

UM RESEARCH FEATURED IN THE NEW YORK TIMES

Research conducted by **Ric Hauer**, former Montana NSF EPSCoR PI and director of the Institute on Ecosystems at the University of Montana, was featured in the Nov. 14, 2016 Science section of *The New York Times*. The feature was also included in the NYT's weekly Science Times e-mail, a selection of top science-related articles Hauer is currently director of the Center for Integrated Research on the Environment at UM,

The *Times* article is based on a June 2016 article in *Science* co-authored by **Harvey Locke**, co-founder of the Yellowstone to Yukon Conservation Initiative; UM professors **Vicky Dreitz**, **Mark Hebblewhite**, **Winsor Lowe** and **Cara Nelson**; **Clint Muhlfeld**, research aquatic ecologist from the U.S. Geological Survey; Professor **Stewart Rood** from University of Lethbridge; and biologist **Michael Proctor** of Birchdale Ecological.

In the article, reporter Jim Robbins writes about the authors' revelations about the ecological importance of gravel-bed river floodplains.

"In the West, a dynamic river is not important just to fish or to amphibians, but to grizzly bears and mountain lions descending from mountaintops to the flood plain for important foods. Indeed, two-thirds of the species in a large river valley spend at least part of their lives in its flood plain," Robbins wrote. The article included several quotes from Hauer.

See The New York Times article at: https://www.nytimes.com/2016/11/15/science/mountain-rivers-gravel-beds.html?_r=0

The original journal article, entitled "Gravel-bed river floodplains are the ecological nexus of glaciated mountain landscapes" is at <http://advances.sciencemag.org/content/2/6/e1600026.full>



UPCOMING EVENTS

April 6, 2017: EPSCoR All-Hands Meeting and IoE Science Summit, Bozeman.

April 7-9, 2017: Montana Aquatic Ecology Research Symposium, Flathead Lake Biological Station.

April 11, 2017: Peter Vitousek of Stanford University presents at UM-Missoula.

April 12, 2017: Peter Vitousek of Stanford University presents at Museum of the Rockies, Bozeman.

April 17-18: IoE partner Montana Watershed Coordination Council offers a Spring Training on watershed restoration planning. Missoula..

Aug. 22-26, 2017: Wetland Systems for Water Pollution Control (WETPOL) International Symposium. Big Sky, Montana.

Nov. 5-8, 2017 NSF EPSCoR National Meeting, Missoula.

For a full schedule of events, visit <http://montanaioe.org/events>

MSU STUDENT EARNS SCHOLARSHIP FOR WATER QUALITY RESEARCH ON CROW RESERVATION

Emery Three Irons, a Montana State University graduate student supported by Montana NSF EPSCoR through the Montana Institute on Ecosystems, has received a major scholarship to continue researching water quality on Montana's largest Indian reservation. He plans to combine his findings with others in a multi-institutional effort to reduce health risks on the Crow Reservation. Three Irons is also an IoE Graduate Fellow.

The two-year \$67,390 scholarship from the National Institute of Environmental Health Sciences (NIEHS) is the latest in a series of awards for Three Irons, a member of the Apsaalooke tribe. It will allow him to investigate and analyze factors associated with coliform bacteria that contaminate home well water and how that relates to metals contamination.

Three Irons earned his bachelor's degree in geospatial and environmental analysis from MSU in 2015 and is working on his master's degree in MSU's Department of Land Resources and Environmental Sciences. After he completes his degree, Three Irons said he will return to the Crow Reservation to serve his people. Water quality may be his first focus, but he can see himself branching off into other issues.



Photo courtesy of Emery Three Irons and Lakisha Flores.

PEOPLE

BRIEFS

MSU Ecology Professor and Montana NSF EPSCoR focus lead **Andy Hansen** was part of a team receiving \$1.2M from NASA Earth Sciences and the United Nations Development Program (UNDP). Their project will provide policy makers in 34 countries information to meet the conservation goals outlined on the International Convention on Biodiversity. The team will develop satellite-based products that are global in extent and regionally relevant for mapping forest condition, human pressure, and forest integrity, and assessing habitat fragmentation and connectivity.

Gilbert Ogunkoya, a PhD student in the Ecosystems Dynamics Lab at MSU co-authored *Using optical sensors on gliders to estimate phytoplankton carbon concentrations and chlorophyll-to-carbon ratios in the Southern Ocean* in *Frontiers in Marine Science* with Sandy J. Thomalla, Marcello Vichi and Seb Swart.

Leo Calle, also a PhD student in the Ecosystems Dynamics Lab published *Historical carbon dioxide emissions due to land use changes possibly larger than assumed* in *Nature Geoscience* with several co-authors.

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UM STUDENT WINS EPA GRADUATE FELLOWSHIP

University of Montana student **Ranalda Tsosie** was one of 50 students nationwide awarded a \$132,000 Science to Achieve Results Graduate Fellowship from the U.S. Environmental Protection Agency.

Her project is “Addressing Longstanding Groundwater Contamination using Silica Polyamine Composites in the Tséyah Area in Arizona.” Tsosie is a doctoral student in interdisciplinary studies with a research emphasis on chemistry, environmental studies and geosciences. She will receive the grant over the next three years, until her expected graduation from the doctorate program. She is supported by Montana NSF EPSCoR via the Montana Institute on Ecosystems as well as UM’s Indigenous Research and STEM Education (IRSE).

A member of the Navajo Nation, Tsosie was awarded under the funding opportunity for sustainable and healthy communities for tribes and American Indians, Alaskan Natives and Pacific Islanders. Her research focuses on developing a filter for the removal of contaminating metals, such as uranium and arsenic, from wells on the Navajo reservation in Arizona.

Tsosie said the grant will help her complete her graduate studies, pay for travel to and from her study sites in Arizona and



Ranalda Tsosie (Photo by UM student Stephen Chase)

purchase research supplies.

The EPA’s STAR Graduate Fellowships program for master’s and doctoral students is part of a national effort to ensure the United States meets current and projected human resource needs in environmental science, engineering, mathematics and technology.

PRINCE OF MONACO PRESENTS AWARD TO GYE SCIENTISTS

Montana NSF EPSCoR Faculty Hire **Dave McWethy** (Earth Sciences) along with EPSCoR partners **Craig M. Lee** (MSU) and **Greg Pederson** (USGS) earned the \$100,000 Camp Monaco Prize from the Buffalo Bill Historical Center’s Draper Natural History Museum, University of Wyoming’s Biodiversity Institute, and the Prince Albert II of Monaco Foundation-USA. The trio is working to save ancient material revealed by melting patches of ice in the Greater Yellowstone Ecosystem (GYE).

The prize was conferred in Monaco by His Serene Highness, the Sovereign Prince of Monaco Albert II at ceremonies held July 1. McWethy will work with IoE Director Cathy Whitlock to examine pollen, charcoal and insect remains from sediment layers embedded in ice cores from the patches.

Their research explores the dynamic past of the GYE, including seasonal use by Native American groups over thousands of years. The team will explore how wildlife and people intensified their use of the alpine environment



HSH the Sovereign Prince Albert II of Monaco, left, presented the Camp Monaco Prize to (from left) Craig M. Lee, Gregory Pederson and David McWethy on June 30 in Monaco. Photo by FPA2, JC Vinaj. Used with permission.

in the face of hot and dry conditions in the valleys, or lessened their presence during colder and wetter conditions. A goal of the research is to determine if human and animal use cluster around known periods of unusual climatic conditions such as droughts and warm intervals.

NSF EPSCOR TRACK 2 ADDRESSES TRADE-OFFS IN FOOD, ENERGY, WATER, BIODIVERSITY

Providing adequate energy, healthy food, and clean water for a growing human population while conserving biodiversity on a planet where temperatures are rising represents an urgent challenge. The NSF EPSCoR Track-2 supported WAFERx (Water, Agriculture, Food, Energy, Research Nexus) interjurisdictional collaboration is working across disciplines to address this pressing societal issue through integrated research, mentorship, innovation, and outreach activities. **Montana State University**, along with partners at the **University of South Dakota (USD)**, **University of Wyoming (UW)**, and **NASA**, is developing innovations at the intersection of food, energy and water systems while training the next generation of scientists. The overall research question is: How do proposed climate solutions in the Upper Missouri River Basin impact trade-offs between water, energy, food and biodiversity?

The WAFERx team kicked off its regional interdisciplinary collaboration with a two-day meeting in January. Collaborating investigators and partners joined the meeting from MSU, USD, UW, NASA, The Industrial Company, and other institutions. Over the course of the kickoff meeting, the group discussed planned research, mentorship, and outreach activities for Year 1 activities. Below are some highlights:

STUDENT / TEAM MEMBER RECRUITMENT

- We are actively recruiting five new MSU graduate students and multiple undergraduate students.

- We recruited a project manager, **Alisa Royem**.

COMMUNICATION

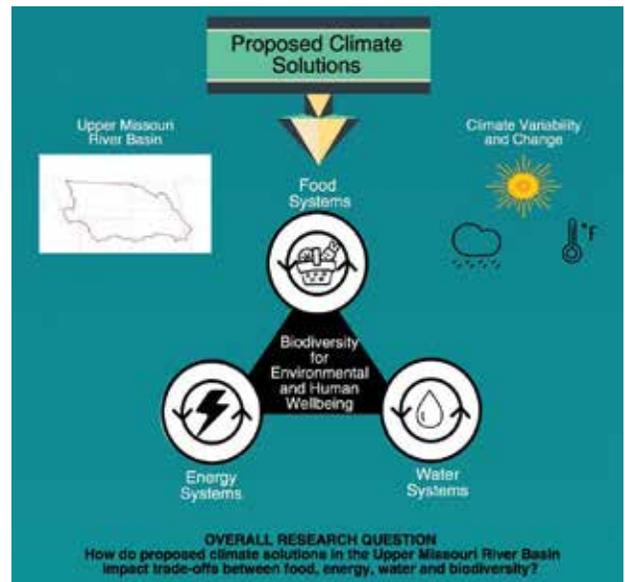
- We engaged in a professional development session led by AAAS on science communication.
- We are developing a project website: <http://wafex.montana.edu/>

RESEARCH

- We are preparing a concept paper on the need for a BECCS research framework for CO2 mitigation scenarios that support food security, clean energy, and biodiversity.
- We are focusing on baseline assessments of the food-energy-water nexus in the Upper Missouri River Basin including field trials, modelling activities, and social science field research with regional stakeholders.

PRESENTATIONS AND MEETINGS

- PI **Paul Stoy** of LRES presented a poster at the American Geophysical Union Fall Meeting in San Francisco in December and will present talks at the European Geosciences Union General Assembly and the North American Carbon Program meetings this spring.
- Co-PI **Selena Ahmed** of SFBS / HHD will present a poster at the Agriculture



and Climate Change Conference this March in Spain. She will also attend the Innovations at the Nexus of Food, Energy and Water Systems Principal Investigator Workshop at the National Science Foundation Headquarters in Arlington, VA this March.

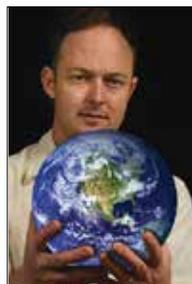
This material is based on work supported by the National Science Foundation under Grant 1632810, Sustainable socio-economic, ecological, and technological scenarios for achieving global climate stabilization through negative CO2 emissions policies. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

CLIMATE CHANGE PAPER STUDIES CARBON UPTAKE IN ECOSYSTEMS

A new paper out in *Nature Climate Change* by University of Montana researcher and Montana NSF EPSCoR supported faculty hire **Ashley Ballantyne** delves into one of the great uncertainties in predicting future climate. Ballantyne is a Montana NSF EPSCoR-supported faculty hire.

“Will ecosystems take up more carbon or release more carbon as the climate changes?” Ballantyne said. “This is a key question in trying to predict what the climate might look like in the future.”

Together with former UM doctoral student **William Smith**, Ballantyne investigated



Ashley Ballantyne

the sensitivity of these carbon feedbacks. While carbon dioxide has increased steadily over the last 50 years, the Earth’s temperatures have increased in an erratic stair-step pattern due to redistribution of energy in the Earth system.

“We were curious to learn how Earth’s carbon cycle responded during periods of rapid warming and periods of less rapid warming,”

Ballantyne said. “We discovered that the amount of carbon taken up by land ecosystems slows during periods of rapid warming and speeds up during periods of slower warming.”

The researchers were surprised to learn that this speeding-up of carbon uptake during periods of slower warming was due mainly to less respiration from plants and not to greater photosynthesis. This means that during the so-called ‘warming hiatus’ from 1998 to 2012, the Earth took up much more carbon from the atmosphere. However, as global warming ramps up again, this carbon may be returned to the atmosphere to further warm the planet.

UM Regents Professor of Ecology **Steve Running** is a co-author of the paper, as is **Ben Poulter**, formerly of MSU, now at NASA.

The article was published Jan. 23 at *Nature Climate Change*. www.nature.com/nclimate/journal/vaop/ncurrent/full/nclimate3204.html

OUTREACH

EPSCOR-SUPPORTED UM SPECTRUM DISCOVERY AREA PREMIERES WATER EXHIBITION

In partnership with the Montana Institute on Ecosystems, the **University of Montana spectrUM Discovery Area** premiered its mobile “Water” exhibition in Fort Benton in November. The ecosystems-science exhibition will travel to nine rural and tribal communities across Montana this spring.

The “Water” exhibition transforms school gymnasiums into interactive science centers, with in-school field trips guided by spectrUM educators and a capstone Family Science Night for the whole community. Highlights of the exhibition include a non-point source pollution table, a groundwater model, a virtual watershed sandbox that allows visitors to create topography models by shaping sand, and an array of other exhibits and hands-on activities that engage students with relevant, place-based learning experiences. The exhibition’s signage features IoE researchers and role models **Maury Valett** and **Mandy Slate**.

According to spectrUM Director **Holly Truitt**, the goal of spectrUM’s mobile engagement is “to inspire Montana’s next generation about STEM and higher education and to help power a vibrant, homegrown workforce in our state.” Truitt also serves as Outreach Lead for Montana NSF EPSCoR at UM and directs UM’s Broader Impacts Group.

The “Water” exhibition builds on momentum from spectrUM’s deep partnerships with Montana NSF EPSCoR

and the Montana IoE. In 2013, spectrUM and IoE researchers co-created an interactive Large-River Ecosystems exhibition that showcased the institute’s role models and current research to over 27,000 museum visitors annually.

“Water” was also co-created with UM and IoE researchers, including **Ric Hauer, Andrew Wilcox, Maury Valett, and William Woessner**. “With this team of scientists, along with spectrUM’s education team, we treated spectrUM’s museum as a research and development lab to create new exhibits and curate existing pieces from our Large-River Ecosystems exhibition to travel to rural and tribal communities,” says Truitt.

Leveraging core funding from Montana NSF EPSCoR and IoE, spectrUM also partnered with the Jane S. Heman Foundation and the Martin Family Foundation to bring the “Water” exhibition and ecosystems-science role models to schools throughout the Bitterroot Valley this spring. Additionally, the Clark Fork Coalition helped support the building of the exhibition’s Virtual Watershed Sandbox.

Today, spectrUM engages more than 55,000 Montanans annually through in-museum and statewide mobile programming. Seeded with a grant from NSF EPSCoR, spectrUM now operates on a \$2 million annual budget that supports its Missoula museum, a statewide mobile



At spectrUM’s Virtual Watershed Sandbox, students can create 3D topography models by shaping sand.

science program, and deep engagement initiatives on the Flathead Reservation and in the Bitterroot. Since 2006, spectrUM has traveled exhibits and educators to 73 schools and four public libraries in 31 Montana counties and on all seven American Indian reservations in Montana. Thirty percent of the people spectrUM serves are Native American, and more than 75 percent live in rural communities.

INTERDISCIPLINARY COLLABORATIVE NETWORK ENTERS FOURTH YEAR OF SUPPORT FOR GRAD STUDENTS

The 2016-17 academic year has ushered in a number of exciting events and collaborations and the fourth year of UM’s graduate student-driven Interdisciplinary Collaborative Network (ICN).

The ICN hosted its third annual Rapid-Fire Creative Scholarship and Networking Symposium in November. Pairing undergraduates with graduate student mentors, Rapid Fire involved over 30 students from all corners of campus. Since the program’s inception, 171 UM graduate and undergraduate students have had the chance to network and collaborate via Rapid-Fire.

ICN’s fourth annual Graduate Student Seminar Series focuses on professional development and is divided into two primary sections: how to thrive during graduate school, and how to succeed in the job-search period. The course roster includes students from multiple disciplines (sciences, humanities, arts) and at different stages in their graduate careers. Over the course of the semester, students participate in interactive workshops aimed to develop skills in communication, both in academic and professional context; effectively mentoring undergraduate students; writing compelling CVs; and mastering online networking tools and making a personal website. The ICN

has invited **Karen Kelsky**, founder of The Professor and authority on all things post-graduate employment, to speak on how to use our academic experience to find jobs outside of academia. This event and another on maximizing mental health in graduate school,

is open to all UM graduate students, and is supported by Montana NSF EPSCoR via the Montana Institute on Ecosystems. The ICN also collaborates with the UM Graduate and Professional Student Association (GPSA).

ICN members have a strong record of community outreach and have long partnered with spectrUM Discovery Area to bring hands-on science to greater Missoula. The ICN recently partnered with the UM Broader Impacts Group (BIG) to co-host a session on We Are Montana in the Classroom so graduate students from across campus could learn to be academic role models for K-12 students. The ICN is thrilled to extend its impact into local classrooms and to serve as an advocate for the value of higher education.

Lastly, for the third year in a row, ICN will award Collaboration Challenge Research Grants to graduate students engaged in interdisciplinary research. These \$1000 grants are made possible with contributions from many UM academic departments and IoE.

