

## **Fish Parasite Monitoring as an Index of Stream Health in San Francisco Bay Area, USA**

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### **ABSTRACT**

We are documenting eukaryotic parasite diversity of native and non-native freshwater fishes in San Francisco Bay Area (SFOBA), including Point Reyes National Seashore (PORE) and Golden Gate National Recreation Area (GOGA). Some water drainages within and near these protected parks are altered and impacted by anthropogenic activities. While effects of such activities on the composition of fish communities have been documented, the effects on the distribution of exotic parasites in both native and non-native fishes remains largely unknown, due mainly to the lack of systematic and comprehensive multi-species fish parasite surveys. Our study aims to provide the much needed baseline information on species composition and diversity of eukaryotic fish parasites, so that they may be assessed for their potential pathogenicity, and as health indicators of streams and lakes. The complex life cycles of many parasites, often involving multiple hosts (snails, crustaceans, frogs, birds, etc.), can provide both insights as well as a comprehensive understanding of aquatic and adjacent (such as riparian) ecosystems. So far, the trend indicates that native and non-native fish of the SFOBA are mainly infected with adult parasites that are specific or typical of them. We documented ten, external and internal, native parasitic taxa in the indigenous threespine stickleback, *Gasterosteus aculeatus*. However, we noted both native and non-native parasite species in the non-native mosquitofish, *Gambusia affinis*. Our study reports new host records, range extensions and also the discovery of two species new to science. Abundances of these parasites vary among water bodies within the study area. Currently, we are evaluating whether fish parasites in the SFOBA can be used as ecological indicators and tools for research and management of aquatic resources, as has been demonstrated elsewhere by other parasitologists. Such information would allow natural resource managers to use these data for risk assessment analyses and management decisions regarding control or elimination of non-native fishes and re-establishment of native fishes.

### **KEYWORDS**

Fish-parasite, stream-health, San Francisco Bay Area