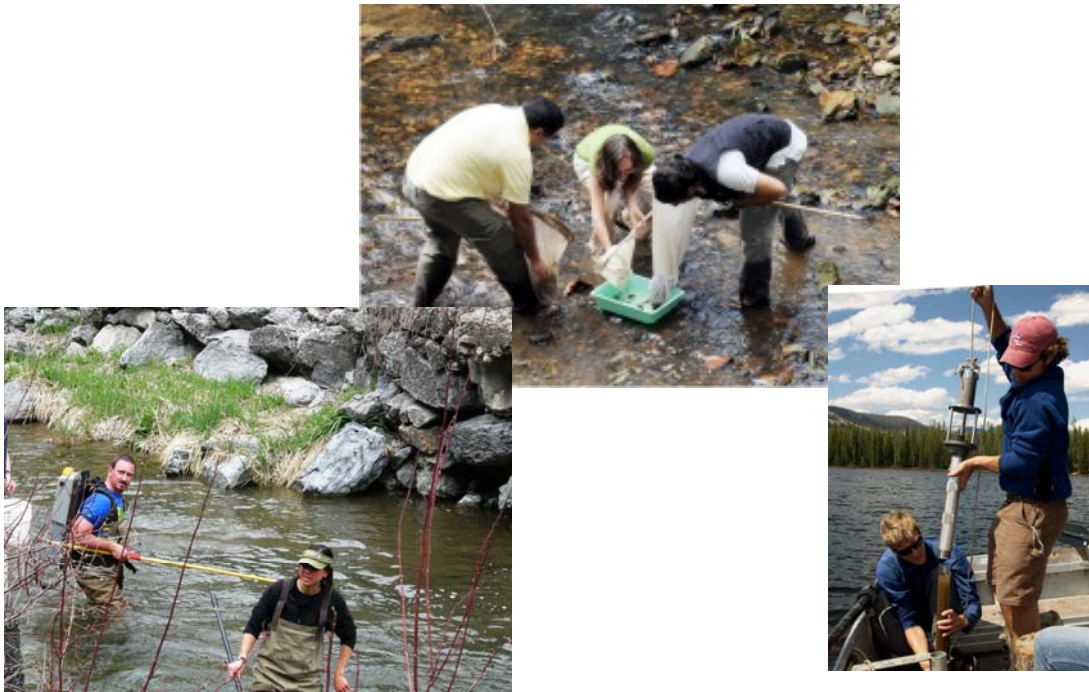




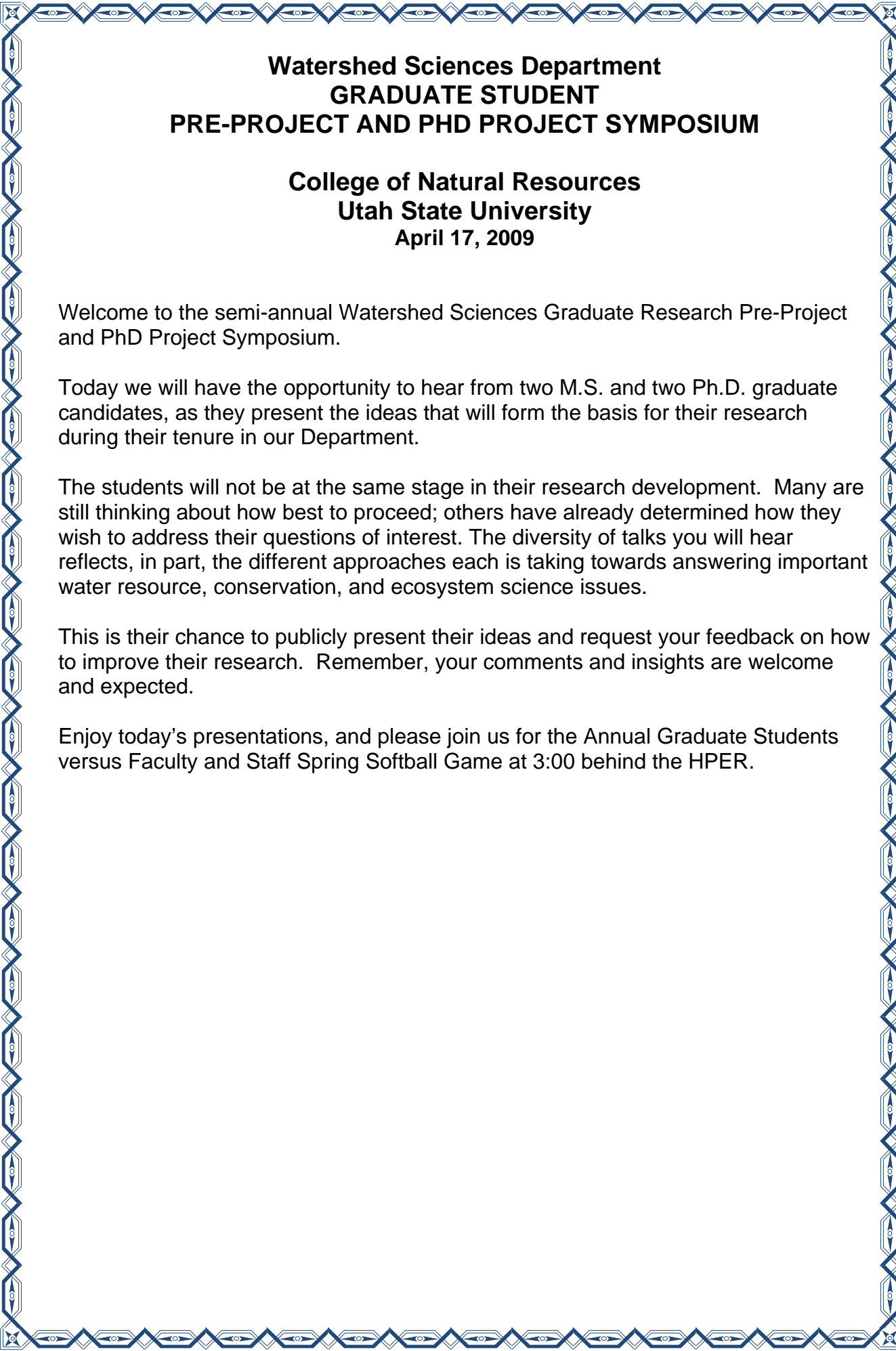
# Watershed Sciences Department

## Spring 2009 Graduate Student Research Symposium



**Friday, April 17, 2009**  
**Merrill Cazier Library, Auditorium**  
**9:00 a.m. - 11:00 a.m.**  
**3:00 p.m. Softball Game**





**Watershed Sciences Department  
GRADUATE STUDENT  
PRE-PROJECT AND PHD PROJECT SYMPOSIUM**

**College of Natural Resources  
Utah State University  
April 17, 2009**

Welcome to the semi-annual Watershed Sciences Graduate Research Pre-Project and PhD Project Symposium.

Today we will have the opportunity to hear from two M.S. and two Ph.D. graduate candidates, as they present the ideas that will form the basis for their research during their tenure in our Department.

The students will not be at the same stage in their research development. Many are still thinking about how best to proceed; others have already determined how they wish to address their questions of interest. The diversity of talks you will hear reflects, in part, the different approaches each is taking towards answering important water resource, conservation, and ecosystem science issues.

This is their chance to publicly present their ideas and request your feedback on how to improve their research. Remember, your comments and insights are welcome and expected.

Enjoy today's presentations, and please join us for the Annual Graduate Students versus Faculty and Staff Spring Softball Game at 3:00 behind the HPER.

## Program Schedule

9:00 Welcome – Todd Crowl



9:10 David Epstein, MS Student - Nutrient Cycling in Alpine Lakes:  
Gaining Knowledge through Experimentation and Modeling



9:30 Katrina Langenderfer, MS Student - Assessing Geomorphic  
Response to Cattle Exlosures John Day Basin, Oregon



9:50 Matt Hansen, PhD Student - The Role of Mountain Pine Beetle  
Outbreaks in Lodgepole Pine Ecosystem Functioning



10:15 Gong Zhang, PhD Student (presentation through Breeze) -  
Update of Seasonal Photosynthetic Parameters in Ecosystem  
Model



3:00 **Spring Softball Game behind the HPER – Graduate Students  
vs Faculty and Staff**



**David Epstein, MS Student**

Title: Nutrient Cycling in Alpine Lakes: Gaining Knowledge through Experimentation and Modeling

Advisor: Wayne Wurtsbaugh

Abstract:

Lakes have historically been underappreciated and neglected as critical nutrient processors at the watershed scale. Recent research has highlighted the effects lake coverage may have on nutrient transport in alpine watersheds. Additional research has demonstrated the importance of littoral sediments in nutrient uptake and cycling, which may be important in sustaining productivity of lake and other downstream ecosystems. Other work has suggested that different lake biota may play a large role in nutrient uptake and recycling. I propose to examine nitrogen flow and cycling pathways within Bull Trout Lake in central Idaho using a stable isotope tracer experiment. By injecting isotopically enriched nitrate ( $^{15}\text{NO}_3$ ) into the inflow stream during spring runoff and sampling the various lake ecosystem "compartments" through the growing season, I will be able to follow the injected  $^{15}\text{N}$  through the lake ecosystem. In determining rates of nitrogen uptake and transfer I will be able to qualify how nitrogen flows through the lake ecosystem and how it is transformed from inflow to outflow. Additionally I will collect standard limnological data throughout the growing season and will populate a two-dimensional lake model in order to represent the processes involved in determining nutrient cycling and water chemistry. Once an adequate depiction of the lake has been modeled, I will manipulate the input values to simulate different hypothetical scenarios and their effect on lake nutrient cycling. One such scenario is a series of lakes within the upper watershed to test the effect of lake coverage on downstream water quality. This research will provide insight into nutrient pathways and cycling within alpine lakes that, in conjunction with related stream ecology and hydrology studies, will improve the understanding of nutrient flow on a watershed scale.

Presentation Evaluation

Please rank from 1 – 5 (5 excellent)

Abstract information content	_____	Relevance of abstract to presentation	_____
Clarity of questions/hypotheses	_____	Clarity of research design	_____
Soundness of overall design	_____	Quantitative approach	_____
Quality of slides (fonts, etc)	_____	Quality of overall presentation	_____

Comments to strengthen research:

Comments to strengthen presentation:

**Katrina Langenderfer, MS Student**

Title: Assessing Geomorphic Response to Cattle Enclosures John Day Basin, Oregon

Advisor: Jack Schmidt

**Abstract:**

A decline in fisheries populations has been directly attributed to habitat loss and disturbance due to cattle grazing in riparian areas (Platts 1982). Belsky (1999) and Fleischner (1994) have extensively reviewed and documented the impacts of livestock grazing to riparian ecosystems. They state that livestock grazing negatively affects stream discharge and velocity, water temperature, water quality, in-channel geomorphic structure and organization, and riparian zone soils and vegetation. To mitigate these impacts to stream health, grazing enclosures were established across the West as a means to promote passive restoration and recovery.

In the John Day Basin of Eastern Oregon, substantial money has been spent by the Bonneville Power Administration (BPA) to restore and protect freshwater salmonid habitat through the use of grazing enclosures. Decades after their construction, most enclosures have never been monitored to determine their effectiveness. While land managers continue to install new enclosures in good faith, questions have been raised regarding their value as a restoration tool.

Channel geomorphology is dynamically linked to every aspect of a stream ecosystem. Because of this, measures of channel form are one of the major criteria used to evaluate stream recovery from grazing (Platt et al. 1987; MacDonald et al. 1991). Therefore, it is important to study how changes in channel form will promote fish population recovery. The purpose of my research is to assess geomorphic response following grazing enclosure for 40 BPA sites. The study will be conducted using a paired site approach, evaluating both a control (grazed) and enclosed (ungrazed) stream reach. Geomorphic response metrics surveyed will include elements such as channel width to depth ratios, pool quantity and depth, riffle sequences, substrate type, bank angle, undercut bank, and composition of vegetative cover. Geomorphic response comparisons between the control and enclosed reaches will be made using analysis of covariance models.

**Presentation Evaluation**

Please rank from 1 – 5 (5 excellent)

Abstract information content _____	Relevance of abstract to presentation _____
Clarity of questions/hypotheses _____	Clarity of research design _____
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Quality of slides (fonts, etc) _____	Quality of overall presentation _____

Comments to strengthen research:

Comments to strengthen presentation:

**E. Matthew Hansen, PhD Student**

Title: The Role of Mountain Pine Beetle Outbreaks in Lodgepole Pine Ecosystem Functioning

Advisor: Michael White

Abstract:

Ostensibly, bark beetles are critical components in the ecosystem process of death, decay, and renewal. A comprehensive, landscape scale perspective of ecosystems is needed to understand the relationships among bark beetles and other ecosystem components, with an emphasis on understanding how components generate and maintain each other. I propose to investigate bark beetle effects on ecosystem processes, concentrating on flows of energy (gross and net primary production) and matter (carbon and nutrients) which are likely to be substantially influenced by bark beetle outbreaks. I will focus on lodgepole pine (*Pinus contorta* Dougl. ex Loud, var. *latifolia* Engelm.) systems affected by mountain pine beetle (MPB; *Dendroctonus ponderosae* Hopkins) because they are relatively simple and the biology and ecology of the beetle and its hosts are relatively well-studied. I hypothesize that bark beetle-caused perturbations regulate and, possibly, act to maximize flows of energy and matter within a lodgepole pine ecosystem. I further hypothesize that MPB disturbances promote maintenance of lodgepole pine type. Because it is not possible to experimentally test these ideas (i.e., exclude bark beetles from a forest for several hundred years), I intend to address these hypotheses using various modeling approaches, and employ empirical data to parameterize and validate the models when possible.

Presentation Evaluation

Please rank from 1 – 5 (5 excellent)

Abstract information content _____	Relevance of abstract to presentation _____
Clarity of questions/hypotheses _____	Clarity of research design _____
Soundness of overall design _____	Quantitative approach _____
Quality of slides (fonts, etc) _____	Quality of overall presentation _____

Comments to strengthen research:

Comments to strengthen presentation:

**Gong Zhang, PhD Student**

Title: Update of Seasonal Photosynthetic Parameters in Ecosystem Model

Advisor: Michael White

**Abstract:**

A detailed understanding of the factors and processes influencing seasonal variability in photosynthetic parameters is essential for accurate estimation of carbon exchange between vegetation and the atmosphere. By analyzed the photosynthetic measurement of some dominate species during two growth season in Inner Mongolia steppe, China, the seasonal patterns of the photosynthetic variables were illustrated. There is a significant relationship between maximum carboxylation velocity ( $V_{cmax}$ ) and water stress. The seasonal pattern of  $V_{cmax}$  also presents much difference among growth stages, which reflect the influence of the plant development and allocation. The seasonal measurements of photosynthetic parameters in 9 sites around world were gathered to be compared with The Moderate Resolution Imaging Spectroradiometer (MODIS) data. Most measurements reveal the three-stage pattern during one growth season. Some remote sensing data match to the seasonal pattern of  $V_{cmax}$  in temperate vegetation. Among the indexes of remote sensing, the Normalized Difference Vegetation Index (NDVI) could separate the three-stage, and the near infrared land surface reflection have the most similar pattern with  $V_{cmax}$ .

**Presentation Evaluation**

Please rank from 1 – 5 (5 excellent)

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Comments to strengthen research:

Comments to strengthen presentation: