2015 SMALL GRANT IN AID OF RESEARCH – ANNUAL SUMMARY REPORT

Improving the detectability and categorization of California sea lions using unmanned aerial imagery

Karen Adame Fernández

Unidad La Paz, Centro de Investigación Científica y de Educación Superior de Ensenada. Miraflores 334, La Paz, BCS 23050, Mexico.

The goal of the study was to provide numerical support for the hypothesis that counts of California sea lions (*Zalophus californianus*) and their age and sex class categorization are less biased when using an unmanned aerial vehicle (UAV) to take photographs, opposed to when they counted and categorized from a boat, as it is traditionally done. To prove this, during 2015 and 2016, we conducted 12 surveys in which we counted and categorized the sea lions from Los Islotes rookery (Mexico) with both techniques (paired in time and space): from a boat and with photographs taken by an UAV. We compared the abundance estimates of both methods by fitting generalized additive models. The results were used to calculate the percentage of animals missed from the boat and to correct previous abundance estimates using the traditional method. There was a consistent underestimation of total sea lion counts, based on the traditional method, that ranged between 21.5 and 39.1% (99-% CI). Pups were the only class that was always underestimated when surveyed from the boat (up to 70%). The lack of consistency in the relationship between methods for juveniles indicated a problem of categorization during boat-based counts. These results served as the base for a larger study, which included UAV-based counts for all of the 13 sea lion rookeries in the Gulf of California, Mexico. The funds provided by the Society for Marine Mammalogy were key to the fulfillment of this research project. We are very grateful for this important contribution. An academic note was submitted for revision to the Marine Mammal Science Journal and is currently about to be resubmitted following the recommendations suggested by our reviewers and editor.