



CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

Name(s) Alexandra P. Orczyk	Project Number J2315
Project Title Comparing Changes in Local Sea Star Populations	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Sea star populations, recently hit by sea star wasting syndrome, have been declining at my local tidepools, and throughout the West Coast. Water temperature is rising, and rising temperatures have been shown to intensify sea star wasting syndrome. Rising temperatures can also diminish sea stars' abilities to protect themselves from overheating and desiccation during low tides. I hypothesized that these effects would over time decrease the general population. Additionally, I wondered if human disturbance had any impact. These questions led me to investigate at the Cabrillo Point Loma tidepools.</p> <p>Methods/Materials During multiple timed searches, I documented four species of observed sea stars. I then obtained 26 years of raw data on annual sea star numbers from Cabrillo biologists, and local water temperature data from NOAA. To analyze temperature correlation with sea star numbers, I compared the number of counted sea stars in the six warmest vs. six coolest seasons, by using two-sample unequal variance t-tests. Because temperature changes may have delayed effects, I also compared the number of sea stars with various time lags after the six warmest and six coolest seasons. Cabrillo is composed of Zone 1 and Zone 2, with visitors, and Zone 3, with no visitors allowed. I compared these three groups to assess possible human impacts.</p> <p>Results I found no statistically significant differences based on temperature. Comparing the six warmest and six coolest seasons, with any delay period, returned a p-value >0.05. Concerningly, sea stars populations plummeted in the once-haven of Zone 3 ($p=0.006$), especially bat stars ($p=0.008$). Comparing the peak population of 1990-1994 to that of 1995-2017 revealed a decline of 94.5% for sea stars in Zone 3. Knobby sea star numbers slightly increased in Zone 1 only ($p=0.02$). The three zones had no statistically significant differences overall ($p=0.10$).</p> <p>Conclusions/Discussion Neither temperature nor human intrusion seems to be factors in sea star population size. However, the extreme population decline in Zone 3 suggests the possibility of other factors; prey and predator abundance, or, since Zone 3 is closer to the San Diego Bay's marinas than Zones 1 and 2 are, perhaps a higher concentration of potential pollutants.</p>	
Summary Statement I analyzed and compared numbers of four sea star species at the Cabrillo National Monument tide pools.	
Help Received My science teacher lent me some materials, and my mother drove me to the tide pools. Marine biologists at the Cabrillo National Monument gave me helpful advice as well as long term data.	