



# Hurt or Help? The Effect of the COVID-19 Pandemic on the Lower Columbia Basin Salmon Fishery

Mei Li Qing Wei Robben Dott, Comparative Behavioral Research (PSY 224)

Dr. Heide Island, Dept. of Psychology | Pacific University | 2043 College Way | Forest Grove, OR 97116

## Introduction

Astoria, Oregon is a small fishing town located in the mouth of the Columbia River Gorge. Since it was founded in 1811, Astoria has been a city built on the fishing industry. However, within the last 30 years California sea lions have made their home along the docks and disrupted the flow of this industry by consuming large numbers of salmon..

### Empirical Questions

1. How will the Oregon Shelter-In-Place order affect the Astoria salmon Fishery?
2. How will the Oregon Shelter-In-Place order affect the prevalence of sea lions in the Columbia River?

The male California sea lions have migrated from their natural habitat into the marine waters of the Columbia River. One of the main places this species can be found is Astoria, Oregon, located in the Lower Columbia River. This species has proven to have made an impact on the commercial fishing industry, sport fishing, and local tribal fishing in this area due to its overconsumption of fish. Currently, the methods used for the removing sea lions include killing via lethal injection, shooting, and relocation. Which have all become legal after the repeal of the Marine Protection Act. These methods have proven to be unsuccessful in managing this issue.

Sea lions can spend 12 hours or more of their day hauled out on docks sleeping (Rochmis, 1999). During other times of the day the sea lions will fish, guard and defend territory from other encroaching sea lions. Bull sea lions show aggression and defend their area by barking.

Sea lions have been in Astoria since it was founded in 1811 and have continued to make it their spring and summer feeding ground. The overconsumption of fish from sea lions became an issue for fishers in the later 1990's (Frankowicz 2017). Fisherman have tried a variety of methods to make the habitat undesirable. These include the addition of bumpers (pool noodle like foam that attached to the edges of docks), placing "air dancers" on the docks, and relocation. All these techniques have failed as the sea lions have proven to be a resilient species. However, there are other methods that have not yet been explore including undamming of the Bonneville Dam and Snake River Dam, and implementation of other devices to make docks undesirable.

The investigation of sea lion predation on the salmon fishery and methods historically used to remove them, we may find more effective ways to keep this species from interfering with the fishing industry.



Astoria , Oregon is located at the mouth of the Lower Columbia River. The proposed study site includes 2 main docks along the river walk. One is boards located under Buoy (pub and restaurant), and the other is located at the East Mooring Basin.

## Proposed Method

### Proposed Target Species

This studies target species is the California Sea Lion (*Zapholus californious*). This species is native to California and travels to the Oregon and Washington Coast during the Spring and Summer. The sea lion has distinct ear flaps, and large front and back fins to allow "walking" on land. One of these locations is Astoria, Oregon. The sea lions make the trip into these brackish marine waters, to feast on the Chinook Salmon (*Oncorhynchus tshawtscha*). These salmon are also an important resource to local fisherman, those in the sport fishing industry, and tribal fisheries. To maintain this resource, people have begun killing the sea lion. The predator, the California sea lion, is searching for salmon in the Lower Columbia River, it's predator; the fisherman aims to kill it to maintain the salmon supply of this region.



### Proposed Materials

The main part of this study includes the formation of an ethogram from observations. A key material is "Rite in the Rain" paper because Astoria, Oregon is a very rainy climate. In Astoria it rains more days of the year than not. This paper, as well as pencils will be used to write detailed observations, and take down counts of specified events and behavioural. These will then be logged into Excel data sheets. This material will be used to record the amount of sea lions present during different times of day during spring and summer months. The numbers of salmon taken in by fisherman March through August of 2020 will also be recorded.

Other materials used in the study include devices for measuring oceanic variables. This includes an app called TideTrac for tracking the tides, thermometers for measuring water temperature, anemometers for measuring wind speed, and a nephelometer for measuring turbidity. A Bushnell trophy camera will be set up on the East Mooring Basin, and personal recording devices will be used to record sea lion sounds.

### Proposed Design and Procedure

The main part of this study will include an ethogram built off observations taken during interval scan sampling. Sampling will occur at 3 times during morning, afternoon and evening at the East Mooring Basin. The dock will be observed and the behaviors of the sea lions will be recorded. The number of sea lions present on the dock will be counted and then recorded. The times of day will correlate with the low tides of that season. Events recorded include diving off the dock, and acts of aggression. When sea lions aren't spending their day sleeping, or eating, they are protecting their territory. Bull sea lions spend a large portion of their day diving for food, they eat 15-35 pounds of food per day.

Another component of this study will be citizen scientist reports. These responses will be from local citizens and fisherman. This will include any sightings of sea lions along the Lower Columbia River. The sea lions in Astoria make their main residence at the docks by the East Mooring Basin and underneath Buoy (local restaurant). When they aren't inhibiting these location's sea lions have been spotted in differing locations along the Columbia River. Citizen scientists and fisherman can notify researchers of locations where sea lions are present. The reporters include fishers who regularly survey the waters. Fisherman will report the amount of salmon they are able to attain, and locations where sea lions were present, including how many sea lions were seen.

## Proposed Analyses

To answer the question of whether the Shelter-In-Place order in Oregon during the COVID-19 pandemic protected the salmon fishery, a Pearson's r correlation will be conducted for the months of March, April, May, June, July, and August of 2020 relative to the last 5 years. This will look at the fish catches of salmon in Astoria and in other fisheries along the Columbia River.

Bull sea lions continue to migrate into the Columbia River every year after during the spring and summer. It is predicted that as the numbers of fish in the Lower Columbia River rise, the numbers of sea lions who return each year will also continue to rise. Sea lions who preside in this area continue to find the same food source each year as they gather fish from Astoria and up to other areas along the Columbia, including the Bonneville Dam.

It was predicted that sea lions would predate at specific times of day along preferred marine areas of Astoria. These areas will correlate with tidal changes. Sea lions are opportunistic, therefore it is further predicted they will fish during low, slack tides, when the current is weakest. Further, their preferred prey, Chinook salmon, is also most abundant during low tides when the water conditions are least brackish.

### IMPLICATIONS FOLLOWING COVID-19

predict to see a rise in the amounts of salmon being brought in by fisherman following the COVID-19 outbreak. As the sea lion population is managed, I expect that there will be less competition between sea lion and fisher, and less and less sea lions will lose their lives due to their overconsumption of salmon.

## Implications

The current world pandemic of COVID-19 in Spring of 2020 has had a large impact on the fishing industry in Astoria, OR. As the number of fisherman who work and continue their jobs lessens, there are more fish in the Columbia River Gorge.

The population of the five different salmon species in the Pacific Northwest has been steadily declining. This change in the salmon population is partially due to the numbers of sea lions who are actively fishing and feeding off highly populated salmon areas. By learning about more permanent solutions of deterring sea lions and enable fishers to attain salmon, the fishing, sport and tribal fisheries will no longer have to worry about a dwindling salmon supply in the river. By repealing sea lions from areas along the Oregon coastline, the fishers will be able to meet the demands of salmon needed to keep this industry alive.

## Select References

- Costa, D. P. (2000, December 1). Foraging energetics and diving behavior of lactating New Zealand sea lions (*Phocartos hookeri*). *Journal of Experimental Biology*, 203(23), 3655-3665.
- Frankowicz, K., & Ap. (2017, November 25). Northwest Fishermen Struggle to Find NextGeneration of Workers. *Oregon Public Broadcasting*
- Langdon-Pollock, J. (2006, January). A Study in Two West Coast Marine Fishing Communities, Astoria and Newport, Oregon. *Pacific States Marine Fisheries Commission*.
- Milne, A.O., Grant, R.A. Characterization of whisker control in the California sea lion (*Zalophus californianus*) during a complex, dynamic sensorimotor task. *Journal of Comparative Physiology*, A 200, 871–879 (2014).
- Richard, T. (2015, April 19, 2019, January 9). Hundreds of Sea lions on Astoria docks draw steady stream of onlookers. *The Oregonian*.

A complete list of references are available upon request.