

ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: National

Planning Area(s): Chukchi Sea and Pacific Coast

Title: An Opportunistic Study of Hearing in Sea Otters (*Enhydra lutris*):
Measurement of Auditory Detection Thresholds for Tonal and
Industry Sounds (NT-09-x10)

BOEM Cost: \$173,754.00

Period of Performance: FY 2009-2011

Conducting Organization(s): Long Marine Laboratory, University of California, Santa Cruz; PI Dr. Colleen Reichmuth

BOEM Contact: [Dr. James Price](#)

Description:

Background: Possible damage to the hearing of marine mammals and the consequent ecological impacts are of concern to BOEM in assessing environmental impacts of offshore operations. Considerable research effort has been expended to determine the sensitivity of marine animals (predominantly mammals, turtles, and fish) to sounds generated by offshore activities and consequences to the organisms' hearing, behavior, ability to navigate, find food, reproduce, track offspring, etc.. There now exists a fair amount of knowledge relevant to whales but much less that is relevant to other species. In particular, science knows almost nothing about pinniped hearing and the ecological impact of sounds on pinnipeds. This study will be the first step in acquiring the ability to make environmental impact assessments of offshore-operations-generated noise on sea otters.

Sea otters are common along the U. S. Pacific coast, an area of some existing oil and gas operations and a potential area for alternative energy development. Also, they have been seen in shallower areas of the Chukchi Sea, an area of possible oil and gas development. This proposed study will help BOEM assess adverse impact to these animals from offshore noise in the air (from support aircraft) and in the water.

Objectives: produce in-air and in-water audiograms (hearing sensitivity as a function of frequency) of sea otters covering a wide range of frequencies.

Methods: The audiograms will be obtained from behavioral techniques applied to trained sea otters in a laboratory very well equipped to make the necessary measurements of sound intensity, perform the training, and do the behavioral exercises with the animals.

Importance to BOEM: This study will determine the auditory range of sea otter hearing in and air and in sea water and thereby help in the assessment of sea otter vulnerability to noise generated by offshore renewable energy projects and associated ship and aircraft traffic. Sea otters are listed as threatened and therefore require protection. This information is needed for analyses and consultations under NEPA, ESA and MMPA.

Current Status: Awarded September 10, 2009; behavioral audiograms completed on first otter; work on a second test animal is proceeding; period of performance extended due to illness of the PI

Final Report Due: October 09, 2012

Publications: Ghoul, Asila and Reichmuth, Colleen , “Sound Production and Reception in Southern Sea Otters (*Enhydra lutris nereis*)”, *The Effects of Noise on Aquatic Life, Advances in Experimental Medicine and Biology 730*, Arthur Popper and Anthony Hawkins editors, Springer 2011, 695 pp

Affiliated Web Sites: <http://www.pinnipedlab.org/>

Revised Date: May 16, 2012

ESPIS: Environmental Studies Program Information System

All *completed* ESP studies can be found here:

http://www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp