S.A.G.E. Outdoor Program

Project Summary:

This STEM/STEAM project will focus on local natural resource management with integrated and articulated lessons for students K-12. Students throughout Harney County will engage in hands-on experiences that involve critical thinking through observation, measurement, investigation, analysis, and hypothesis. The overarching goals of this project are that students will (1) develop the skills and knowledge to address major environmental challenges through participation in outdoor activities that contribute to a healthy, sustainable community; (2) develop a greater appreciation of how local land is managed not only for wildlife but for sustainable agriculture; and (3) meet and exceed selected Content Standards in Science, Math, Environmental Literacy and Next Generation Science Standards.

Through partnerships with agencies that include Bureau of Land Management, the Burns Paiute Tribe, Malheur Field Station, Malheur National Wildlife Refuge, The Eastern Oregon Agriculture Research Station, The Nature Conservancy, students will have exposure to local environmental issues and to occupational opportunities related to natural resources.

This proposal requests total funds of $140,274 to be used for the purchase of equipment and supplies required to carry out authentic experiences as well as provide professional development and staff release time to develop comprehensive lesson plans to support these hands-on activities.

S.A.G.E. *Students Attaining Great Education*

Project Rational: Geographically, Harney County is the largest land-mass county in the State of Oregon and ninth largest in the nation, covering over 10,000 square miles. Our county holds a *frontier* designation, meaning there are fewer than six people per square mile. We have one of the highest unemployment rates in the state and many of our workers are seasonal. The unemployment rate in February 2013 was 16.5%; in July 2013 it dropped to 11.1% due to seasonal employment. The economic base of the County is agriculture with cow/calf production and sales, and alfalfa and native meadow hay as predominant crops. We have limited industry or business other than agriculture.

There are ten school districts located within Harney County with current average daily membership of all students reported at 1056. The 14 schools include an alternative school and a charter school. The largest school is Slater Elementary in Harney County SD 3 (Burns) with enrollment of 366; the smallest school/district is Pine Creek with an enrollment of 3 students. The seven rural districts (Pine Creek, Diamond, Suntex, Drewsey, Frenchglen, Double O, and South Harney SD) and Crane Elementary are K-8 schools that feed into Crane Union High School. Crane Union High School is unique in that it is a boarding school for students from the rural districts; students arrive Sunday evening and live on campus until they return home Thursday evening after school. Overall, 65.7% of Harney County School children are eligible for free or reduced lunch. Ethnic groups represented in our school communities include American Indian/Alaska Native, Asian, Hispanic/Latino, Multi-Racial, Native Hawaiian/Pacific Islander, and Black/African American (Appendix A). As demonstrated by these demographics a large percentage of our students are economically disadvantaged, the effects of which are compounded by the remoteness of our communities, which often restricts experiences and

opportunities for these students. A review of the 2012-13 eighth grade OAKS math and science show Harney County students scoring above the state averages. It is our intent to provide STEM/STEAM educational opportunities to our students that will mitigate the barriers of economics and geography, recognize their academic achievements and enhance the excellence of our schools.

The adults of our community are committed to cooperating to provide opportunities for our young people to participate in outdoor community-based projects that are integrated into the curriculum at every grade in our public schools. Through these projects we seek to develop in our youth the knowledge and skills that will enable them to investigate problems, develop, evaluate and participate in solutions that will create a positive future for all members of our community for generations to come.

Historically, there has been a lack of awareness of the variety of the natural resource careers available in our County. Because Harney County lacks a secure industrial tax base, Harney County schools lack funding to provide students with hands-on, place-based opportunities for exposure to our STEM/STEAM careers. Exposing students to local occupational opportunities related to natural resources and environmental sciences (fisheries, range, fire, wildlife and forestry biologists, technicians, scientists, conservationists and ecologists) is a critical component of creating healthy, sustainable communities while pursuing academic excellence.

Goals: Students in Harney County will:

1. Develop life-long health and learning skills that will lead to a variety of career choices, including those that allow them to stay in the area.

2. Develop the skills and knowledge to address the major environmental challenges facing this community, state and country.
3. Participate in outdoor activities that contribute to a healthy, sustainable community including the production of food, the conservation of natural resources and the development of renewable energy resources.
4. Participate in hands-on activities that educate students as to how local land is managed not only for wildlife but for sustainable agriculture.
5. Meet and exceed selected Oregon State Science and Math Standards and demonstrate proficiency in STEM/STEAM essential skills.

Students will participate in outdoor experiences and inquiry at every grade level. Activities and investigations will be tied to environmental/community issues which include study and observation of plants, native/invasive species interactions, water quality, fish counts, migrating bird counts, species distributions, plant/fish/water quality interactions, soils//erosion, vegetation/riparian zone/erosion/water quality interactions, and the effects of weather on any of these subjects. All activities have a direct link to Oregon State Science and Math Standards and the Next Generation Science Standards that are under consideration. Activities also follow the STEM/STEAM program in learning place-based science (environmental science, biology and chemistry), technology (data recording technologies and collecting programs), engineering (constructing methods to improve environmental health), art and design (creating better designs for lake and forest restoration), and math (population counts, graphing, statistics, etc).

Evaluation Plan: Each grade level objective will have activities with measureable outcomes of student participation and achievement. In addition, as a result of participation in the S.A.G.E. Outdoor Program by June 2015 we expect the following outcomes for all students:

- Students will demonstrate a 30% increase in positive attitudes toward STEM/STEAM activities and awareness of careers as measured by pre/post surveys.
- Students will demonstrate an increase of 30% in content knowledge and skills as measured by pre/post assessments.
- Students will obtain, evaluate and communicate information through project-based activities as measured by project rubrics.

Timeline for Implementation:

- **February through May, 2014:** materials and supplies will be ordered, collaborative meetings with partners to plan activities for students throughout the next year, development of a portable science station for student use, grounds preparation for the high school restoration project. Job shadow and observe partner scientists in their element.
- **July and August 2014**: Professional development, planning detailed lesson plans, planning and scheduling of outdoor activities; training on processes of data collection used at Malheur Wildlife Refuge. Possible high school summer internships with Malheur Wildlife Refuge.
- **September 2014-June 2015**: Full implementation for all grades.

A more detailed implementation timeline can be found in Appendix C.

Sustainability Plan: Harney County schools have on-going partnerships with science and natural resource agencies; often working together to provide unique opportunities for students. Historically, our barrier to implementing these hands-on science and math activities has been lack of funds to secure the equipment and supplies. Receipt of these grant funds will allow us to purchase the necessary non-consumable items required to carry out authentic experiences and to provide release time to develop comprehensive lesson plans, both of which can then be shared throughout the County. With these two pieces in place, the K-12 objectives and activities we have outlined will be sustainable in the coming years. Field trips, as culminating activities for students, and continued professional development will be funded through school district curriculum funds.

Partnership networks/organizations:

Harney County Consortia is named as a partner in the Greater Oregon STEM Hub application recently submitted by Eastern Oregon University. We are looking forward to a partnership with this Hub for professional development, technical assistance and more. Locally, we have commitments from agencies including the Burns Paiute Tribe, the Nature Conservancy, The Eastern Oregon Agriculture Research Station, Bureau of Land Management, Malheur National Wildlife Refuge, Bend Research, Malheur Field Station, to partner with us in providing authentic experiences for our students such as testing soil, field trips led by agency biologists, participate in eradication of invasive species and participate in grounds restoration activities. Appendix B lists partner agencies, who at the time of this writing, have committed to support these student activities.