**EXAMPLE BI PROJECT DESCRIPTION**

**Broader Impacts Description**

We will partner with Centers for Ocean Science Education Excellence Networked Ocean World (COSEE NOW) for the development and implementation of the following broader impacts activities. We will develop three lesson plans about satellite images of sea surface temperature and primary production. Embedded in these lessons will be information about how to interpret satellite images, how to interpret sea surface temperature and chlorophyll-a images, and how scientists use these data in research. Once the lessons are developed, we will prepare and implement a two-day-long professional development workshop for 30 teachers at Wizard University focusing on the use of remote technology to study the ocean. COSEE NOW staff will use existing teacher networks to recruit the teacher participants.

After this event, the 30 teachers will be able to interpret sea surface temperature and chlorophyll-a satellite images and will be prepared to deliver the three lessons in their classrooms. The teachers will be required to implement the lesson plans with their students within two months of the professional development workshop. The teachers will be required to gather and report student feedback on the lessons. Once feedback is collected, appropriate revisions will be made to the lessons. The lessons will then be posted to the COSEE NOW website, disseminated through the COSEE Network, and presented to teachers attending a National Marine Educators Association (NMEA) conference through a conference presentation.

**Broader Impacts Tasks**

As a result of the broader impacts activities funded in conjunction with the proposed research, the team will:

* Develop three lesson plans about satellite images of sea surface temperature and primary production and how scientists utilize these data in research.
* Prepare and implement a two-day long professional development workshop for 30 teachers.
* The teachers will implement the lesson plans with their students within two months of the professional development workshop and gather and report student feedback on the lessons.
* The lessons will be revised based on feedback.
* The lessons will be posted to the COSEE NOW website, disseminated through the COSEE Network, and presented to teachers attending a National Marine Educators Association (NMEA) conference through a conference presentation.

**Broader Impacts Objectives**

During the school year after the teacher professional development workshop, teachers will:

* Implement a single or multi-period lesson plan that teaches their students about satellite images of sea surface temperature and primary production (how to read images, how to interpret temp and production from images, how scientists use them, how important images, temp and/or primary production are to scientists), and apply the information to a real world question or problem.
* Gather student data generated from the lesson implementation.
* Report their results and perceptions from implementing a data focused lesson in their classroom.

**EXAMPLES OF CURRENT UMAINE BROADER IMPACTS**

COSEE <http://cosee.umaine.edu/>

COSEE-Ocean Systems (OS), with a team of researchers and other experts from the University of Maine, New England Aquarium, and the Institute for Broadening Participation, was established to implement several integrated activities, each designed to improve COSEE's impact on rural and inland communities. COSEE-OS is one of 12 Centers for Ocean Sciences Education Excellence (COSEE) and is funded by the National Science Foundation.

Maine EPSCoR Office <https://umaine.edu/epscor/>

The Established Program to Stimulate Competitive Research (EPSCoR) is directed at states that have historically received lesser amounts of research and development (R&D) funding. Through this program, states develop partnerships between their higher education institutions, industry, government, and others to effect lasting improvements in their R&D infrastructure, capacity, and national competitiveness. Maine EPSCoR at the University of Maine oversees and implements the state’s NSF EPSCoR programs. Examples of EPSCoR collaborations are included below. Laurie Bragg is the Outreach Manager for Maine EPSCoR.

* Wabanaki Youth in Science (WaYS) Program <https://umaine.edu/nativeamericanprograms/wabanaki-youth-science-program/>

The Wabanaki Youth and Science, (WaYS), program’s goal is to provide access and experience to Native youth in the sciences that combines Traditional Ecological Knowledge (TEK) and scientific exploration. Traditional Ecological Knowledge is the knowledge acquired by indigenous and local peoples over time thru their experiences in the environment. Students participating in WaYS are connected with their cultural heritage and legacy of environmental management and stewardship while at the same time learning the western science perspective. The WaYS educational model promotes Native American persistence and participation in sciences from junior high through college and when choosing a career pathway. Additionally, this program helps promote understanding between Maine’s tribal and scientific communities as they work together to foster the next generation of tribal leaders.

Tish Carr is the WaYS Special Projects Coordiator.

* SEANET Aquaponics <https://www.aucd.org/template/news.cfm?news_id=13650&id=17>

Six-week summer internship program for students with disabilities. Partners include UMaine, Hancock County Cooperative Extension 4-H Youth Development Program and the Center for Cooperative Aquaculture Research. This program provides students with hands-on learning opportunities in aquaponics. Research projects are designed to teach the essential elements of aquaponics and encourage students to generate their own research questions. Interns will gain understanding of topics such as water quality, photosynthesis, fish and plant nutrition, and how small projects are brought to scale. They will also learn about the growing aquaculture industry in Maine and the employment opportunities in related fields. Janet May is the Exploring Aquaponics project coordinator.

Cooperative Extension

The University of Maine Cooperative Extension is part of the Cooperative Extension System, a publicly funded educational network. Many outreach activities exist within the Cooperative Extension. Laura Wilson, a 4-H Science Professional, is a contact for the below programs.

* 4-H kits <https://extension.umaine.edu/4h/youth/4-h-projects/science-engineering-technology/science-toolkits/>

These projects provide an experiential learning opportunity for youth in Maine by providing materials needed to successfully complete experiential learning science-based activities. Groups and youth develop an interest in science through hands on learning. Youth learn life skills through completing these projects. They can study the process of science, engineering and technology, while working as a team to ensure the success of their project.

* Follow a Researcher <https://extension.umaine.edu/followaresearcher/about/>

Using technology and social media, Follow a Researcher® connects K–12 classrooms with research as it is being conducted around the globe. The program gives students a glimpse into a scientist’s world by providing live expedition updates and facilitating communication between the youth and scientist through weekly Twitter chats and videos describing the research aligned with Next Generation Science Standards Practices.

The program also provides recommendations for educators on related demonstrations and experiential learning activities.

* 4-H Stem Ambassadors <https://extension.umaine.edu/4h/youth/4-h-projects/science-engineering-technology/stem-ambassadors/>

4-H STEM Ambassadors are trained University of Maine students who facilitate hands-on science, technology, engineering, and math (STEM) activities with youth 8–14 years old throughout Maine. Through 4-H STEM Ambassadors, youth become connected to the research, resources, and scientists at Maine’s public universities. Before 4-H STEM Ambassadors work with children, they complete hands-on training to understand how to work with and keep youth safe, as well as how to facilitate inquiry-based STEM activities. For UMaine students, participation in the 4-H STEM Ambassador program is part of the UMaine Engaged Black Bear Initiative – contact Laura Wilson for more information.

* Many additional programs such as Science Saturday, Power of Wind and Citizen Science Opportunities can be found at <https://extension.umaine.edu/4h/>.

Acadia Learning for Participatory Science <http://participatoryscience.org/>

Acadia Learning brings scientists, teachers, and students together in partnerships that result in useful research and effective science education, including science data literacy. Acadia Learning is a collaboration by the Schoodic Institute and the University of Maine. Sarah Nelson, Associate Research Professor in the School of Forest Resources, helped to create this collaboration in 2007. Areas of interest for the center include the Maine Data Literacy Project, Snowpack, Mercury in Watersheds, Nitrogen Cycling in Watersheds and Culverts & Stream Ecology.

The Maine Center for Research in STEM Education (RiSE Center) <https://umaine.edu/risecenter/>

The Maine Center for Research in STEM Education (RiSE Center) is an interdisciplinary center organized to conduct research, graduate education, and professional development, and to build community partnerships focused on improving the research and research-based practice of STEM education at all levels of instruction. Members of the RiSE Center include faculty, staff, and graduate students engaged in education research across multiple STEM departments and the College of Education at the University of Maine.

* The Maine STEM Partnership <http://www.mainestempartnership.org/>

The mission of the Maine STEM Partnership is to build and sustain a diverse, statewide community that strengthens PK-16+ STEM education by promoting rich, research-supported classroom experiences that deepen learning and engage all students. This community seeks to build STEM literacy and career competency and to encourage students to become STEM educators and education researchers.

Girls Engineer Maine <https://umaine.edu/gem/>

GEM is a statewide educational outreach program designed to increase the number of women studying engineering in Maine. GEM aims to [**help high school and middle school girls**](https://umaine.edu/gem/about/) to understand better what engineers do as well **encourage girls** to explore how to prepare for an engineering career

* Sustainable Energy Leaders (High School) <https://umaine.edu/gem/sustainable-energy-leaders-of-the-future-self-for-high-school-students/>

Emera Planetarium <https://astro.umaine.edu/>

 The Emera Planetarium offers a variety of educational experiences to the public. Through school visits, science lectures, and weekly dome presentations, the Universe is accessible to all.

[Margaret Chase Smith Policy Center](https://mcspolicycenter.umaine.edu/)

The Margaret Chase Smith Policy Center is a nonpartisan, independent research and public service unit of the UMaine. Created in 1989, the Center was named to continue the legacy of Senator Margaret Chase Smith who served as a model of civil discourse and integrity. The Policy Center is dedicated to improving and promoting the quality of public dialogue about state, regional, and national policy issues through applied policy research and community engagement. Research is interdisciplinary, cutting across departmental lines to bring together faculty, students and external policy experts to address issues confronting the state and nation.

Senator George J. Mitchell Center for Sustainability Solutions <https://umaine.edu/mitchellcenter/>

For the last decade, the Senator George J. Mitchell Center for Sustainability Solutions has been a leader in launching and supporting partnerships in which interdisciplinary teams of students and faculty from universities and colleges throughout the state collaborate with diverse stakeholders to tackle and help find solutions to a wide range of urgent sustainability challenges that directly benefit Maine and other regions. These challenges, which reside at the intersection of environmental, social, and economic issues, include renewable energy, local agriculture, municipal planning, forest management, solid waste, and coastal water quality.

* Road to Solutions <https://umaine.edu/mitchellcenter/road-to-solutions/>
* Sustainability Education <https://umaine.edu/mitchellcenter/educateengage/>