Planning and Incentivizing Native Oyster Restoration in Southern California

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Meet the Native Olympia Oyster

Ostrea lurida, the Olympia oyster, is the only oyster native to the west coast of the United States and was once highly abundant in bays and estuaries along California's coastline. Their populations declined in the early 1900's due to overharvesting, pollution, and habitat destruction. Today, Olympia oysters are found throughout Southern California but populations are small and conditions are not ideal for oyster bed formation.

Why Native Oysters?

With 70% of California's population living in counties directly on the coastline, people are putting a significant amount of stress on coastal ecosystems due to pollution, erosion, and habitat destruction. One way to mitigate these impacts in California is to restore native oyster beds. Oyster beds have been shown to help with water quality improvement, shoreline stabilization, and the production of food and habitat for fish and invertebrates.

Project Significance

Along the eastern coast of the United States and in the northern region of the west coast, numerous oyster restoration projects have occurred. Despite their importance within estuarine ecosystems, there have been few oyster restoration projects in Southern California. This project aims to provide tools and economic incentives to motivate the support future restoration efforts.

Objectives

The goal of our project is to answer the following questions:

1. **Where are native oysters in Southern California?**
2. **What are the incentives for native oyster restoration?**
3. **How do we foster successful restoration?**

Conclusion

This project indentifed the presence of native oysters in Southern California through spatial analysis, began quanitifying the economic incentives for doing restoration through the use of cost benefit analysis and bio-economic model, and developed communication strategies such as an ArcGIS story map and public service announcement videos to help showcase the importance of this project.

Acknowledgments & References

Group Project Advisor:
Professor Hunter Lenihan

Additional Advisors:
Jose Zenteno, Professor Danielle Zacherl

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Group Project Client:
Carpinteria Salt Marsh Reserve

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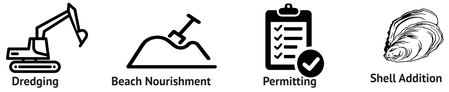
Methods

Spatial Analysis

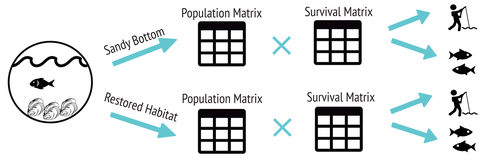
Oyster Presence Data Collection: Literature review, visits to natural history museums, interviews with oyster experts, surveys in local bays and estuaries

Economic Incentives

1. Shoreline Stabalization: Cost benefit analysis comparing restoration to traditional shoreline stabilization methods



2. Habitat & Food for Fish: Bio-economic model to estimate impact on Kelp Bass and California Halibut



Communication

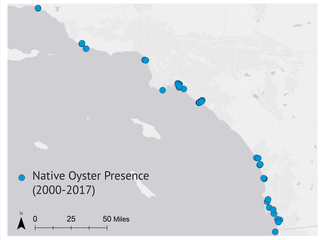
1. ArcGIS Story Map: Organize oyster presence data for public & scientists

2. Digital Marketing: Write, direct, and produce films about the importance of native oyster restoration

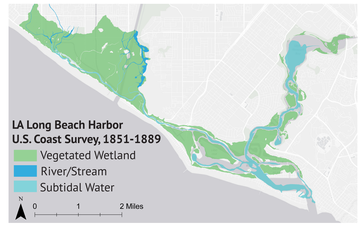
3. Oyster Restoration Forum: Plan a forum at the Aquarium of the Pacific to enhance communication between oyster restoration experts around the country

Results

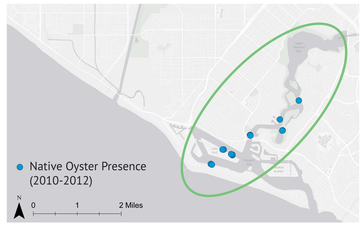
Native oysters are present in most bays and estuaries in Southern California: Significant loss of wetland habitat in California contributed to the loss of native oysters in the early 1900's. However, we did find oysters in low abundances along the coast.



Native oyster presence data collected (2000-2017)

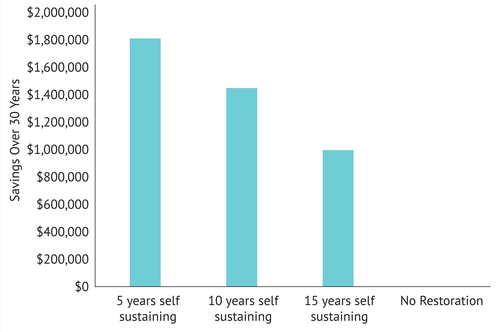


Historic Wetland Habitat (1851-1899) in Newport Bay



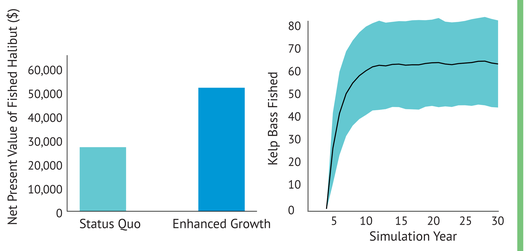
Native Oyster Presence in Newport Bay. Data collected by Dr. Danielle Zacherl 2010-2012

Native oyster beds may be a cost effective way to protect wetland habitat



Savings provided by restored oyster reefs with consideration of different restoration time scenarios

Native oyster beds may increase abundances of Kelp Bass and California Halibut

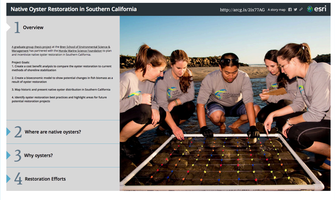


1 hectare of restored oyster bed may increase the California Halibut fishery value by $24,411 over a 30 year period

Kelp Bass catch is modeled to increase by about 1,100 over a 30 year period. The blue area indicates standard deviation.

ArcGIS Story Map

A method for managers and restoration experts to input data into one central location that will be easy to use and navigate. This will be open sourced and therefore, free for any managers and experts to use.



Restoration Forum

Native Oyster Restoration Forum at the Aquarium of the Pacific with the Honda Marine Science Foundation.

AQUARIUM OF THE PACIFIC
A non-profit institution

The Nature Conservancy

ORANGE COUNTY COASTKEEPER

Elkhorn Slough National Estuarine Research Reserve

UC DAVIS UNIVERSITY OF CALIFORNIA

BILLION OYSTER PROJECT

Video Production

A public service announcement and documentary film to motivate future restoration efforts in California.