OCS EIS/EA
BOEM 2012-017

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

Environmental Assessment

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

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Author

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Page

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. 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. 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. Description of Proposed Action

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. 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 MHK devices; (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, this 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 this 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 this 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.

Information considered in this EA includes:

1. Public response to the June 24, 2011, NOI to prepare this EA (76 FR 30184);
2. BOEM research and review of current relevant scientific and socioeconomic literature;
3. Ongoing 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;
4. 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
5. 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

2.1. Alternative A (Preferred Alternative) – The Proposed Action

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).

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. 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 MTB buoys would be selected by FAU SNMREC using the same criteria upon the completion of site characterization surveys.

As part of the proposed action, this EA assumes that FAU SNMREC will 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 would deploy each MTB at a separate mooring location, and each MTB would require installation, operation, and decommissioning. FAU SNMREC proposes 12-24 annual turbine test sessions (up to five days duration each, with a minimum one day duration) for each buoy.

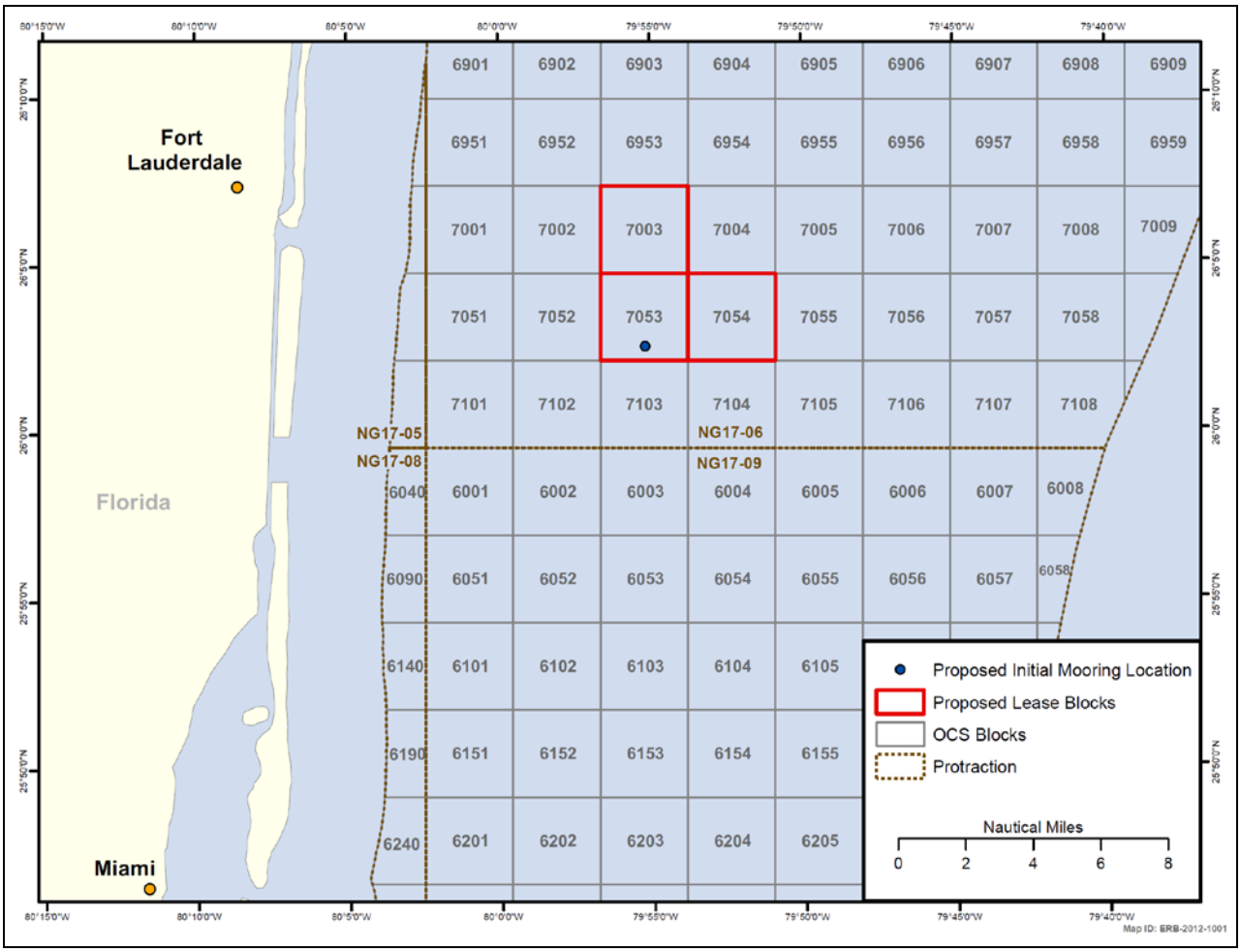

Figure 2.1. Proposed lease area and initial mooring location.

2.1.1. 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 273 and 472 total vessel trips would occur as a result of these activities over the 5-year lease term. This is based on an estimation of 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, 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 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 (*see* 50 CFR 17.108 and FWC, 2011a). Vessel speed restrictions in these zones range from idle speeds up to 25 miles per hour (mph) 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.

Lease Stipulation for Vessel Strike Avoidance Measures

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, but at a minimum, BOEM will require the lessee to abide by the following:

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 are 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) (18.5 km/h) or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits. A 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. When animals are sighted in the vessel's path or in close proximity to a moving vessel, the lessee must reduce vessel speed and shift the engine to neutral. The 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 of whether the injury or death was caused by their vessel.

2.1.2. 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) 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, 2011). 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 Archeological 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 and must be sufficient enough to provide complete survey coverage of the entire area that could potentially be impacted by the mooring system. This survey 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 285* (USDOI, BOEM, 2011); or (2) an ROV survey using an ROV equipped with sector-scanning sonar technology and digital recording capabilities. A professional marine archaeologist must be present to direct, observe, and monitor the ROV investigation.

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:

1. Immediately halt all seafloor-disturbing activities within the area of the discovery;
2. Notify the BOEM Director of the discovery within 72 hours;
3. Keep the location of the discovery confidential; and
4. 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.

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 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 Biological Resources (Acoustic Surveys)</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 less than 200 kHz. 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 – Consultations). The measures below are considered standard

program design criteria for reducing acoustic disturbance to marine fauna, especially marine mammals. Additional program design criteria, including those that may be developed during the Federal 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.

1. The lessee must ensure that a 200-m (656-ft) radius exclusion zone will be monitored around the survey vessel. If the exclusion zone does not encompass the 160-dB Level B harassment radius calculated for the acoustic source having the highest source level, BOEM will consult with NMFS about additional requirements. BOEM may authorize surveys having an exclusion zone larger than 200 m (656 ft) to encompass the 160-dB radius if the lessee demonstrates that it can be effectively monitored.
2. The lessee must ensure that active acoustic sound sources must not be activated until the protected species observer has reported the exclusion zone clear of all marine mammals and sea turtles for 30 minutes.
3. Except as noted in (4) below, if any marine mammal is sighted within or transiting towards the exclusion zone, an immediate shutdown of the equipment is required. Subsequent restart of the equipment may only occur following clearance of the exclusion zone for 30 minutes.
4. Shutdown is not required for dolphins approaching the vessel or towed equipment at a speed and vector that indicates voluntary approach to bow-ride or chase towed equipment.

ROV Surveys

In addition to acoustic surveys BOEM will require, through lease stipulations, FAU SNMREC to conduct additional site-specific surveys for proposed anchor locations prior to deployment. These surveys would be used to verify bottom types and identify any potential coral habitats. Video and photographic surveys from a submersible, 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 protocol (Section 2.4, FAU, 2011) was developed in consultation with FAU's Harbor Branch Oceanographic Institute, specifically the Robertson Coral Reef and Conservation Program; and NOAA's NMFS Southeast Regional Office and promulgated by BOEM. This concept is reflected in the Habitat Mapping and Resource Characterization recommendation in NMFS' comments on the NOI to develop this assessment (USDOC, NOAA, NMFS, 2011a).

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. The area is considered to be 73,000.0 square m (785,765.5 square ft) for each mooring location. This is based on a 70.0-m (229.7-ft) drop radius for the anchor deployment and the approximately 82.0 m (269.0 ft) of chain that will periodically contact the seafloor. This comes to a radius of approximately 152.0 m (498.7 ft), which equals an area of approximately 73,000.0 square m (785,765.5 square ft) that could be impacted. When taking into account the 10-13 total anticipated mooring locations under the proposed action, the total survey area comes to 730,000.0 to 949,000.0 square m (7,857,654.6 to 10,214,957 square ft) which represents 1 – 1.3 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 will take 40 – 53 days to conduct ROV surveys over all potential mooring system locations.

Lease Stipulations for Biological Resources (ROV Surveys)

The proposed lease area is located within Habitat Areas of Particular Concern (HAPC) for both tilefish and live/hard bottom, 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:

1. The biological resources shall be identified and characterized within a minimum of 73,000.0 square m (785,765.5 square ft) for each mooring location;
2. Seafloor video imagery should be continuous along each transect and be taken from no more than 1-2 meters off the seafloor; and
3. 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).

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). These surveys will aid the assessment of impacts to essential fish habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act.

2.1.3. 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 MTB would be anchored to the ocean floor by a conventional faired mooring line attached to a 2,722.0 kg (6,000.0 lb) Danforth anchor. 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 2.2). 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 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. 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. As noted in the application, the disturbance area of seafloor based upon this deployment method would be approximately 6,000 square meters (64,583 square ft). 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 (*see* 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

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:

1. The lessee shall avoid placement of the mooring system on sensitive benthic habitats including high and low relief features associated with tilefish EFH and deep-sea coral communities;
2. The lessee will avoid the potential sensitive benthic resources by establishing a minimum 75 m buffer/exclusion from the mooring and associated appurtenances;

3. The lessee has the option to demonstrate, through additional investigations, that sensitive benthic resources either do not exist or would not be adversely affected by the seafloor/ground-disturbing activities; and
4. If BOEM has specified a minimum avoidance buffer zone around a potential archaeological resource (as described in Section 2.1.2–, Archaeological Resources) then the lessee will not conduct any ground disturbing activities within that buffer.

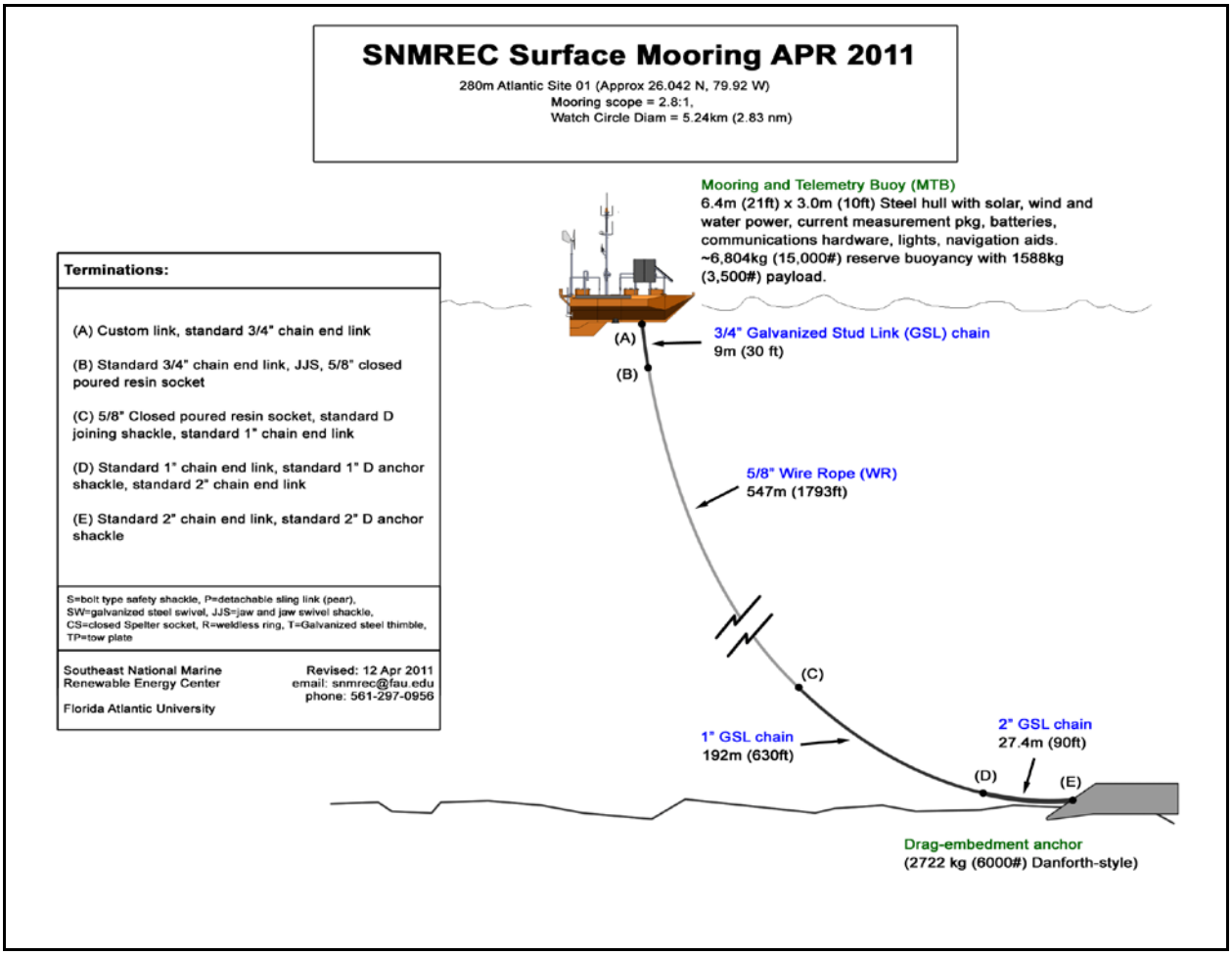

Figure 2.2. MTB mooring system.

These requirements were based on activities proposed in FAU's application, and recommendations from NMFS submitted in response to the NOI regarding potential impacts to sensitive coral and hard bottom features.

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, synthetic floatation will be placed along the mooring line at several locations to ensure that the line does not touch the seabed. 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 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.

2.1.4. 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 2.3). 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 2.4). 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 turbine 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).

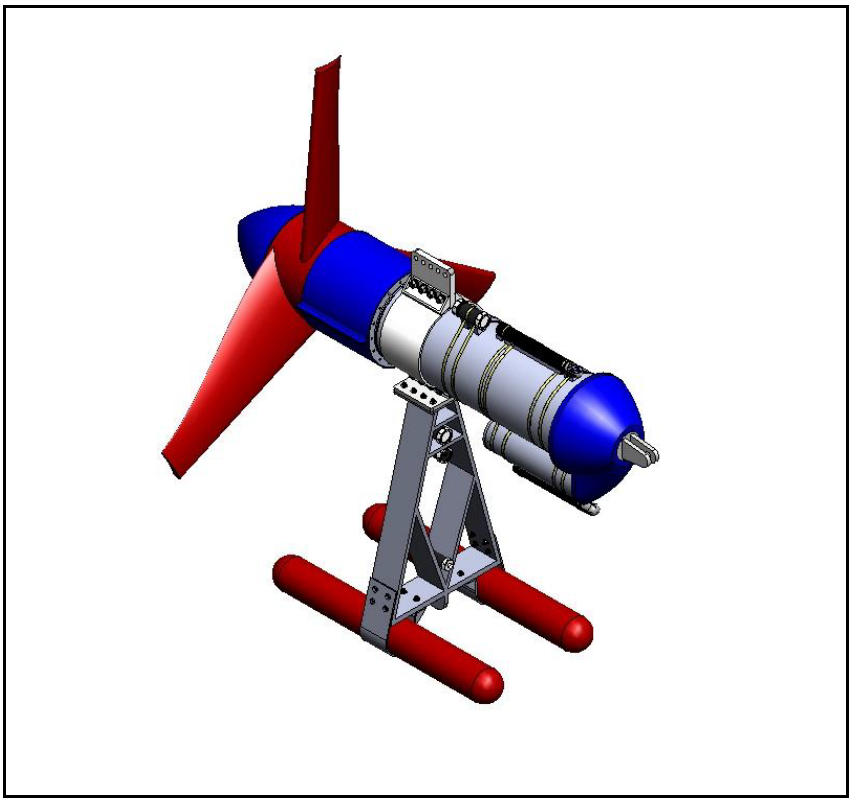

Figure 2.3. Testing device.
(Source: FAU, 2011)

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 turbine 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. Turbine 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 Turbine Testing/Operation

In order to avoid impacts to protected species, BOEM will require the lessee to comply with construction conditions similar to 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). 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 following the Federal consultation process prior to lease signing, but at a minimum BOEM will require the lessee to abide by the following:

1. 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;
2. 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); and
3. If a protected species is seen within 100 yards of the active daily turbine testing/operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 ft (15.24 m) of a protected species. Operation of any mechanical equipment shall cease immediately if a protected species is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

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.

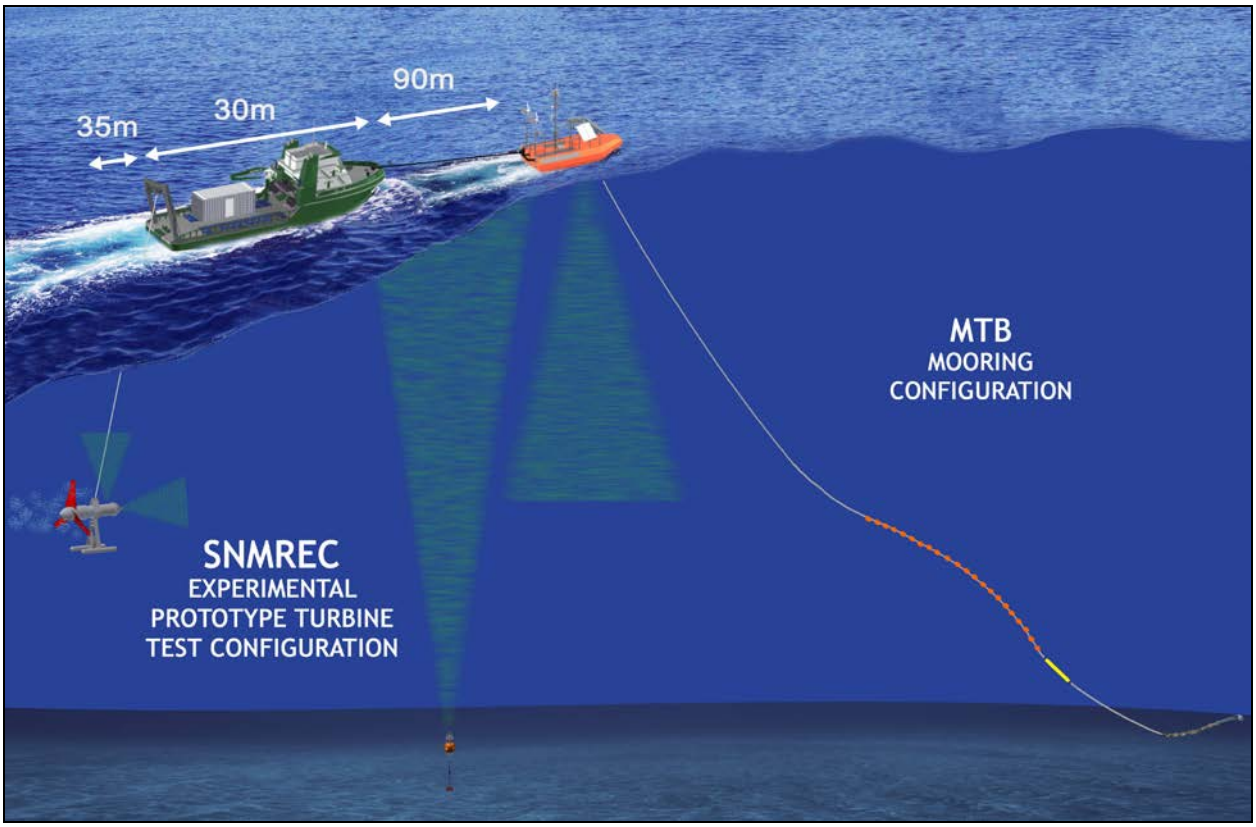

Figure 2.4. Complete turbine test configuration.

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 of OCS Block 7003 (*see* Figures 2.5, 2.6 and 2.7 below). 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 (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.

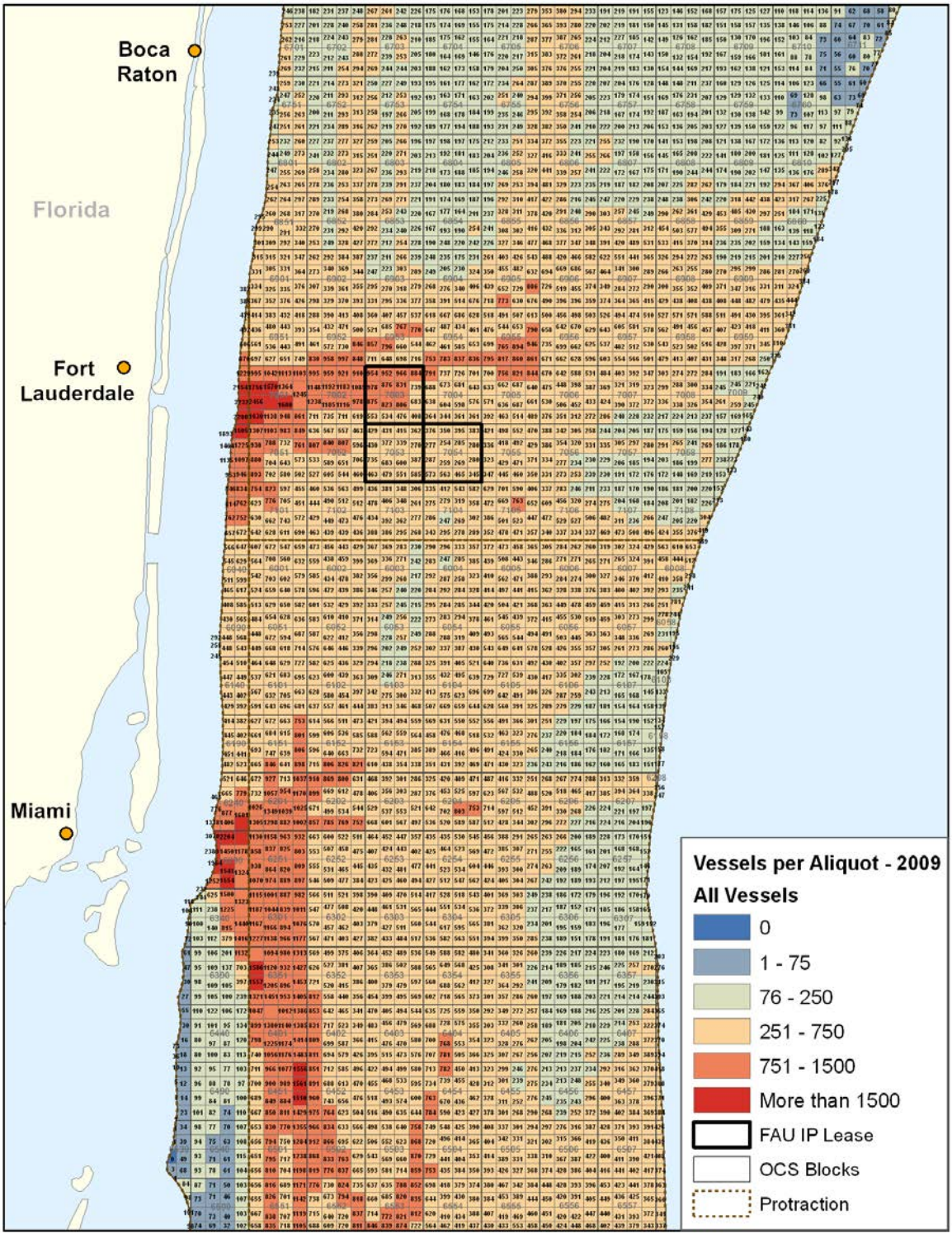

Figure 2.5. AIS data for all vessel traffic for 2009.

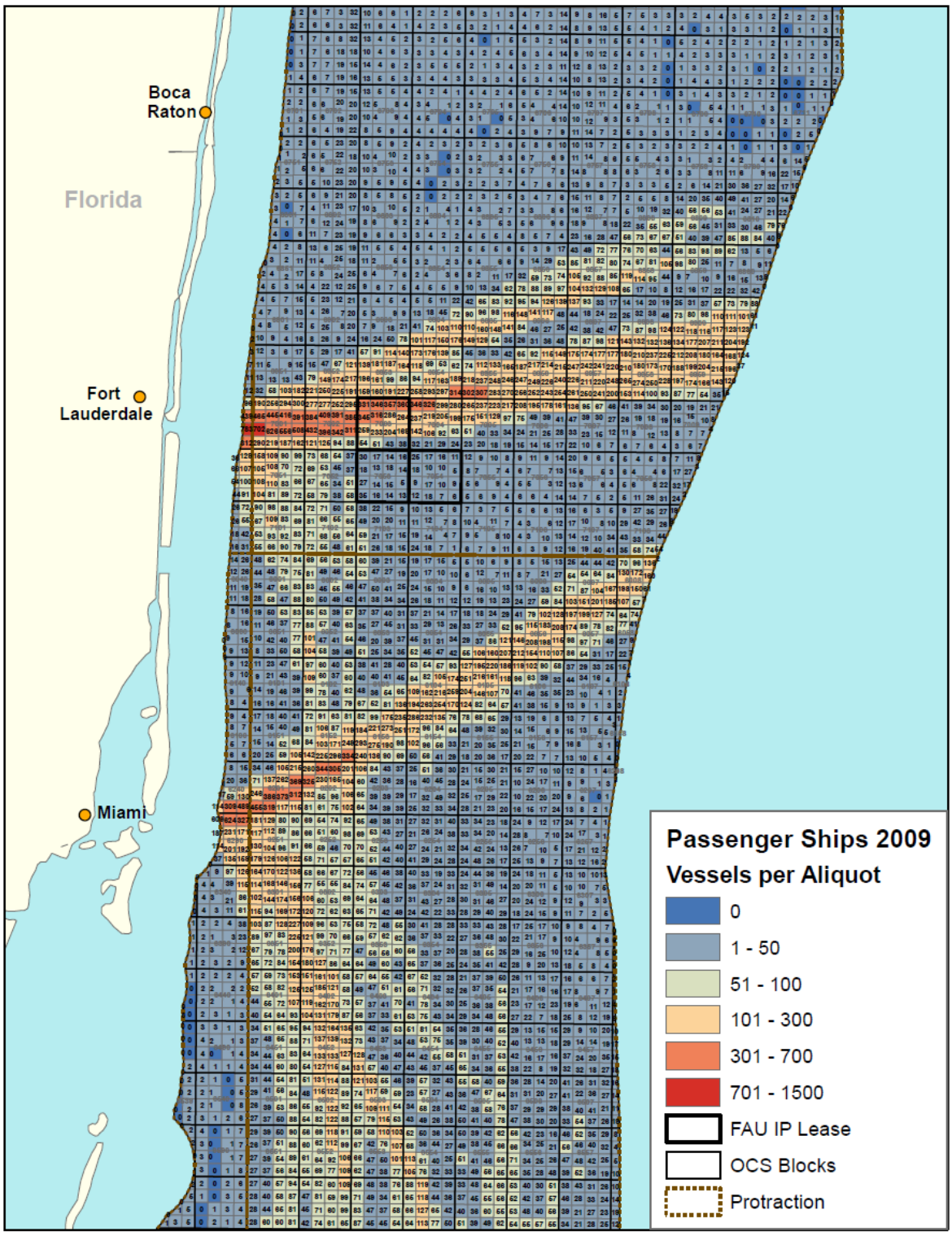

Figure 2.6. AIS data passenger vessel traffic for 2009.

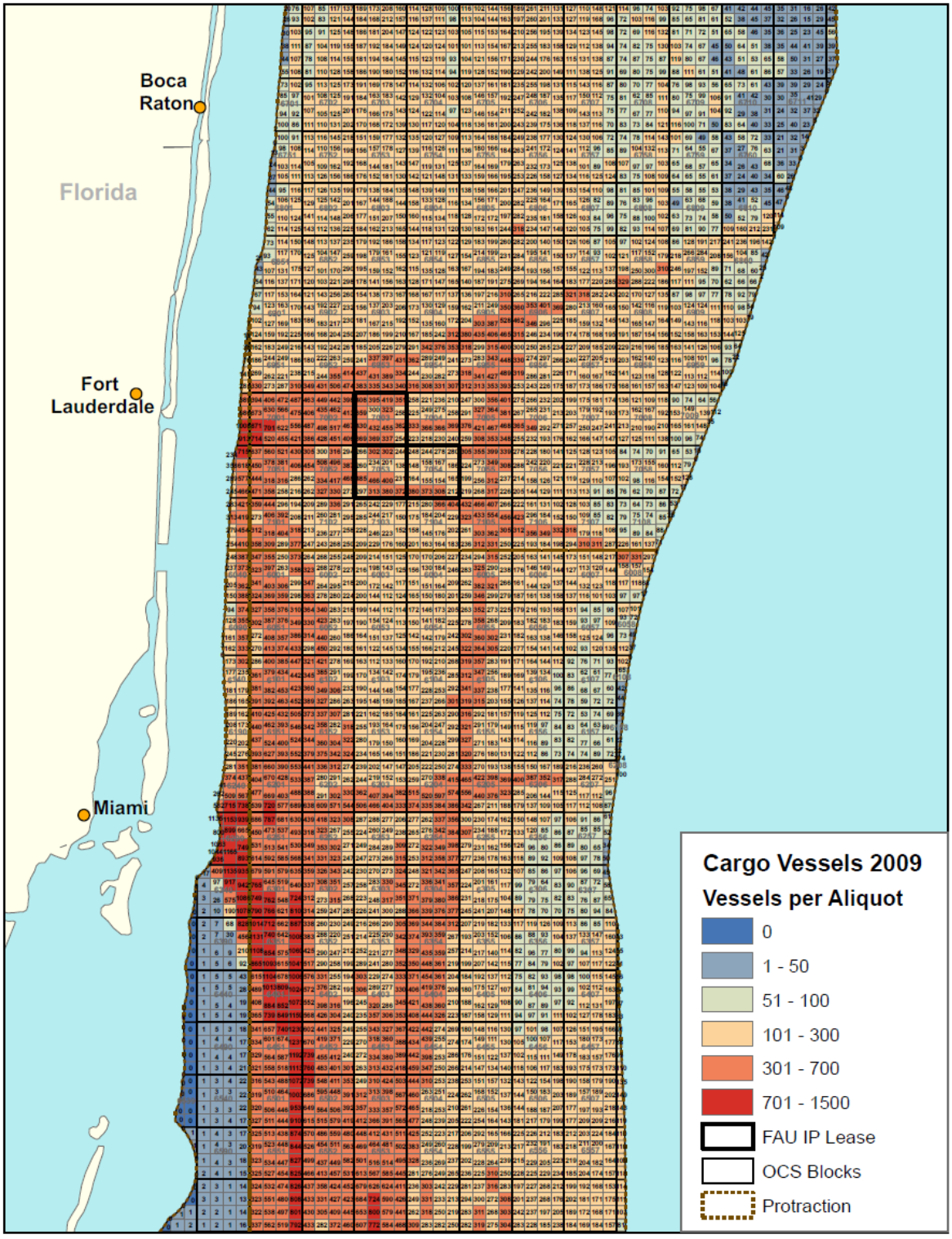

Figure 2.7. AIS for cargo vessel traffic data for 2009.

2.3. Alternative C – 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. The reasonably foreseeable impacts of Alternative C (No Action) on the environment are described in Section 3.3 of this EA.

3. ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

3.1. The Proposed Action (Alterative 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 2.1.2 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. There will be an additional three vessel trips in order to remove the last three of the mooring buoys for a total of 16 – 19 vessel trips. 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. 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 applies 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 buoy. 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.

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, the applicant must submit an Oil Spill Response Plan with the Project Plan that outlines the emergency response action plan, worst case discharge scenario, and training and drills for responders (30 CFR 254) in order to minimize impacts to water quality.

The mooring/telemetry buoys could also serve as attractants for marine life, which in turn attracts recreational fishermen to the area. 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 (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's application also indicates that one of the potential support vessels receives onshore support from the Port of Miami, located in Miami-Dade County, Florida (FAU, 2011). 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.

3.1.2.1.2. Impact Analysis of the Proposed Action

Routine Activities

The vessel traffic anticipated to occur in connection with the proposed action is approximately 273 – 472 vessel trips over a 5-year period (*see* Section 2.1.1 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 3.16 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 activity 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 22 percent of the total vessel traffic for the proposed action.

Pursuant to section 9 of the lease, 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 40.2 km per hour (25.0 mi per hour) 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 MHK device, 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 erosion induced 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 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 40.4-mi (65.0-km) long carbonate platform that lies between Boca Raton and South Miami at depths of 656.2 to 1,312.3 ft (200.0 to 400 m) in the northern Straits of Florida. It consists of high-relief Tertiary limestone ridges, scarps and slabs that provide extensive hard bottom 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 27 square mi (70 square km) 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 hard bottom 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). Deep-water 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 and the Port of Miami 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 MHK devices. In addition to Port Everglades the applicant also anticipates that some vessels will utilize the Port of Miami. A full description of the industrial ports at Port Everglades and Miami 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 and the Port of Miami as well seaward of the beaches north and south of the port's 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 and Port of Miami. 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).

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 Doppler current profilers 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 their acoustic Doppler current profilers (ADCPs) in the proposed lease blocks. The anchor would then be set in place by dragging it through a portion of the drop area. Attached to the anchor is approximately 82.0 m (269.0 ft) of 5-cm (2-in) shock chain. It is the shock chain that will absorb the loads from the surface MTB and the MHK device under test. The mooring line to the MTB and MHK device is attached to the shock chain. The applicant estimates the total area of disturbance from the deployment of the mooring system is approximately 0.6 ha (1.5 ac) per deployment or up to 0.078 square km (0.003 square mi) over the 5-year lease period. The area that would be expected to be disturbed after deployment is an area within a 40 degree arc

approximately 82.0 m (269.0 ft) down-current of the anchor. This area, equal to approximately 2,500.0 square m (26,909.8 square ft) per deployment or 0.0325 square km (0.0125 mi) over the five-year lease period, is the area that would be periodically disturbed by movement of the shock chain dragging on the seafloor.

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 deep-sea 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 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. The ROV, which may be deployed from a separate vessel, will dive the anchor and attach recovery gear to it.

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 and areas of high and low relief from the mooring system will be avoided by the standard operating conditions that are described in Section 2.1.3 of this document. Specifically, impacts to sensitive habitats will be avoided by the required setback/buffer from the resource of 150 m. The presence of the any sensitive benthic resources 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 avoid hard bottom and deep-sea coral habitat (Section 2.1.2), 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 deep-sea 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 MHK device, 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 MHK device 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 472 trips over 5 years between the project site and Port Everglades or Miami would cause any additional impacts to the coastal benthic communities in the vicinity of the port 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 is 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 coral live hardbottom, and areas of high or low relief that may provide important fish habitat. Portions of the Miami Terrace contain sensitive benthic habitats such as coral and hard-bottom communities and entire areas of the proposed location have been identified as HAPC by NMFS and the SAFMC. 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 0.0325 square km (0.0125 mi) which is a negligible percentage of the total benthic habitat on the Miami Terrace. Therefore, any damage to benthic habitat in this area would not be significant.

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 habitats and avoid these sensitive habitats per BOEM lease stipulations (*see* Section 2.1). FAU has had experience deploying ADCPs in the area and believe they 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.

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 and the Port of Miami are expected to easily handle additional traffic from project vessels. 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.

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 and Miami. 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 et al., in preparation). 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	*Serenia*		
West Indian Manatee	*Trichechus manatus*	endangered	coastal
Baleen Whales	*Mysticetes*		
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*	endangered	coastal/shelf/slope
Toothed Whales	*Odontocetes*		
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	*Peponcephala 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 as well as the transit corridor to and from the principal ports. 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 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

Routine Activities

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.

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). The existing operating conditions and BOEM lease stipulations, include speed restrictions to which project vessels must abide, are designed to reduce the impact of a vessel collision with a manatee and allow greater time for avoidance by the vessel operator and the manatee (*see* Section 2.1.1 of this EA). Outside of the Manatee Protection Zones, BOEM will require the lessee to abide by vessel strike avoidance measures. These measures, which are described in detail in Section 2.1.1 of this EA, include the lessee maintaining a vigilant watch and maintaining a 45 m separation distance.

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. Additional vessel traffic is expected from survey activity for the 10-13 deployment areas for an estimated maximum of 472 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. 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. Neither 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 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 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. 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 high-frequency (200 + kHz) sonar surveys. These surveys are likely to be limited to single beam echosounders, multi-beam echo sounders, or side-scan surveys. In general, these sources are of low power and transmit very short pulses. The high frequencies also attenuate in sea water more quickly than low-frequency sources (Lurton and DeRuiter, 2011). 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 upcurrent (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 200m (656ft) exclusion zone around echosounder 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-yard monitoring zone, and 50 ft (15.24 m) exclusion zone for protected species, including marine mammals, for turbine testing activity (*see* Section 2.1.4).

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-yard monitoring zone, and 50 ft (15.24 m) exclusion zone for protected species, including marine mammals, for turbine testing activity (*see* Section 2.1.4). 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 MHK device, 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 or coastal beaches adjacent to the principal ports, Port Everglades and the Port of Miami. 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 as well 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

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, and blade strikes from the test turbines.

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 (273-472 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 of this document).

Acoustic Harassment

Potential acoustic impact sources for sea turtles are anticipated to be caused by survey echosounders 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, or side-scan surveys. In general, these sources are of low power and transmit very short pulses. The high frequencies also attenuate in sea water more quickly than low-frequency sources (Lurton and DeRuiter, 2011). 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 upcurrent (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. The echosounder frequencies described herein are believed to be well beyond the hearing range of sea turtles. Acoustic disturbance from vessel operations (propeller cavitation/engine noise) and from turbine 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 echosounder surveys, BOEM will require a 200 m (656 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 turbine testing and echosounder 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, 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).

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 MHK devices. 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, and blade strikes from the test turbines. 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 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. 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 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 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. 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 at 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 2.1.1), 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 2.1.2). 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.

It is hypothetically possible that the deployed MHK devices could impact diving birds. A diving bird (e.g., a cormorant) could pursue prey into a device and get struck by the rotating blades of an underwater turbine. Given that some birds like the cormorant frequently use buoys for perching, this habit may put these daytime feeding birds at further risk by attracting them to the testing sites. However, 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 a MHK device in the affected environment on diving birds would be negligible.

Finally, buoys and deployment vessels may provide 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 compliment 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 MHK devices, 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 are expected compared to other sources of light. 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 MHK devices, 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 3.8). 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 threatened or endangered (76 FR 66385). The Florida bonneted 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 3.8

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/threatened.
[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 2.1.1), 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 all nighttime activities associated with the proposed action 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. However, 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 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, 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 and the Port of Miami). Since the anticipated impacts are expected to be restricted to the offshore environment, the discussion below is restricted to benthic and pelagic fish and fish habitat in the offshore environment.

The proposed lease 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 3.9), 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 3.9.

Table 3.9

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 spp.)	hagfishes
Laemonema barbatulum	shortbeard codling
Helicolenus dactylopterus	blackbelly rosefish
Fenestraja plutonia	pluto skate
Merluccius albidus	offshore hake
Polyprion americanus	wreckfish
Lopholatilus chamaeleonticeps	golden tilesfish
Caulolatilus microps	blueline tilefish
Hyporthodus niveatus	snowy grouper
Commercially Important Demersal Shellfish	
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*).

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 of concern that may be found in or adjacent to the proposed action area including two shark species - the dusky shark, 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 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 (1,300.0 ft). The dusky shark is not commonly found in estuaries due to a lack of tolerance for low salinities. The species migrates northward in summer and southward in fall. The night shark is a deepwater species that occurs in the South Atlantic at depth between 275-365 m (900-1200 ft) during the day migrating up in the water column to 185.0 m (610.0 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 (262.0 to 366.0 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 hard bottom/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 hard bottom 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, mostly 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 3.9 and 3.10) for one or more life stages in the proposed action area:

Table 3.10

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 3.11

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 is adjacent, to the east, of the current HAPC for corals defined under the SAFMC's Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region (Coral FMP) Fishery Management Plan (Coral FMP). Specifically the HAPC is defined as offshore (5.0 to 30.0 m [5.0-90.0 ft]) hard bottom 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 2 (CE–BA2) that amended several FMPs including Amendment 7 to the Coral FMP. The Coral FMP Amendment 7/CE-BA2 established the Stetson-Miami Terrace HAPC which encompasses all three of the proposed lease blocks (Figure 3.1). The Stetson-Miami Terrace HAPC was designated as HAPC in part because it supports high relief hard-bottom, *Lophelia* coral mounds, octocorals, and sponge communities (SAFMC, 2011). This assessment evaluates the impacts to coral in Section 3.1.2.2 Benthic Habitat.

Tilefish HAPC

In CE-BA2 also amended the Snapper Grouper FMP to designate HAPC for golden tilefish and blueline tilefish (Figure 3.1). 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 are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200 meter depths. EFH-HAPCs for blueline tilefish includes irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break; or upper slope along the 100-fathom contour (150-225 meters); hard bottom 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 hard bottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs (USDOC, NOAA, NMFS, 2011b).

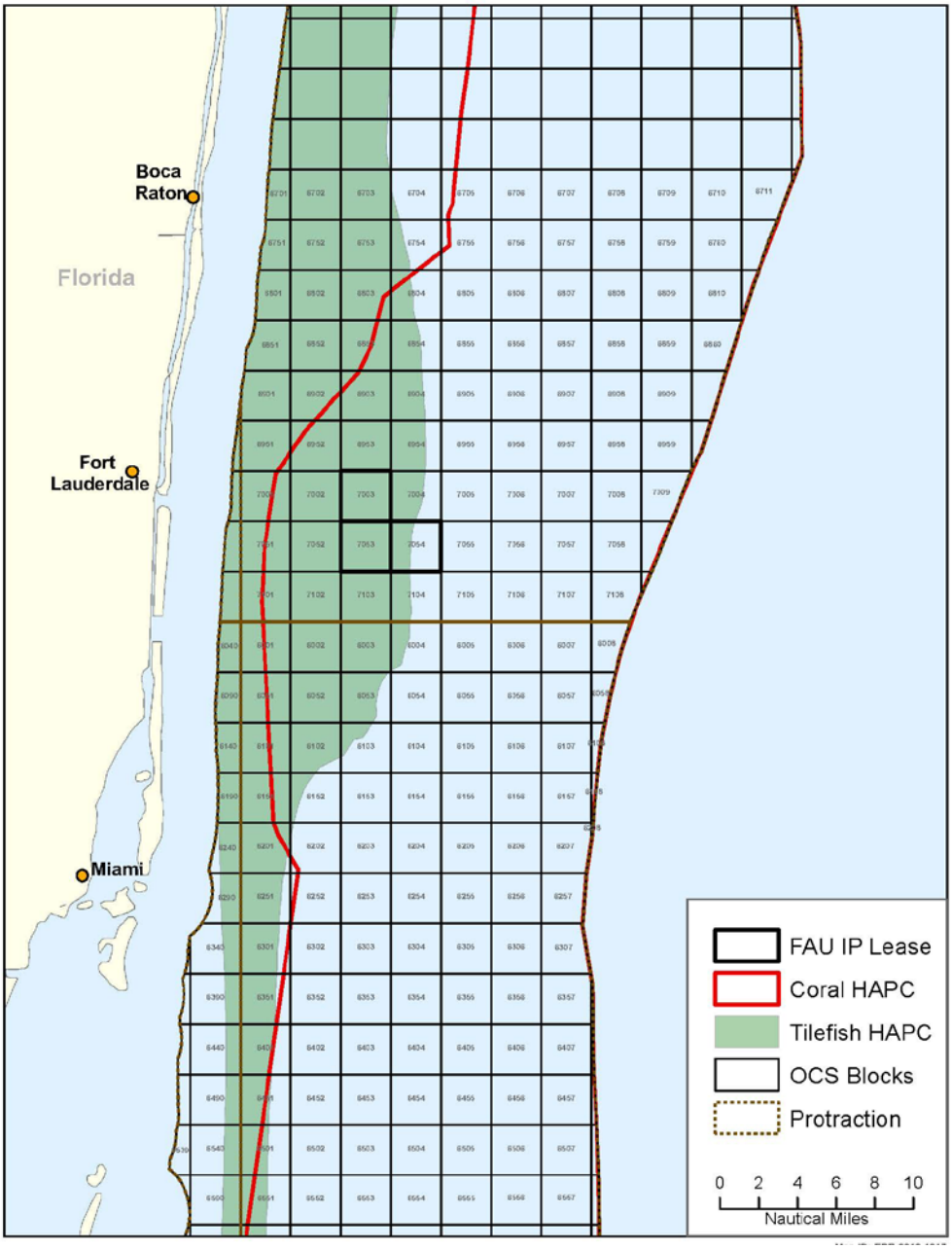

Figure 3.1. Habitat Areas of Particular Concern for Tilefish and Coral, Coral Reefs, and Live/Harbottom Habitat (Stetson-Miami Terrace).

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 MHK device. 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 are 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 0.6 ha (1.5 ac) per deployment or up to 0.078 square km (0.003 square mi) over the 5-year lease period. The area that would be expected to be disturbed after deployment is an area within a 40 degree arc approximately 82.0 m (269.0 ft) down-current of the anchor. This area, equal to approximately 2,500.0 square m (26,909.8 square ft) per deployment or 0.0325 square km (0.0125 mi^2) over the five-year lease period, is the area that would be periodically disturbed by movement of the shock chain. 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. 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 MHK device 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 MHK devices, in this case an axial-flow, horizontal turbine generator with a blade diameter of 3.0 to 7.0 m (9.8 to 23.0 ft), could cause impacts to pelagic fish. The applicant anticipates the test turbines to be deployed between 5.0 and 50.0 m (16.4 and 164.0 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 (2.1 and 3.3 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 12.0 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. This potential interaction 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. 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 MHK testing would likely not have any long term impacts to fish populations nor ecosystem processes.

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 2.4, 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, 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 (2.1 and 3.3 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 rmp 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.

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 Nomandeau et al. (2011) also identified 183 other fish species that may also be sensitive to EMF. Regardless, 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. 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 the 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 0.6 ha (1.5 ac) per deployment or up to 0.078 square km (0.003 square mi) over the 5-year lease period. The area that would be expected to be disturbed after deployment is an area within a 40 degree arc approximately 82.0 m (269.0 ft) down-current of the anchor. This area, equal to approximately 2,500.0 square m (26,909.8 square ft) per deployment or 0.0325 square km (0.0125 mi^2) over the five-year lease period, is the area that would be periodically disturbed by movement of the shock chain. 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. The habitat in the footprint of the anchor would be lost during the period of deployment. Additionally, the approximately 2,500.0 square m (26,909.8 square ft) downstream of the anchor would be periodically disturbed by the chain sweep. For the purposes of this analysis it is assumed that this area 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 deep-water 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 seafloor areas of high and low relief that are equated to the troughs and burrows that are utilized as refuge by tilefish (*see* Section 2.1 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 which will then be excluded from mooring placement. Impacts to the Stetson-Miami 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 0.00005% of the 59,250 km^2 total HAPC area. Setbacks/buffers from sensitive benthic features will ensure that impacts to these resources are negligible (*see* Section 2.1).

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 MHK device 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.

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 MHK device, 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 (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.

Conclusion

BOEM anticipates the primary adverse impacts to benthic fish habitat will result from the deployment of the mooring system. Approximately 0.0325 square km (0.0125 square mi) over the five-year lease period would experience loss of habitat. However, this area represents only 0.00005% 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 sensitive habitat avoidance measures specified in Section 2 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) deployments 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. Thus physical disturbance to fish and essential fish habitat is expected to result in 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 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. 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, including designated EFH and HAPC, for those species in lease area.

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, 2011).

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. However, 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) (USDOI, BOEM, 2011:133). Because these proposed 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.

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 account anchor line drag at each mooring location, the area of seabed that could be directly impacted by the proposed lease area encompasses approximately a 150.0-m (492.0-ft) radius around each of the proposed anchoring locations. If archaeological resources are present in these areas, the impacts from the anchor installation or anchor line drag would result in the direct damage or destruction of a resource or the removal of archaeological materials from their primary context. Therefore, BOEM will require 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. As discussed in Section 2.1.2, lease stipulations will also include the provision that if potential archaeological resources are identified within a 150.0-m (492.0-ft) of the radius around any of the proposed anchoring locations, then the lessee must relocate the proposed seafloor disturbing activities. Therefore, the proposed action will avoid any impacts to cultural 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 a small potential to affect offshore 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 (including traditional cultural 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 Feranandina 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/Hard bottom 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 3.12

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

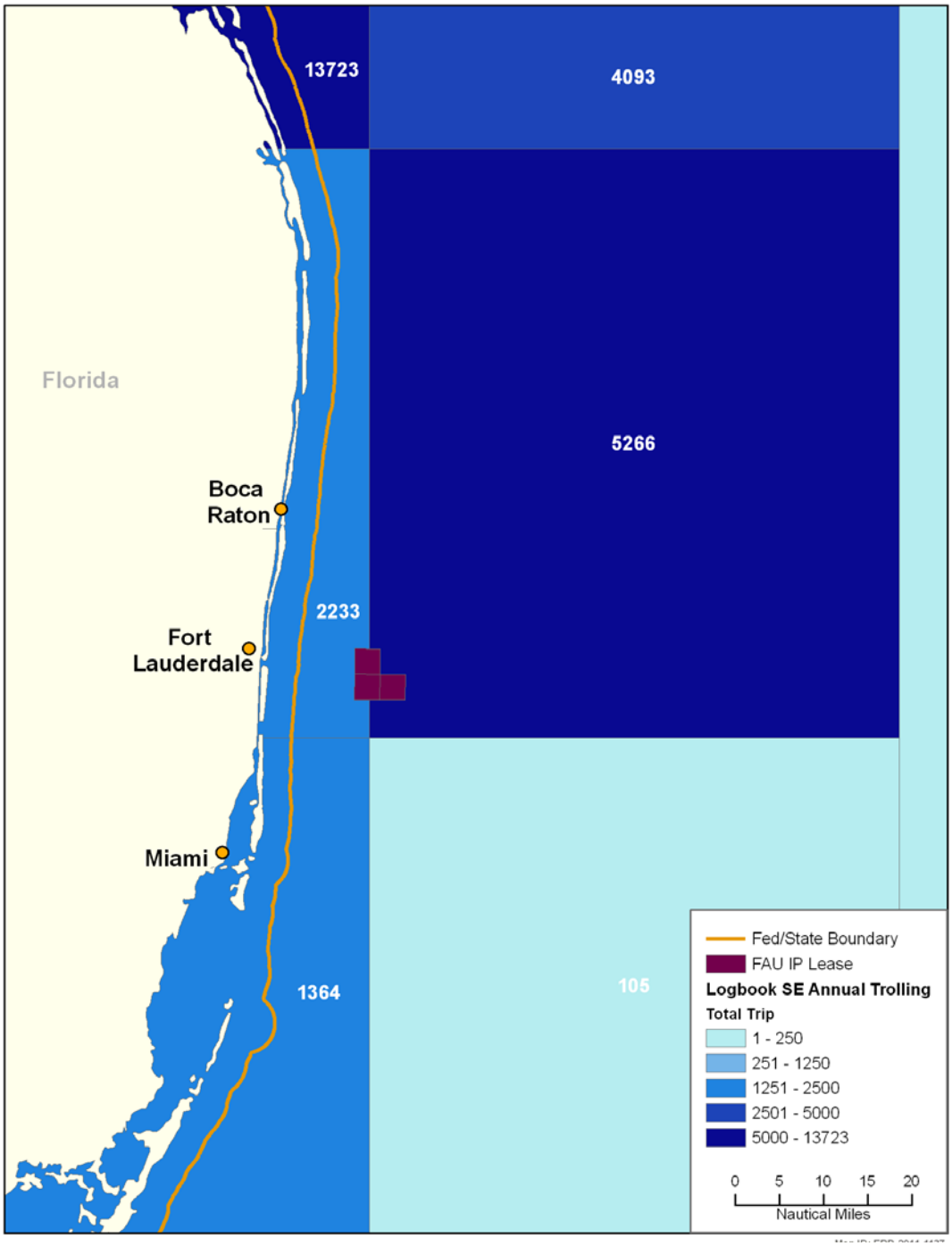

Figure 3.2. Annual total fishing trips for commercial troll gear for the period 2004-2009.
(Notes: Effort blocks equal one degree square (~60 nautical miles). Lease blocks are three miles square.)

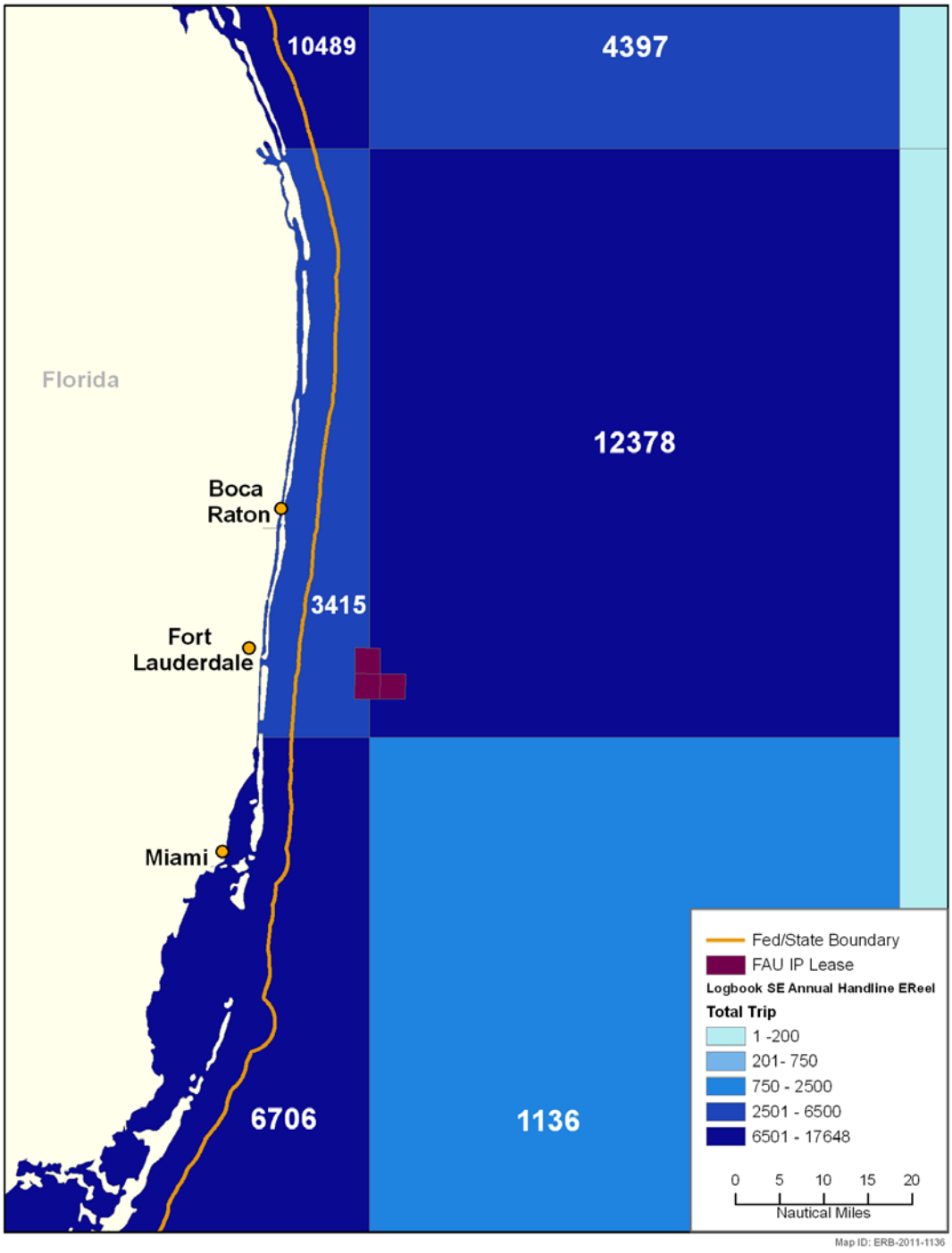

Figure 3.3. Annual total fishing trips for commercial handline and electric reel gear for the period 2004-2009.
(Notes: Effort blocks equal one degree square (~60 nautical miles). Lease blocks are three miles square.)

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 deployments 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 MHK device, 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, so commercial fishing vessels do not likely use the principle ports proposed by the applicants. 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 hard bottom 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 MHK device, 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 3.13

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 2.1.1, 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 3.14

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 3.15

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 2.1.1 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 3.16

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 3.16 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 3.16 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 2.1.1) 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.

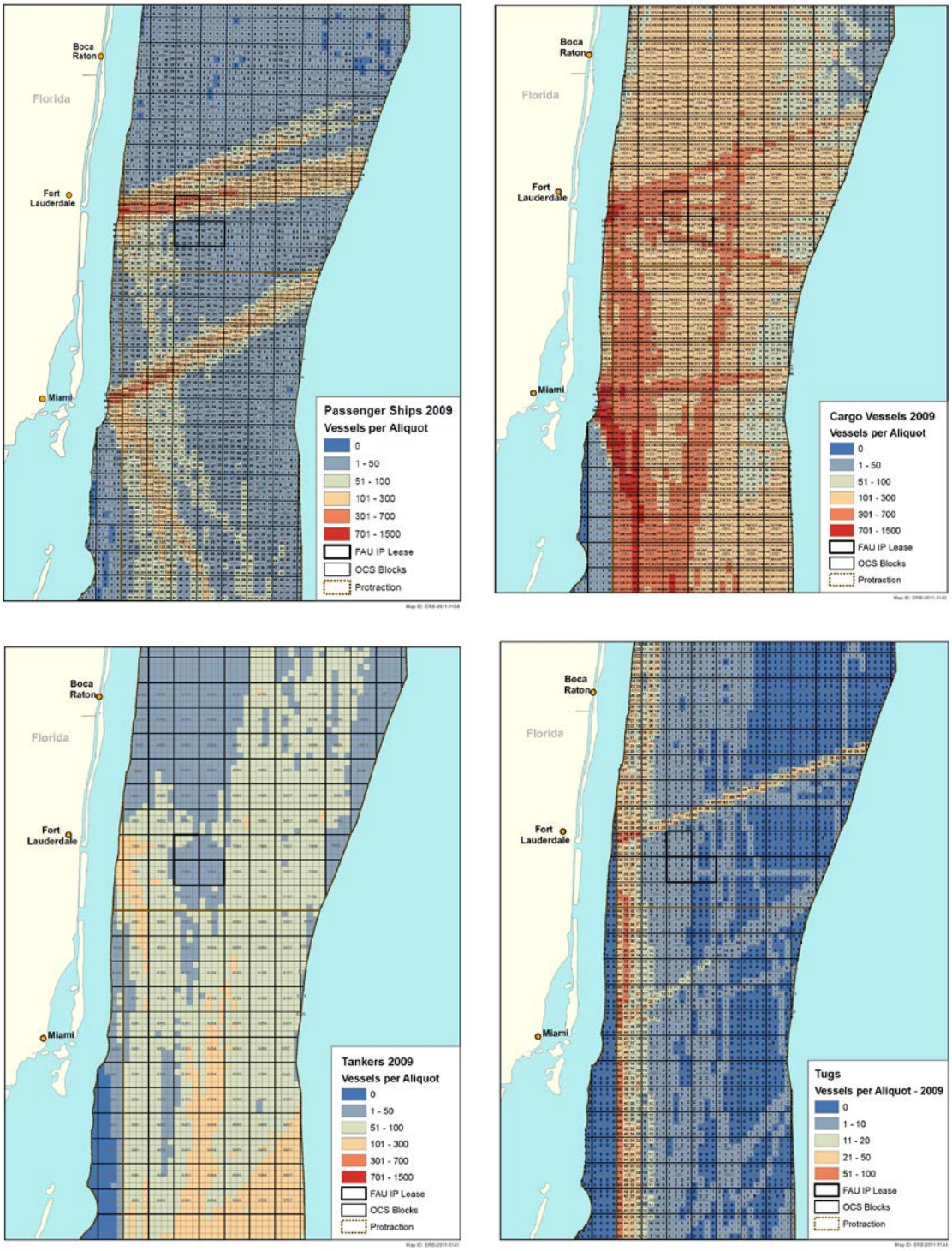

Figure 3.4. AIS data for vessel traffic in the Port Everglades vicinity per OCS aliquot. (Source: USDHS, USCG, 2012)

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 273-472 total vessel trips over a 5-year period (*see* Section 2.1.1). 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 Department of Defense (DOD) 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.

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 2.5, 2.6 and 2.7 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). Due to the reduction in size of the lease area, alternative B would also cause a reduction in geophysical surveys and associated vessel traffic when compared with Alternative A. 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 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 – 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 MHK devices; (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.

3.4 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 hallmark of the affected environment for Alternative A is one of 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 273 and 472 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.

Incremental Contribution of Alternative A

While between 273 and 472 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 concurrent 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 273-472 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

BOEM is making this EA available for public review. Comments on the EA will be solicited for 30 days following the publication of the Notice of Availability in the *Federal Register*.

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. Two 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.

In addition, 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.

4.3. Consultations

4.3.1. Endangered Species Act

As required by Section 7 of the ESA, BOEM is consulting 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, and birds. In addition, BOEM concludes that the proposed action will have no effect on ESA-listed fish and 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 these project design criteria, 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 (HRG Survey Protocol) that is reflected in the proposed action.

4.3.2. 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 EFH. The NMFS published the final rule implementing the EFH provisions of the Magnuson-Stevens Fisheries Conservation and Management Act (50 CFR 600.900) on January 17, 2002. OCS activities authorized by BOEM, including this proposed action may result in adverse effects to EFH, and therefore, require EFH consultation.

As required by the Magnuson-Stevens Fishery Conservation and Management Act, BOEM has analyzed impacts to EFH and HAPCs from the proposed action in this document and will initiate an abbreviated consultation with the NMFS via this document. This EA concludes that the proposed action is anticipated to impact the quality and quantity of EFH to some degree. 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.

4.3.3. 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).

4.3.4. 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. Additionally, 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).

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6. PREPARERS

NEPA Coordinators

Brian Krevor, Environmental Protection Specialist
Angel McCoy, Meteorologist

Resource Scientists and Contributors

David Bigger, Avian Biologist
Stephen L. Creed, GIS Specialist
Callie Hall, Oceanographer
William Hoffman, Archaeologist
Brian Hooker, Marine Biologist
Brandi Carrier Jones, Archeologist
Brian Krevor, Environmental Protection Specialist
Angel McCoy, Meteorologist
Michelle V. Morin, Chief, Environment Branch
Nina (Jean) Thurston, Environmental Protection Specialist

Reviewers

BOEM, Office of Renewable Energy Programs

Maureen A. Bornholdt, Program Manager
Casey Reeves, Florida Lead, Renewable Energy Program Specialist
Jennifer L. Golladay, Renewable Energy Program Specialist

BOEM, Headquarters, Office of Environmental Programs

Tamara Arzt, Headquarters' Coordinator, Environmental Protection Specialist
Kelly K. Hammerle, Environmental Protection Specialist
Sally Valdes, Aquatic Ecologist
James Woehr, Avian Biologist

USDOI, Office of the Solicitor

John Cossa
Cory Spiller

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 an 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).

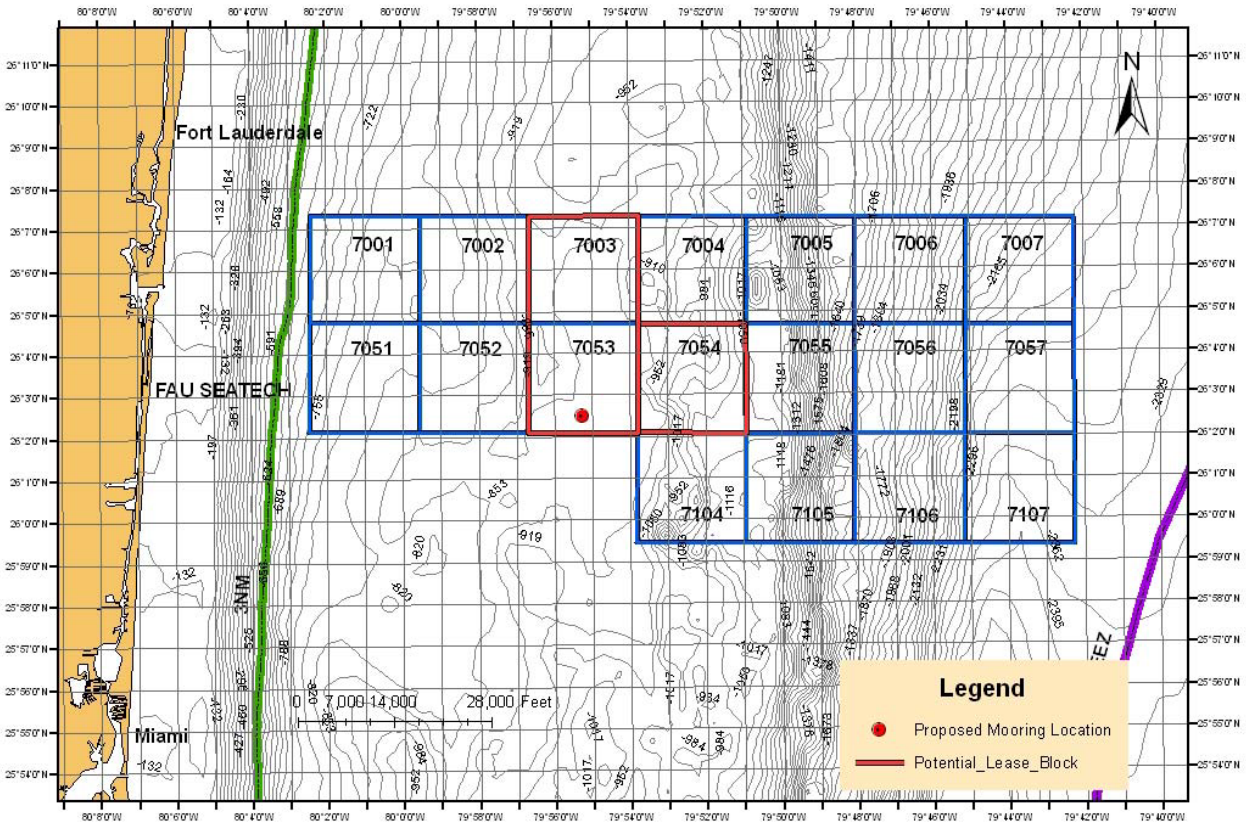

Figure 1: Location of the proposed lease area

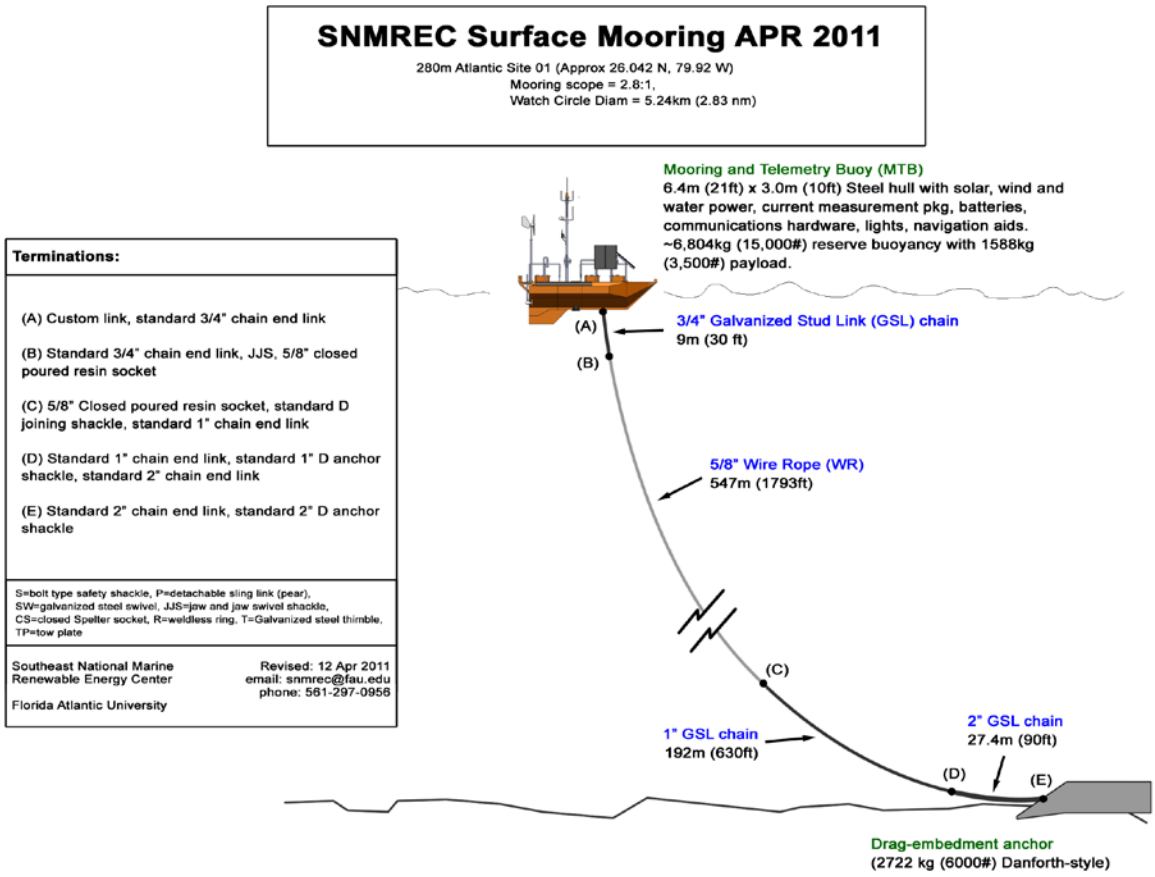

Figure 2: Proposed configuration of the data collection and technology testing buoy.

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 OMM

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