MONTANA NSF EPSCoR
NEWSLETTER
SUMMER 2020

COVID-19 AND CREWS

COVID-19 has redefined what our lives look like and forced us all to adapt to a new pandemic reality. Across Montana, members of the CREWS team have stepped up to not only address the needs of their research due to COVID-19's impact but also the needs of the communities they live and work in (see page 5 to learn about the NSF EPSCoR CREWS project).

Megan Moore, a second year Ph.D. student at the University of Montana, and Amanda Bailey, CREWS research staff, are both members of Libby Metcalf's Human Dimensions Lab at the University of Montana. As a part of the CREWS Natural Resources and Social Science Team (NRSS), their research focuses on the relationship between water and soil quality and how communities respond to degradation of these resources. An important part of their research is conducting in-person interviews with community leaders in Anaconda and Deer Lodge, but in response to new COVID-19 guidelines provided by the University of Montana's Internal Review Board, Megan and Amanda are now conducting their interviews over Zoom or by phone.

"Some participants have expressed that they would prefer to do in-person interviews, and it has been disheartening to tell them that we are not able to do that at this time. People have been understanding of the whole situation, [but] there is a sense that something is lost. In our research, trust is an essential component," say Megan and Amanda. "While this new style of interviewing has been an adjustment, we feel fortunate that so many people have given their time and energy to visit with us in this current global climate. We think that the sooner we can make face-to-face connections with people, the better it will be for trust building and forming lasting relationships with people we have engaged with in these towns."

Megan Moore. *Photo credit: Megan Moore*

Amanda Bailey. *Photo credit: Amanda Bailey*

At Crow Agency, the Tribe is experiencing tremendous personal and cultural loss, like the cancellation of their annual powwow, Crow Fair, because of COVID-19. With further loss of jobs due to COVID-19, food security on the Reservation has also gotten much worse. To address community needs, John Doyle and Emery Three Irons, both EPSCoR team members from Little Big Horn College (LBHC), have been working with Charlene Johnson and other community members through the non-profit Plenty Doors to distribute food, water, cleaning supplies and other essentials to families across the Reservation. The primary funding for this work comes from the Foundation for Community Vitality, supported by the Scott family and others.

Emery Three Irons. *Photo credit: Emery Three Irons and Lakisha Flores*

"These distributions are also a way to stay in touch with families in each of our communities. Emery, Charlene, and I have been asking people to fill out a one-page survey about what their needs are, so we can match our distributions to people's needs," says John. "We are learning that many families especially lack access to adequate safe water – which has become even more essential for bathing and cleaning homes, in addition to drinking and cooking uses. We have purchased more water coolers (which dispense water from refillable five-gallon jugs) and will be distributing those when we do more in depth interviews with people about their experiences. For now, our EPSCoR work (and budget) is on hold, as we are doing what we can to help in our communities."

As the team continues to move forward, the ongoing and additive impacts of COVID-19 are difficult to predict. The team is resilient and the work from sensors and field data collection to laboratory studies is moving forward. Video conference meetings are now the new normal, and the team is relying even more on collaboration technologies.

CREWS PARTNER HIGHLIGHT – GEUM, INC.

Geum Environmental Consulting, Inc. (Geum) began working with the Upper Clark Fork Working Group (UCFWG) CREWS project on behalf of Montana's Natural Resource Damage Program (NRDP) To support the shared interest in water quality and aquatic habitat in the Upper Clark Fork River between CREWS and NRDP, Geum is providing technical tools and facilitating meetings to help make the UCFWG a forum where academic researchers and public agency managers can understand each other's perspectives. Members of the UCFWG hope that this collaboration will result in more focused research, multi-disciplinary problem-solving, and management decisions that reflect scientific findings.

Geum was established in 2003 and focuses on ecological restoration of aquatic, riparian and wetland habitat and function. Their approach is to create site conditions that support ecological processes with self-sustaining biological communities. Geum provides services, ranging from wetland and vegetation evaluations, habitat evaluations, and restoration designs that integrate terrestrial and aquatic habitat. They work on all phases of a project from site characterization, permitting, project design, construction and field crew oversight, and project monitoring.

Geum, working with the University of Montana's Valett lab, co-facilitated a working group meeting in October 2019 attended by multiple entities who shared their past and current work as well as questions and concerns for the river. Geum prepared a 20-foot long map of the Upper Clark Fork River between Warm Springs, Montana and Missoula, Montana. Working group participants identified data assets and data needs for different locations on the map and discussed research questions and opportunities for collaboration. This information was then translated to an online map, developed by Geum, to help individuals identify potential partners and resources to inform and support their work. Geum also developed a website where all publicly available spatial data is displayed for public use in an interactive map format (available here: **https://ucfwg.org/map-data-portal**).

Participants place sticky notes on maps provided by Geum at the October UCFWG meeting. *Photo credit: Marisa Sowles*

As the UCFWG continues to develop, this group has the potential to be a collaborative entity that is effective and efficient at solving water quality and habitat problems in the Clark Fork River. Geum understands that science and technical knowledge are important when solving problems in the context of a Superfund cleanup. However, people communicating with each other are the most important components of land management, restoration, and research. Because of that, Geum views their role with the UCFWG as an opportunity to truly engage with a community that cares about the Upper Clark Fork River and appreciates being part of this meaningful work.

Geum Environmental Consulting

Members of the spectrUM team prepare science kits. *Photo credit: Jessie Herbert-Meny*

SCIENCE KITS AND STEM ROLE MODELS

Team members from spectrUM, a CREWS outreach partner, have worked hard to prepare and deliver over 5,000 science kits this summer to families through the Missoula Food Bank and Community Center, the Missoula Public Library, and partner locations in the Bitterroot Valley and on the Flathead Reservation. These science kits explore Sensing for Science, Parachute Landing, Fun with Flight, Water Chemistry, and more.

spectrUM has also created their STEM role models website to more prominently feature role models working across a range of disciplines. You can visit the STEM role models website at **http://spectrum.umt.edu/education/rolemodels/default.php**, and if other CREWS role models would like to be featured please contact Jessie Herbert-Meny at jessie.herbert@umontana.edu.

CREWS INNOVATION & COMMERCIALIZATION INTERNSHIP PROGRAM

CREWS launched an Innovation & Commercialization Internship Program this past spring and summer, providing two graduate students and one postdoc an opportunity to explore the commercial potential of their research or innovation idea. The call for Year 3 Commercialization Interns has been released, and applications are due September 15.

To explore commercial potential, interns can participate in a workshop (through the Montana NSF Regional I-Corp program) to learn about customer/market discovery, build a template for a commercialization plan, engage with industry, agency, or non-profit partners, and/or complete other tasks appropriate to the specific innovation idea. "We are excited about the ideas our first cohort of interns are exploring," says Jakki Mohr, director of the CREWS IC2 program.

David Hutchins. *Photo credit: Bryan Ortega-Welch*

DAVID HUTCHINS is a postdoc at Montana Technological University, working in Jerry Downey's Lab on the Continuous Flow Metal Recovery System (CFMR) as part of the CREWS project. CFMR technology uses magnetic nanoparticles which are an emerging technology with a wide range of applications, including biomedical applications such as anti-cancer drug synthesis. Through his internship, David is exploring feasibility for this biomedical application through literature and patent review, as well as consultations. "This internship has been a great opportunity to explore new possibilities for our technology," says David. "We tend to get so focused in our areas of expertise that we risk missing alternative applications with serious potential."

TAYLOR GOLD QUIROS is a PhD student at the University of Montana in the Valett Lab. Her CREWS research on the Upper Clark Fork River investigates the impact of long-term stressors, such as mining, on the structure and function of aquatic communities—in this case, fish. As an intern, Taylor is looking at the commercial potential of her idea to develop an app that would provide a data sharing platform for anglers, academics, and agencies. "My goal is to create an exchange of information; the app would create an opportunity for scientists to share data directly with people who may use it and have a citizen scientist component where the public can help scientists track demographics of the fish (and fishermen) on the river," says Taylor. Taylor is working with Montana Fish Wildlife and Parks on this idea and has participated in UM's I-Corps program to research its feasibility.

Taylor Gold Quiros. *Photo credit: Taylor Gold Quiros*

QIPEI SHANGGUAN is a PhD student at the University of Montana, working on sensor development for the CREWS project in Mike DeGrandpre's lab. He is developing a prototype alkalinity sensor for in situ freshwater monitoring. Through his internship, Qipei is working with Sunburst Sensors to perform experimental tests and assess market interest for this new technology. "It is great to work with industry and exchange ideas. I hope the alkalinity sensor will help freshwater researchers to observe fine scale natural phenomena," says Qipei.

Qipei Shangguan. *Photo credit: Fischer Young*

Contact info@mtnsfepscor.org for details or reach out to Chelle and/or Jakki. Also, join the #innovationandcommercialization channel on the CREWS Slack Project.

EPSCoR TEAM MEMBERS SHARE THEIR WORK

Engineer Erika Espinosa-Ortiz received a seed grant from Montana NSF EPSCoR in February and quickly jumped into her work with students and teachers via a new outreach project called CREWS Junior Researcher.

For the seed grant research project, Espinosa-Ortiz, a research assistant professor at Montana State University, is leading a team of Center for Biofilm Engineering researchers that will develop and test new biofilms for treating water contaminants commonly associated with coal mining. The CREWS Junior Researcher project helps kids replicate similar experiments at home.

Espinosa-Ortiz said her childhood growing up in Mexico City – a population center of over 20 million people – impacted her decision to become an environmental engineer. She saw serious issues with water scarcity and wants to look for ways to preserve our water resources. She also hopes to inspire other young people to care, conserve, and join in the search for solutions to our water crisis.

The CREWS Junior Researcher experiments focus on acid mine drainage, and they will help young people understand how stream pollution might occur when industrial activities like mining combine with naturally occurring processes. Youth will also learn how scientists and engineers — including those on the Montana NSF EPSCoR project — are helping to preserve water quality and clean up contaminated areas using natural materials and processes.

Both experiments use materials that can be found fairly easily at home or at a grocery store. However, Montana NSF EPSCoR can support students or teachers who would like to do the experiments but are having trouble accessing the materials. Please email Suzi Taylor at taylor@montana.edu if you would like help acquiring the materials or would like a group kit to complete with a classroom or out-of-school youth program. You can download the CREWS

CREWS Junior Researcher handout. *Image credit: Suzi Taylor*

Junior Researcher: Acid Mine Drainage experiments at **https://www.mtnsfepscor.org/index.php/project/crews/blog/crews-engineer-shares-her-work-junior-researcher-outreach-project**

DIRECTORS UPDATE

We've had a busy year so far. Like every aspect of society, research and education, and higher education overall, were disrupted in early 2020 by the COVID-19 pandemic. Students moved to online courses, research labs shut down, and universities implemented hiring and travel freezes. The impacts were unprecedented. The CREWS project had to adapt quickly and the team's response was brilliant. They adjusted their work to focus on activities like finishing publications, analyzing data, and revising conceptual frameworks. They developed new plans to continue lab and field research work that met needs for social distancing and safety. The broader engagement team developed new online mechanisms to deliver science and STEM content to students, teachers, and local stakeholders. The Year 2 Reverse Site Visit, a formal project evaluation by the National Science Foundation and an assembled team of experts, was moved to a virtual meeting at the last minute. The CREWS annual All-Hands meeting was rescheduled as an online meeting. We have become experts at Zoom, GoToMeeting, and WebEx. The result is that the project is on track to achieve goals and objectives. And as we move forward into a new academic year filled with uncertainty, we know the CREWS team is ready to overcome challenges. We will continue to develop and communicate relevant science about Montana's environmental water systems.

Ray Callaway and & Todd Kipfer

WHAT IS EPSCOR?

ABOUT NSF EPSCoR

The Montana NSF EPSCoR Consortium for Research on Environmental Water Systems, or CREWS, is a five year project that explores how changing compositions and levels of nutrients and contaminants affect water quality--from soils and rivers to local communities that rely on clean water. The project focuses on three main landscapes where water and economy are inextricably linked: the Upper Clark Fork River, the Judith Basin, and the Powder River Basin. This project creates opportunities in workforce development, innovation, and entrepreneurship through partnerships with private business and is a collaborative effort across Montana's universities and colleges. For additional information please visit our website at https://mtnsfepscor.org.

The National Science Foundation's Established Program to Stimulate Competitive Research (EPSCoR) enhances the research competitiveness of targeted jurisdictions by strengthening STEM capacity and capability.

Montana's EPSCoR governing committee is the Montana Science & Technology Committee within the Office of the Commissioner of Higher Education. The CREWS project's leadership and topic were selected by this committee through a statewide competitive process. NSF EPSCoR has been a quiet but powerful partner in growing Montana's Research and Development enterprise since 1979.

Montana NSF EPSCoR

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WELCOMING OUR NEW PARTNER INSTITUTIONS

The University of Montana Western

montana state university BILLINGS

RMC Rocky Mountain College