Shifting Signals: Exploring Geographic Echolocation Click Variation in Risso's Dolphins of the California Current

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For access to supplementary code and data related to this research, please visit the following GitHub repository: https://github.com/SarahShiers/BIO-708

Introduction to Research

Risso's dolphins (*Grampus griseus*), members of the delphinid family, are globally distributed, with documented populations residing off the coast of California. Little is known about the global ecology of the species, including their population boundaries, population structure, and distribution on a global scale (Soldevilla et al. (2017)). Their presence is observed both through vessel-based observations and by listening to their acoustic activities via passive acoustic monitoring (PAM). Risso's dolphins exhibit unique vocalizations that can be identified on spectrograms, spectral plots, and long-term spectral averages (LTSAs) using a stable and characteristic pattern of spectral peaks and notches that do not appear in the acoustic patterns of other delphinid species (Soldevilla et al. (2008)). While previous research has investigated echolocation click variation between differing geographical populations of Risso's dolphins in the western North Atlantic, the Gulf of Mexico, the Hawaiian Islands, and the Southern California Bight, this project will focus on data collected from central Oregon to Central California (Soldevilla et al. (2017)). This research is especially valuable at this time, given the impending construction of offshore wind energy areas in the waters of the United States West Coast, specifically in this study area. By focusing on this region and the geographic variation in Risso's dolphins present, a better understanding of the underlying environmental variables and distinct populations can be determined.

Soldevilla, Melissa S., Simone Baumann-Pickering, Danielle Cholewiak, Lynne E. W. Hodge, Erin M. Oleson, and Shannon Rankin. 2017. "Geographic Variation in Risso's Dolphin Echolocation Click Spectra." *The Journal of the Acoustical Society of America* 142 (2): 599–617. https://doi.org/10.1121/1.4996002.

Soldevilla, Melissa S., E. Elizabeth Henderson, Gregory S. Campbell, Sean M. Wiggins, John A. Hildebrand, and Marie A. Roch. 2008. "Classification of Risso's and Pacific White-Sided Dolphins Using Spectral Properties of Echolocation Clicks." *The Journal of the Acoustical Society of America* 124 (1): 609–24. https://doi.org/10.1121/1.2932059.