Reference SON: *2014-ER-6: Ambient Noise Measurements on Aquatic Environments*

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Ambient Noise Level Measurement in the Aquatic Environment[1]

Research Need

Broad ranges of environmental circumstances such as water quality, surface conditions, underwater objects, and diversity and abundance of sound-sources, both natural and anthropogenic, influence the level and variability of ambient noise in the aquatic environment. Models demonstrating noise permeation through the aquatic environment are available but they lack the resolution needed for impact assessment (Schreiner 1990).

There is a need for a database of consistent, high-quality sound measurements reflecting ambient conditions in aquatic environments for comparison to sound levels produced by aquatic activities such as pile driving, dredging, dredged material placement, navigation and other anthropogenic sound sources. The USACE must be able to identify and differentiate ambient and construction related noise levels in order to assess environmental impacts, identify areas and organisms potentially affected, and determine where management or mitigation is necessary.

Project Objectives & Plan

The purpose of this work unit is to collect, process, and analyze ambient sounds and anthropogenic noise in aquatic environments. The principal goals are to sample and characterize acute and chronic noise associated with USACE activities (e.g., dredging, pile driving, bank armoring, and dredged material placement) and to establish ambient sound levels in harbors and shipping canals for comparison.

An available database of underwater sound files will support more quantitative assessment of impacts associated with aquatic construction activities, and inform management or mitigation needs.

Primary products of this research will include:

- An archived library of underwater sounds produced by natural processes (e.g., water movements, animal behaviors) and by anthropogenic activities (e.g., construction, navigation)
- A consistent and systematic methodology for sampling, processing and analyzing underwater sounds to ensure high quality data supporting assessment of impacts associated with dredging and construction activities;
- A self-contained sampling system that can be readily deployed and used by field crews to accurately measure noise levels.

Payoff

The proposed sound database will provide baseline data for comparison of anthropogenic to ambient noise levels. This project has wide application to Corps underwater construction and maintenance activities in both freshwater and marine environments, and will have particular utility in assessment of potential for impact of such activities on sensitive, or threatened and endangered species. The ability to deploy commercially available hydrophones with user-friendly interfaces will also enable USACE Districts to collect their own sound data, in a consistent and technically sound manner, to support defensible noise impact evaluations.

Products

Software

Software has been developed to assess the impact of underwater anthropogenic sound on marine mammals by application of marine mammal auditory weighting functions for permanent threshold shift onset acoustic thresholds. Contact EMRRP program manager for Python file and user guide.

Presentations

(2019). Conference Presentation Yangtze/Mississippi River meeting. Demonstration of software capabilities and how masking and behavior levels are determined.

(2019). Poster Presentation- UAS community of practice.

Project Activities

Established Inter-agency collaboration – National Marine Fishery Service, current regulatory agency – established collaboration, possible future training course. USACE lead: Katzenmeyer.

[1]Project Alias – Work Unit Documentation Title: *Ambient Noise Level Measurements in Aquatic Environments* ERDCpedia Title: *Ambient and Anthropogenic Sound in the Aquatic Environment*