**Marshall University**
Researchers study campus wastewater for SARS-CoV-2

**West Virginia University**
Researchers try to save salamander species

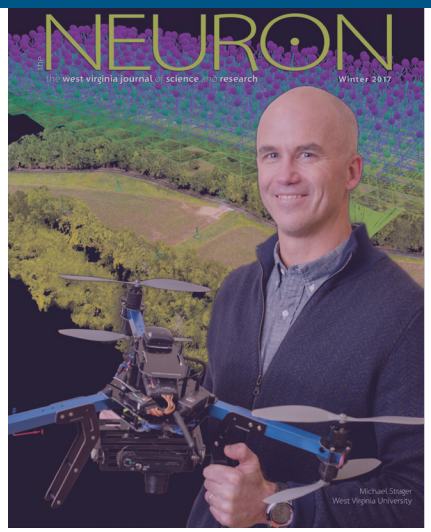
**West Virginia State University**
$1.1 million in USDA grant funding

# NEURON

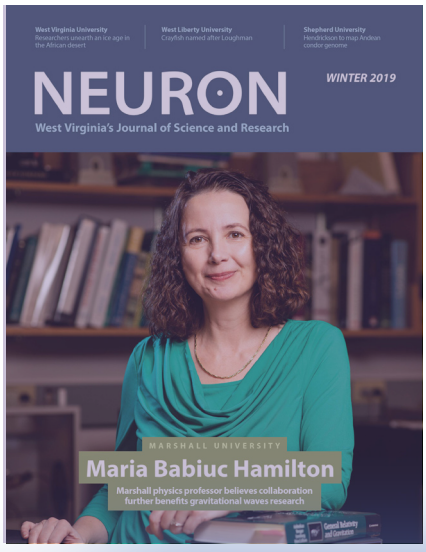
## West Virginia's Journal of Science and Research

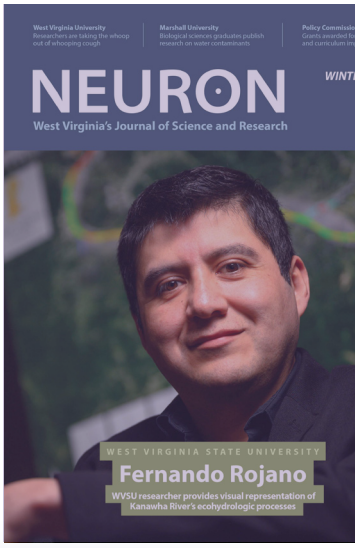
***SUMMER 2021***












STATEWIDE INITIATIVE

# Waves of the Future

*Reflecting on five years of West Virginia's federally-funded NSF EPSCoR RII-Track 1 project*



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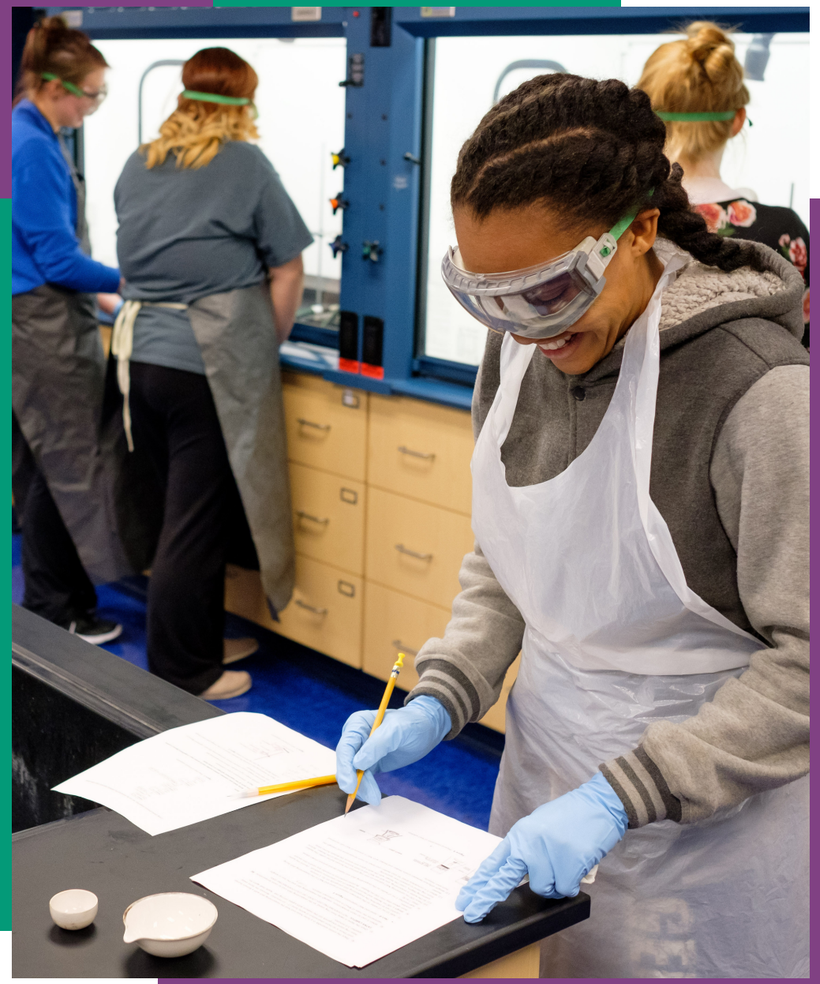

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35 WV
STaR Division

**SUMMER 2021**

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**ABOUT**
STaR Division: Science, Technology and Research at the West Virginia Higher Education Policy Commission provides strategic leadership for the development of competitive academic research opportunities in science, technology, engineering and mathematics (STEM). The office directs the National Science Foundation's (NSF) Established Program to Stimulate Competitive Research (EPSCoR) in West Virginia, coordinates scientific research grants to academic institutions from federal and state agencies, and conducts outreach activities to broaden the public's understanding of science.

**FUNDING**
This material is based upon work supported by the National Science Foundation under Award No. OIA-1458952.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

*Above: Professor Maura McLaughlin, Ph.D. (right), with a student*

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# News briefings


Green Bank

### WVU helps net $2 million NSF award to build international gravitational wave detection network

The hunt for more evidence of gravitational waves will be accelerated with a nearly $2 million National Science Foundation grant awarded to West Virginia University.

Eberly Distinguished Professor of Physics and Astronomy Maura McLaughlin will serve as principal investigator on the project, which will bolster a global network of researchers and telescopes called the International Pulsar Timing Array. The coalition's goal is to discover low-frequency gravitational waves – a different sort from what's already been identified - using high-precision timing observations of exotic stars called millisecond pulsars with the world's largest radio telescopes.

Key researchers also involved in the IPTA are Professor Sarah Burke-Spolaor and Assistant Professor Emmanuel Fonseca, both in the WVU Department of Physics and Astronomy and the Center for Gravitational Waves and Cosmology.

"In five years, we hope to have the most sensitive dataset in the world to search for gravitational waves," McLaughlin said.

### Shepherd's Miller observes new deep learning interpretation

Shepherd University Computer Information Science Professor Jason Miller has discovered that size impacts accuracy when a form of machine learning called deep learning is used to interpret information from deep neural networks.

With the help of two Shepherd computer information science students, Keegan Thomson and John Little, Miller has been working with recurrent neural networks that are usually used for text processing to examine whether the length of ribonucleic acid (RNA) sequences impacts accuracy.

"Models trained on the longest sequences do poorly overall, but models trained on sequences of about 750 do the best overall," Miller said. "So, if you want a neural network to operate well on RNA, you really need a size-specific neural network. You're going to have better performance if you have one neural network for the short RNA and one for the longer RNA."

Miller is working on this research with Donald A. Adjeroh, Ph.D., associate chair at the Lane Department of Computer Science and Electrical Engineering at West Virginia University, who is also his doctoral advisor.

35 WV STaR Division

**West Virginia Science & Research is now STaR Division: Science, Technology & Research**

Our division has been known by many names over the years from WVSR to WVEPSCoR. That is why, for the sake of continuity, we embarked on the task of rebranding to find an identity that encompasses all of our programs. West Virginia Science & Research is now officially known as STaR Division: Science, Technology and Research at the West Virginia Higher Education Policy Commission (Commission). You will begin to see our new logo and brand colors soon, including in this issue of the Neuron, along with the new Commission branding. Same resources and opportunities, just with a fresher look. The goal remains the same: To continue investing in the future of science, technology and research in the Mountain State through our higher education institutions.

Photo courtesy of West Virginia University

# FROM THE DIRECTOR: Juliana Serafin

## *West Virginia's NSF EPSCoR grant continues to encourage collaborative research*


Serafin

Photo courtesy of University of Charleston

Welcome to this very special issue showcasing the accomplishments of "Waves of the Future" - West Virginia's Established Program to Stimulate Competitive Research (EPSCoR) Research Infrastructure Improvement (RII) Track-1 project, funded by the National Science Foundation.

Beginning in 2015, this $20 million grant partnered five higher education institutions and was administered by STaR Division: Science, Technology and Research at the West Virginia Higher Education Policy Commission. The vision was two-fold: to initiate and sustain research to help manage the risks of environmental contamination of water supplies, and to build a nationally and internationally competitive gravitational wave detection and characterization program. Because Track-1 grants are intended to build infrastructure throughout the state, the mission also included integrating research, education, workforce development and active participant science activities by expanding and enhancing collaborations across and within disciplines.

The major institutions participating in this statewide project were West Virginia University, Marshall University and West Virginia State University. In addition, Shepherd University and West Virginia Wesleyan College were partners with the Gravitational Waves astrophysics group.

It has been my pleasure to be involved in a project with such impact. We decided to reflect on that impact by highlighting the faculty, students and other participants that have worked together since 2015. As this project ends, the research will be sustained by other grants, but the partnerships formed will continue to benefit West Virginia.

Julie

**Juliana Serafin, Ph.D.**
Senior Director of Science & Research, West Virginia Higher Education Policy Commission, and Project Director, WV EPSCoR

The Science & Research Council was established by the West Virginia Legislature in 2009. The goal of the Science and Research Council is to increase the capacity of the state and its colleges and universities to attract, implement and use cutting-edge, competitive research funds and infrastructure. Members provide expertise and policy guidance regarding federal and state programs including EPSCoR, the Research Challenge Fund, and the former Research Trust Fund. Representatives of government, industry, business and academia make up the council.

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**Jose Ulises Toledo, Ph.D.**
*Former Vice President for Research and Public Service,* West Virginia State University

Photos courtesy of Mark Webb, Alex Wilson, West Virginia Wesleyan College, and West Virginia State University

Photos courtesy of Alex Wilson and West Virginia University

# Waves of the Future

## *Reflecting on five years of West Virginia's federally-funded NSF EPSCoR RII-Track 1 project*

*Written by* **Angela Sundstrom**

Astrophysics and water quality science do not have much in common. One might say they even exist on different planets. However, projects competing for federal grants are not chosen solely by theme, but by substance. That often involves seizing the opportunities around you, and that is exactly how "Waves of the Future," West Virginia's NSF EPSCoR RII-Track 1 project, was brought to life.

West Virginia was one of the first seven states selected in 1979 to participate in the National Science Foundation's (NSF) Established Program to Stimulate Competitive Research (EPSCoR) Research Infrastructure Improvement (RII) Track-1 Program. EPSCoR works to enhance research competitiveness by strengthening capacity and capability in science, technology, engineering and mathematics (STEM). STaR Division: Science, Technology and Research at the Higher Education Policy Commission administers West Virginia's inter-institutional program. "Waves of the Future," the most recent project which ran from 2015-2021, aimed to build up the state's current resources to help prevent another water crisis, while also investing in the continued exploration of space with help from a world-renowned telescope located in our own backyard.

### Appalachian Freshwater Initiative

A chemical leak contaminated the Elk River just north of Charleston in 2014, leaving thousands of residents without suitable drinking water. It was evident that further research was needed to provide more resources to respond to and prevent such an event from happening again. Enter the Appalachian Freshwater Initiative (AFI).

The goals were simple: manage the risks of environmental contamination and ensure a clean water supply in West Virginia. Researchers from West Virginia University (WVU), Marshall University (MU) and West Virginia State University (WVSU) connected to discover how best to achieve these goals.


Hubbart


McLaughlin

**Jason Hubbart, Ph.D.**, professor of hydrology and water quality at WVU, joined the project in 2018. Hubbart is also the director of the Institute of Water Security and Science at WVU (the Institute) and served as the technical leader for AFI. He believes their work was beneficial and that concluding the formal project is bittersweet, as he has grown fond of his fellow researchers.

"I feel a lot of pride for all of our accomplishments," Hubbart said.

Those accomplishments include research on acid mine drainage, land use practices, aquatic bacteria and more. There were investments in both instrumentation and facilities at all participating institutions that will expand research opportunities for years to come. The Institute was even able to pay publication fees so findings could be easily shared with the public.

Still, as with many large collaborations, communication was a challenge.

"The biggest hurdle is to stay informed and aware of what folks are doing."

One of Hubbart's first acts was streamlining the project administration. This included quarterly reporting and revamping specific tasks so researchers spent more time on their designated duties and less time on paperwork.

Hubbart emphasizes the importance of NSF EPSCoR in smaller states that strive to gain more research competitiveness. He describes it as the "first domino for productivity investment."

"You invest in that infrastructure and, as soon as it's there, you can start to leverage it, keep investing in it, continue to build it, and continue to grow it," Hubbart said.

As important as the actual research is, Hubbart is particularly thankful for the relationships made and the lessons learned.

"My greatest personal milestone was learning enough to become a more effective leader."

**Gravitational Waves**

Astronomers announced the first direct detections of gravitational waves in 2015. These ripples in space-time were predicted by Albert Einstein over a century ago and allow for further study of black holes. It is an exciting time in astrophysics, even more so when you have one of the most sensitive telescopes in the world in your backyard.

The Gravitational Waves project (GW) had a stable research foundation at WVU, but the additional EPSCoR funding allowed for expansion. This included connecting to other departments within WVU, like computer science and engineering, as well as neighboring institutions, including MU, WVSU, Shepherd University (Shepherd) and West Virginia Wesleyan College (WVWC).

"When we wrote the proposal, gravitational waves had not yet been detected," said **Maura McLaughlin, Ph.D.,** professor of physics and astronomy at WVU and technical leader for GW. "We can't say that the work from this project resulted in that detection, but it's really allowed us to get in on the ground of a brand new field and play a very leading role."

Researchers at WVU were involved in the detection with LIGO, the Laser Interferometer Gravitational wave Observatory operated by CalTech and MIT. They are now using the Green Bank Telescope (GBT) to detect gravitational waves at much lower frequencies through timing exotic stars called pulsars.

The funding for this project helped purchase computational infrastructure for data mining and creating new algorithms. It also allowed some focus on fast radio bursts. This topic was not even included in the original proposal, but the ever-evolving nature of astronomy presented an opportunity McLaughlin described as an "unexpected, serendipitous discovery."

"We had very clear science goals set out, like exactly what new algorithms we wanted to develop, what kind of partnerships we wanted to make, how many students we wanted to get involved," McLaughlin said. "I think we've gotten even more out of the award than we anticipated."

**Sustainability & Impact**

Partnerships and broadened participation will be the legacy of this EPSCoR award. Both AFI and GW credited it with building a collection of experts across the state.

Hubbart served as guest editor for a special issue of the peer-reviewed journal Water titled, "Integrated Water Resources Research: Advancements in Understanding to Improve Future Sustainability." The issue focused on integrated and multidisciplinary water resources research that advances the understanding and sustainability of water resources. A total of 19 articles were published, including 15 collaborative articles from AFI faculty, postdoctoral fellows and students reporting related research.

WVSU also partnered with the West Virginia Department of Environmental Protection's (WV DEP) Project WET (Water Education Today) program to offer a free, five-week virtual STEM camp that taught youth about aspects of water quality and management. The Worldwide Water Network STEM Camp was held February 2, 2021 for students in grades 6-9. Participants learned about watershed design, management, connection and aquatic life with opportunities for interactivity and hands-on learning like making their own watershed model.

"I think what is really great is that we've established a new threshold of productivity between institutions and among researchers," Hubbart said. He hopes this will continue as many more people have been connected.

McLaughlin admits collaboration could have been stronger prior to this project. "We didn't talk to anybody in other departments at WVU, much less other colleges in the state," McLaughlin said. "The award really built-up links between us."

The Pulsar Search Collaboratory (PSC), developed by McLaughlin and WVU's Duncan Lorimer, Ph.D. with collaboration from WVWC's Tracey Delaney, Ph.D., and

The Appalachian Freshwater Initiative (AFI) was a game changer for West Virginia State University (WVSU). This five-year, state-wide endeavor was fully leveraged by WVSU and the entire jurisdiction.

Undergraduate and graduate students were afforded the opportunity to conduct research year-round while being mentored by faculty members who were part of this project. The ability for our students to engage in high-caliber research is particularly important for predominantly undergraduate institutions. Furthermore, interactions with students at other institutions strengthened students' experiences.

WVSU was also able to acquire new expertise in aquatic toxicology and water quality modeling. These new areas enriched the research for students and the entire AFI group. Participating faculty members also strengthened their research acumen and capabilities. Interactions among faculty with other institutions were impactful as collaborative dialog was incited which resulted in cooperative work and joint publications.

Faculty were also able to acquire specialized equipment and instrumentation, which was a key factor in building capacity. Access to these resources resulted in increasing research capabilities and better training students in new methodologies and use of sophisticated equipment and instrumentation, which translates into a more educated workforce for the industry.

An important component of this endeavor was providing experiential research learning opportunities for K-12 schools. Participating research faculty and students worked with and trained teachers and students who in turn successfully translated their research learning and new skills to their classrooms.

A few challenges associated with reaching target audiences and better coordination with industry members were overcome by pursuing a team approach and effort. In fact, these challenges and opportunities made this experience unique and worthwhile. As a long-time research administrator at a historically black college and university (HBCU), I can confidently state that the investment made through this program had a profound impact on our institution and the stakeholders we serve, especially our students. The contributions made by PUI's in the form of diversity, not just racial, are also invaluable and should not be underestimated. WVSU is better off to date because of access to this NSF-EPSCoR RIII Program.

**Jose Ulises Toledo, Ph.D.** is the former vice president for research and public service at West Virginia State University

*Photo courtesy of West Virginia State University*

Being part of the EPSCoR RII Track 1 project has been an exciting and beneficial experience for me as well as for the high school teachers, high school students, undergraduate, and graduate students that I have been fortunate enough to work with as a result of participation in the project. The experience has allowed me to hone my abilities as a researcher and skills as a research mentor for students.

This summer, I was able to work with an early career high school teacher and a rising high school senior with the PERT program (Preservice and Early Career Research for Teachers) associated with the RII project. During PERT, participants worked 35 hours a week for a five week period. There was a total of seven PERT teams at Marshall University (MU) this summer with logistics for all involved orchestrated and spearheaded by Dr. Tina Cartwright, professor in the College of Education & Professional Development at MU. The early career teacher and rising high school senior worked on a project this summer demonstrating that commercial polycarbonate filtration membranes can be functionalized with high concentration azo dyes leading to increased rejection of low molarity azo dyes when filtered using the same functionalized filter. Their work is significant in that dye pollution from the textile industry makes up a significant portion of industrial wastewater pollution.

The students helped create a poster showcasing their work for a final onsite presentation as well as contributed to a second poster that was presented at "Exploring Innovation in Appalachia: An Undergraduate Research Symposium" virtual event hosted by West Virginia University. The results obtained this summer may well lead to a publication for them.

The rising high school senior is a student at Spring Valley High School outside of Huntington and has interests in engineering. The early career high school teacher, a first-generation college student who graduated from MU last May after earning a degree in secondary education with a concentration in general science, began teaching in North Carolina this fall.

**Sean McBride, Ph.D.** is an assistant professor in the Department of Physics at Marshall University

*Photo courtesy of Marshall University*

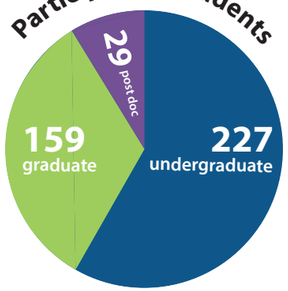
Shepherd's Jason Best, Ph.D., utilized the Green Bank Observatory (GBO). The PSC grew into a nationwide effort providing authentic research experiences to high school students and teachers. Over 200 West Virginia middle and high school students from 30 schools were involved in pulsar searching. Teachers were provided with research opportunities and training in radio astronomy and pulsar science. This effort resulted in discoveries of millisecond pulsars that can be added to arrays for low-frequency gravitational wave detection with the data analysis performed by students. In 2020, high school students discovered a new pulsar and are involved in follow-up observations with GBO. A WVU-led citizen-science program called Black Holes @ Home also allowed participants worldwide to simulate binary black holes that could be detected by LIGO.

The West Virginia Science Public Outreach Team (SPOT) trained undergraduates to be ambassadors by presenting related research at K-12 schools throughout the state. After the COVID-19 pandemic began, virtual training workshops allowed for continued connection by developing skills like public speaking and technological fluency. SPOT delivered 42 presentations to 14 schools and organizations in the last year with approximately six schools and organizations requesting more than one presentation.

"Waves of the Future" enriched stable technical knowledge with more human connections. Most successful scientific projects lead to more questions. Thanks to this EPSCoR award, West Virginia's astrophysics and water quality researchers have an entire network to help answer them.

**537**
**publications**
*including Science, Nature, and Nature Astronomy*

**$9 MILLION**
**in follow up funding**
*$28 million pending*



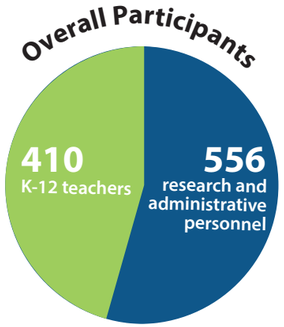

The **Center for Gravitational Waves and Cosmology** has been created at WVU as a result of the project

AFI is a part of the WVU Institute of Water Security and Science and has developed an **institutional network** to pursue projects involving the modeling and characterization of freshwater tributaries and the development of sensors to detect contaminants

The project exceeded diversity targets, retaining **53 percent** of underrepresented minority students, **58 percent** of underrepresented person students and **55 percent** of female students

**528**
**presentations**

**26**
**dissertations**




*Source: Evaluation of the West Virginia Established Program to Stimulate Competitive Research (EPSCoR) Summative Report: 2015-2021 from July 2021*

# Marshall University researchers study campus wastewater for SARS-CoV-2

*Courtesy of* **Marshall University Communications**

Members of the Marshall University research community have looked to an unusual outlet to supplement the battle against the SARS-CoV-2 virus, which causes COVID-19.

Starting in the fall of 2020, a collaboration of Marshall programs began working together to collect and test campus wastewater for the SARS-CoV-2 virus. **Dr. Chuck Somerville**, the dean of the College Science, was among a group of Marshall University employees that became aware of a program being used at municipalities across the country that would test municipal wastewater as a predictor for clinical outbreaks of the disease. The idea was that if a residence hall waste stream tests positive for SARS-CoV-2, campus safety could monitor those facilities.

From there, a plan was hatched. **Travis Bailey**, director of the physical plant, could collect the samples; **David Neff,** a technician in the chemistry department, could prep the samples for amplification; and **Dr. Daniel Brazeau**, an associate professor in the School Medicine and School of Pharmacy, and **Jason Chute,** DNA technical leader in forensic science, both had the equipment and experience to perform the genetic testing of the samples. Sampling started in October of 2020 for the project.

Autosamplers were set up to collect samples in the morning. Samples were taken back to the lab and run through purification to remove chemicals. SARS-CoV-2 RNA was isolated by the Forensic Science center. Prepared samples were then taken to the School of Pharmacy for detection of SARS-CoV-2 using standard CDC guidelines.

***Above: Holden Young calibrates the pH meter for use in processing wastewater samples.***

*Photo courtesy of Marshall University*

The project is already paying dividends in the surveillance of the virus and as a teaching opportunity in state-of-the-art genetic testing procedures. Students have been brought into the project in several ways from lab work to recordkeeping and methods development.

Somerville says collecting data in this kind of system can allow for institutions to prepare ahead of time before a surge can overwhelm.

"It can allow for the moving of PPE or medical equipment where it will be most needed," Somerville said. "Institutions will know where to ramp up testing, what can be open and what can be closed."

Somerville says they'd like to develop a system that can be used past the testing for presence of the SARS-CoV-2 virus.

"We would like to have a system that not only provides information on this pandemic, but helps the state manage the next emerging infectious disease," Somerville said.

After running samples for a few months on a small-scale level, the Marshall team was contacted by the West Virginia Department of Health and Human Resources (WV DHHR) to collaborate on a larger project of surveillance monitoring at the state level. The hope is to create a program that could give lead time for the state to prepare for surges in cases.

The project has been valuable in helping the team to learn how to conduct this type of research quickly and accurately. The project is still in the developmental stage and officials continue to work with biosafety officials on how the research can be conducted safely.


Brown


Rucker


*Above: Red-backed salamanders (such as the one pictured here) are engulfed in a battle over resources and space in parts of West Virginia with another salamander species, the Cheat Mountain salamander.*

# As one salamander species, loses ground to another, WVU researchers try to save both

*By* **Leah Nestor**

Two of West Virginia's mountain-loving salamander species are wrestling for resources and space as climate change threatens their habitats. Researchers with the West Virginia University Davis College of Agriculture, Natural Resources and Design have slithered in to figure out how to preserve them both.

Herpetologist **Donald Brown**, research assistant professor of wildlife and fisheries resources, is exploring how climate change affects the already federally-threatened Cheat Mountain salamander and its primary competitor, the eastern red-backed salamander.

"As the climate warms, lower elevation species like the red-backed salamander are moving up the mountain and competing more heavily with high-elevation endemic salamanders like the Cheat Mountain salamander, which have nowhere to go because they're already on the top of the mountain," Brown said. "Whatever happens they have to deal with, including changes in competition because of species moving into their areas."

Federally designated as a threatened species, there are an estimated 80 populations of Cheat Mountain salamanders, some with as few as 10 documented individuals. They're slim creatures at four inches long that only exist around Cheat Mountain. That certainly does not amount to much when compared with the red-backed salamander, the state's most common woodland salamander with a broad range and high populations.

"Red-backed salamanders are considered the villain in our world. They're not; they're just trying to survive," Brown said.

The increased competition between the two could lead to the extirpation of the Cheat Mountain salamander - meaning it would become locally extinct to the area and forced to seek habitat elsewhere.

"There's a debate in the wildlife field about whether we should argue for the economic or functional value of species, but species are inherently valuable. They don't have to prove themselves to us to have value," Brown said.

Brown worked with **Lacy Rucker,** a natural resources science graduate student, to conduct an experimental mesocosm study in the Monongahela National Forest. She and Brown found the red-backs increased near the forest edges, indicating that at high elevations they could benefit from forest canopy openings or reduced competition from Cheat Mountain salamanders.

Rucker expressed concern about also losing diversity.

"I think the loss of diversity is a great tragedy, especially for species that only occur in the state of West Virginia," she said. "People have a lot of pride because it's something specific to their region. The loss of a cog in the ecosystem is never a good thing. These animals serve a purpose, and their extinction would be a great loss."

*Photos courtesy of West Virginia University*



# West Virginia State University receives $1.1 million in USDA grant funding

*Courtesy of* **West Virginia State University Communications**

West Virginia State University (WVSU) has received $1,138,825 in grants from the United States Department of Agriculture (USDA) for three research and extension projects. The funding is part of the USDA National Institute of Food and Agriculture's (NIFA) Capacity Building Grants Program for 1890 Land-grant Institutions. WVSU is one of 19 such institutions in the nation.

"We at West Virginia State University appreciate USDA NIFA's ongoing commitment to supporting the important work of the nation's 1890 Land-grant universities," said **Dr. José Ulises Toledo**, WVSU's former vice president for Research and Public Service. "With this funding, we will be able to expand our research and extension initiatives in water quality, agriculture and urban forestry. The funded projects will have direct impacts on the people of West Virginia, from consumers to agricultural producers."

The funded projects include two research and one extension initiative. An award of $300,000 was given to expand research on the effects that storm events have on water quality, greenhouse gas emissions and microbiome processes in the Kanawha River watershed.

Another research project, awarded $599,679, aims to enhance resiliency and marketing opportunities for watermelon growers in West Virginia and the United States by launching appropriate grafting technologies to optimize returns on investment and address stress factors in watermelon crops. The goal is to understand how grafting technology can result in stronger, more disease-resistant crop options for growers.

The West Virginia Tree Minders extension program received $239,146, which will be used to provide technical assistance to communities in the form of digital tree inventories, data hosting, workshops and online hosting of virtual program modules.

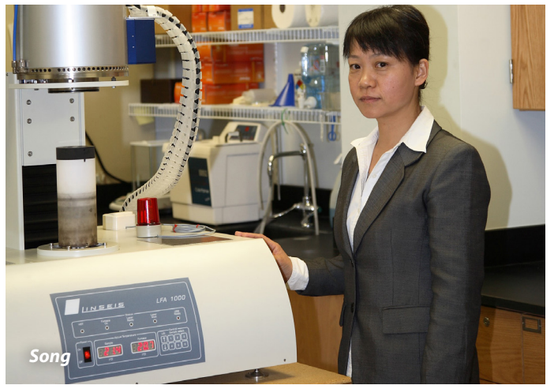
USDA NIFA funded 58 projects totaling over $21.8 million during this cycle of capacity-building grants, designed to build capacity for teaching, research and extension activities at eligible institutions.

"Our 1890 Land-grant universities are an integral part of our nation's fabric," Agriculture Secretary Tom Vilsack said in a statement. "As USDA continues to work tirelessly to advance equity and provide greater access to nutritious and safe food for all Americans, especially to historically disadvantaged groups, this investment will strengthen the ability of our Land-grant Institutions to deliver innovative solutions that address emerging agricultural challenges impacting diverse communities. We are pleased to be able to build the research and training capacity of these critical institutions as they develop the next generation of leaders in agriculture."


Kuehn

## EarthCube Leadership Council welcomes Concord geoscience professor

**Stephen Kuehn, Ph.D.**, an associate professor of geology at Concord University, was elected to be a representative of the Science and Engagement team on the council. His two-year term of service began in late June. EarthCube is a program of the National Science Foundation which works to move more earth science data into the digital age.


Song

## WVU engineer receives $1.25 million to fuel a cleaner future through hydrogen

**Xueyan Song,** professor of mechanical and aerospace engineering at West Virginia University and lead investigator, will use the award to aid a project aimed at producing a higher amount of hydrogen gas – a clean fuel – with less electric power consumption.


Nosoudi

## Marshall biomedical engineering researchers earn NSF grant

A Marshall University team of researchers led by **Nasim Nosoudi, Ph.D.**, assistant professor of biomedical engineering, was awarded a $267,658 National Science Foundation grant to acquire a CytoViva enhanced darkfield optical microscope for research in nanotechnology.


Mason

Hodder

## WVCTSI at WVU designated one of only eight ECHO Superhubs in the U.S.

West Virginia Clinical and Translational Science Institute (WVCTSI) Project ECHO can now offer outreach support, mentoring and training to healthcare providers and institutions on how to start their own program to reduce health disparities in underserved and remote areas. **Jay Mason** and **Sally Hodder, M.D.** lead the program.

*Photos courtesy of Concord University, West Virginia University and Marshall University*





# COMMENTARY: Jack Carpenter

What if your favorite aunt brought an apple pie to your house for you and your cousins to share? Your bigger cousins quickly consume 90 percent of the treat and leave you and your other cousin with just 10 percent. It wouldn't seem very fair because you and your cousin are just as smart, talented and hungry as your larger cousins. You would probably huddle up with your cousin to make sure the next time your aunt gave you a pie, you would get a more equitable slice.

That is the same principle behind West Virginia's efforts to work with other smaller states to secure a fair share of federal research funding issued by key federal agencies that inspire scientific advancements and encourage economic development and progress.

Ideas for innovation and discovery can germinate anywhere in America. But, the opportunities for funding those ideas are all too often geographically concentrated. Currently, five states receive 90 percent of federal research and development funds. West Virginia and 24 other states share only 10 percent of those same funds.

This uneven distribution of federal research led to the National Science Foundation to create the Established Program to Stimulate Competitive Research (EPSCoR) in 1979 to help states like West Virginia build the infrastructure for science, research and engineering capacity. The idea was to expand and enhance the research capability of scientists in states that traditionally lack strong university-based research efforts to help them to compete more successfully for a portion of the federal academic R&D budget. West Virginia received one of the very first awards under the program. In subsequent years, additional federal agencies have created EPSCoR and EPSCoR-like programs.

West Virginia has leveraged all of these EPSCoR programs to build research capabilities at our higher education institutions. For example, we received multiple infrastructure grants from NSF for the study of identification technologies, nano, bio-nanotechnology, water quality and gravitational waves.

The collaborative nature of the large grants also forged strong and productive alliances between our large research institutions — WVU, Marshall and West Virginia State — and other partnering undergraduate schools across the state.

There is no doubt that EPSCoR has been a success, but there are equity issues that still need attention. For example, although collectively, the 25 states eligible for EPSCoR programs represent 20 percent of the population and 25 percent of the doctoral research universities in the nation, they receive only 10 percent of available federal research funding. If the United States is to be competitive in an increasingly challenging world, it must encourage and use all of its R&D potential regardless of geography.

West Virginia helped create the National EPSCoR/IDeA Coalition to work with Washington's policy makers to build upon EPSCoR programs to meet the needs of our states, support the mission of the federal agencies, and unleash untapped resources to create a sustainable environment for research, development, innovation and entrepreneurship.

The coalition's immediate challenge is to encourage the U.S. House of Representatives to pass the United States Innovation and Competition Act — a $250 billion bill designed to boost U.S. semiconductor production, scientific research, development of artificial intelligence, and space exploration in the face of growing economic, technological, and military competition from China. The legislation passed the U.S. Senate 68-32 on June 8, 2021.

The bill would provide funding for research on artificial intelligence, wireless technologies, robotics, biotechnology, measures to thwart cyberattacks, foreign infiltration of domestic supply chains and exfiltration of U.S. intellectual property.

EPSCoR has been a critically important tool for R&D progress in the Mountain State, and our continued efforts with the coalition will keep the legacy of progress alive.

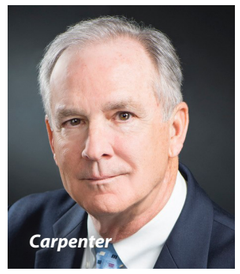

Carpenter

*Photo courtesy of Jack Carpenter*

**Jack Carpenter** is the West Virginia representative on the National EPSCoR/IDeA Coalition Board, dedicated to building research excellence and stimulating competitiveness in the EPSCoR/IDeA jurisdictions. He is also President of Kicking Stones Consulting, Inc. Carpenter received his Bachelor's Degree in Finance from the University of Cincinnati.

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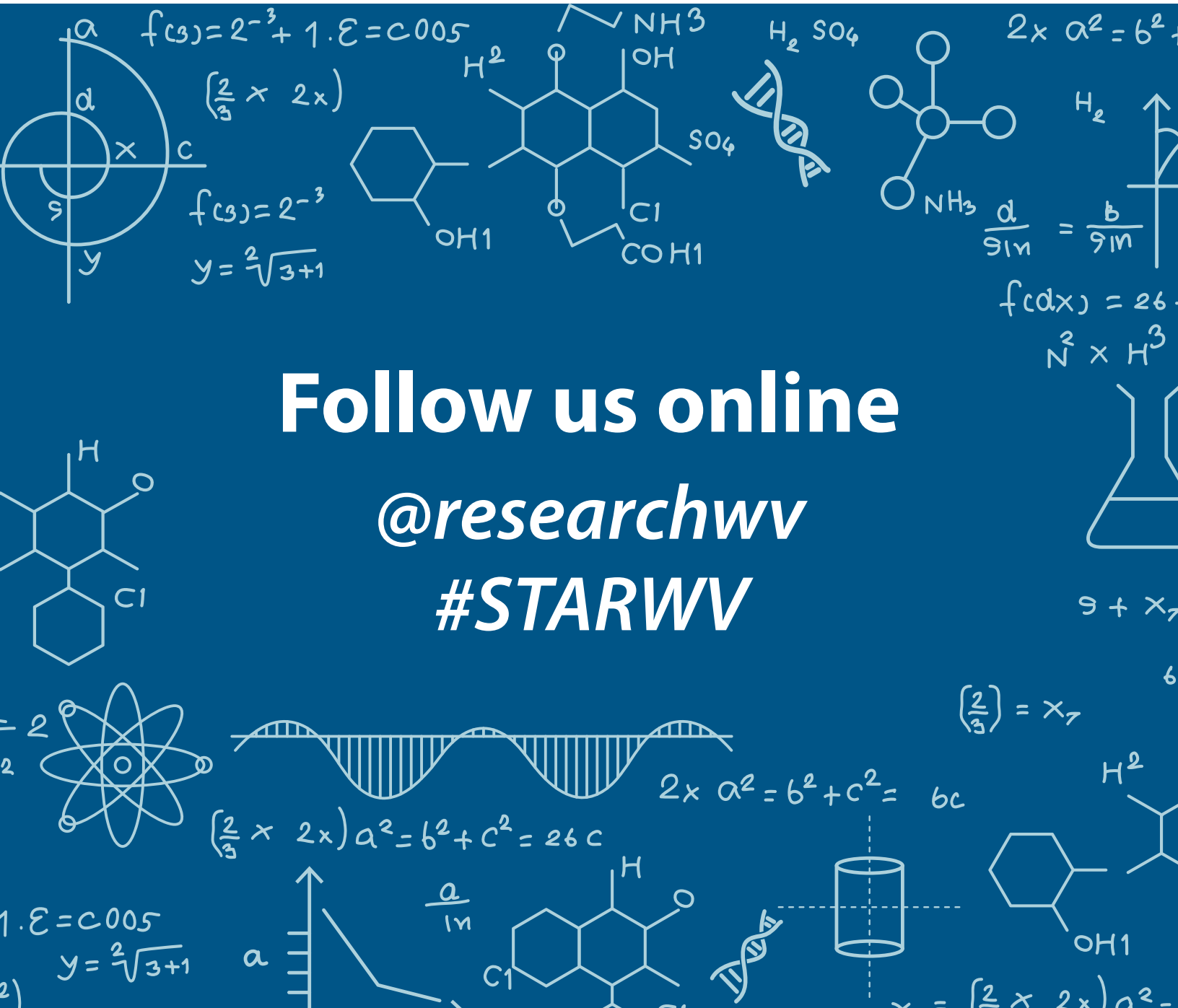

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