Environmental Studies Program: Ongoing Studies

Study Area(s): North, Mid, and South Atlantic

Administered By: Office of Renewable Energy Programs

Title: EMF (Electromagnetic Field) Impacts on American Eel Movement and Migration

BOEM Information Need(s) to be Addressed: Recently BOEM funded field experiments to evaluate the potential effects of EMF on elasmobranchs and lobster species in the Northeast using telemetry. Commercial fishermen in the region have consistently voiced their concern regarding potential effects of EMF emitted from submarine cables on commercially targeted fish species. The American eel (*Anguilla rostrata*), is a species of concern, that was not tested during these previous experiments. Inclusion eels in a follow-on EMF study would assist BOEM in future NEPA analyses of proposed projects in the Atlantic, as well as show a commitment from BOEM to the concerns raised by fishermen.

Total Cost: $694,511 **Period of Performance:** FY 2018-2020

Conducting Organization: University of Rhode Island

Principal Investigator(s): John King, jwking@uri.edu

BOEM Contact: Mary Boatman

Description:

Background: The effects of EMF emitted from submarine cables on marine organisms is of high concern to commercial and recreational fishermen throughout New England. While there are some studies, particularly from Europe, that indicate buried alternating current cables have little to no measurable effects on marine species, there is still concern for important US commercial species. Of particular interest in the Northeast, where wind development is most likely to occur first, are the commercially important American Lobster (*Homarus americanus*) and elasmobranchs (skates, etc.). BOEM funded the study *EMF (Electromagnetic Field) Impacts on Elasmobranch (sharks, rays and skates) and American Lobster Movement and Migration* in 2014. Field experiments for this study were completed in fall 2016 and data are currently being analyzed. The study used telemetry with tagged individuals being exposed to a high voltage direct current cable while in a cage to restrict movements. This new technique allowed for movements to be temporarily tracked with the precision of minutes, allowing for detailed evaluation of potential changes in movement in response to EMF.

Observations of eel movements around alternating current cables suggested that eels may be sensitive to EMF (Westerberg, 2008). The American eel was most recently petitioned for listing under the ESA in 2011, with a finding by the USFWS in 2015 that the listing was not warranted. Although the American eel population was determined to be stable, impediments to migration are still of great concern to the recovery of the population to previous levels. The American eel fishery is not currently large when compared to other commercial fisheries, however it is very important to some communities. From the 1970s to the mid-1980s, American eel supported significant commercial fisheries, with landings ranging from 2.5 -3.6 million pounds. Landings dropped to 1.6 million pounds in 1987 and have remained at low levels, ranging from 1.5 million to 700,000 pounds since then. Since 2010, increased demand for glass eels by foreign markets has led to a dramatic increase in the value of glass eels and record high prices of $2,000+ per pound. In 2015, glass eel harvest from Maine and South Carolina totaled 5,441 pounds, a decrease from 2014. In 2015, total eel landings (glass, yellow and silver eel combined) were valued at approximately $13.6 million (source: Atlantic States Marine Fisheries Commission). This study will extend the experimental design to the American eel (*Anguilla rostrata*). This species is commercially important and remains a species of concern due to a depleted population. The methodology developed for lobster and skates will be extended to eels.

Objectives: The objective is to elucidate the effects of EMF from an HVDC cable on American eels.

Methods: The experimental design used in the study *EMF (Electromagnetic Field) Impacts on Elasmobranch (sharks, rays and skates) and American Lobster Movement and Migration* will be modified for evaluating eel movements in response to the cable. The study will use telemetry to monitor eel movements in a mesh enclosure placed on top of an HVDC cable. A control site using the same type of enclosure will be used for comparison. Experiments will be repeated to ensure statistical robustness of the data.

Additional field work will include deployment of VEMCO receivers and tagging of eels will move through the study area unimpeded. This will allow evaluation of the movements and potential response independently from the enclosure experiments.

Current Status: Awarded March 2018.

Final Report Due: March 2020

Publications: None.

Affiliated Web Sites: None.

Revised Date: April 3, 2018