

Library Research Award Essay
Group Project
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The Galápagos Islands are a volcanic island chain located off the coast of Ecuador. They were initially discovered in 1535 by the Bishop of Panama, Tomas de Berlanga, and are named after the giant tortoises that many explorers came to see there. However, tortoises are not the only famous species to inhabit the archipelago. The islands are also home to a variety of creatures ranging from iguanas, sharks, birds, crustaceans, fishes, plants, and mammals that vary across islands and famously inspired Charles Darwin to write his *Origin of Species*. Given the enhancement of the species diversity throughout the islands, it is no surprise that the once pristine and untouched shores began to be inhabited by humans.

Starting in the 1500s and into the 1700s, human activity in the Galápagos Islands began with pirates, whalers, and other seafarers who used it as a place of rest and restock. Human presence became more permanent in 1832, when the first colonization was established, but did not increase exponentially until 100 years later when tourism started to boom. Currently, the islands are home to 30,000 human residents and are visited by hundreds of thousands of tourists each year. This increase in human activity impacts many of the native islands' species, including the Galápagos sea lions, *Zalophus californianus wolfebaeki*. In the 1970s the sea lion population encompassed over 40,000 individuals; this number has now fallen to around 10,000 due to anthropogenic activity causing injuries and spreading disease to the animals. Given the value of ecological conservation and restoration work, we are very grateful to Notre Dame for giving us the opportunity to travel to the islands and witness the amazing biodiversity first hand.

In the fall of 2024, we, Faith Groody and Kaitlin Mohlenkamp, participated in the Galápagos Islands Practicum in Field Environmental Biology and Geosciences, a class dedicated to learning about the unique features of the archipelago that have influenced vast amounts of evolutionary and ecological theory. Emphasis was made on all the research efforts undertaken

with the goal of keeping this territory of Ecuador a pristine and natural environment, some of which include complex invasive species removal programs and long-term rehabilitation of endangered populations. Over fall break, our class traveled to the Galápagos Islands and participated in on-site lectures and activities encompassing historical, geological, and biological features of the archipelago. In addition to these classes, we participated in partner fieldwork to collect data on desired species present there and practiced data analysis to procure discussable results, which we presented in a research paper after the trip.

Our research question focused on the population density and vocalization patterns of the Galápagos sea lion in wild and urban environments; we wished to understand how anthropogenic activities impacted sea lion density and behavior as compared to their metrics in more wild environments with limited human activity. We defined our urban environment as one with high human activity, such as the market place in the town of Puerto Ayora on the Island of Santa Cruz, and our wild habitats as islands with little human disturbance, such as the Island of Santa Fe, which has no human structures but daily, regulated tourist activity. To measure population densities, we approximated the area using Google Earth, and we counted the sea lions in the field. We also took photographs using a GoPro we rented from Hesburgh Library, and we analyzed these photos after our trip. The duality of the GoPro being able to capture videos on land and in the water was invaluable as it allowed us to record the sea lions in both of their habitats. Additionally, to measure the vocalization frequency, we rented voice recorders from Hesburgh Library and took multiple 20-minute recordings at our location sites that were then analyzed after the trip for vocalization count. We were further able to request extensions to continue renting the technology for longer than the maximum rental periods as we needed time to extract our data off the GoPros and recorders for analysis. Before and after the trip, we used

the Web of Science to find papers on Galápagos sea lions. Having a robust search engine like the Web of Science allowed us to refine our searches and only showed us paper options we had access to, expediting our literature search.

Our data showed that Galápagos sea lions were found in higher densities at wild sites as well as one of the urban sites, and there was a greater diversity of sea lion categories (alphas, mid-aged, and pups) present at the wild beaches. We also found that sea lion vocalization occurred at higher frequencies at the beaches and was influenced in different capacities by intraspecies interactions and human presence at wild sites. Our results show promise in quantifying anthropogenic influence on these endangered populations and improving human understanding of how these influences could be remediated for *Z. wolfebaeki* in the Galápagos, and this research could not have been done without the resources of the Hesburgh Library, from our GoPro and voice recorder rentals to our use of the literature databases.

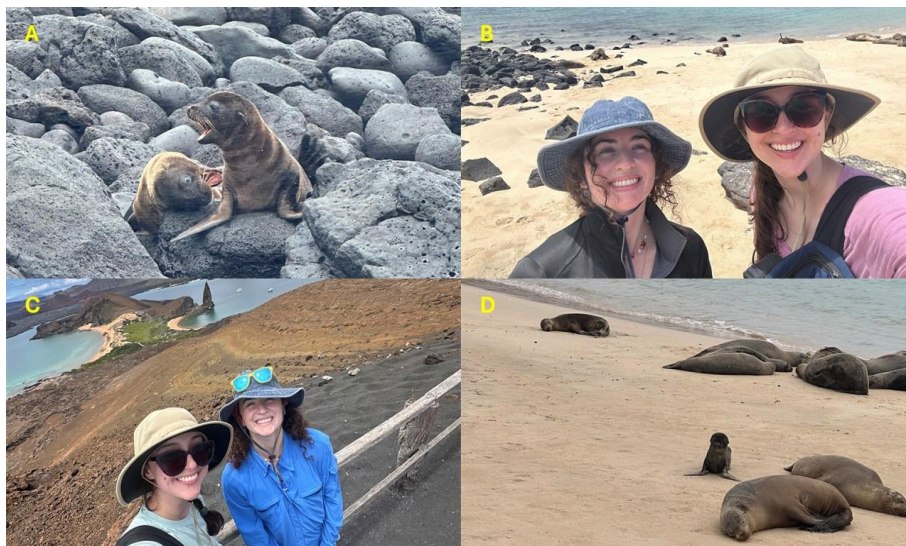


Photo Captions: A) Sea lions pups playing on the Island of Santa Fe B) Faith and Kaitlin on the Island of Santa Fe with sea lion population behind them C) Faith and Kaitlin on the Island of Bartolome D) Sea Lion population on the Island of Santa Fe.