

1. AGENCY INFORMATION

a) Mission statements, goals and objectives

Yampatika's mission is to inspire environmental stewardship through education.

Yampatika fulfills its mission by:

- ◆ Developing and implementing hands-on, inquiry based educational programs and resources
- ◆ Advocating conservation and the sound use of natural lands and cultural resources
- ◆ Strengthening connections to natural environments through place-based education

Storm Peak Laboratory's mission is

To ensure that the Storm Peak laboratory will continue to integrate research and education of climate change by advancing discovery and understanding within the field of aerosol and cloud interactions.

b) History of organizations

Yampatika is a 501(c)3 non-profit environmental education organization located in Steamboat Springs. Yampatika was established in 1992 as the "Yampatika Outdoor Awareness Association" by a group of community members and government agencies that sought to provide environmental interpretation in a rural setting. Today, Yampatika is a collaborative effort of private and public individuals and organizations. Yampatika also has a long history of providing inquiry-based field ecology programs to elementary and middle schools in Routt and Moffat Counties. We are currently putting our energy and resources into developing an environmental science school that serves the children and adults in northwest Colorado.

The Desert Research Institute (DRI), a non-profit organization, operates a unique high elevation facility, Storm Peak Laboratory (SPL), located on the west summit of Mt. Werner in the Park Range near Steamboat Springs, Colorado, at an elevation of 10,500. SPL is a world-class facility. The lab's high elevation places scientists in the middle of the atmosphere, allowing them to conduct experiments they previously had to do from airplanes. SPL is operated year-round and thus provides an ideal location for long-term research on the interactions of atmospheric particles, clouds and natural radiation environments. These studies help us understand the implications of climate change for alpine regions. A comprehensive set of continuous particle measurements was initiated at SPL in 2002; continuous ozone and carbon dioxide measurements were initiated in 2005. The laboratory is currently well equipped for aerosol and cloud measurements, along with science education experiences. Since August 2006, the laboratory has been under the direction of Dr. Anna Gannet Hallar. SPL has a ten year history of providing educational experiences at the laboratory.

c) Current programs, activities and accomplishments

For 10 years, Yampatika has offered hands-on, inquiry-based educational programs to children in Routt and Moffat Counties in both the schools and in the field. Yampatika also offers a variety of seasonal field programs for families and adults, including bird watching, snowshoeing, geology, and much more. During the winter, Yampatika organizes and hosts a speaker series on topics relating to the environment and cultural aspects of northwest Colorado. By promoting a healthy lifestyle and teaching life and leadership skills on and off the trail, Yampatika leads by example and teaches community stewardship and natural resource conservation.

Some of Yampatika's most notable accomplishments are: 1) Receiving the Colorado Alliance for Environmental Education, Educators for Excellence Award in 2002 & 1996, 2) Educating nearly 20,000 residents and visitors per year about the importance of the area's natural surroundings, 3) Received a "Partners in Action" Award from the U.S. Department of Agriculture Forest Service for wilderness education in 1998.

Storm Peak Laboratory has an extensive scientific peer-reviewed publication list available at our website. Additionally, SPL has a long history of providing educational experiences. For example a UNR

graduate winter field course in atmospheric sciences is taught by Dr. Hallar, with two weeks of field research at SPL. This class is designed to give students experience in all facets of a field research program, from development of the research proposal and experiment, project planning, and final reporting. Other universities and colleges also conduct annual field courses at SPL including City College of New York, University of Calgary in Alberta, Colorado State University, Colorado Mountain College, and the University of Wisconsin. Additionally, semi-annual "open house" events are held at SPL. These educate the public about science conducted at the laboratory. Information both for adults and children is presented regarding the science of climate change. Overall, SPL provides a practical, easily accessible facility for researchers, teachers, and students of all ages and abilities.

2. PURPOSE OF PROGRAM

a) Issues to be addressed, constituencies served, target population, and benefits

This program will address two issues: (1) the No Child Left Behind Act's emphasis on standardized testing has focused heavily on reading, writing and math and effectively diminished the time or resources available for science instruction and environmental studies, including climate change (2) climate change is one of the largest environmental issues facing the world today and it is important to equip our children with the scientific knowledge to make responsible decisions. This weather and climate program will provide hands-on, outdoor education experiences for Routt and Moffat County public school children in grades 5 and 6. The grade level for each school is dependent on the year that weather is taught in the school's curricula.

Last year 209 students from North Routt, Hayden, South Routt, Strawberry Park, and Soda Creek Schools participated in the program. These schools would greatly like to participate again in 2008-09. In addition, Craig Intermediate Schools has expressed interest in participating in the weather and climate program. This is a total of 410 students. The lab can accommodate 20-30 students per field trip.

This program has both immediate and long-term benefits. In the short-term, students will learn how to take and record measurements, and graph and interpret data. These skills are required by the Colorado Student Assessment Program (CSAP). Thus, by immersing students in a hands-on experience to learn and apply these skills, this program has the potential to improve science CSAP test scores in area schools. In the long-term, studies have shown that students score higher on all standardized test subjects and achieve more in school when natural environments are integral to schools' curricula. Environment-based programs also foster cooperative learning and civic responsibility when using the local community as the foundational framework for the curricula.¹

b) Goals and objectives for the purpose of this program:

Overall goal: inspire students with science, while teaching skills needed for success.

Goals and objectives for program:

- 1) Continue to develop a weather & climate curriculum that teaches skills required by Colorado Student Assessment (CSAP);
- 2) Provide a hands-on educational experience where students use scientific equipment and conduct atmospheric tests in the field;
- 3) Provide students a 3-day program with introduction, field course, and follow-up to help students grasp concepts and apply to school studies
- 4) Provide all participating students with understanding of climate, weather & snow science; evaluate students' knowledge through a quiz and survey after the field trip
- 5) Make this program available to public school children in Routt and Moffat Counties

Purpose for funding request: SPL, with the support of Yampatika and numerous community volunteers, developed and implemented the climate and weather program in 2006-07. Yampatika and SPL developed a

¹ "California Student Assessment Project Phase Two: The Effects of Environment-Based Education on Student Achievement." SEER: Poway, CA, 2005. Available on the Web site of the State Education and Environment Roundtable (SEER) at www.seer.org; "Effects of Outdoor Education Programs for Children in California." American Institutes for Research: Palo Alto, CA: 2005. Available on the Sierra Club web site; Lieberman, Gerald A.; and Linda L. Hoody. "Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning." SEER: Poway, CA, 1998; "California Student Assessment Project." SEER: Poway, CA, 2000. "California Student Assessment Project Phase Two: The Effects of Environment-Based Education on Student Achievement." SEER: Poway, CA, 2005. Available on the Web site of the State Education and Environment Roundtable (SEER) at www.seer.org.

formal partnership in 2007-08 that enabled the program to expand to five area schools. This program has been tremendously successful and has received widespread support from students, teachers, parents, volunteers, and other members of the community. Despite the program's success and local support, neither SPL nor Yampatika will be able to continue the program in future years without financial support for program expenses, including staffing costs. All costs included in the program budget relate directly to the weather and climate program, and are necessary for the sustainability of this program.

c) Activities planned to accomplish goals and status of activities; new or ongoing activity?

South Routt, North Routt, and Hayden schools will participate in the program in September since many students do not alpine ski. Soda Creek, Strawberry Park, and Craig schools will participate in February and March. Because many students from Craig are unable to ski, they will ride the gondola and do an alternative snowshoe program that uses a weather station near the Thunderhead Lodge. We will also again provide an alternative snowshoe option for the Soda Creek and Strawberry Park students who cannot ski. This program will also take place at the weather station near Thunderhead Lodge.

The weather and climate program will take place over three days. The first day, educators from Yampatika and a SPL scientist will visit each classroom for 30-40 minutes to introduce the concepts of climate and weather and teach students how to use scientific equipment. During the field program on the second day, students will travel to Mt. Werner and measure and record information about temperature, pressure, relative humidity, wind speed, and particle concentration while they travel to the SPL via gondola or suburban. Students who do not ski or who prefer to participate in the alternative snowshoe program will spend the day near the gondola building and Rainbow Saddle studying snow science in addition to their atmospheric studies. Once at the lab, students will meet with both Yampatika educators and SPL scientists to tour the lab, discuss the research activities of SPL and the application of these activities to their curriculum. Following the field trip, Yampatika educators and a SPL scientist will visit the school for a follow-up visit to help children grasp concepts, answer questions, and evaluate students' learning.

The weather and climate program was successfully initiated by SPL in 2007-08 and included 5th grade students from South Routt Strawberry Park and Soda Creek schools; 6th grade students from Hayden; and 3rd – 5th grade students from North Routt. The program was able to include all students; accommodations were created for English as a Second Language students and students with physical and mental disabilities.

d) Timetable for implementation

June/July	Purchase equipment; evaluate and built upon last year's curriculum; reassess compliance with CSAP and Colorado Content Standards
August	Contact area teachers & principals to schedule field trip and classroom visits and train Yampatika's education staff
September	Provide programs for South Routt, North Routt and Hayden schools by shuttling students in suburbans
October	Evaluation for South Routt, North Routt and Hayden
January	Coordinate with Strawberry Park, Soda Creek and Craig schools for February & March visits
February	Begin programs for Strawberry Park, Soda Creek and Craig schools
March	Continue programs and evaluation for Strawberry Park, Soda Creek and Craig schools
April	Compile results and final report; begin disseminating results through media outreach; begin science journal article

e) Organizations participating in the activity

Yampatika: A 501(c)3 non-profit environmental education organization located in Steamboat Springs.

Storm Peak Lab: The Desert Research Institute (DRI), a non-profit organization, operates a unique high elevation facility, Storm Peak Laboratory for long-term research on the interactions of atmospheric particles, clouds and natural radiation environments.

United States Forest Service: SPL is located on the Routt National Forest. Both SPL and Yampatika hold special-use permits to use the land for programs. Both organizations are working closely with the USFS to ensure compliance with federal regulations and the long-term success of this project.

Steamboat Ski & Resort Corporation: SPL and Yampatika are working closely with the Steamboat Ski and Resort Corporation to ensure successful planning and implementation of the project. SSRC is considering providing complementary one-day ski passes to program participants, and has offered to assist with logistics and safety planning for the program.

3. EVALUATION

a) Expected results - Yampatika and SPL expect:

- 1) To host 410 students from Routt and Moffat Counties at Storm Peak Laboratory between September 1st and April 15th.
- 2) 75% of students will successfully meet the learning objectives for the program
 - a. Example learning objectives: Name three greenhouse gases; explain the difference between climate and weather; explain how snowflakes form
- 3) 75% of students will successfully operate scientific equipment, chart pressure, and graph their results
- 4) 75% of students will be able to make connections between their studies and climate change
- 5) An improvement in graphing skills required by the CSAP

b) Definition and measurement of success - Yampatika and SPL will evaluate the success of this program by:

- 1) requiring students to graph their data and take a quiz before and after the program that evaluates their mastery of learning objectives and skills required by CSAP
- 2) conducting interviews & discussions with teachers involved in the program. The teachers' opinions will be used to improve the course for the future
- 3) Giving the students and teacher attitude surveys regarding the program

Yampatika and SPL also expect that students will experience an increase in self-esteem, enhanced problem-solving skills, and a greater appreciation and understanding for the environment.

c) Use and dissemination of results

Information about the results of the weather and climate program will be shared with Yampatika's and SPL's partners, members, and the community at large through a press release to newspapers and radios. The results from this program will be also compiled at the end of the program and published in an end-of-year report, available to the community upon request. Yampatika and SPL will use the results from this program in their requests for additional funding from both local and non-local sources. We are currently working on a publication for our results in the Journal of Geoscience Education.

Appendix I – Facility Request Form for Educational Activities

Part I: General Information

Requestor Name	Anna Gannet Hallar
Institution and Address	DRI / Storm Peak Laboratory
Phone and Email	970-819-0968 ghallar@dri.edu
Faculty Advisor Name (if student requestor)	
Institution and Address	Storm Peak Laboratory P.O. Box 882530 Steamboat Springs, CO 80488
Phone and Email	

Part II: Project Description

Project Title	Weather and Climate Course for 5 th and 6 th grader in Routt and Moffat Counties
Project Location	Steamboat Springs, CO
Start and End Dates of Field Deployment	Various dates in late September, 2008 and early October, 2008 Various dates in January and Feb. 2009
NSF Facilities requested (type and # of systems)	Launch Radiosondes
Number of Expendables requested (if applicable)	

Part III: Educational Activities Description

Number of students involved	Approximately 400 students
Desired training activities conducted by Facility Staff incl. time in the field	
Desired teaching activities conducted by Facility Staff incl. time in the field	Demonstrate use of instrumentation, approximately 3 hours per school (5 schools).
Additional special requirements that pertain to Facility support	

Part IV: Operational Requirements

Please specify data access needs (e.g. real time)	Real time data would be ideal for students.
Please specify data analysis needs	Post-processed data plots to incorporate into our curriculum would be ideal.
Please specify communications needs	