



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ian J. Mallett</b>	<b>Project Number</b> <b>S1611</b>
<b>Project Title</b> <b>Salmonids by Numbers II: A Predictive Simulation-Analysis of San Lorenzo River Fish Populations</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I constructed a statistical model that considers streamflow in the San Lorenzo to predict fish populations migrating past Henry Cowell Redwood State Park. I then created, from scratch, a computer simulation that predicts fish populations at any point in their life-cycle based on many of the factors that affect salmonids. I then created a website that lists all the data collected by the Monterey Bay Salmon and Trout Project.</p> <p><b>Methods/Materials</b></p> <ul style="list-style-type: none"><li>-Copies of raw data about the fish, taken daily by many observers from San Lorenzo Valley High School and the Monterey Bay Salmon and Trout Project at the fish trap in Felton during spawning season since 2000</li><li>-Data available online from the United States Geological Survey about daily local average stream flow near Felton</li><li>-Information on salmonid lifecycles and the factors that affect them, from various sources, including Don Alley et al.</li><li>-Fathom statistical software, (student ed.)</li><li>-OpenOffice Calc/Writer/Impress</li><li>-Microsoft Excel</li><li>-VUE mind-mapping software</li><li>-TI-89 Platinum graphing calculator</li><li>-Python 2.5.4 programming language</li></ul> <p><b>Results</b> The effort to simulate fish populations has been successful. A rough sensitivity analysis of the simulation indicates that the most important factors that affect salmonid migrations are streamflow and sedimentation. The results obtained from the simulation are not more accurate than the statistical model that considers only streamflow. However, the simulation has the advantage of being able to predict fish populations at all stages of their lifecycle. In addition, the simulation could also be recalibrated fairly easily to a wide variety of other rivers and streams.</p> <p><b>Conclusions/Discussion</b> Statistical methods, such as those that I presented in my research last year, accurately predict the relative frequency of the timing of fish populations migrating upstream when the explanatory variable, streamflow, is simple. By simulating the fish populations instead, a reasonable degree of accuracy is</p>	
<b>Summary Statement</b> The project is a summative statistical and simulation analysis of critically endangered fish populations in the San Lorenzo Valley River.	
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