



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2019 PROJECT SUMMARY**

<b>Name(s)</b> <b>Elizabeth Lindholm</b>	<b>Project Number</b> <b>S2205</b>
<b>Project Title</b> <b>The Witching Hour: Diel Variations among Kelp Forest Fishes at Monastery Beach, CA</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Through the observation and repeated sampling of kelp forest ecosystems and organism behaviors, scientists are able to piece together a more complete picture of how these ecosystems function. The results of this project could specifically help to lay out parameters for fishing regulations as well as other conservation efforts. For instance, by knowing where fish are going to be and when, resource managers will be able to more accurately describe the most efficient method for fishing them with the lowest environmental impact. These insights into fish communities may also illuminate the problems with existing laws and regulations.</p> <p><b>Methods</b> In order to observe fish behavior in the context of diel variation, three dives per time period were conducted at south Monastery Beach in the exact same location each time. The time periods were morning (after sunrise), afternoon (before sunset), night (after sunset), and morning (before sunrise). Each of the twelve total dives were conducted in the same manner using SCUBA equipment and two HD Sony Vixia camcorders. In addition, a related study was conducted on the observation of latitudinal variation in kelp forest fish communities. With respect to this section, data was collected in much the same way but only during one time period (morning after sunrise) across three sites.</p> <p><b>Results</b> The first and third hypotheses were supported by the results, meaning that total fish population was higher during the night and that the species behavior did change across the diel cycle. The second was not supported by the data that were collected, in turn the data showed that species diversity was highest in the morning. There are several possible explanations including the variation in predatory behaviors of marine animals in relation to light concentration and habitat usage of different species throughout the day. The last hypothesis was largely supported by the results, probably due to the mixing of southern and northern fish species to form a larger community than either one separated out.</p> <p><b>Conclusions</b> These results demonstrated that fish behavior does change with time and distance and further studies can be conducted to provide a more complete view of the ecosystems.</p>	
<b>Summary Statement</b> I demonstrated that kelp forest fish behavior and habitat utilization changes in response to time of day and latitudinal variation.	
<b>Help Received</b> I designed, organized, and conducted this study on my own however for safety reasons, Frank Degnan, Tommy Dolan, Paulina Salinas Ruiz, Megan Salomonson, and Kameron Strickland assisted me during dives.	