



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Karissa J. Willits	Project Number S1919
Project Title The Influence Gravel Seep Temperature and Dissolved Oxygen Has on Juvenile Salmonid Numbers and Behavior	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Elevated stream temperatures and low dissolved oxygen are two components which are detrimental to salmonids. Ground water is generally cool enough to be considered thermal refugia to salmonids; however, they contain low levels of dissolved oxygen. The objective of this project was to observe the temperature and dissolved oxygen of gravel seeps and the influence they have on juvenile steelhead in Redwood Creek, Humboldt County, CA. My hypotheses were that due to low dissolved oxygen content of the groundwater issuing from the seeps, fish would stay in the main channel until the stream reached an elevated temperature ($>21^{\circ}\text{C}$), and to cope with the low dissolved oxygen levels, fish would weave between the cool seeps and the warmer stream channel.</p> <p>Methods/Materials Four times a day, five days a week I made fish observations and measured the temperatures of the stream, seep, and seep influence zones. Once per week I measured the dissolved oxygen of those seeps, plus the temperature and dissolved oxygen of six other seeps and nearby riffles. I identified seep influence zones by temperature and dissolved oxygen levels, as well as with a FLIR infrared thermal imaging camera.</p> <p>Results The seep water had extremely low dissolved oxygen content, ranging from 1.91 mg/L to 4.58 mg/L (desired levels are 7 mg/L or greater). Seep 1 and Seep 2 had water temperatures under 19°C. Fish converged in seep influence zones, which had an average dissolved oxygen level of 6.73 mg/L with average temperature of 21.0°C.</p> <p>Conclusions/Discussion Fish did not start to utilize the seeps until the stream reached 24°C. Fish converged in the influence zones of the seeps. By utilizing the influence zones, fish were able to find compromise between thermal refugia and adequate dissolved oxygen which minimized the need to weave between the main channel and the seep water. Larger fish used Seep 1, which had slightly cooler water than Seep 2 and slightly high dissolved oxygen content. They were generally found closer to the mouth of the seep.</p>	
Summary Statement I studied gravel seep temperature and dissolved oxygen in Redwood Creek for five weeks to determine the influence gravel seeps have on juvenile salmonid numbers and behavior.	
Help Received Michael Sparkman suggested this project and answered questions, Department of Fish and Game provided supplies, Scott Willits took infrared pictures and proofread.	