West Virginia EPSCoR

The National Science Foundation Experimental Program to Stimulate Competitive Research

In 2015, West Virginia EPSCoR was awarded $20 million dollars in funding from the National Science Foundation (NSF) to build a national and international status in gravitational wave astrophysics and to build competitiveness in freshwater science with the Appalachian Freshwater Initiative (AFI). The Research, Infrastructure and Improvement (RII) grant began in 2015 and will continue for five years.

Science and Engineering

- Current research in gravitational wave astrophysics at WVU and Marshall University (MU) is focused on using pulsars that spin at highly regular rates to detect longer wavelength gravitational waves with colleagues across the world. Our team expects to have a detection using this method within five years.

- WVU astrophysicists have recently received a Physics Frontier Center award based on their gravitational wave research.

- West Virginia University has regained the highest research activity classification (R1) from the Carnegie Foundation. This achievement is in part due to the investments by NSF EPSCoR and the state in research infrastructure, including faculty support.

- The Appalachian Freshwater Initiative (AFI) consists of a statewide research team of biologists, ecologists, environmental engineers and scientists, chemists, and geologists focused on understanding and detecting the ecological and biological effects of contaminants in water under varying climate change scenarios. For this initiative, AFI researchers are using a watershed research framework to address clean water challenges affecting West Virginia.

- AFI scientists have developed and validated methods to measure a variety of compounds that have the potential to harm human health and the ecosystem. Among the research projects already underway are evaluating sub-lethal effects of multiple contaminants on sensitive species in streams, using environmental DNA (e-DNA) and traditional community sampling to determine if e-DNA can be used to identify sensitive communities in streams. In addition, researchers are studying the effects of low concentration contaminants on cellular and molecular neurophysiology which has shown changes in protein expression and live cell behavior, in addition to other effects, in adult neural stem cells. By the conclusion of the current grant, our researchers expect to provide a comprehensive assessment of freshwater conditions through unprecedented research quantifying complex contaminants.

Workforce Development in West Virginia

- EPSCoR is increasing the number of highly trained MS and PhD graduates in science, technology, engineering and mathematics (STEM).
- EPSCoR and matching support for NSF EPSCoR Research Infrastructure Improvement (RII) awards has led to the hiring and support of 20 new faculty members during the current and two past RII awards..
- EPSCoR has invested in university and primarily undergraduate institution faculty and students, high school teachers and students, young children and the general public. Successful activities supported by the grant and the participating institutions include undergraduate research, public school teacher research, training for undergraduates who subsequently provide programs on science to K-12 classrooms, and DIY sensor workshops for the public.

<u>Economic Development</u>

- With the recent completion of the first year of the current grant, no discoveries have yet entered the economic development pathway, but the training of students and post docs has implications for providing the building blocks for a more technology-based West Virginia economy. Some of the expected outcomes from the research are sophisticated tools for water quality decision-making and elegant sensors to determine water quality.

Outreach

- *The Neuron*, WVEPSCoR's quarterly science magazine is distributed via print copy to more than 2,500 subscribers, promoted on social media channels and seen by web visitors in pdf format.
- EPSCoR researchers are featured explaining their RII research in short, documentary-style videos which are available on the WVEPSCoR website via a link to the Division of Science and Research YouTube channel.
- Middle and early high school students are engaged in RII research through the publication of *The Neurite*, a quarterly science magazine focused on research by undergraduates and fun science activities.
- Interesting and engaging STEM speakers are featured in an ongoing Chancellor's STEM Speaker Series. The events are free to the public and have attracted from 200 to 1,800 citizens who are anxious for the opportunity to hear the varied lectures on scientific topics.

Funding

- Research expenditures by West Virginia universities was highest during the stimulus period at $207.1M in 2011 and $200.6M in 2012. In the succeeding years, post-stimulus, expenditures were $195.4M, $195.3M, $199.2M and 200.3M in 2016.

For more information on West Virginia EPSCoR and the Division of Science and Research, please visit our website at:

http://www.wvresearch.org