

Final Report

PNW CESU Project P14AC01456 (Supporting the Ocean Noise Reference Station Network with Underwater Acoustic Monitoring at the National Park of American Samoa)

Project Abstract

The objective of the project is to establish a network of ocean noise reference stations in U.S. waters to monitor long-term changes and trends in the underwater ambient sound field. The plan was to deploy identical autonomous acoustic recording systems developed at Oregon State University (OSU) at each reference station to ensure proper calibration and consistency of the collected data sets. Beginning in 2014, the National Oceanic and Atmospheric Administration (NOAA) has deployed 9 acoustic monitoring locations in U.S. waters. A partnership between the National Park Service (NPS) Water Resources Division (WRD), the Natural Sounds and Night Skies Division (NSNSD), OSU, and NOAA would expand the network to include stations in two park units- NPSA and BUIS with the possibility of expanding if funding becomes available.

From an NPS perspective, this is an exciting collaboration because it would be the first long-term marine soundscape monitoring system for the agency, and because NPS would gain leverage through the partnership with OSU and NOAA. Understanding trends in ocean noise conditions within U.S. waters will help protect marine organisms, the integrity of the ecosystem, and visitor enjoyment of a healthy marine habitat.

Accomplishments

In collaboration with the National Oceanic and Atmospheric and Administration (NOAA), Oregon State University (OSU), and the National Park Service an Ocean Noise Reference Station (NRS) mooring was first deployed off Tutuila, American Samoa on June 9th 2015 at -14.2686, -170.7196 in 33 meters of water (NRS 10). The NRS installment was delayed from the original schedule of November 2014 to June 2015 due to transportation delays to American Samoa. Additionally, the original location was shifted from Ofu Island due to field support logistics. The autonomous underwater recorder (AUH) on the NRS mooring was programmed to begin data logging on June 15th 2015, and sampled continuously at 5000 Hz until April 5th 2016. A second AUH was programmed and shipped from Newport, Oregon in the summer of 2016 and swapped with the original hydrophone on August 18th 2016. The original

AUH was shipped back to Newport, Oregon for analysis and arrived on October 3rd 2016. Data was processed upon arrival to Newport and initial quality checks indicated that the AUH logged successfully (Figure 1).

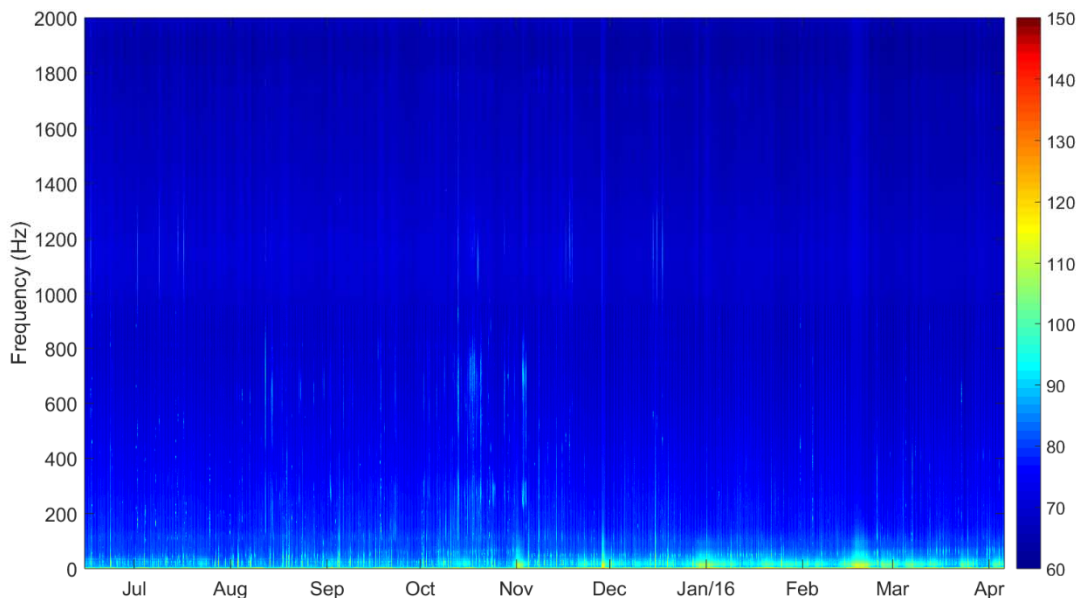


Figure 1: Long term spectrogram (1 Hz, 1 hr window) of continuous NRS10 data collected from June 2015 - April 2016. Color bar indicates sound level (measured in decibels).

In addition to the successful deployment, staff from NPS, OSU and NOAA participated in organization and logistics calls to discuss the instrumentation, analysis, and sharing of all NRS data. In 2015 calls occurred on: November 3 and December 1. In 2016, the calls occurred on January 5 and 21, February 29, May 16, June 20, Aug 22, September 8 and 28, and December 5.

Next Steps

Sound level analysis is on-going and results will be available in 2017. Preliminary fine scale soundscape analyses indicate presence of snapping shrimp and humpback whales, as well as anthropogenic and abiotic (weather, ocean processes) sound sources. On-going analyses will identify seasonal sound patterns and establish baseline sound level measurements for cross-NRS network comparisons, as well as to inform future acoustic monitoring efforts and support management of anthropogenic noise in the park. During analysis, sound clips from NRS 10 will

be selected to use for public and stakeholder outreach to raise awareness about natural sounds and preservation of sensitive species.

A second AUH swap is tentatively scheduled for August 2017. Future activity will be reported under the Pacific Northwest Cooperative Ecosystem Studies Unit task agreement P16AC00349.