**Title:** Acoustic Dynamics of Hawaiian Monk Seals (*Neomonachus schauinslandi*) at Lehua Rock, Niʻihau in Response to Tourism and Diel Vertical Migrations.

**Background:**

'īlio holo i ka uaua or Hawaiian monk seals (HMS; *Neomonachus schauinslandi*), is an endangered marine mammal endemic to Hawai'i, with current estimates suggest a population of around 1,500 individuals. Despite its endangered status, there is a gap in the understanding of the underwater acoustic communication patterns of free-ranging HMS. Prior research indicates marine mammals predominantly rely on sound for various activities such as foraging, mating, navigation, and communication. Existing data on HMS vocalizations stem from one individual in human-care, named Kekoa. Preliminary observations suggest the existence of six distinct underwater low-frequency call types, with a noted increase in vocalizations during the mating season.

**Objective:**

This research intends to characterize and analyze the underwater vocalizations of free-ranging HMS at Lehua Rock, Niʻihau, thereby addressing the observed knowledge gap. Moreover, it aims to describe the temporal patterns of these vocalizations and to investigate potential external influences on call frequency.

**Methods:**

A SoundTrap 500F passive acoustic monitor was deployed at Lehua Rock in May 2021, a region frequented by scuba divers. This monitor continuously recorded at a 96kHz sampling rate. Unfortunately, on the sixth day post-deployment, a monk seal interfered with the equipment, damaging the hydrophone. The gathered acoustic data were subsequently analyzed using spectrograms, which represent sound with frequency (y-axis), time (x-axis), and amplitude (color intensity). Inspection was conducted at 5-minute intervals per hour daily to discern and categorize both biological and anthropogenic sound sources.

The following parameters were noted for each detected sound:

- Species making the sound (Species.Code)

- Type of sound (Call)

- Date of the sound (Date)

- Start and end time of the call (Start.time and End.time, respectively)

- Amplitude or loudness (Parameter.1)

- For the 'whoop' call type, the count of whoops in a sequence (Parameter.2)

**Research Questions:**

1. Are vocalizations more frequent on days with no tourism activities?

2. How does diel vertical migration of species influence call frequency?