CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0607

Project Title
Measuring the Outgoing Tide of Bolinas Lagoon

Abstract

Objectives/Goals
The purpose of my project was to determine how fast Bolinas Lagoon drains in the period between high tide and low tide, to see if there is a lag between the calculated low tide and the actual low tide, and to find out if the water is warmed as it sits in the shallow lagoon.

Methods/Materials
Procedure: Take three preliminary temperature readings at different points along the lagoon. Measure distance of 100 feet along the side of the narrow channel where water exits the lagoon. Mark distance with cones. Every fifteen minutes, throw a grapefruit into the water. Time how long it takes for the grapefruit to travel the 100 feet between the cones. Measure the temperature of the outgoing water every hour. Over the course of 7.5 hours, I threw a total of 35 grapefruits into the channel and measured their speeds.

Materials: 2 cones for marking the 100 foot distance
thermometer
35 grapefruits
stopwatch
tide tables for Bolinas, California
data table to record current speeds and water temperatures

Results
The water flowed increasingly faster until mid tide, and then it slowed down. There is a lag of about 45 minutes between official calculated low tide and actual low tide because the bottom of Bolinas Lagoon drags on the water as it drains. There is a lag of about 30 minutes for high tide. The water was not warmed as it sat in the lagoon.

Conclusions/Discussion
The water probably drained the fastest out of the lagoon at mid tide because it had a chance to gain momentum and overcome the drag effect of the mud. However, at the beginning of the tide cycle, the water was still dragging on the mud, and this created the lag. The water may be warmed as it sits in the lagoon. However, the day of the experiment, it was overcast and rainy, so the sun never had a chance to heat the mud.

Summary Statement
My project was about measuring how fast water flows out of Bolinas Lagoon, determining if there is a lag between calculated low tide and actual low tide, and determining if the water is warmed when it sits in the lagoon.

Help Received
I talked briefly with Professor Jim Ingle in the School of Earth Sciences at Stanford University about plans for my project. He also discussed my results with me after I finished the experiment. My dad drove me to Bolinas Lagoon.