What a Load of Barnacles:
A Spatial Population Genomic Simulation Measuring Evolution at Large Scales

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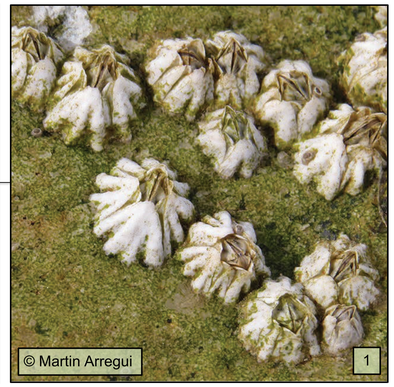
Background

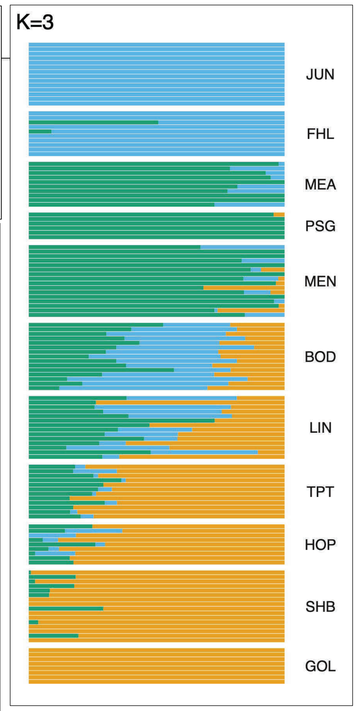
The Pacific acorn barnacle

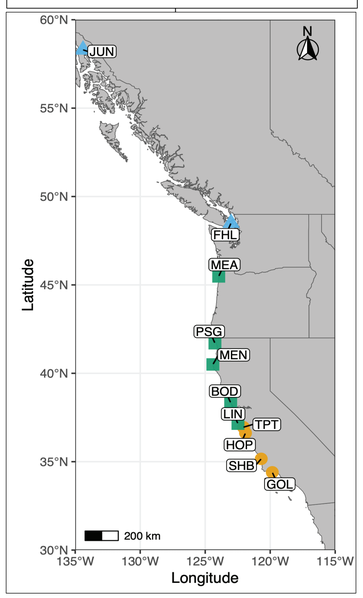
- Filter-feeding invertebrate found in intertidal zones
- Undergoes planktonic larval stage, and sessile juveniles and adult stages



The Pacific Coast Range

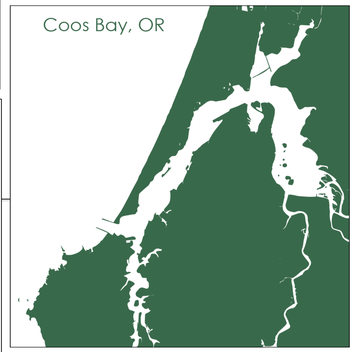
- We observe population structure across the Pacific Coast[2]





SLiM simulation of Coos Bay, OR

- SLiM is an evolutionary simulation framework[3]
- It allows us to simulate individuals, their genomes, and the spatial interactions between the population and their environment

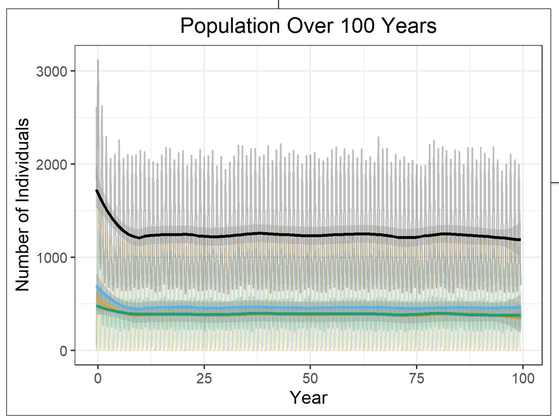


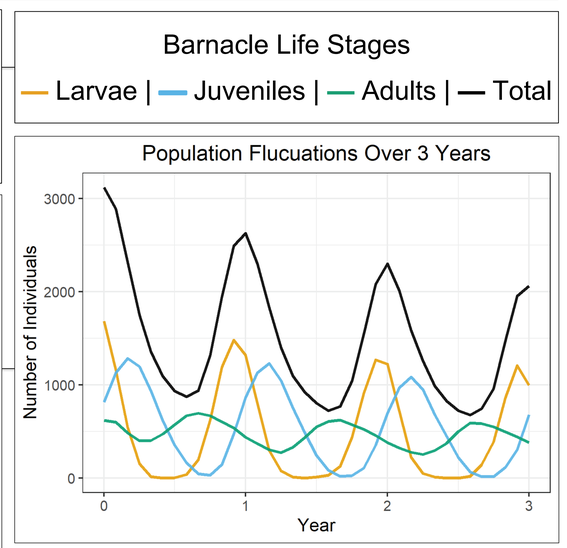
Scan the QR code to see this project's GitHub repository!

How do we model population genomics for the Pacific acorn barnacle (*Balanus glandula*)?

Reproduction and life stages

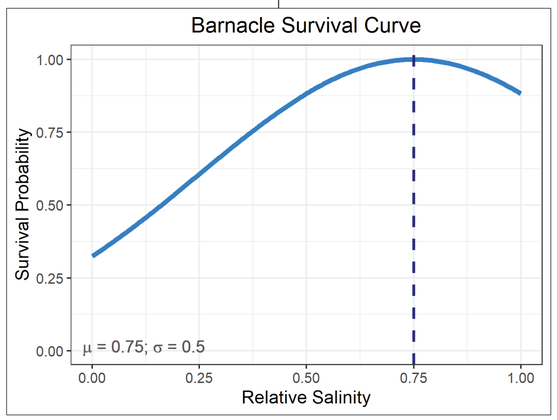
- Brooding occurs seasonally in the late winter, with larvae dispersing during the summer and juveniles settling in the fall





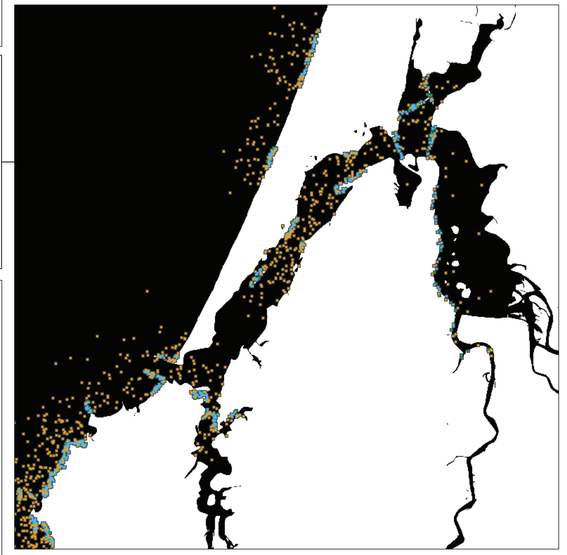
The Effects of Environmental Variables

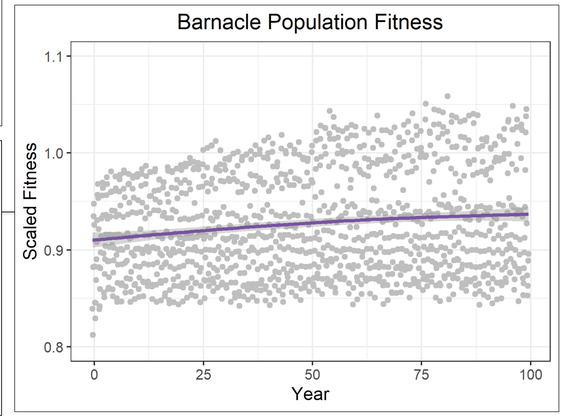
- Juvenile (recently settled) barnacles have higher survival at moderate to high salinities[4,5]



Modeling Population Fitness

- Fitness is the product of density-dependent selection[7], environmental gradients, and local adaptation
- To see the effects of local adaptation, the model needs to run for much longer than 100 years!





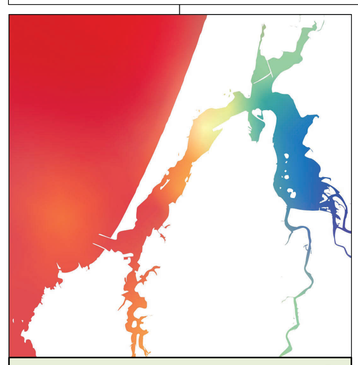
Conclusion

- Our model captures the life cycle and reproduction of the Pacific acorn barnacle
- Implemented a population response to environmental variables
- Developed a framework for future research on this biological system

Future Steps

Expanding Environmental Model

- Implementing other environmental conditions that impact barnacles such as temperature and tides[7]
- Add seasonal variation of environmental variables
- Model long-term environmental change


Temperature Model, Winter 2014[5]


Temperature Model, Summer 2014[5]

Evolution of Barnacle Populations

- Apply model to study the genomic variation of barnacle populations across the Pacific coast
- What environmental variables are contributing to the population structure?

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