

# T1 Upgrade Supplement to DEB 9810218: The Niwot Ridge Long Term Ecological Research Program 1998-2004: Control on the Structure, Function and Interactions of Alpine and Subalpine Ecosystems of the Colorado Front Range

## Introduction

### A. Development and Expansion of a T1 Facility at the Mountain Research Station

A 1993 supplement to our LTER program provided the base funding for the establishment of a T1 facility at the Mountain Research Station (MRS). This line was installed from the Boulder campus to the Marr Laboratory at MRS. Ethernet cable and AC power lines were subsequently purchased and installed with help of the Army Corps of Engineers to research sites in the subalpine (the C1 atmospheric monitoring site, the Monson Ameriflux tower site, the subalpine subnivean laboratory) and to the alpine (the tundra laboratory and the alpine subnivean laboratory). This facility currently provides quality access to the Internet for researchers housed at the MRS as well as routine, real-time data collection and transfer activities to the NWT LTER information management system (e.g., <http://culter.colorado.edu:1030/exec/climexpage.pl>). Resources are requested here to upgrade and interface the technology offered by the T1 link with the outreach activities and potential offered by the MRS.

The NWT LTER has carried out a K-12 outreach program based at the Mountain Research Station (MRS) by collaborating with existing programs for children in the Boulder area and by working specifically with the Boulder Valley School District. The conceptual theme of the outreach is the connection between the alpine and subalpine ecosystems of the mountains and the communities of the Rocky Mountain Front Range. These communities are located at the intersection of the Great Plains and the Rocky Mountains, and have been expanding in population and development. We propose to enhance this outreach program by improving the connectivity at both the MRS and the participating schools. The goal of these improvements is to make it possible for the teachers to effectively use the NWT LTER database and other electronic materials and to interact easily with the scientists from the NWT LTER project. We expect that these interactions developed through our outreach program will enhance the educational experience of the students in the classroom and in their visits to Niwot Ridge and the MRS.

Our outreach program is a continuation of the involvement of teachers from the Boulder/Denver area achieved through our LTER Schoolyard program. This program has four aspects: 1) teaching in-service and pre-service teachers alpine ecology in a summer course at the MRS, 2) bringing elementary and middle school students to the MRS for field trips in the summer 3) development of a schoolyard monitoring program for streams on the lowlands to follow the spring flush of colored organic material (DOC) from the alpine and sub-alpine and 3) development of instructional materials about the Colorado alpine to be used by educators that complement the summer field programs. We take advantage of the fact that children in elementary and middle school years are most receptive to environmental education that emphasizes discovery, exploration and empathy of their local environment. As discussed by D. Sobel in his text "Beyond Ecophobia", a locally based approach to environmental education is more effective in both conveying ecological concepts and developing empathy than are approaches emphasizing more distant and abstract environmental crises, such as destruction of rain forests.

In addition to the field trips and monitoring program of the schoolyard LTER we have a Virtual Field Trip to Niwot Ridge. The prototype of this field trip is now posted on the web site at [http://culter.Colorado.EDU:1030/Field\\_trip](http://culter.Colorado.EDU:1030/Field_trip). The virtual field trip provides background information, and then 3 field trips that emphasize the mammals, plants and the effect of nitrogen on biodiversity. The trip is structured with pictures of the animals and plants that can be enlarged. The virtual field trip complements the experiential field trips in many ways. It provides a back up should inclement weather limit the trip. It provides access for children in a group who may have a handicap limiting the possibility for a hike. Finally, the virtual field trip also provides a follow-up and refresher material for students after the trip which they can access at school or at home. The site also contributes material that the students could use in later classroom activities and projects in later grades.

### Outreach to Elementary Teachers

The major use of the funds requested in this supplemental proposal will be used to enhance the computer connectivity upon which the NWT Schoolyard LTER depends for long-term success of the program. The four aspects of these improvements are: