Seminar Announcement

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Wednesday January 20, 2016
12:15pm

WHOI-NEFSC Special Seminar Series on Fisheries and Ecosystem Acoustics

Assessment of Three Sonars to Evaluate the Downstream Migration of American Eel in the St. Lawrence River

Dr. Christopher W.D. Gurshin, Normandeau Associates, Inc., Portsmouth, NH
To be held at: NEFSC Stephen H. Clark Conference Room, NOAA Aquarium Building

ABSTRACT

The Electric Power Research Institute (EPRI) collaboratively funded the Eel Passage Research Center (EPRC) to develop methods for providing effective downstream passage of out-migrating adult American eels at hydroelectric facilities. Based on previous studies, EPRC's preferred strategy to provide safe downstream eel passage is to guide out-migrating eels to a collection point, transport them downstream, and release them back into the St. Lawrence below Beauharnois Generating Station. To evaluate eel behavioral responses to cues such as light, electricity, sound, and other stimuli for guidance to a collection point, a suitable sampling technique is essential to effectively monitor eel abundance and movements. In this study, three phases of research assessed the feasibility of three sonar technologies to estimate eel abundance, determine distribution, and describe approach behavior. First, a Simrad EK60 split-beam echosounder (120 kHz), Sound Metrics ARIS Explorer multibeam sonar (1100/1800 kHz), and Mesotech M3 multi-mode multibeam sonar (500 kHz), each equipped with dual-axis rotators, were deployed from the nose piers at Iroquois Dam for testing multiple sampling configurations at detecting artificial targets and tethered live eels. The second phase focused on experimentally testing whether known numbers and sizes of live adult eels tethered to surface floats released upstream of the sonar beams and allowed to swim through at known locations and times could be detected by the sonars. These eel releases at multiple ranges in conjunction with randomized releases of other known targets allowed for their detectability and classification error to be preliminarily assessed. Lastly, the three sonars collected data continuously to monitor for wild, out-migrating eels from 15 through 22 July and 17 through 19 September 2015. Preliminary results highlight several challenges in acoustically monitoring eels in a large, fast-moving river with a few orders of magnitude higher abundance of other targets that can lead to a high false positive error rate as a result of motion artifacts causing non-eel echoes to mimic the distinctive pattern of eel echoes. Thus far, the ARIS multibeam sonar, operating with 48 beams, holds the most promise for correctly identifying eels out to 16-20 m in range, but the M3 multibeam sonar has some value for tracking previously identified targets over larger areas.