

## Project Summary

### Rocky Mountains Cooperative Ecosystem Studies Unit

**Project Title:** Permafrost Education for Students and Staff

**Discipline:** Natural  
**Type of Project:** Education  
**Funding Agency:** National Park Service  
**Other Partners/Cooperators:** University of Colorado, Boulder and Metropolitan State College  
**Effective Dates:** 3/1/2010 - 6/30/12  
**Funding Amount:** \$32,106

**Investigators and Agency Representative:**

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**Project Abstract:**

This project has two major parts:

- 1) During the summer of 2010, Dr. Janke and Dr. Chris Meloche, a colleague from the Biology Department will teach a one-day seminar about permafrost and tundra species identification for students and staff (up to 25 students and 15 staff). This day will include a few hours of class time and a field outing to the alpine tundra. Staff will come from education and interpretation, facilities, and resources. Students will come from Metropolitan State College; this funding will allow students to participate who would not otherwise be able to due to financial hardships (including cost of travel and missing work). The instructors will work closely with park staff to minimize impacts to the tundra from this field seminar.
- 2) Working with students from Metropolitan State College, Dr. Janke will refine the map of permafrost along Trail Ridge Road by completing the following tasks.

March through May 2010      Field visits will be conducted by Dr. Janke and two to three students to assess wind and snow distribution near sites 1-5 (near Forest Canyon Overlook).

May 2010      Borehole will be drilled at the proposed locations provided in Figure 1. Site locations were selected based on previous temperature measurements, the presence of other permafrost indicators, and their proximity to pull offs near TRR. The proposed location for borehole #1 is along a pull off, beyond the Forest Canyon Overlook. The borehole will be drilled at a location no more than 5 feet from the shoulder of the road. Borehole #2 will be located in another gravel pull off. The terrain around this area is steep, so the borehole will be drilled in a protected corner of the pull off. Site #3 is located beyond the Gore Range parking lot. The borehole will be drilled at a location no more than 5 feet from the shoulder of the road. If a suitable location does not exist, the borehole will be drilled off the Gore Range Parking lot to minimize impact on the tundra. Boreholes will be drilled to a depth of 6 m depth with a 10 cm diameter. In each borehole, 8 HOBO data logger sensors will be installed. Temperature sensors will be placed at 1.0 m increments, and an additional soil moisture sensor will be placed near the surface (Figure 2). The data logging unit will be contained within an 8 inch canister directly above the borehole. Each data logger runs on 4 AA batteries and should last about a year. The data collected

will be used to determine the depth to permafrost and active layer thickness at these locations along Trail Ridge Road.

- June 2010 A solifluction site located near temperature data loggers 1-3 will be surveyed using a ZipLevel Pro-2000 Precision Altimeter. Five wooden stakes will be installed along a transect to measure downslope movement.
- June 2010 or July 2010 The educational workshop on permafrost and tundra species will be conducted.
- July 2010 Temperature measurements from the 30 sensor installed during 2008 will be downloaded. Low batteries and corrupt sensors will be replaced. The data collected will be used to detect changes in climate and possible associated effects on soil and tundra communities. A time-lapse camera will also be placed at a discreet location in order to determine the timing of snowfall events.
- Sept. 2010 The solifluction site will be resurveyed.
- May 2011 Data will be downloaded from the boreholes.
- June 2011 The solifluction site will be resurveyed.
- July 2011 Data will be downloaded from the 30 HOBO data loggers.

**Outcomes with Completion Dates: December 31, 2011**

- Quarterly progress reports, sent via email to the key official, due June 30, September 30, December 31, and March 31 for the duration of the project
- One day field seminar class for up to 40 participants (25 students and 15 park staff) (summer of 2010, TBD by PI and ATR)
- Project report (which must include an executive summary) and refined map of permafrost distribution along Trail Ridge Road, identifying locations of concern, how environmental conditions affect permafrost distribution in the park, and identifying future monitoring needs (due May 31, 2011)

**Keywords:** Rocky Mountain National Park, University of Colorado at Boulder, permafrost, staff training, student education, Metropolitan State College