oculina Bank HAPC for deep- and cold-water coral species lies farther offshore than (and somewhat north of) the tow-test location shown.

Our proposed tow test area is approximately 65 km (35 nm) from the southern extent of the Northern Right Whale habitat, and further offshore than the 9. 26 km (5 nm) seaward extent of the habitat. No operations are planned within the habitat boundaries, and no turbine towing would occur outside of the proposed test area.

The Johnson's Seagrass Critical Habitat is located south of the proposed operating area, with its northern extent at 27 deg 16 72 min North, approximately 20 km (10 8 nm) away from the tow testing area, and is exclusively designated within the Intercoastal Waterway, with no areas identified in the open ocean Because seagrass is located on the bottom and no bottom interactions are planned or anticipated as a result of tow testing, and because tow activities occur offshore, suggests that this habitat area would not be adversely affected by the proposed action

The Elkhorn and Staghorn Coral Critical Habitat is located south of the proposed operating area, with its northern extent of 26 deg 32.7 min or approximately 95 km (51.3 nm) away. The habitat is located near shore in its northern extent, extending about 2 km (1.1 run) offshore of the coastline. The great distance from the proposed towing area, its proximity to shore, and the sessile nature of the corals indicate that the proposed action would not adversely affect this habitat.

Species Accounts and Status of the Species in the Action Area

Lists of threatened and endangered species and species of concern that are known to occur in the waters offshore Florida are provided in Table II and Table III, respectively. These include marine mammals and other marine species, both free swimming and sessile. Since the tow tests are not anticipated to interact with the seafloor at any time and are planned offshore of reefs and other sensitive benthic communities found in the area, the species that could potentially be affected by this specific test are a subset of what is illustrated in the fables. The following sections describe the location of the proposed action relative to Critical Habitat areas offshore Flo1ida and the species that could occur in the area of operation, based on those listed in Table II and Table Ill.

Table II[2]
Listed Species that may occur in the vicinity of the proposed action[3].

Listed Species	Scientific Name	Status	Year Listed
Marine Mammals			
blue whale	Balaenoptera musculus	Endangered	1970
fin whale	Balaenoptera physalus	Endangered	1970
humpback whale	Megaptera novaeangliae	Endangered	1970
North Atlantic right whale	Eubalaena glacialis	Endangered	1970
sei whale	Balaenoptera borealis	Endangered	1970
sperm whale	Physeter macrocephalus	Endangered	1970
Turtles			
green turtle	Chelonia mydas	Endangered	1978
hawksbill turtle	Eretmochelys imbricata	Endangered	1970
Kemp's ridley turtle	Lepidochelys kempii	Endangered	1970
leatherback turtle	Dermochelys coriacea	Endangered	1970
loggerhead turtle	Caretta caretta	Threatened	2011
Fish			
atlantic sturgeon	Acipenser oxyrinchus oxyrinchus	Endangered	2012
shortnose sturgeon	Acipenser brevirostrum	Endangered	1967
smalltooth sawfish	Pristis pectinata	Endangered	2003
Invertebrates			
elkhorn coral	Acropora palmate	Threatened	2006
staghorn coral	Acropora cervicomis	Threatened	2006
Seagrasses			
Johnson's seagrass	Halophila iohnsonii	Threatened	1998

[2] Reference for Species information: http://www.nnmfs.noaa.gov/pr/pdfs/species/esa_table.pdf
[3] South Atlantic list: http://sero.nmfs.noaa.gov/pr/endangered%20species/specieslist/PDF2012/South%20Atlantic.pdf

Table III[2]
Candidate Species and Species of Concern that may occur in the vicinity of the proposed action.[3]

Candidate Species	Scientific Name
Fish	
blueback herring	Alosa aestivalis
scalloped han1merhead shark	Sphyrna lewini
Invertebrates[4]	
boulder star coral	Monlastraea annularis
boulder star coral	Montastraea franksi
elliptical star coral	Dichocoenia stokesii
Lamarck's sheet coral	Agaricia lamarcki
mountainous star coral	Montastraca favcolata
pillar coral	Dendroevra cylindrus
rough cactus coral	Mycelophyllia ferox
Species of Concern	**Scientific Name**
Fish	
dusky shark	Carcharhinus obscurus
key silverside	Menidia concharum
mangrove rivulus	Rivulus marmoratus
Nassau grouper	Epinephelus striatus
opossum pipefish	Microphis brachyurus
sand tiger shark	Carcharias Taurus
speckled hind	Epinephelus drummondhayi
striped croaker	Bairdiella sanctaeluciae
Warsaw grouper	Epinephelus nigritus
Invertebrates[4]	
ivory bush coral	Oculina varicosa

Species Potentially Affected by Proposed Action

The proposed action would take place only in the water column, and no interaction with the seafloor is planned or anticipated. As such, the marine species that could potentially be affected by the proposed action would only be free-swimming and not benthic species located on the seafloor. Therefore, of the species listed in Tables IT and Ill, only marine mammals, turtles, and fishes are potentially affected by the proposed tow testing action-these are consolidated in Table IV. The species that will not be affected by the proposed action because they are only located in benthic habitats are consolidated in Table V.

The potential effects on species capable of swimming and/or drifting within the water column inside the proposed test area, specifically at depths from the surface to 30 m (100 ft), could include collision with the tow vessel tow cable, OCT body, or sea anchor in phase 1. The tow cable is 15.9 mm (0.625 inches) in diameter, and would reach from the surface to the tow depth of the OCT and attached sea anchor. The exposed frontal area of the OCT is approximately 1.3 sq. m (14 sq. ft), and the sea anchor is 1.5 m (10 ft) in radius with a projected area of7 sq. m (75 sq. ft). The relatively small exposure area of the towed items to the flow, and the slow speeds at which they would be pulled through the water, should allow ample time for marine mamn1als, sea turtles, and free-swimming fish to avoid the towed equipment. Compared to the large frontal area and much higher speeds of cargo shipping in the area, for example, these tests offer little risk to

[4] http://www.nmfs.noaa.gov/pr/species/invertebrates/corals.htm

sea lite. Furthermore, as discussed next, avoidance measures during testing will further decrease this low risk

Table IV
Free-swimming Listed and Candidate Species that could occur within water column.

Listed Species	Scientific Name	Status	Year Listed
Marine :Mammals			
blue whale	Balaenoptera rnusculus	Endangered	1970
Jin whale	Balaenoptera physalus	Endangered	1970
humpback whale	Megaptera novaeangliae	Endangered	1970
North Atlantic right whale	Eubalaena glacialis	Endangered	1970
sei whale	Balaenoptera borealis	Endangered	1970
sperm whale	Physeter macrocephalus	Endangered	1970
Turtles			
green turtle	Chelonia mydas	Endangered	1978
hawksbill turtle	Eretmochelvs imbricata	Endangered	1970
Kemp's ridley turtle	Lepidochelys kempii	Endangered	1970
leatherback turtle	Dermochelys coriacea	Endangered	1970
loggerhead turtle	Carella careua	ThJeatened	2011
Fish			
atlantic sturgeon	Acipenser oxyrinchus oxyrinchus	Endangered	2012
shortnose sturgeon	Acipenser brevirostrum	Endangered	1967
smalltooth sawfish	Pristis pectinata	Endangered	2003
Candidate Species		**Scientific Name**	
Fish			
blueback herring		Alosa aestivalis	
scalloped hammerhead shark		Sphyma lewini	
Species of Concern		**Scientific Name**	
Fish			
dusky shark		Carcharhinus obscurus	
key silverside		Menidia conchorum	
mangrove rivulus		Rivulus rnarmomtu.5	
Nassau grouper		Epinephelu.5striatus	
opossum pipefish		Microphis brachyurus	
sand tiger shark		Carcharias Taurus	
speckled hind		Epinephelus drum mondhayi	
striped croaker		Bairdiella sanctaeluciae	
Warsaw grouper		Epinephelus nigritus	

Table V

Benthic Listed Species that should not occur within water column.

Listed Species	Scientific Name	Status	Date Listed
Invertebrates			
elkhorn coral	Acropora palmate	Threatened	2006
staghorn coral	Acropora cervicornis	Threatened	2006
Seagrasses			
Johnson's seagrass	Halophila johnsonii	Threatened	1998
Candidate Species		**Scientific Name**	
Invertebrates			
boulder star coral		Montastraea annularis	
boulder star coral		Montastraea franksi	
elliptical star coral		Dichocoenia stokesii	
Lamarck's sheet coral		Agaricia lamarcki	
mountainous star coral		Montastraea faveolate	
pillar coral		Dendrogyra cylindrus	
rough cactus coral		Mycetophyllia ferox	
Species of Concern		**Scientific Name**	
Invertebrates			
ivory bush coral		Oculina varicosa	

Best Management Practices for Avoiding Impacts

The draft EA[1] released for comment by BOEM on April 24, 2012 requires SNMREC (the "lessee") to abide by standard vessel strike avoidance measures similar to those issued in BOEM's Notice to Lessees and Operators (NTL) of Federal Oil, Gas, and Sulphur Leases in the OCS, Gulf of Mexico OCS Region on "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"[5] (NTL 2012-JOINT-G01). The NTL is based upon the NMFS Southeast Region's Vessel Strike Avoidance Measures and reporting for Mariners. At a minimum, these requirements are:

1. The lessee must ensure that vessel operators and crews watch for marine mammals and sea turtles, and slow down or stop their vessel to avoid striking protected species;
2. When whales an: sighted, the lessee must maintain a distance of 91 m (300 ft) or greater from the whale. If the whale is believed to be a North Atlantic right whale, the lessee must ensure that the vessel maintain a minimum distance of 457 m (1,500 ft) from the animal (50 CFR 224.103);
3. When sea turtles or small marine mammals are sighted, the vessel must maintain a distance of 45 m (150 ft) or greater whenever possible;
4. When marine mammals are sighted while a vessel is underway, the lessee must ensure that the vessel remain parallel to the animal's course whenever possible. The lessee must ensure that the vessel avoids excessive speed or abrupt changes in direction until the marine mammal has left the area;
5. The lessee must reduce vessel speed to 10 knots (kn) (18.S km/h) or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety pe1mits.

5 See http://www.bsee.gov/Regulations-and-Guidance/Notices-to-l.essees-and-Operators.aspx

single cetacean at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised;

6. Whales may surface in unpredictable locations or approach slowly moving vessels.
7. Wl1en animals are sighted in the vessel's path or iJ1 close proximity to a moving vessel, the lessee must reduce vessel speed and shift the engine to neutral. TI1e engines must not be engaged until the animals are clear of the area; and
8. The lessee must report sightings of any injured or dead marine mammals or sea turtles to BOEM and NMFS within 24 hours, regardless ofwhetl1er the injury or death was caused by their vessel.

These monitoring and avoidance measures would also be implemented during the proposed tow testing offshore Fort Pierce. These procedures and precautions would serve to reduce or eliminate the chances of st1i.king a marine mammal or other protected marine species with the tow vessel, OCT, or sea anchor/rotor during operations.

The draft BOEM E also suggests a potential for acoustic harassment due to possible acoustic sources for similar activities. In order to minimize the risk of creating acoustic sources that might disturb or harass marine mammals or sea turtles, specific mitigation measures are proposed if one or more active acoustic sound sources will be operating at frequencies less than 200 kHz. In the case of the proposed tow testing offshore Fort Pierce, the lowest acoustic frequency acoustic source will be 2 MHz, ten times higher in frequency, which is well above the acoustic frequencies that has been suggested could possibly adversely affect marine mammals or sea turtles. Therefore, the use of planned equipment is therefore not anticipated to cause any adverse effects to any species in the area of testing.

Effects of the Action and Conclusions

The preceding analysis of potential affects for the proposed actions of tow testing SNMREC's OCT offshore Fort Pierce, Florida with both a sea anchor and rotor indicates that the actions are Not Likely to Adversely Affect protected species in the proposed area of operation. This determination is based upon the indication tl1at the identified potential effects are insignificant or are discountable. These include the absence of critical habitats in the proposed area, lack of potential for acoustic harassment (because only significantly higher fra1uencies than those perceived by marine mammals will occur), and extremely unlikely potential for events such as vessel or OCT strikes with protected species. SNMREC asserts that the probability of such events is reduced by tl1e implementation and execution of proposed avoidance measures, low vessel speeds, the sho1t duration and small number of testing events, and the small projected area of the towed devices.

The proposed action is "not likely to adversely affect" the species listed in Table IV and would have no effect on species listed in Table V. Therefore, we believe that formal consultation is *not* required. All reasonable and prudent measures will be taken to avoid impacts to any listed species or their habitats. The SNRMEC therefore requests the concurrence of the NMFS with this determination and upon receipt of concurrence, this consultation may be concluded.

The Department of the Interior Mission

As the Nation’s principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources, protecting our fish, wildlife and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

The Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.