

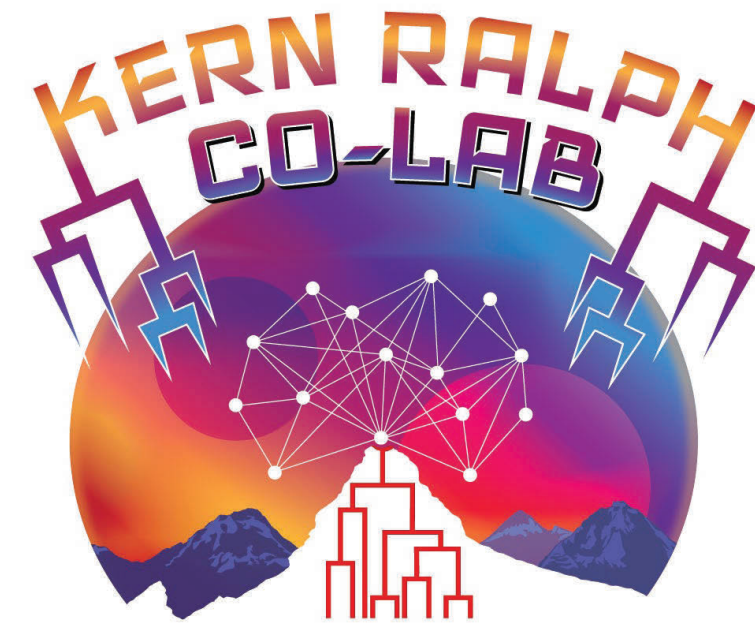


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# What a Load of Barnacles: A Spatial Population Genomic Simulation Measuring Evolution at Large Scales

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## Background

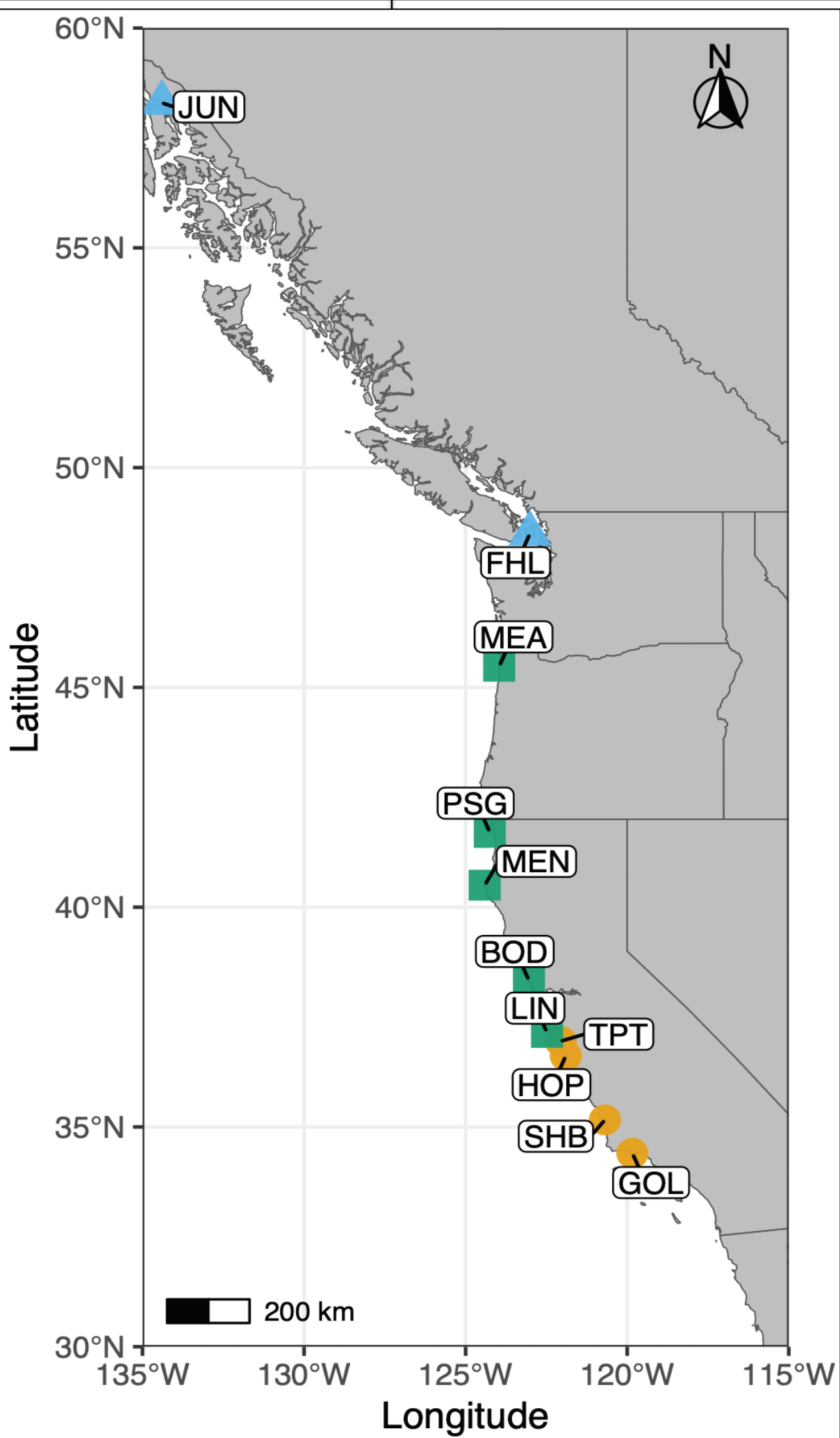
### The Pacific acorn barnacle

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



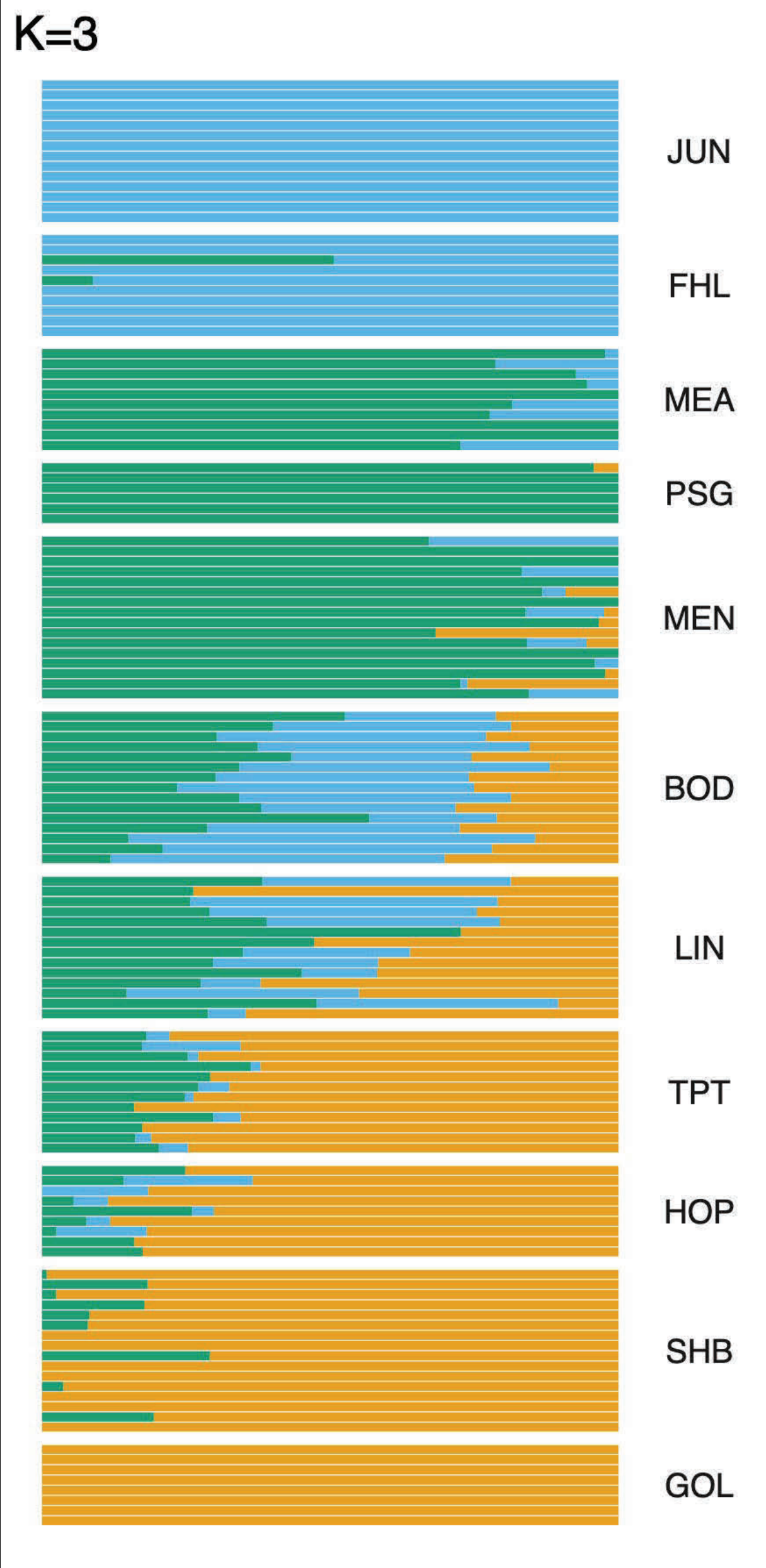
### The Pacific Coast Range

- We observe population structure across the Pacific Coast<sup>2</sup>



### SLiM simulation of Coos Bay, OR

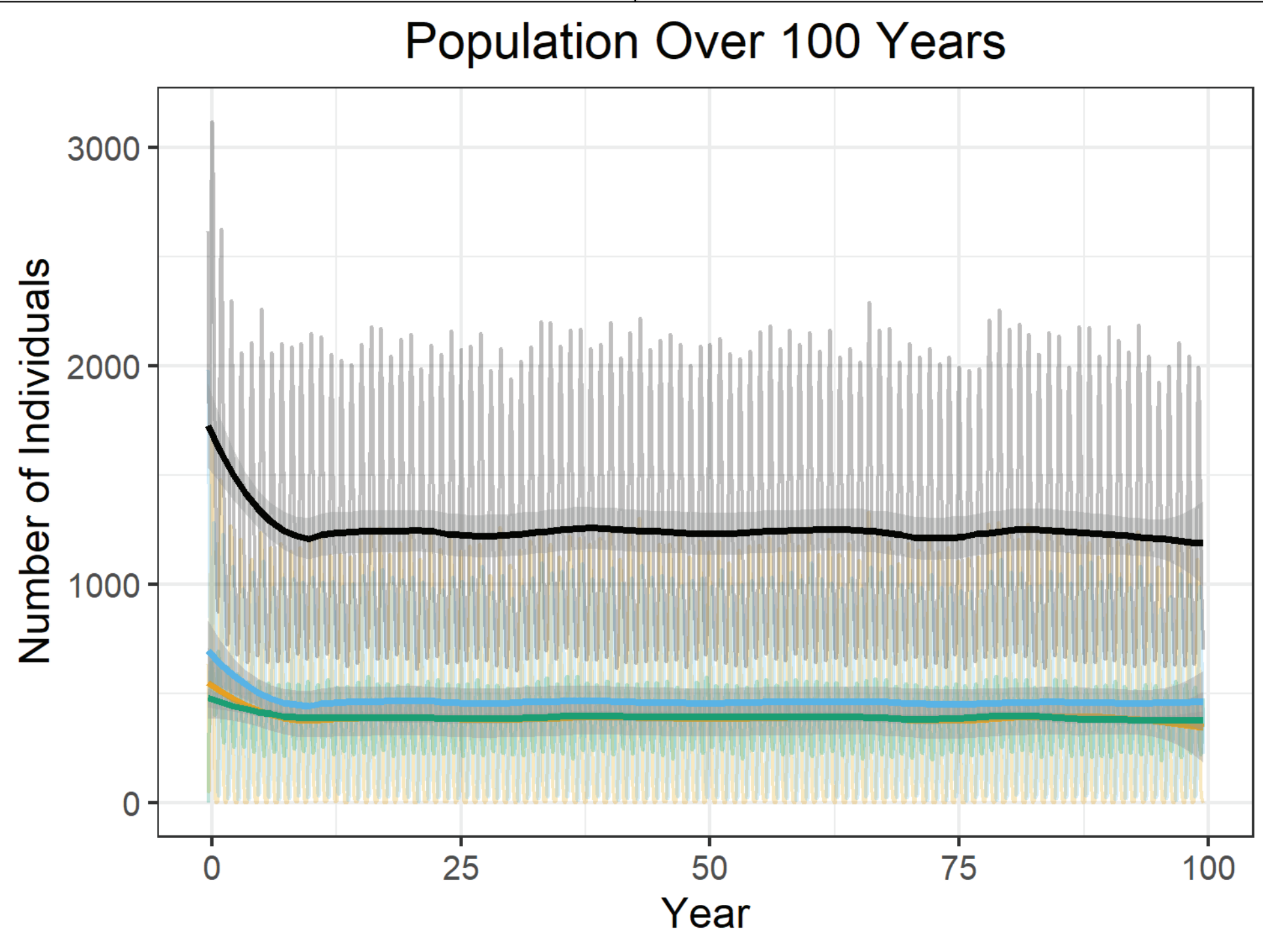
- SLiM is an evolutionary simulation framework<sup>3</sup>
- It allows us to simulate individuals, their genomes, and the spatial interactions between the population and their environment



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

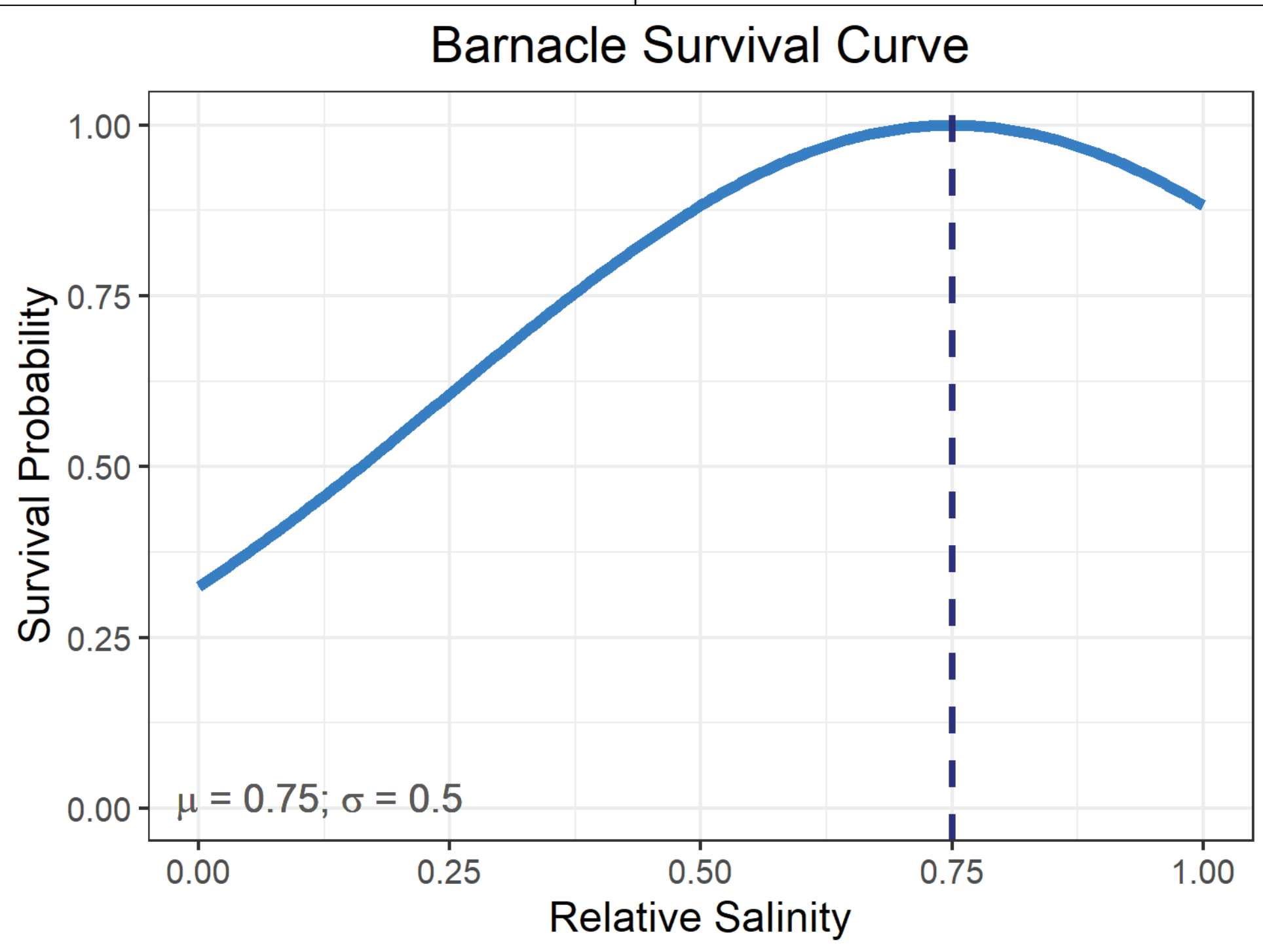
### Reproduction and life stages

- 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<sup>4,5</sup>

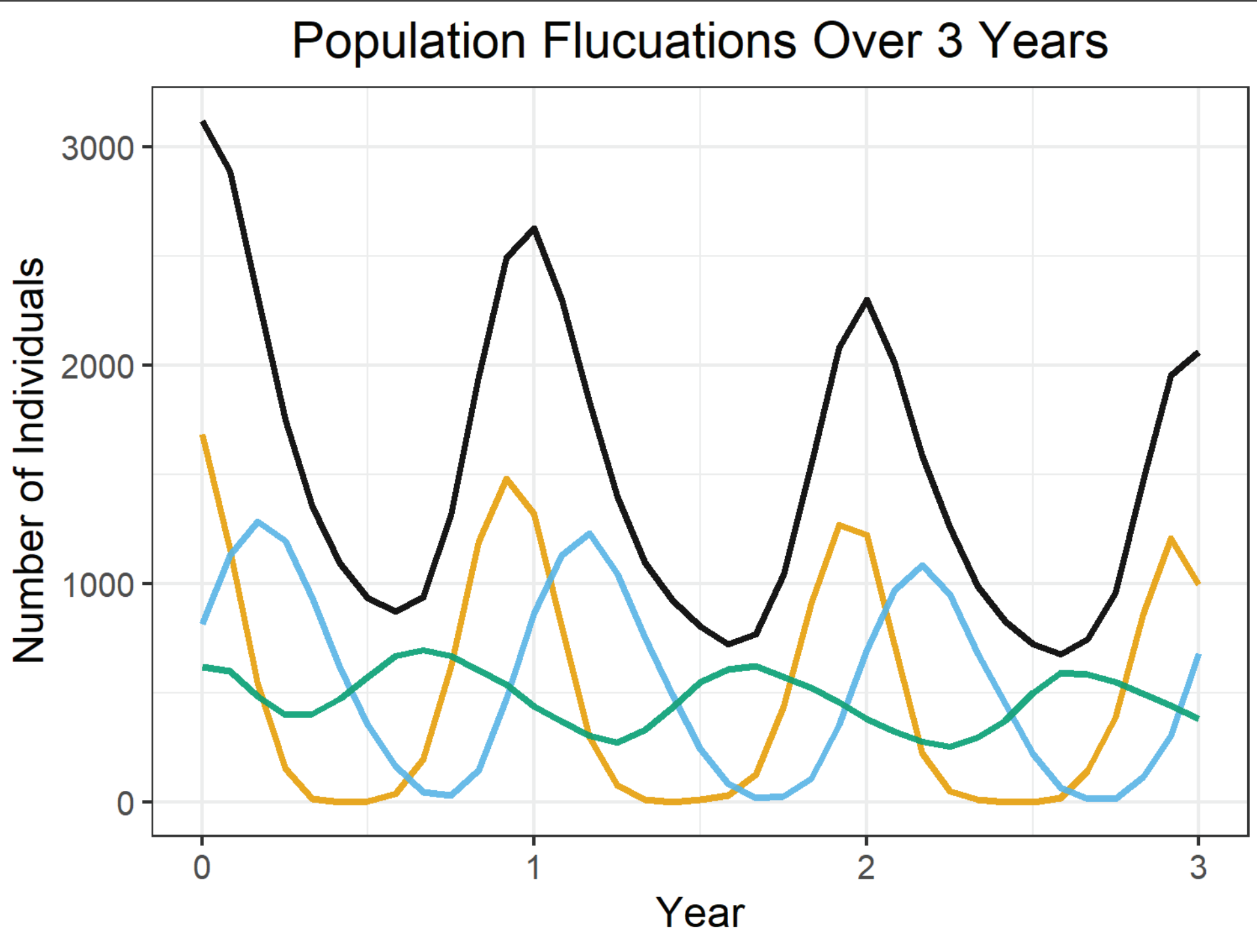


### Modeling Population Fitness

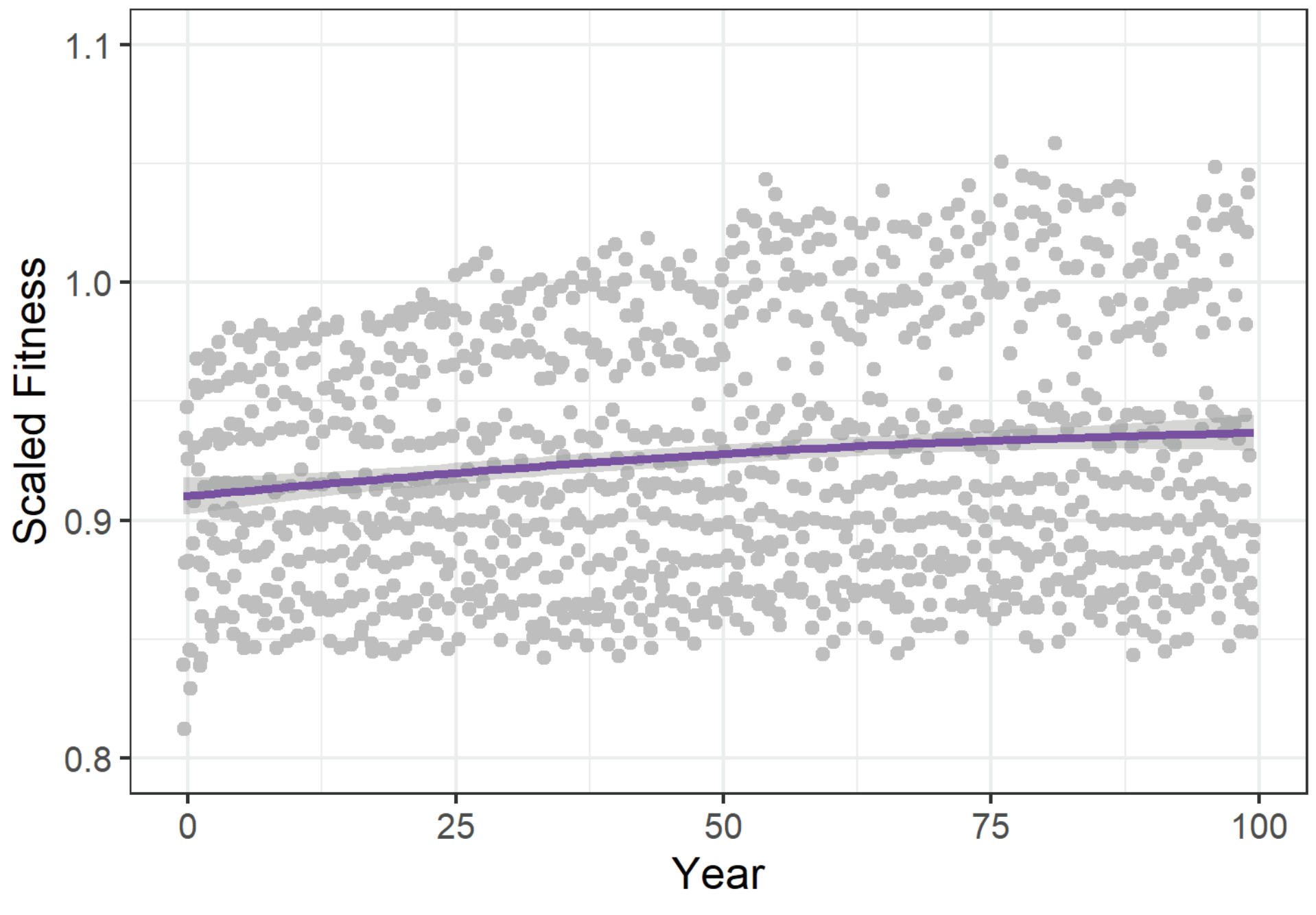
- Fitness is the product of density-dependent selection<sup>7</sup>, environmental gradients, and local adaptation
- To see the effects of local adaptation, the model needs to run for much longer than 100 years!

### Barnacle Life Stages

— Larvae | — Juveniles | — Adults | — Total



### Barnacle Population Fitness



## 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<sup>7</sup>
- Add seasonal variation of environmental variables
- Model long-term environmental change



### 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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