

# 2020 DELTA SCIENCE FELLOW **FINAL REPORT**



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**Focus** Estuarine fish community responses to climate, flow and habitat

**Award** \$192,470

**Research Mentors**

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## **Predicting fish community responses to variable climate regimes, flows and habitats along an estuarine gradient**

Estuaries are dynamic transition zones spanning fresh and salt water. They function as critical nursery habitat for a variety of fish species. There is a pressing need to identify the effects of climate change on these multifaceted habitats.

The goal of Colombano's project was to better understand how climate change affects fish with different life histories and habitat associations across the San Francisco Estuary. Existing datasets were incorporated in synthetic analyses and cutting-edge statistical models to identify fish community responses to climate, flows and habitats along the estuarine salinity gradient.

### **Research Conclusions**

The team investigated how freshwater flow and sea surface temperature impacted juvenile fish species in the lower and upper estuaries and found differing tolerances. Additionally, they looked at both the biological and spatial structures within the communities and concluded preserving diversity is key to stabilizing juvenile fish recruitment in response to changing environmental conditions.

Even in highly dynamic environments such as estuaries, climate change will likely result in winners and losers among species. With an increase in the frequency and duration of drought and marine heatwaves, estuaries may become less hospitable to species that are environmental specialists, such as freshwater or cool water dependent species. This may lead to lower recruitment success. Ultimately, climate change may negatively affect species persistence, food web dynamics and ecosystem function.

