

# Department of Geosciences

College of Arts and Sciences

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*The DeVlieg Foundation*  
P.O. Box 515  
Clarkston, WA 99403

September 27, 2008

## **Re: Progress Report and Thank You from B.S. Candidate, Eric Carlson**

Dear Members of the DeVlieg Foundation Board,

First off, I wish to say Thank You for your support of this Undergraduate research project. I have learned a tremendous amount about how rivers work and how science gets done in the real world. Being able to work in partnership with Professors and Graduate Students has both added value to my undergraduate experience, but also has opened my eyes to future opportunities in field-based research at the graduate level. I am thankful to have spent the summer at Taylor Ranch in the Frank Church Wilderness and know it is an experience I will take with me throughout the rest of my life. To give you a sense of my project I will outline the premise for the work, the activities I have completed, what I am doing now and what I hope to accomplish by the end of the project.

### ***Project Background***

I am an undergraduate student at Idaho State University in the Department of Geosciences, and am supervised by Dr. Ben Crosby. I joined ISU as a transfer student and wanted to push my education forward with independent research. Working with Dr. Crosby, I established a project to measure how much sediment is being transported out of the tributaries and main stem of Big Creek. Because Big Creek has a long history of burns, I can compare the sediment washed out by streams in three kinds of watersheds: recently severely burned, moderately burned and unburned. By measuring sediment delivered off the landscape from these three types of watersheds I can examine (1) how fire effects sediment delivery to rivers and (2) how long the signal of fire persists in sediment delivery. These are important questions because as warming occurs in the future, there will be increased susceptibility to burn in these mountains and we should anticipate how these burns can affect stream ecosystems downstream.

### ***Work Completed***

After I got notification of the award, Dr. Crosby and I began exploring techniques to collect sediment data. We decided to measure suspended sediment (the sediment up in the water column rather than on the bed) because this was more tractable and would give a better sense of the potential impacts of more frequent fires on aquatic ecosystems. Working with Dr. Colden Baxter's lab, we created a sample collection protocol that involves collecting a representative sample of river water and filtering that water to isolate the sediment onto a filter paper for later weighting. Before heading into the field,

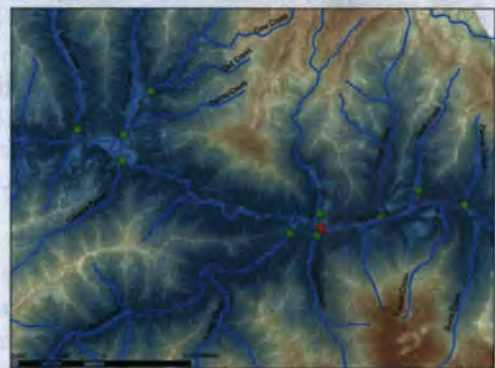


Figure 1: Location map for Big Creek showing the locations of tributary (green) and Big Creek (red) gaging stations. Taylor Ranch is at the red dot. (Figure from Neil Olson)



I baked and weighed hundreds of filter papers in preparation for my time at Taylor. Once at Taylor, I set up a vacuum filtration facility to process all my samples. I collected water samples from the same 10 tributaries (Figure 1) that Neil Olson was working in during the summer of 2008 because I also needed to know water flow at the time of my sampling. In this sense, my project is a direct collaboration with Neil. Without his measurements, I would not be able to calculate the volume of sediment moving downstream.

I also collected samples from the mainstem of Big Creek at the Taylor Ranch Bridge (Figure 2). These samples were collected using a massive whale-shaped sampler that I lowered off the bridge using a hand-winch. These samples will reflect the concentration of sediment in the river that results from integrating the contributions of each of the tributaries that I sampled. I also used an electric Auto-Sampler on Big Creek to collect samples at a high frequency (every 3 hours) so that I could capture the sediment flux variations during the day and night and during storms, even if I was working in another location of the basin. Over the summer I collected and filtered (Figure 3) 246 water samples.

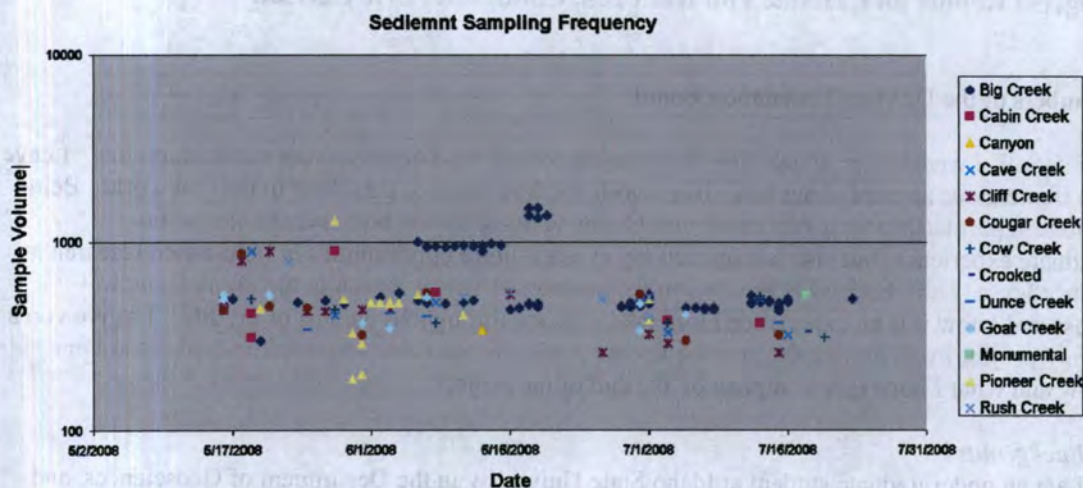


Figure 2: Plot of sampling dates, volumes and locations. Plot demonstrates that samples were collected throughout the field area over the duration of the project. The largest and most consistent group of samples was collected from Big Creek at Taylor Ranch (blue diamonds).

**Current Work**

I am currently working in the lab to measure the mass of inorganic and organic sediment that was collected in each sample. These values will be used to calculate a sediment concentration. Once combined with the water flow data from Neil's project, I will be able to present the sediment flux rate (volume/time) for each of the streams and correlate these fluxes to the catchments burn history. These results will be presented in a poster I will create for the annual meeting of the American Geophysical Union (AGU) in San Francisco (15,000 scientists in attendance).

**Future Work**

This project is evolving directly into my Senior Thesis (Spring, 09). This fall I will weigh all my samples and calculate the sediment flux rate. I will present my results at AGU in December and finalize my thesis and final report in the late spring. I hope to submit my results for publication.

Sincerely,  
Eric Carlson



Figure 3: Eric explains his filtering techniques to a junior investigator.