



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Alec M. Howard	Project Number J1514
Project Title Buoyancy 101: The Effect of Water Temperature on the Bouyancy of a Floating Object	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine whether a change in water density, as its temperature is raised from 5 degrees C to 95 degrees C, will cause a model boat hull to sink lower in the water to a measurable degree.</p> <p>Methods/Materials Ten identical styrene model boat hulls were each weighted with 128 grams of steel. Each was floated in water ranging from 5 degrees C to 95 degrees C. The temperature was increased by increments of 10 degrees from cold to hot. The distance from the waterline at the stern of each hull to its top edge was recorded at each temperature level, using ice to cool the water, and a gas flame to heat it on a stove top. A hot water heater drain pan was used to hold the water.</p> <p>Results The results were challenging to record, because the instability of the hulls while floating made the measuring process difficult, but from 5 degrees C to 95 degrees C the hulls showed a drop in the waterline of approximately 2 millimeters.</p> <p>Conclusions/Discussion Although each hull was only 33 cm long, it was possible to detect a minimal change in the water line in spite of the small scale, by elevating water temperature from almost freezing to almost boiling, a much greater temperature range than a real ship would ever experience. This demonstrated that increasing water temperature causes water molecules to spread further apart, in turn reducing upthrust, and allowing a floating object to displace more water as its buoyancy is reduced.</p>	
Summary Statement A significant increase in water temperature will create a detectable change in the water line of even a small floating object as the water molecules spread apart due to increased temperature.	
Help Received My father helped me gather research material, and to record the results of the experiment. My teacher regularly reviewed my findings.	