

A summary of the increased strandings and human interaction cases across 6 pinniped species
Ana Noel

The objective of the study was to look at spatio-temporal trends in age, sex, species, and human interaction (HI) cases in 6 pinniped species on the coasts of Oregon and Washington from 1991-2016. They hypothesized that the number of HI cases and strandings will increase during the length of their study because of rising population growth, range expansion, and the ability to better respond to stranded pinnipeds. They also hypothesize that different species will strand in different areas throughout the coast.

15 regional response network members collected data from 1991-2016 on the coasts of Washington and Oregon and were sent to the National Marine Fisheries Service (NMFS) and the National Oceanic and Atmospheric Administration (NOAA). “Level A” data was collected which includes the ID number, observation date, stranding location, latitude and longitude coordinates, age class, sex, species, stranding condition, and other observational data such as evidence of injury or HI cases. They looked at the total number of cases resulting from HI by recording “yes,” “no,” or “could not be determined” and indicated the cause such as fishing gear, boat collisions, etc.. Measurements were taken to see what type of HI had the greatest effect on each species, age group, and sex. They ran a statistical analysis to see if the number of strandings were different between age, sex, species, and location. They looked to see if HI cases and strandings changed over their study period and looked at spatial and temporal patterns.

They found that 14,729 pinnipeds stranded during the length of their study with 29% standing alive, 31% recently dead, and the rest being in a state of decomposition. Out of the 6 species recorded, the majority of the strandings were harbor seals (69%), followed by California sea lions (19%), followed by smaller numbers of the remaining pinnipeds studied. HI was found

in 11% (1,652) of the strandings with the greatest number of cases (38%) being recorded as “other,” followed by gunshot wounds (37%) and fishing gear entanglement (21%), although, they found that each age group had different HI cases. For example, fishery interactions were the most common in yearlings (40%), where gunshot wounds were more common in adults (58%). Differences in strandings across species were observed such that more males (78%) stranded than females (1%) in California sea lions and that 61% of strandings in harbor seals were pups. They looked at temporal patterns and found that, since 1991, the number of strandings has significantly increased: in 2003 it went from 341 strandings per year to 792 strandings per year. They saw an increase in the number and prevalence of HI cases from 1991-2016 with there being 28 cases per year up until 2002 and 98 per year after, specifically in gunshot wounds, fishery entanglement, and boat strike injuries. They noticed that the number of strandings varied by month, for example, harbor seals stranded more in June through September and California sea lions stranded in May and again from August to November. They looked at spatial patterns and recorded more strandings along the inland coast of Washington and the Oregon coast as opposed to the outer Washington coast. They noticed the data for HI cases was similar with 33% of cases being on the Oregon coast, 50% on the inland Washington coast, and 17% on the outer Washington coast. HI cases were found to be different throughout each region with boat collisions and fishery entanglements more prevalent in the inland Washington waters, where gunshot wounds were more common along the Oregon coast.

This data can help further conserve and manage pinniped species and increases our awareness as to why these species are stranding and where they are stranding so we can help save and release these stranded species. This paper has given areas of HI hotspots which we can try and manage or reduce the number of HI cases in these areas because we now know what type

of HI occurs in each location. For example, restricting or banning fishing gear on the inland Washington coast because that was found to be the number one reason for HI strandings in that area. These findings are significant because it looked at 6 different species and found a different result for them all which can help us protect each species individually and be able to come up with conservation methods for each species as opposed to only implicating one conservation method for every species with the risk of it not working for all species. This paper also implies that action is needed because the number of strandings and HI cases are increasing and most likely will continue to increase if nothing is done to stop it. The increase could be due to more people finding these stranded pinnipeds or more awareness and the paper mentioned how some cases may not be strandings and some people may have called in a pinniped when it was actually resting, so the findings also suggest further research be conducted as well.

Their hypothesis was correct because they did see an increase in HI cases and strandings throughout their study. The reasons for the strandings in their hypothesis (rising population growth, range expansion, and the ability to better respond to stranded pinnipeds) was less correct because they mentioned in their conclusion how an increase in HI strandings was most likely due to changing population dynamics, public awareness, enhanced stranding response effort, improved ease of reporting, and continued coastal socioeconomic development. They also noticed that each species tends to inhabit a specific area of the coast so they didn't really see range expansion and noted in the introduction that harbor seals reached a carrying capacity in 1999, so population growth wouldn't be as prevalent. Their second hypothesis was correct because they saw that different species did strand in different locations throughout the coast and that these strandings were not uniform.

Warlick, A.J., D.A. Duffield, D.M. Lambourn, S.J. Jeffries, J.M. Rice, J.K. Gaydos, J.L. Huggins, J. Calambokidis, L.L. Lahner, J. Olson, E.D. Agnese, V. Souze, A. Elsby, and S.A. Norma. Spatio-Temporal Characterization of Pinniped Strandings and Human Interaction Cases in Pacific Northwest, 1991-2016. *Aquatic Mammals* 2019, 44(3), 299-318.