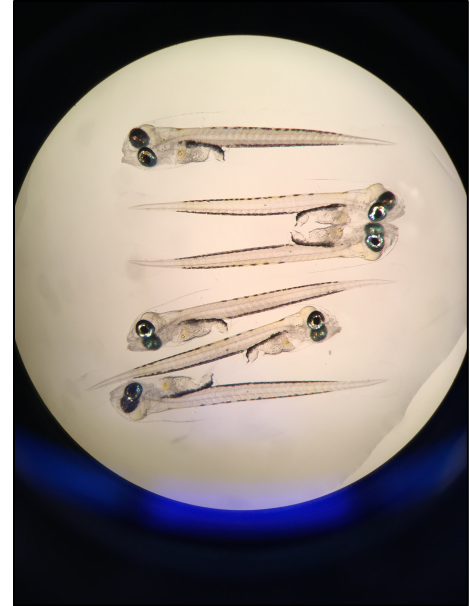


## Effects of ocean acidification and low dissolved oxygen on larval rockfish

Rockfishes (*Sebastes*) are a diverse family of fishes that live in the California Current and are both ecologically and economically important. Over 60 rockfish species are federally managed by the Pacific Fishery Management Council, which requires regular stock assessments of commercially and recreationally important species. It is important to understand how climate change will impact individual rockfish species, particularly at very sensitive embryological and larval stages, so that effective species-specific protections can be developed. This project will enhance our understanding of the effects of ocean acidification (OA) and low dissolved oxygen (DO) on the development and performance of two species of commercially important rockfish in the California Current. OA and low DO are each known to negatively impact larval fish in multiple ways, including physical deformity.



Previously, live female gopher rockfish (*Sebastes carnatus*) and blue rockfish (*Sebastes mystinus*) were collected by hook and line in Monterey Bay and transported to the NOAA Southwest Fisheries Science Center in Santa Cruz for laboratory experiments. To determine the effect of OA and low DO on reproductive output and larval condition, gravid (carrying eggs or young) females were placed in four different treatments for the course of embryological development: control (ambient DO and OA conditions), +OA (high OA, ambient DO), +DO (low DO and ambient OA), and +OA+DO (high OA and low DO). Hatched larvae were collected from each brood and preserved in ethanol and will be used to assess total fecundity (reproductive output) and deformity proportion.

### **As an undergraduate student assistant for this project, you will get to assist with:**

- Use of a plankton splitter to divide samples into 4 equal groups of 200-500 larvae each
- Counting larval fish under a dissecting scope to estimate total fecundity for each female
- Quantifying deformity by identifying deformed larvae under the dissecting scope and separating them from the rest of the sample for photographs

- Taking morphometric measurements of photographed larvae using ImageJ

**Things you will learn/be exposed to:**

- Laboratory skills and procedures
- Plankton splitter techniques
- ImageJ (an open source image processing program designed for scientific multidimensional images)
- Dissecting scope skills
- Fish biology and early life history
- Ocean chemistry
- Climate science

**You will need to be willing and able to:**

- Looking through a dissecting scope for extended periods of time to count small fish larvae
- Reliably get yourself to Moss Landing Marine Laboratories

**Looking for someone who is**

- Detail oriented
- Enthusiastic
- Diligent
- Flexible
- Communicative
- Kind
- Respectful
- A good listener