

# Relationship between Sea Otters and Aquatic Vegetation:

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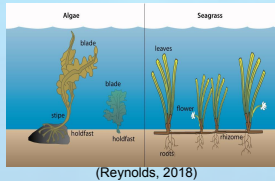
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## Abstract

Sea otter populations have had a long journey from the brink of extinction after being extensively hunted for the fur trade in the 1800s. Legal protections enacted in the U.S. and Mexico have helped the population recover. In order to better understand how the reemergence of otters in these marine ecosystems has affected the kelp forests and other aquatic vegetation, we compiled data from the scientific literature to see whether or not larger otter populations are correlated with more abundant populations of kelp and seagrasses. We used the search terms "sea otters," "kelp forest," "benthic grazers," and "aquatic vegetation" to locate relevant sources for our study. We found that in areas with a larger sea otter population, there is a larger population of kelp and other aquatic vegetation, as well. This will provide awareness of the ways in which the loss of a keystone species can affect an aquatic ecosystem.

## Seagrass and Kelp

Both seagrass and kelp are types of aquatic vegetation. Seagrass is a vascular plant and has a full system of roots, stems, and leaves. Kelp, however, is a type of algae and has no vascular system.



## Materials & Methods

For this study, we looked for sources of information on SCOPUS and Google Scholar relating to our topic. We used the keywords: "Sea Otters," "Kelp," "Seagrass," and "Sea Urchins." We chose sources from the results and compared the results of their studies to answer our question.

## References

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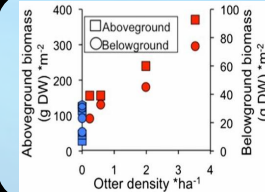
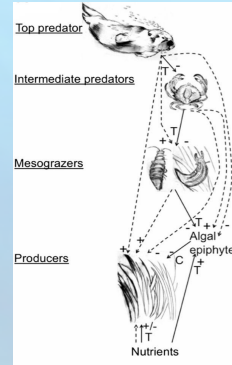
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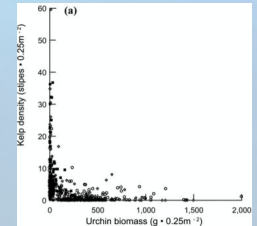
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**Figure 1:** This figure shows the top-down food web and summarizes the effect that sea otters have on vegetation, like seagrass and kelp (labeled "Producers"). The sea otters eat the benthic grazers (labeled "Mesograzers"), which eat seagrass and kelp. A large decline in the population of otters could lead to a trophic cascade caused by an overpopulation of grazers.



**Figure 2:** This graph shows the mass of different above- and below-ground seagrass beds in the different testing sites vs the number of otters. Each icon represents a bed of seagrass. The blue symbols are from the first test site with a low otter population and the red symbols are from the second site with high otter population. This graph highlights the positive effect that sea otters have on seagrass.

**Figure 3:** This graph shows the relationship between sea urchins and kelp. Each symbol represents a testing site and the type of symbol determines the density of otters at the site. Open circles had a low density of otters (>6 otters per km), solid squares had a high density (>6 otters per km), and shaded diamonds represent sites that didn't record otter density. This graph shows the negative effect that too much sea urchin predation has on seagrass.



## Discussion

**Significance:** We conclude that sea otters and vegetation have a positive relationship, in which the presence of sea otters allows for the growth of aquatic vegetation. Where otters are present, they regulate the populations of other species, keeping their marine habitats in balance by reducing the populations of mesograzers.

**Future Directions for Research:** Investigation into the reintroduction of sea otters and the resulting effects on aquatic vegetation could help us to understand where human interventions could help manage the health of these ecosystems.

## Acknowledgements

Professor Nathan Rank, Professor Martha Shott, Professor Wendy St. John, Ellie Foster, & Professor Brent Hughes