

**Youth-based citizen science program reveals climate-related trends in rocky intertidal**

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LiMPETS (Long-term Monitoring Program and Experiential Training for Students) is a citizen science program in which students, educators and volunteer groups monitor ecological changes along the coast of California's National Marine Sanctuaries. Through this statewide program, over 6,000 citizens annually participate in a hands-on, scientific endeavor that increases their knowledge of the marine environment, creating a new generation of informed and engaged ocean stewards.

Beyond the educational value of the program, the power of LiMPETS lies in the large quantity of data collected along the coastline of the Greater Farallones and Monterey Bay National Marine Sanctuaries. By consistent and frequent monitoring, LiMPETS has established a baseline from which we can better address current and future impacts, including the impacts of ocean acidification, sea-level rise, warming waters, and increased storm severity and frequency.

LiMPETS collects abundance data on 5 of the GFNMS Climate-Smart taxa (sea lettuces, green pin-cushion, coralline algae, mussels, and sea stars) and 7 of the GFNMS Ocean-Climate Indicators (surfgrasses, giant green anemone, sunburst anemone, mussels, pink acorn barnacle, leaf barnacle, and the ochre sea star). Data from the past 10 years reveal regular seasonal fluctuations in algal abundances, massive declines in ochre sea stars, expansions of mussel beds, boom and bust patterns of storm-sensitive algae, and subtle geographic expansion of the sunburst anemone.

Like most monitoring programs, the value of the LiMPETS rocky intertidal dataset will grow over time. LiMPETS has the power to reveal shifting zonation patterns with sea-level rise, geographic expansion of species northward due to warming sea-surface temperatures, intense animal and algal abundance fluctuations with increased storminess, and patterns of disease like sea star wasting syndrome.

In addition to the rocky intertidal monitoring sites currently sampled by LiMPETS, the Greater Farallones LiMPETS program will begin collecting information at two new rocky intertidal sites in 2017. We will expand our geographic range to accommodate students in the new areas of the Greater Farallones National Marine Sanctuary and to establish a baseline from which we can assess climate-change impacts along the Sonoma coast.