

Galápagos Sea Lion Behavioral Differences in Relation to Human Exposure

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Figure 1. Basking Galápagos sea lions.

Introduction

- The Galápagos Sea Lion (*Zalophus wollebaeki*) is an endemic species to the Galapagos Islands and is regarded as an endangered species by the IUCN.
- They play an essential role in oceanic ecosystems, feeding on sardines and squid, but also preyed upon by sharks and orca whales.
- Based on previous studies, increased human exposure disturbs sea lion populations by altering behavior and potentially impacting reproductive and population growth rates.
- We hypothesized that sea lions would behave differently on beaches with greater concentrations of humans.
- Specifically, if there are greater concentrations of humans on sea lion-populated beaches, we predicted a positive correlation between sea lion aggressive behavior and the number of people present.



Figure 2. Juvenile sea lion interacting with snorkeler

Study Area

- The study was conducted on three different beaches in the southwest region of the island of San Cristóbal, Ecuador in mid-July 2014.
- At low tide, the beaches consist of many rocks along the shoreline, on which many of the sea lions would bask.

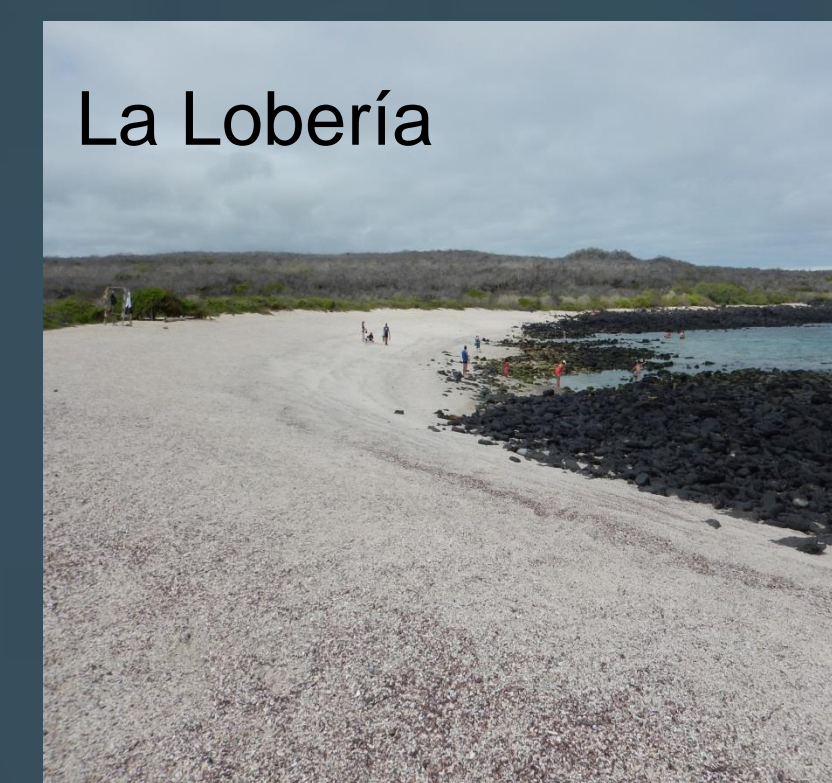
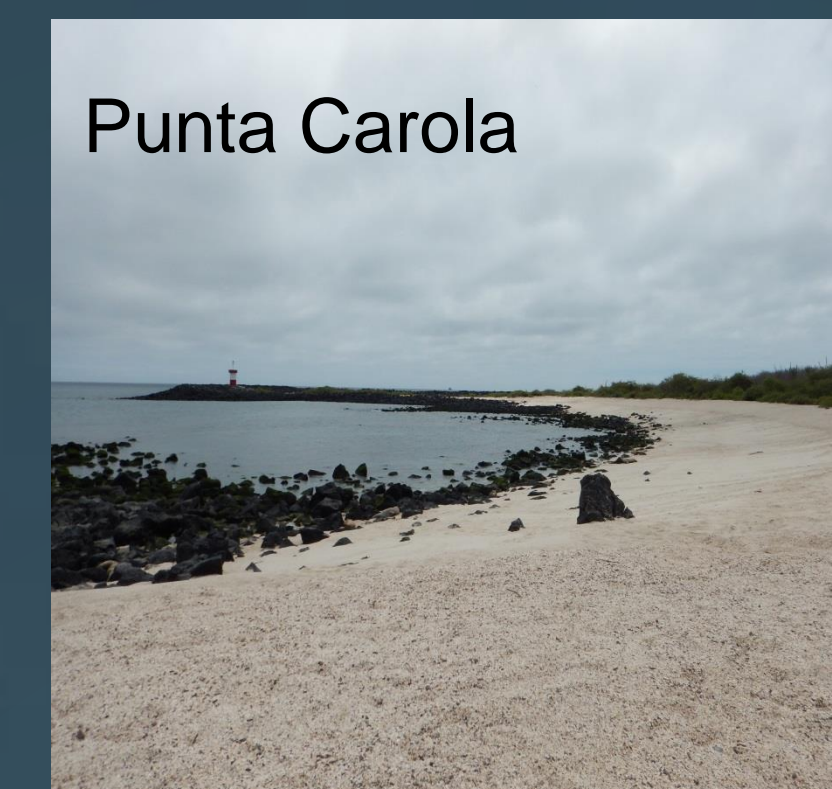
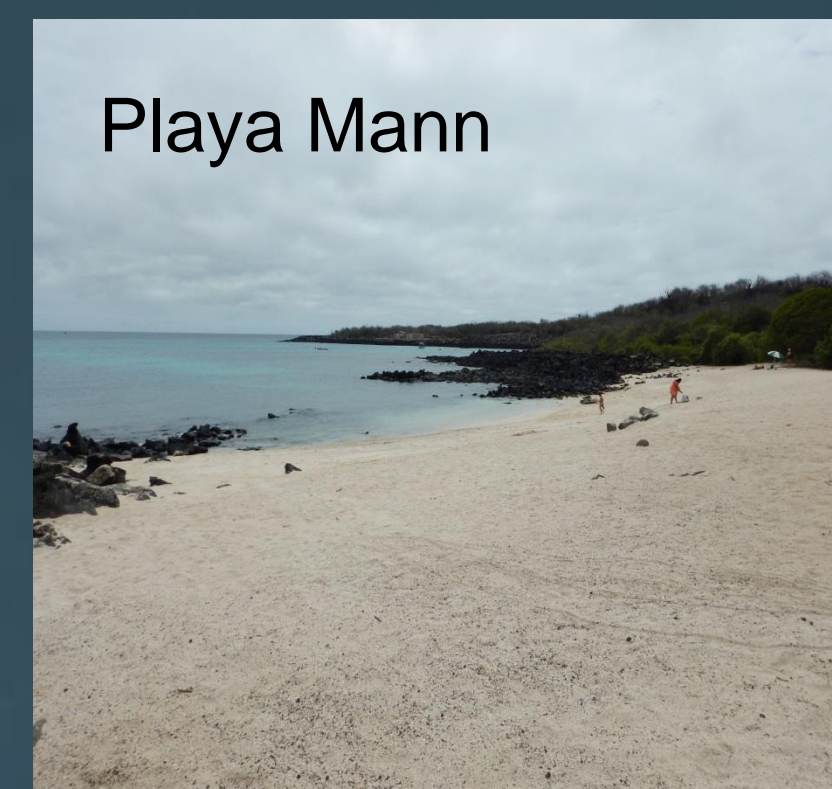


Figure 3. Beach study sites

Methods

- We classified sea lion behaviors (land and water) prior to surveying behavior and surveyed sea lion behavior daily at low tide for 2-3 hours.
- Data collected included: total number of sea lions and humans, sea lion behavior, time of behavior and survey area (in 1000m²).
- Data analysis included:
 - Chi-squared test between observed and expected numbers of sea lions and people for each beach.
 - Chi-squared test between the observed and expected behaviors for each beach.

Results

Table 1. Chi-squared test for number of sea lions and humans on beaches. All results were significant.

Beaches	Observed	
	Mean Number of Sea Lions/1000m ²	Mean Number of People/1000m ²
Playa Mann	50.65	16.29
Punta Carola	29.19	2.80
La Loberia	20.05	20.55
Beaches	Expected	
	Number of Sea Lions/1000m ²	Number of People/1000m ²
Playa Mann	18.40	7.30
Punta Carola	59.47	23.60
La Loberia	22.02	8.74

Table 2. Chi-squared test for number of behaviors on beaches. All results were significant.

Beaches	Observed					
	Number of Aggressive Land Behavior/1000 m ²	Number of Aggressive Marine Behavior/1000m ²	Number of Interactive/Non-aggressive Land Behavior/1000m ²	Number of Interactive/Non-aggressive Marine Behavior/1000m ²	Number of Non-human Related Land Behavior/1000m ²	Number of Non-human Related Marine Behavior/1000m ²
Playa Mann	23.10	3.55	19.55	14.22	269.23	19.55
Punta Carola	4.95	0.27	9.07	6.05	213.92	11.82
La Loberia	20.80	3.71	15.60	23.02	176.77	42.33
Beaches	Expected					
	Number of Aggressive Land Behavior/1000 m ²	Number of Aggressive Marine Behavior/1000m ²	Number of Interactive/Non-aggressive Land Behavior/1000m ²	Number of Interactive/Non-aggressive Marine Behavior/1000m ²	Number of Non-human Related Land Behavior/1000m ²	Number of Non-human Related Marine Behavior/1000m ²
Playa Mann	9.00	1.39	8.15	7.98	121.58	13.58
Punta Carola	29.08	4.49	26.33	25.77	392.88	43.88
La Loberia	10.77	1.66	9.75	9.54	145.45	16.25

Conclusions

- Based on these results, sea lions behaved more aggressively on beaches with higher concentrations of humans than on beaches with less people present ($p < 0.001$). Sea lions may behave aggressively towards humans as a means of defending their offspring or because humans tend to disrupt their natural behavioral states. Previous studies have found that increased human exposure can lead to a decrease in population size in sea lions. Since tourism in Galapagos Islands has increased over the last several decades, increased human/wildlife interactions may result in negative impacts to wildlife populations.