Applicant Name		[redacted]
Organization Name		University of Idaho Foundation on behalf of the McCall Outdoor Science School
Contact Email		[redacted]
Contact Phone		[redacted]
Program Website		www.uidaho.edu/moss
501(c)(3)		Yes
School/Educational Institution		No
Copyright Release		Yes
Legal Release		Yes
State / Province		ID
Audience Description		The McCall Outdoor Science School (MOSS) serves Preschool students, K-12 students, undergraduate and graduate students, pre-service and in-service K-12 teachers and general community members. Fifty-three percent of the students we serve are from schools eligible for Federal Title I status, those where at least 40% of students are from low-income families. Idaho is in the bottom 10 states for its people going on and finishing a 4-year college degree. Student demographics closely mirror those found in Idaho – 82.7% White, 1.9% Native American, 7.4% Hispanic, 1.3% African American, 3.3% Asian, 0.7% Hawaiian or Pacific Islander and 2.6% not reporting.
Audience Size		MOSS currently serves approximately 2,700 preschool and K-12 students, 50 undergraduate students, 20 graduate students, 50 pre-service teachers, 150 in-service teachers and 250 community members annually. Our online presence through blogging and social media includes an additional several thousand parents, teachers, students, and other community members. We do not expect these numbers to increase significantly in the next 5-10 years until we are able to make significant investments in our capital infrastructure, although high priority is to increase the diversity of people reached by our existing numbers.
Annual Operating Budget (USD or CAN)		[redacted] Note that this funding is self-generated (i.e. generated independent of the University of Idaho)
Budget Type - for program or organization?		program
Budget Type - Please describe if your budget is another type		
Images - URL or location		[redacted]
Videos - URL or location		[redacted]
Project Name		The University of Idaho McCall Outdoor Science School: Building E-STEM Identity in Idaho

Short Description of Project		MOSS is an award-winning program of the University of Idaho (UI) College of Natural Resources (CNR). We facilitate place-based, collaborative E-STEM inquiry through the context of Idaho's land, water and communities. MOSS has five program areas: 1) Youth Programs; 2) Graduate Residency Program; 3) Teacher Professional Development; 4) Educational and Environmental Research; and 5) Community Programs.The goals of our curriculum are to foster scientific literacy, help students develop a sense of place, and promote community skills. We connect students to the landscapes and people of Idaho in ways that make learning relevant and meaningful. The outdoor environment is our textbook, and the subject matter literally comes alive for students outside the walls of the classroom. We use problem-based and inquiry-based approaches that have students work in small groups to solve complex, real-world problems with less-than-straightforward solutions. We emphasize an integrated version of E-STEM in which students ask questions, engage in science practices, think critically, use creativity to solve problems, and work collaboratively with their peers. We encourage and provide opportunities for students to communicate their findings to a broad audience of their peers, their parents, and other students through accessible technology and an online forum. Imagine an entire school year based o an adventure-based learning model where collaborative inquiry, integrated subjects, technology, low student-teacher ratios and authentic learning experiences are the everyday norm, not just a special field trip. MOSS is making it happen in Idaho one expedition at a time.Adventure-based learning (AL) provides students and teachers with opportunities to explore real-world E-STEM issues by combining place-based expeditions with collaborative online environments, all of which is anchored in inquiry-based learning. For example, within an AL expedition, K-12 students and teachers interact with graduate student and university faculty researchers creating opportunities for collaborative learning. Learners collect data and connect what they observe in the field with their current knowledge base. They then present potential solutions to relevant issues based on the scientific method. Participants engage in experiences born from leading-edge university research. Our historic lakeside field campus high in the Idaho Rocky Mountains provides the ideal setting for K-12 students and teachers to take E-STEM concepts such as climate change and biofuel production from the realm of abstract theory, to first-hand observation. Resident graduate students engage in research, take university courses, and teach K-12 students in the field. MOSS therefore represents a unique link between the Idaho K-12 education system and its university counterpart. We challenge the traditional understanding of what science is, how it is practiced, and who can participate. Our vision is that, when describing the people involved in doing E-STEM, teachers and students talk about themselves. In this spirit, inquiry,

		leadership and discovery happens at every level from our PhD level faculty to graduate students, teachers and K-12 students, who share their experiences with classrooms and parents back home. The common thread of E-STEM discovery runs throughout the entire process, the needle led by a strong vision and set of values.
Main Criterion #1: Describe how your program or organization uses environmental education to advance STEM learning through research and investigative activities for your service population.		Residential school-year and summer E-STEM programs are at the heart of the MOSS experience. The goals of our curriculum are to foster scientific literacy, help students develop a sense of place, and promote community skills. Because of their immersive, student driven nature, n two programs are alike. Here, we describe two case studies that demonstrate how we harness student fascination with technology and social media to help them build 21st-century skills. Specifically, students critically evaluate visual and written information, communicate and collaborate face to face and over the internet, and address complex E-STEM issues through creative thinking and problem-solving. The first case study served students from the UI Upward Bound Math Science (UBMS) program. UBMS serves at-risk high school students who with the goal of them becoming first-generation-college bound. Over the course of a three-week unit, students were given the challenge of designing a town that addressed energy and water scenarios while considering potential impacts of climate change on water resources and reducing greenhouse emissions. Scenario 1: Our water resources may be affected by climate change. We need to explore adaptation and mitigation strategies that can make our community more resilient. Scenario 2: Our current energy profile is unsustainable. We need to explore alternative and more efficient options for powering our lifestyles. The project followed problem-based learning framework in which students defined the problem, investigated solutions, researched information and assembled data, and developed a written report to share with their peers and outside experts. This learning approach had students working in small groups to solve complex, real-world problems with less-than-straightforward solutions. In addition to field-based data collection, students used technology that enabled them to interview experts over a distance, provided access to content, and served as medium for students to communicate their proposed solutions. This project emphasized communication, collaboration, and creative problem solving. Students worked together to identify experts to consult on their project design. They collaboratively designed and

		defended novel ideas for the design of "ideal" cities. They conducted hands-on inquiries to better understand how natural systems might react to climate change (e.g. how watershed systems historically dominated by a winter snowpack might change if precipitation shifts to more rain than snow under climate change scenarios). They used social science-based methods to conduct interviews in the community with homeowners and business owners who have implemented alternative energy projects. For example, they visited a home that had a significant solar array, city government buildings that use geothermal heating, and a school that has a wood-chip heating system. Students also met with a city planning manager and attended a community-planning conference. They formed "expert groups" comprised of 4-5 students that were each assigned one aspect of the community (food systems, energy, water and waste management, and transportation). To present their solution, students created website (http://ubmsmodelcity.wix.com/ecolibrium) that described their "ideal" town. The website served as a primary assessment piece. A rubric assessed student understanding of the issues, creativity and innovation in posing solutions, analysis and critical thinking, quality of communication, and group interactions. Students made presentations to their peers and a Skype presentation to an outside panel of experts. Student-reported outcomes were assessed through a follow-up survey. One student remarked, "After…planning an eco-friendly city, learned and made choices to conserve more water and recycle." Another student said, "It's great to understand the things you love, and even better to learn about new things in ways you never imagined." This project has been peer-reviewed and published in the journal Science Scope: Eitel, K.B., Hougham, R.J., & Miller, B.G., Schon, J. & LaPaglia, K. (2013). Upload/download: Empowering students through technology-enabled problem-based learning. Science Scope. 36(7), 32-39. The second case study, called "Lakes Alive", served 6th grade students from an Idaho elementary school. A central piece of the MOSS curriculum engages students in experiential student-led field inquiry projects. In this particular example, we invited a University of Idaho limnologist to our campus to help students explore a frozen lake in winter and to engage them in hands-on authentic scientific practice. Students learned field methods and some basic research questions through a presentation and field exercises with the

		limnologist. They were then challenged to replicate and connect these ideas to new creative inquiries of their own. One group of students developed the question, "How does a zooplankton population change throughout the water column?" They developed several hypotheses to be tested. Using an ice auger, water samplers, and light meters, the students set out to determine if their hypotheses were supported. The students created a sophisticated project and effectively communicated their results to their peers during the "inquiry conference" that happens o the last day of each MOSS program. The "Lakes Alive" project has been peer-reviewed and also published in the journal Science Scope: Eitel, K.B., Wilhelm, F., Parsons, R., Eitel, J.U.H. (2014). Lakes Alive! Science Scope. 38(2), 2 – 29. Our regular assessment of projects like the two described above show that these projects affect positive increases in student science identity and science process skills. Carlone and Johnson (2007) stated that "someone who has a science identity demonstrates competent performance in relevant scientific practices and deep and meaningful knowledge and understanding of science, and recognizes herself and gets recognized by others as a 'science person'". Students that have strong science identity are more likely to enroll in science related classes and pursue science related careers. Science process skills include being able to record data, represent data graphically, and draw conclusions supported by the data. Students that possess strong science process skills can navigate through the scientific inquiry process with ease and apply it to their daily lives. MOSS was recently recognized for our innovative work on projects such as demonstrated in these two case studies. In 2012, we competed with 180 nominees statewide to win the J.A. and Kathryn Albertson Foundation "Idaho 21st Century Award" for challenging traditional education with creativity and innovation.
Main Criterion #2: Describe how the organization or program you are submitting for this award promotes citizenship and social responsibility.		While MOSS Education Director, Dr. Karla Eitel, was pondering ways she could better engage her graduate students in the local community, [redacted] Elementary School (DES) 5th grade teacher, [redacted], was wondering how her class could tackle the problem of an impaired creek that runs immediately adjacent to their school. From an otherwise ordinary meeting in 2007 to discuss potential partnership opportunities, a perfectly reciprocal relationship was born that would soon gain national recognition. [redacted] would rely on the expertise of the faculty and graduate students at MOSS to lead her students through an

		authentic inquiry of Boulder Creek, while her classroom would serve as the ideal laboratory school for MOSS graduate students training to become the next generation of E-STEM educators, scientists and environmental leaders. In a valley high in the Rocky Mountains of central Idaho runs Boulder Creek, a small tributary feeding into Cascade Lake Reservoir. Boulder Creek originates from a mountain lake north of Donnelly, a small Idaho ranching community. Since 1994, Boulder Creek has been listed as "impaired" by the Environmental Protection Agency (EPA) for phosphorous loading, high temperatures, low dissolved oxygen, and sedimentation. As a result, many segments of Boulder Creek no longer support any beneficial uses. Because the creek runs behind DES, it is a natural place for students to focus their science study. When the class found out that the creek was impaired, their studies took on a new level of authentic inquiry as the students sought to assist in monitoring and restoring the creek. An so a question was posed: Boulder Creek is impaired. Is there anything we can do? Together the partners guided the students to become stewards of their creek and to understand their community's impact on it. MOSS provided equipment and expertise to guide [redacted] and her students through the process of tackling this important community project. MOSS graduate students worked with the elementary students to introduce the concepts of water quality testing and healthy trout habitat to determine if their class-raised trout could be released in the creek. The partners also sought help from Idaho Department of Environmental Quality (IDEQ), Idaho Department of Fish Game (IDFG), and Payette National Forest. By engaging with professionals and experts to receive guidance and mentoring, the partners developed a unique, ongoing service-learning experience that addresses a place-specific issue important to their small community's future. Meanwhile, MOSS graduate students honed their own civic skills and learned that problem-based and place-based learning can happen in formal school environments, making them more likely to take on this kind of work as they progress in their careers. The project has demonstrated civic importance. [redacted] is not only ranching community, but tourist community as well. Trout fishing is a big draw for tourists from Boise – Idaho's largest city. These tourism dollars represent a sustainable source of support that diversifies a local economy traditionally reliant o natural resource extraction. The project has received over $30,000 in support to study and restore the creek. A grant from IDEQ to mitigate streambank erosion strengthened the local economy. Students designed the restoration, hired local builders, purchased local

		equipment and supplies, and managed the overall implementation of the slope restoration. Evidence of the project's success continues to grow. Each year, [redacted] students present to the [redacted] City Council, informing them of the current water quality status of the creek. Local government agencies and elected officials have voiced their support for the good work of the students. An IDEQ employee acknowledged the students' impact by stating: "Without the students, I think we would see little community participation." She added, "Those little kids have tremendous role; that's what did it, that is how we got our foot in." The partnership between MOSS and DES sparked new and effective collaborations between state agencies and the local community. Government agencies often struggle to involve citizens and landowners in restoration projects and to secure access to land for collecting data. After seeing student efforts to restore the creek, a local landowner reached out to IDEQ and agreed to work with them to mitigate erosion on his land. Soon thereafter, one of the largest landowners in the area donated acreage to a project that created trail access throughout town and offered another access point for students to work on the creek. The result of community members hearing and seeing the effort of these students has led to several other landowners allowing local government agencies to work on their land, broadening the effort to restore Boulder Creek. Within six years of the start of the student-led water quality monitoring and restoration projects, five new landowners have adopted "Best Management Practices" with materials and labor provided. In 2012, [redacted] was recognized for her work on this project as one of 1 teachers nationwide winning the Presidential Innovation Award for Environmental Educators. MOSS also received national recognition for its leadership role in the project in 2013, winning the West Region W.K. Kellogg Engagement Scholarship Award and being named one of four finalists for the C. Peter Magrath University Community Engagement Award. This award is the highest honor bestowed upon American university programs for their outreach and engagement efforts. Prior to starting this program, [redacted]'s students were at-risk in science and averaged a score of only 62% at the proficient or advanced level in fifth-grade science on the Idaho Science Achievement Test. In 2012, her students averaged 95% proficient or advanced level. The project has also led to two peer-reviewed publications in the journal "Science and Children", a publication of the National Science Teachers Association, with a third manuscript in progress. The two published papers are as follows:

		Bingaman, D. & Eitel, K.C.B. (2010). Boulder Creek Study. Science & Children, 47(6), 52 – 57. Schon, J., Eitel, K.B., Bingaman, D., Miller, B.G., Rittenburg, R. (2014). Big Project, Small Leaders: A creek resoration project led by fifth-grade students affects the whole community. Science & Children. 51(9), 48-54.
Main Criterion #3: Describe how your program or organization tackles real challenges in the environment.		As a nation we are challenged to meet the energy demands of a growing population in a ways that are locally and globally sustainable. Finding solutions to this complex problem requires multi-pronged approaches that consider changes in human behavior, development of more efficient machines, and adoption of new sources of energy. The transportation sector in particular is challenged by public demand, policy and resource security to find adequate and sustainable replacements for non-renewable fossil fuels. Here in the Pacific Northwest (PNW), MOSS addresses this locally by partnering with the Northwest Advanced Renewables Alliance (NARA) on a 5-year, $40M USDA project investigating the creation of biojet fuel from PNW wood waste. The project aims to a) increase efficiency for each supply chain step, from forestry operations to conversion processes; b) create new bio-based products; c) provide economic, environmental and social sustainability analyses; d) engage stakeholder groups; and e) improve bioenergy literacy for students, educators, professionals and the general public. MOSS is leading the bioenergy literacy components of the project through K-1 teacher professional development, direct K-12 student engagement in energy learning and research, and development of online resources. Biojet fuel has the potential to reduce greenhouse gas emissions from the airline industry and is therefore an important piece of the nation's overall climate change mitigation strategy. Local impacts of climate change are already being felt in the PNW through decreasing snowpack, diminished water resources, and compromised fish habitat. By increasing energy literacy in the PNW, MOSS is preparing citizens who can participate in the bioenergy workforce and make informed decisions about energy and climate issues. Our specific goals are to: 1. increase energy literacy of students and teachers across the PNW by providing education and resources for teaching and learning about energy in place-based contexts, preparing learners to become decision-makers and problem-solvers on global issues with local impacts;

		2. use innovative E-STEM approaches to engage teachers and students in scientific research in bioenergy and advanced woody biomass based biojet fuel production in the PNW; and 3. use the NARA project as case study for developing methods to address complex issues in collaboration with researchers, teachers, students, and communities. We meet these goals in various ways. First, MOSS teaches place-based energy literacy to each of the 2,500 middle and high school students we reach annually. For example, MOSS graduate students conduct energy audits with their students using advanced monitoring technology developed by University of Idaho engineering students. Second, teacher professional development takes on two different formats: 1) a webinar series designed to support teachers with new content knowledge in bioenergy and skills for facilitating problem-based learning through coaching high school energy problem-solving teams participating in the "Image Tomorrow" competition (imagine.wsu.edu) and 2) a 4-day intensive workshop where a cohort of teachers visiting MOSS are engaged in problem-based learning about bioenergy and communicate their learning in a blog format for the benefit of a cohort of teachers following online. These efforts serve 50 PNW K1 teachers annually. Third, the efforts from NARA teams and educators are integrated into the Energy Literacy Principles Matrix (http://energyliteracyprinciples.org/), a web-based resource that organizes materials to be used by science teachers and the general public. The organization of these materials follows the U.S. Department of Energy authored energy literacy principles as a guideline (U.S. DOE, 2012). Evidence suggests that our three-pronged approach to energy literacy is achieving success. random sample of students (n= 304) participated in a pretest/post-test/one-month delayed post-test assessment. The tests contained questions relating to energy literacy as defined by the U.S. Department of Energy. Results indicate that students attending a four or five-day MOSS residential program demonstrate a positive increase in their energy literacy, even during the one-month follow-up. Teacher energy literacy begins relatively high, but still shows a positive increase from time one to time two. In addition, a recent biofuel team coached by a MOSS PD participant, won their division at the "Imagine Tomorrow" competition at Washington State University, demonstrating highly developed skills for communicating about E-STEM-related information.

		Teachers have provided written reflections on their learning through the face-to-face workshop and associated online blog. An online participant wrote, "After participating …through the blog and through online conversations, I've come to understand the intense complexity of figuring out our nation's energy issues. I've also come to understand that the problems that face our state or the whole country need to be headed by people who have ample experience with solving problems in the way that we attempted to during this unique experience." A onsite participant added: "While scientists are trying to secure a better energy future for us all, teachers are responsible for providing the world with better thinkers and better problem solvers so that a better future with better solutions can be realized. I like the idea of providing students with projects in an English class that may test some English skills, but allow them to think carefully about real world problems." We have also produced several peer-reviewed research publications through this project: Eitel, K. B., Hougham, R. J., Laninga, T., Fizzell, G., Schon, J. & Hendrickson, D. (2015). Teacher Professional Development for Energy Literacy: A comparison of two approaches. Journal of Sustainability Education, Vol. 8. Schon, J.A., Eitel, K.B., Hougham, R.J., Hendrickson, D. (2015). Creating a research to classroom pipeline: closing the gap between science research and educators. Journal of Sustainability Education, Vol. 8. Hougham, R. J., Hollenhorst, S., Schon, J., Eitel, K., et al. (2015). Education at the Speed of Research: an overview of the NARA approach to BioEnergy Literacy. Journal of Sustainability Education, Vol. 8. Hendrickson, D., Corrigan, K., Keefe, A., Shaw, D., Jacob, S., Skelton, L., Schon, J., Eitel, K.B., Hougham, R.J. (2015). Global Sustainability: A Authentic Context for Energy Education. Journal of Sustainability Education, Vol. 8. Schon, J., Hougham, R.J., Eitel, K., & Hollenhorst, S. (2014). The Value of a Tree: Comparing Carbon Sequestration to Forest Products. Science Scope 37(7).
Describe how you might you use these funds to		Seventy-five years ago, the University of Idaho established a summer field studies program on 12 acres of Idaho endowment land

advance your work.		o the shores of Payette Lake in McCall, Idaho. MOSS is now hub for E-STEM programs that serve communities across Idaho. Our commitment to E-STEM is matched through ownership and capital investment in infrastructure to guarantee these programs exist in perpetuity for Idaho and our citizens. Three of our highest priorities in the MOSS 2015-2020 strategic plan are to 1) prepare graduate students to enter the E-STEM and E-STEM education workforce as positive, thoughtful innovators, 2) increase engagement of learners from underrepresented groups in E-STEM, and 3) foster excellence in K-12 E-STEM education. If selected for a monetary award, we will invest in these three objectives. Examples include 1) enhancing graduate student fellowships to catalyze more work between E-STEM researchers, educators, and communities, 2) establishing scholarships for students from underrepresented minority and/or low income groups who might not otherwise be able to afford a MOSS experience, and 3) strategic investment in tools and instrumentation needed to support exceptional E-STEM educators. We feel that it would also be important and fun to collaborate with UL and NAAEE to determine how our mutual goals could be met through strategic investments of the monetary award.
Application Feedback		[redacted]