Is the invasive Pacific Oyster promoting habitat forming macroalgae?

Julia Cao Sánchez, Åsa Strand*

*This project was conducted as part of my internship in Tjärnö Marine Laboratory (Gothenburg University) with the collaboration of Tor Boëthius (MSc Student), Churchill Carter (Internship Student) and Gunilla Toth, and under the supervision of Åsa Strand.

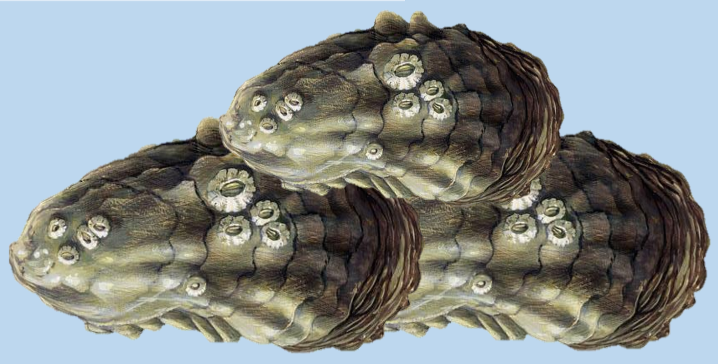
Contact
Julia Cao Sánchez
(juliacao5@gmail.com)
Åsa Strand
(asa.strand@ivl.se)

INTRODUCTION

The Pacific Oyster (*Magallana gigas*) is probably one of the most **invasive species** in the world [1, 2]. Being identified as an invasive species comes directly with a negative connotation, but the complexity of its ecological effects is far from being well understood. *M. gigas* is an **ecosystem engineer species** and the **biogenic reefs** that creates act as refuge and substrate for many organisms. For instance, macroalgae species, which rely on a hard substrate to attach and, in turn, provide habitat to numerous species of invertebrates and fish [1, 3].

In this study, data on the **biomass** and **species richness** of macroalgae occurring on oyster beds in the swedish west coast was collected. The goal is to assess the relationship between macroalgae abundance and oyster coverage. Observations and data obtained from the field seem to show a positive trend between these variables, but more statistical analysis are yet to be performed. If this is confirmed, pacific oyster beds could be promoting biodiversity in the shallow coastal communities of the swedish west coast.

Pacific Oyster
Magallana gigas
(Thunberg, 1973)



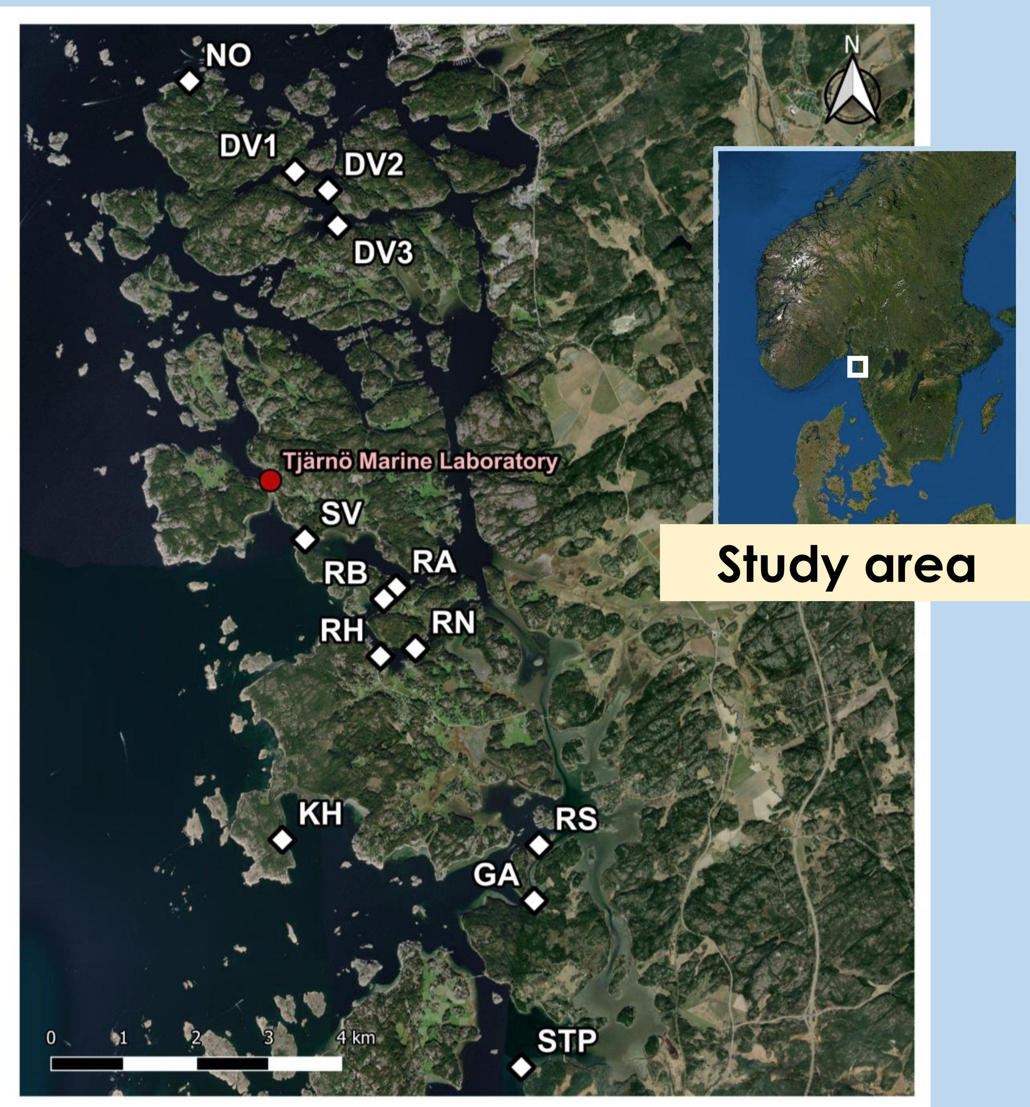
Originally from Japan. First introduced in Sweden in the 1970s for aquaculture trials and was believed to be unable to reproduce due to the low summer temperatures. Reappeared in the swedish west coast in 2007 and has been spreading ever since [1, 2]. *This species is a highly efficient filter feeder with high growth rates and reproductive output, and a good tolerance for a large range of abiotic conditions. It also has a high comercial value* [1, 2].

OBJECTIVES

The aim of this project is to study the relationship between macroalgae abundance (biomass and species richness) and oyster coverage.

Do we find more macroalgae in places with a higher oyster coverage?

METHODS



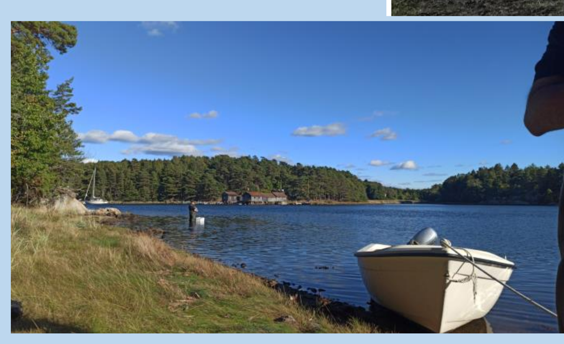
Fieldwork was conducted in **13 oyster beds** located around Tjärnö Marine Laboratory.

In every location, 12 random points of the oyster reef were sampled using a metal square of 0.5x0.5m.

For all the squares, data was collected on **coverage** (%) and **abundance** (number of individuals) of **live and dead oysters**.

For every square, the number of live and dead oysters that had **macroalgae attached** to them was also recorded. These macroalgae were removed and stored in zip lock plastic bags.

In the laboratory, **macroalgae biomass** was estimated (as wet weight) and the different **species** were identified.



FIRST RESULTS

A total of **28 species** of macroalgae were identified

10 species of algae found growing on the oysters

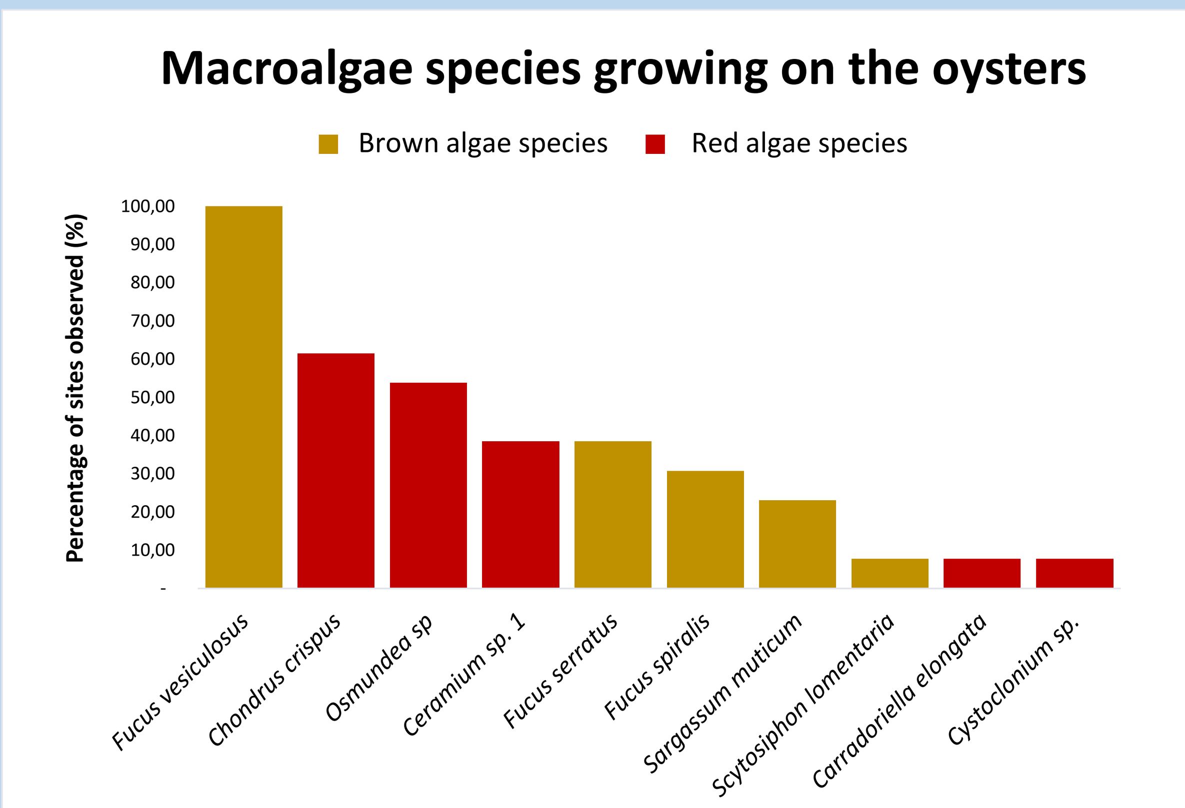


Figure 1. Macroalgae species found growing on the oysters and the percentage of sites in which they were observed. The dominant species was *Fucus vesiculosus* observed in all the locations.

There seems to be a **positive tendency** between the percentage of oyster cover and the macroalgae biomass (but more statistical analysis need to be performed).

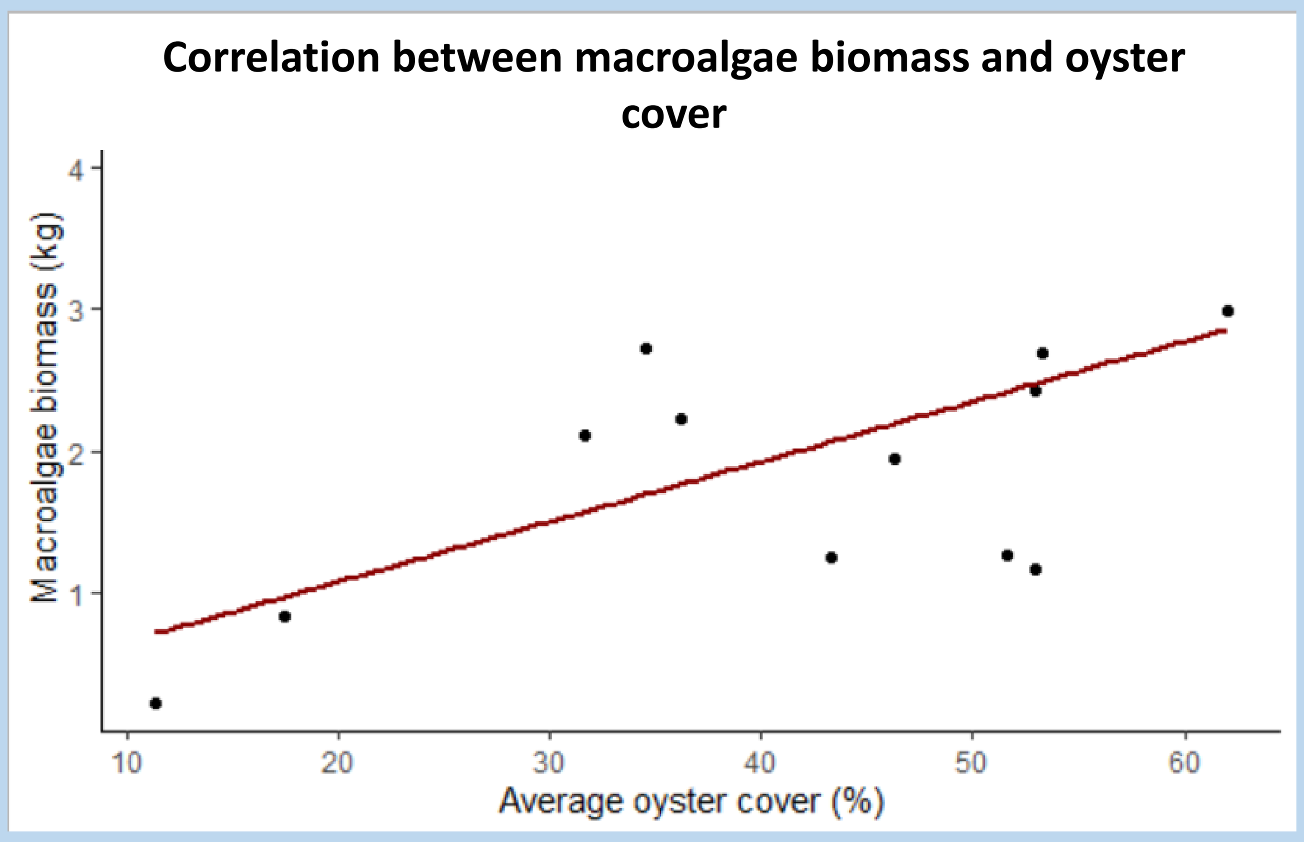


Figure 2. Linear regression between the average oyster cover (%) in every site and the biomass of algae (kg). Adj R^2 = 0.2954; p-value = 0.0319.

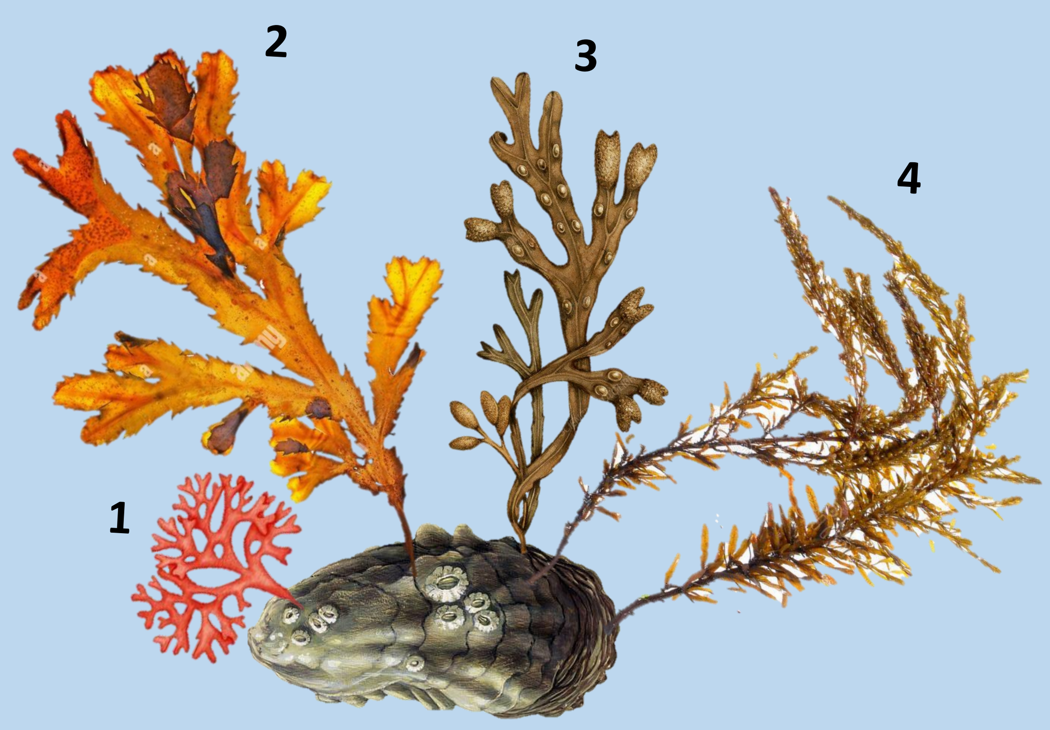


Figure 3. Graphic representation of some of the most abundant macroalgae species found growing on the oysters: (1) *Chrondrus crispus* - Karragentång; (2) *Fucus serratus* – Sågtång; (3) *Fucus vesiculosus* – Blåstång; (4) *Sargassum muticum* – Japansk sargassotång.

REFERENCES

[1] Laugen, Ane Timenes, Johan Hollander, Matthias Obst, and Åsa Strand. 2015. “The Pacific Oyster (Crassostrea Gigas) Invasion in Scandinavian Coastal Waters: Impact on Local Ecosystem Services.” *Biological Invasions in Changing Ecosystems: Vectors, Ecological Impacts, Management and Predictions*, 230–52.

[2] Mortensen, Stein, Torjan Bodvin, Åsa Strand, Mark W. Holm, and Per Dolmer. 2017. “Effects of a Bio-Invasion of the Pacific Oyster, Crassostrea Gigas (Thunberg, 1793) in Five Shallow Water Habitats in Scandinavia.” *Management of Biological Invasions* 8 (4): 543–52.

[3] Norling, P., M. Lindegarth, S. Lindegarth, and A. Strand. 2015. “Effects of Live and Post-Mortem Shell Structures of Invasive Pacific Oysters and Native Blue Mussels on Macrofauna and Fish.” *Marine Ecology Progress Series* 518: 123–38.