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UM Earns Research Award for Submicroscopic 3D Printer

This image shows examples of submicroscopic structures that can be produced by UM's new bioprinter. (Courtesy of Monica Serban)
MISSOULA – A University of Montana research center recently was awarded a $480,000 grant to support the purchase of a three-dimensional bioprinter, which will allow nanofabrication of tiny structures.

The new instrument, only the second such bioprinter at a U.S. university, will add a submicroscopic dimension to UM’s technological toolkit.

The M.J. Murdock Charitable Trust grant went to the University’s Montana Biotechnology Center (BIOTECH). The funding will purchase a highly precise bioprinter, the Quantum X Bio System, which can construct sub-microscale tissue-like structures from biomaterials, tiny drug delivery systems, sensors and more.

Serban

“The Quantum X Bio System will accentuate the cutting-edge educational and research capabilities of our center and UM,” said Monica Serban, the BIOTECH director. “It also will strengthen our clinical, academic and corporate partnerships and allow our students to be involved in solving real-life biomedical and biotechnological societal problems – involving them in open innovation and prototyping.”

How exciting is the new bioprinter? Well, it uses laser-writing technology to create incredibly tiny structures at tremendous speed and accuracy for biological and biomedical applications. It uses something called “two-photon polymerization” for its sub-microscale 3D printing, a process that relies on the super-accurate interaction of light with a photosensitive material, which then becomes a building block for the printed structure.

In her own research, Serban will use the bioprinter to develop a prototype device that instantly releases hearing-protective therapeutics when it detects harmful noise levels. This could
protect the hearing of U.S. military personnel. In fact, the bioprinter purchase will be jointly funded by her Office of Naval Research project titled “New Engineered Systems to Prevent Hearing Loss in Sailors and Marines.”

BIOTECH is focused on connecting students, entrepreneurs, scientists and clinicians so they can enhance local and regional biotechnology capabilities. Its mission is to enable local and regional biotechnology-focused workforce development through educational activities. It does research that targets the development of biomedical products – specifically therapeutics, wearable sensors and other medical devices intended primarily for resource-limited settings.

Boggs

“We are extremely grateful for our sponsors’ support and are excited to share the 3D bioprinter’s capabilities and associated scientific outcomes with our valued research community,” said Heidi Boggs, associate director of the UM center. “At BIOTECH we are passionate about growing innovative research technologies that will improve our way of life and benefit society. This instrument provides research, innovation and partnership opportunities otherwise not possible.”

One example of such a partnership is BIOTECH’s collaboration with Dr. Rob Minor of Billings Clinic Heart and Vascular at Community Medical Center in Missoula. Minor hopes to use the Quantum X Bio System to create patient-specific 3D models of vascular anatomy. This will enable pre-surgical blood-vessel-stenting procedure simulations for difficult cases, as well as the development and testing of innovative therapies.

Minor also is involved in the development of Montana’s first Center for Critical Limb Ischemia Care and Limb Salvage. This new center seeks to provide expanded services to all western Montana, with the goal of preventing amputations and improving quality of life.

“The center would link vascular specialists, multidisciplinary team members and wound care services with many rural Montana communities,” said Minor, an interventional cardiologist. “This will create additional collaborative opportunities with BIOTECH through which our students and researchers could learn of current unmet needs and challenges in healing chronically infected wounds and those that lack blood supply. It could apply the bioprinter’s unique capabilities to novel therapeutic alternatives.”

Scott Whittenburg, UM vice president for research and creative scholarship, said the new bioprinter will be a welcome addition to the University’s research enterprise.

“As a top-tier R1 research university, UM needs more tools like this that advance our abilities to work in emerging scientific fields,” Whittenburg said. “Once the bioprinter is installed, it will be only the second Quantum X instrument in the U.S., with the other housed at Rice University in Houston.

“Not only is this instrument the centerpiece of our array of advanced 3D printing technologies, it will lead to collaborations with researchers at other institutions regionally and nationally,” he said.

The M.J. Murdock Charitable Trust, created by the will of the late Melvin J. “Jack” Murdock, provides grants to nonprofit organizations in five states of the Pacific Northwest –Alaska, Idaho, Montana, Oregon and Washington. The trust seeks to strengthen the region’s educational, social, spiritual and cultural base in creative and sustainable ways.

Contact: Monica Serban, director, UM Montana Biotechnology Center, 406-243-4907, monica.serban@umontana.edu; Heidi Boggs, BIOTECH associate director, 406-243-2225, heidi.boggs@umontana.edu.

Launch UM virtual tour.
UM graduate student Kristen Cram is installing air quality monitors in Seeley Lake, Montana, as part of a capstone project for her joint master’s studies in public health and public administration.

SEELEY LAKE— University of Montana graduate student Kristen Cram spent several weeks this spring semester diligently hunting for strong internet connections in Seeley Lake, Montana.
Her search for a robust link had nothing to do with taking an online class or watching a favored social media channel, but was needed for a capstone project she is conducting, which will help the Missoula City-County Health Department study air quality in the resort community 52 miles northeast of Missoula.

The Wi-Fi she explains is needed to transmit data from small air quality monitors, called PurpleAirs, from Seeley Lake homes and businesses to Missoula. After several attempts she, and her supervisor, Ben Schmidt, air quality specialist for the Missoula City-County Health Department, finally found success.

“Last week we were able to get a sensor up and running at a location we tried several times before,” Cram reported. “We can’t figure out why it worked this time, but we are happy it did! This gave us a green light to reach out to the other volunteers who are letting us install the sensors on their property.”

Such trial-and-error is one of many valuable lessons learned by UM students through capstone research projects.

Cram, who is earning a joint Masters in Public health and Public Administration at UM, had two deliverables as part of this project: Find five to 15 homeowners or businesses willing to have the innocuous PurpleAirs, which are actually white, installed on their property. Then create a study protocol, or design framework, that can be passed along for others involved in this two-year study.

“She is learning the team building aspects of projects like this and how to communicate concepts to the community,” said Schmidt. “And, if there are still problems, where is it and how do we fix it?”

Seeley Lake sits in a narrow valley, making it prone to air inversions made worse from particulate matter in the smoke from older wood-burning stoves. To reduce particulate matter, the county embarked on an ambitious stove replacement program in 2012, changing out 164, or nearly 90%, of existing stoves in the community with cleaner burning devices.

A permanent monitoring station, located at the Seeley Lake Elementary School, continues to show a 50% improvement in particulate matter at that location. The new study aims to see if this improvement is communitywide.
“We think most neighborhoods will meet particulate standards now,” Schmidt said. “But we want to find out if it’s distributed more evenly or if one neighborhood is having trouble. This is important because particulate pollution does impact people’s health.”

Cram, who graduated from Missoula’s Hellgate High School, wants to work on health issues on a communitywide scale.

After earning an undergraduate degree in microbiology, Cram worked for a time in Washington, D.C., as a dental assistant with hopes of becoming a physician’s assistant. While she enjoyed working one-on-one with patients, Cram soon learned she was more interested in working on health issues on a broader scale, and the hunt for a graduate program began.

“My dad discovered UM’s joint master’s program in public health and public administration. I looked into it and it was exactly what I wanted,” said Cram, who grew up on the island of St. Thomas before her family moved to Missoula, where she graduated from Hellgate High School.

Professor Tony Ward, chair of UM’s School of Public and Community Health Sciences, said the joint degree is a perfect bridge between the public health and public administration master’s programs, allowing students to graduate in a shorter time frame and with a broader understanding of issues that often overlap in the community.

“Public health and public administration are very much complementary,” Ward said. “Our graduates go into a variety of fields, including working for health departments and nonprofits. Most have jobs lined up when they graduate, and many stay in Montana.”

Capstone projects like Cram’s, he adds, help to solve real-world issues while offering valuable practical experience in resolving the occasional hiccup that comes with every research project.
A good Wi-Fi connection, Cram said, is valuable for data collection in real time. But, she added, the sensors do have SD cards, so they are still collecting data even if the internet connection goes down.

“I'll just have to go up to Seeley and manually download the data if they stop working,” she said. “We have a lot of possibilities to make this work.”

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**Contact:** Dave Kuntz, UM director of strategic communications, 406-243-5659, dave.kuntz@umontana.edu.

Launch UM virtual tour.
Lost Montana Masterpiece to Join Collection in New UM Museum

28 MARCH 2023

Montana Museum of Art and Culture Director Rafael Chacón hopes the return of this work by Montana impressionist Fra Dana, missing since the 1950s, will open the door for other pieces to come back to UM’s collection. The MMAC will have a new home this fall.

MISSOULA – Montana Museum of Art and Culture Director Rafael Chacón received a phone call last winter from someone in Kentucky who said he had something that belonged to the University of Montana.
The man, who had been going through his late father’s things, came across a work of art his father had told him years before he wanted returned to UM. When Chacón saw a photo of the piece, he knew immediately it had been missing and thought lost for more than 60 years.

“He said his father bought the painting at a yard sale in Missoula for $25. No one knows how it ended up in that yard sale,” Chacón said. “I didn’t ask any other questions. I just said thank you. We are just so grateful to have it back.”

The portrait of a boy wearing a brimmed hat and smoking a cigarette has soft, quick brush strokes characteristic of impressionist works. Painted by Fra Dana – inarguably Montana’s most gifted impressionist of the early 20th century – “Portrait of Clifford Breeding” went missing without a trace in the 1950s. It was even featured in a 1990 missing arts journal as one of our most important lost artworks at the time.

Chacón thought it was lost forever until the man in Kentucky called to tell him what he’d found.

“This is an exciting return,” said Chacón. “We hope it opens the door for other pieces to come back to our remarkable collection.”

The discovery and return of this beloved artwork couldn’t be timelier as the staff at MMAC, along with community volunteers, graduate students and interns, works to catalogue UM’s collection in anticipation of the museum’s move to a new building under construction on the UM campus.

The new MMAC building is scheduled for completion this fall.

Scheduled for completion this fall, the new building will be the first permanent home for a collection with a storied past.

“The move to this new state-of-the-art facility is the culmination of the hopes and dreams of generations before us who understood the value of this
unique collection of art,” Chacón said.

Established in 1895 with scientific specimens donated by the Smithsonian, the museum was first housed in University Hall (now called Main Hall). But by 1900 the collection had grown so large that curators ran out of space to display it. The lack of space and a dedicated home became the story of the museum – at times overshadowing the deep and rich tales of its collection.

“Throughout its history, the museum has had periods of explosive growth and long periods of neglect,” Chacón said.

From the better part of the last century, the museum has moved around campus, with display spaces in Main Hall, the Women’s Club-Art Building, Turner Hall, and storage in the journalism, fine arts and social science buildings, and any suitable place curators could find.

While some of the collection was visible in public spaces and offices across the campus and on loan to institutions across the state, large parts were stored in basements, closets and attics, with artwork tucked in out-of-the-way and forgotten places. Over many years, it has been the subject of undocumented loans, disappearances and outright theft.

“Calls for a new building go back to the early 20th century,” Chacón said of the new building, which ultimately will serve as a cultural gateway to campus. “But the shared vision of our generous giving community and the University finally made this possible. It is a singular moment for all of us who look forward to years of reflection, education and enjoyment of this collection in its new home.”

The privately funded project is made possible by the generosity of many donors, including a commitment of $12.5 million from longtime UM donors Patt and Terry Payne.

As Chacón and his staff prepare to move the collection for the last time, they are making sure they know precisely what has been stashed in the basement of the Social Science Building, where the museum’s paintings, sculptures, period furniture pieces and fabric artworks currently are stored.

UM students like MFA candidate Dagny Walton are donning white gloves and helping catalogue the pieces while getting an education in art history at the same time.
“It's been a great opportunity to experience the permanence of art,” Walton said. “I feel like, as a student and as an artist in the oversaturated digital era, I've accepted that my work certainly won't occupy a permanent spot in history. It's been a pleasure to handle well-known pieces of art that do have that permanence alongside work that is also largely unknown, but still holds a spot in this prestigious collection. That blend has been really satisfying to experience.”

UM’s Megan Foster, another MFA student, said it is a “remarkable thing” to help catalogue MMAC’s collection at such an important time in the museum’s history.

“For me, what has been the most special, aside from just being able to experience the collection in such a personal and hands-on way, is knowing that the work I am doing will enable so many people in our community and outside our community to see the collection as well,” Foster said. “It's a collection that I feel is very connected to this area and its people while also being a collection of great breadth and depth.”

Along with Walton and Foster, close to 50 community members volunteered to help process 350 to 400 objects – the “greatest hits,” as Chacón calls them – between now and August.

One of those greatest hits will be the Dana painting “Portrait of Clifford of Breeding,” home at last.

“This is a very important portrait for Fra Dana’s career,” Chacón said. “Not only do we see her at her most skilled as an impressionist in the way she handles composition, light and color, but we also see her interest in the subjects of the Ashcan School, an American movement from the East Coast at the turn of the century which focused on common subjects in an honest and sincere way. In this sensitive portrait of an indigenous boy living in two cultures, Dana brings the Ashcan to Montana. It is a powerful statement.”

While the building is scheduled to open this fall, staff, community volunteers and students who are earning a soon-to-be-launched museum studies certificate will continue to process the rest of the objects over the next two to three years.

“We'll make countless exciting discoveries along the way,” Chacón said.

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Lost Montana Masterpiece to Join Collection in New UM Museum

Contact: H. Rafael Chacón, director, UM Montana Museum of Art and Culture, 406-243-2019, rafael.chacon@mso.umt.edu.

Launch UM virtual tour.
Research: Genetics May Help Jackrabbits Survive Climate Change Color Mismatch

A winter white-tailed jackrabbit. Credit: Amedio Cortese
MISSOULA – White-tailed jackrabbits can change their color with the seasons, growing snowy white fur in the winter and brown fur during the summer. But shorter winters brought on by rapid climate change can create color mismatch, making jackrabbits stand out like lightbulbs for predators on snowless landscapes.

Populations of jackrabbits can display brown, white, or intermediate-colored coats during the winter, depending on how snowy their environment is. Now an international team led by University of Montana scientists has discovered three genes that determine jackrabbit color variation from white to brown. The genes control the production of pigments – the same pigments that determine if hair is darker or lighter in people. Understanding how the color variation evolved allowed the researchers to predict that certain jackrabbit populations will be better able to adapt to future declines of snow cover.

Winter landscapes provide formidable challenges for many animals.

“A dark animal will be more easily noticed by predators on a white snowy landscape. For prey like hares and jackrabbits, the ability to remain camouflaged can be the difference between life and death,” said Mafalda Ferreira, a Portuguese scientist who led the study while a graduate student working at UM.

Jeffrey Good, a UM professor of ecology and evolution who coordinated the study, said they applied the same cutting-edge technologies used to study human diseases to decode the genomes of jackrabbits with brown, white, or intermediate-colored winter coats. They then combined genetic results with climate projections to reveal that populations with higher variability in their color genes are better prepared to face the likely reductions in snow cover that will occur during the next century.

Scott Mills, a UM wildlife biology professor who was involved in the study, said this critical variation may help rescue white-tailed jackrabbits from population declines caused by climate change.

Nevertheless, the authors offer a cautionary note to this optimistic prediction. A final and striking result is that this adaptive capacity was found most often in populations threatened by habitat loss, diseases; and targeted extermination by humans. For the team, this highlights how maintaining connectivity between populations will be essential to ensure the conservation of this species and others in the long run.
“Although this might be good news for jackrabbits, our discoveries also serve as a cautionary tale for other animals facing the impact of climate change,” Good said. “When people think about wildlife conservation, what normally comes to mind is the protection of populations and habitats. The jackrabbits and their coat colors show how the genetic diversity of a species is just as important, particularly in this rapidly changing natural world.”

The team’s work was published March 23 in Science Magazine in an article titled “The evolution of white-tailed jackrabbit camouflage in response to past and future seasonal climates.” The article is online at: https://www.eurekalert.org/press/scipak/.

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**Contact:** Jeffrey Good, UM professor of ecology and evolution, 406-493-2493, jeffrey.good@umontana.edu

UM early childhood education students embedded in the LAB Preschool teach young children to learn through the act of play.
MISSOULA – Children enrolled in the Learning and Belonging Preschool at the University of Montana spend four days a week playing, exploring and growing in vibrant classrooms stocked with just about everything a young child could want to get their hands on – even a class pet snake. The one thing the preschool lacks is an outdoor playhouse. This semester, the 3, 4 and 5-year-olds are leading the charge to solve that problem.

The preschoolers have spent months answering the question of what their new playground needs and dreaming big about the possibilities. Some ideas are lofty, like building a skyscraper that reaches the clouds or constructing an all-you-can-eat ice cream machine. Teachers distill those daydreams into feasible ideas and present options for the children to choose from themselves.

While the plan is to eventually unveil a playground that is as influenced by the children’s wishes as possible, the larger goal is to engage preschoolers in developmentally-appropriate learning, all through the act of play.

“When they play, they are choosing what they’re most interested in,” LAB Preschool Director Kristin Dahl Horejsi says. “We know that they learn better when they're interested.”

The exercise is emblematic of the philosophy at the core of UM’s early childhood education programs. Using a project-based learning approach and following the ideology that play is learning, budding early childhood educators encourage young children to actively guide their own schooling.

Classrooms such as these are an invaluable resource in a state like Montana – one of only a few in the country without publicly funded preschool. While supportive community-based programs for young children or private preschools exist throughout the state, early childhood educators say the lack of regulation and funding creates disparities. It also builds obstacles for families who cannot afford to send their children to school before kindergarten.

That can leave some children less prepared than others to enter school, says Allison Wilson, an assistant professor in the Early Childhood Education Department and director of the Institute for Early Childhood Education at UM.
In the absence of publicly-funded preschool, Wilson’s vision is that UM’s program and the students who graduate from it with a bachelor’s, master’s or doctoral degree can model the best early childhood education practices for programs throughout Montana.

Open to all Missoula-area children, the LAB Preschool is a learning space for both preschool-age kids and college-level students pursuing an education degree at UM. Early childhood education students embedded in the preschool follow children’s natural curiosity and, with added support and structure, learn to turn that inquisitiveness into a project that both captures kids’ interest and engages them in dynamic learning opportunities.

After Valentine’s Day, one class became curious about sending letters, leading teachers to create a child-size post office with mailboxes, envelopes and stamps. Kids wrote one another letters, charged each other for stamps with play money and sorted mail. The children developed their motor, literacy and mathematics skills all while playing and learning about the world.

“When young children are given the space to be active and engaged with their environment, they grow in confidence,” Dahl Horejsi says. “They also view school as a fun and purposeful experience, and are ready to go on to elementary school with the social skills they picked up here. When they have those pieces, they’re going to be far more prepared.”

UM students benefit from hands-on experience in the LAB Preschool and curriculum tailored to developmentally-appropriate education for the youngest learners, preparing graduates to become experts in their field. Early childhood education graduates exit UM attune to the specific needs of young children – something that both bolsters teacher retention and optimizes the educational experience for young children in classrooms wherever UM graduates teach, Wilson says.

“Students leave with a sustained practice of intentional reflection and flexibility to be responsive to what they know children need in their classroom,” Wilson says. “It’s a disposition and a habit of mind.”

Early childhood education master’s student Olivia Kersey-Bronec is putting this philosophy to work as one of the first two UM graduate students to be chosen as a Borick Scholar.

Founded by entrepreneur Louis Borick, the foundation supports education, youth and leadership development, the arts and animal welfare. The Borick Foundation recently awarded
UM Early Childhood Education Students Teach Preschoolers Through Play

the University of Montana Foundation with a grant to purchase the LAB Preschool’s new playhouse and fund early childhood education graduate students’ research, studies and classroom experience. The scholarship funds Kersey-Bronec’s time as a co-teacher in the LAB Preschool this semester.

“If that wasn’t a reality, I would not be able to do this position, I would have to be making money in other ways,” Kersey-Bronec says of being a Borick Scholar. “Getting to both financially support myself and getting to work in this space toward being a better teacher every day, I'm really grateful for it.”

Previously a chemistry major at the University of Puget Sound, Kersey-Bronec's enrolled in UM's program after spending two years with AmeriCorps working as a kindergarten teaching assistant and teaching sustainable agriculture in Montana. Access to the LAB Preschool is instrumental in advancing her career dream, she says.

“These classrooms are beautiful environments for children, they have math and literacy intertwined into everything that kids do,” Kersey-Bronec says. “As a student, I feel like I've learned so much having access to these spaces.”

UM’s early childhood classes and firsthand experience in the LAB Preschool are preparing Kersey-Bronec to eventually head her own classroom after her expected graduation date of spring 2024. As a teacher, she plans to continue the ideology that play is learning.

“I think it's so empowering to be a kid, express your interests and see it valued in the classroom,” Kersey-Bronec says. “Students don’t remember what you say, they remember how you made them feel. My goal is to be the teacher that leaves a positive memory, as well as set kids up for success in their lives and in school.”

Preparing young children for a life of successful education is also the goal of early childhood education doctoral student and Adjunct Professor Anna Puryear.

Also a Borick Scholar and co-teacher in the LAB Preschool, Puryear already has 22 years of experience working in early childhood and elementary education, as well as a master’s degree in educational leadership from the University of Texas Arlington.

Puryear decided to pursue another degree at UM to dig into a gap she’s perceived between the education of early childhood learners and elementary school children. As young students move
past kindergarten, play and social development is often stifled, Puryear says. She plans to focus her dissertation on that gap.

“There is a real disconnect between what we know about how children develop in early childhood and what is happening in elementary schools,” Puryear says. “People forget about how kids are developing at that time. They learn through movement, they learn through play.”

By providing an income and paying her tuition, Puryear says becoming a Borick Scholar allows her to dive into her research head-first in a way she couldn’t otherwise. The support secures her regular time in the LAB Preschool as a co-teacher and affords her time to collaborate with other early childhood professionals.

Puryear hopes her research will support public schools in bridging the divide and emphasize the importance of placing early childhood educators who emphasize learning through play in kindergarten through third grade classrooms.

“Play is a time where you get to practice what you’re learning with no threat,” Puryear says. “They’re learning how to be people in a place where it's super safe to just be who they are.”

Puryear expects to graduate in spring 2026. Afterwards, she hopes to work with Wilson on expanding the efforts of UM's Institute for Early Childhood Education.

In its nascency, the institute is launching an inaugural summit in April in collaboration with local early childhood organizations Zero to Five Missoula County and the Missoula chapter of the Montana Association for the Education of Young Children.

The summit will seek to advance the institute’s larger mission of convening early childhood stakeholders to work together across disciplines and address the needs of young children and families in Montana. The goal is to bring a variety of experts together to respond to those needs through research, workshops and new partnerships, Wilson says.

The summit will be held April 6-8 in the Phyllis J. Washington College of Education during the National Association for the Education of Young Children Week of the Young Child.

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Contacts: Allison Wilson, UM assistant professor of early childhood education and director of the Institute for Early Childhood Education, 406-243-4865, allison.wilson@mso.umt.edu; Kristin Dahl Horejsi, Learning and Belonging Preschool director, 406-243-4262, kristin.horejsi@umontana.edu.

Children play and learn in the LAB Preschool.

Launch UM virtual tour.
UM Early Childhood Education Students Teach Preschoolers Through Play
When completed in 1918, the Anaconda Smelter Stack was believed to be the tallest masonry, brickwork structure in the world.

ANACONDA – A funny thing happened to University of Montana graduate student Megan Moore on her way to writing her doctoral thesis.
The forest and conservation sciences student set out two years ago to gather community input in Anaconda, Montana, about the ongoing Superfund mining cleanup along the Clark Fork River. She expected to hear a lot about how long the process has taken – 40 years so far – and shared experiences with contaminated soil remediation and the Superfund’s impact on daily life in this historic town of 9,500 residents.

What she found instead was that conversations inevitably circled back to one thing: the 585-foot Anaconda Smelter Stack that towers over the landscape and, she would learn, the town’s psyche.

“I set out to learn more about the community’s collective memories, what gives them pride, what brings nostalgia and what do they hope for the future,” Moore said. “And the stack just emerged from these interviews as the thing that everyone wanted to talk about. I spent more time talking about the stack than about Superfund.”

UM graduate student Megan Moore’s research on the Superfund cleanup around Anaconda soon focused on the town’s long relationship with its smelter stack and its history in the state’s mining history.

Tucked into the folds of the Pintler Mountains, the Anaconda Smelter Stack is not only one of the tallest surviving masonry structures in the world, it’s also one of a few remaining vestiges of the region’s storied mining history – a history that produced vast wealth for some, steady employment for many and environmental pollution still undergoing cleanup today.
Saved from destruction by Anaconda’s citizens, the stack today is the star attraction at the aptly named Anaconda Smoke Stack State Park. It must be viewed at a distance, though, because the ground around the stack is still polluted with toxic levels of arsenic.

“Megan’s research is one part of the $20 million CREWS (Consortium for Research on Environmental Water Systems) grant from the National Science Foundation that has studied water quality in Montana and employed a whole team of researchers, including social scientists like us,” said Moore’s adviser Libby Metcalf, UM’s Joel Meier Distinguished Professor of Wildland Management and senior associate dean of the W.A.
Franke College of Forestry and Conservation.

“In the past decade we’ve looked at community issues surrounding Superfund cleanup in Milltown and Bonner and now we’re looking at Deer Lodge and Anaconda,” Metcalf said.

Metcalf and Moore said the stack, and its central role in the community’s collective memory, was a “thread” too interesting to ignore, becoming the topic of Moore’s research, which included interviews with 55 of Anaconda’s community leaders and surveys sent to the residents at large.

“There were a few, mostly younger, people who think the stack should be torn down because it’s a symbol of contamination and is holding the town back,” Moore said. “But there were a lot of people who say it needs to stay up, it’s a symbol of who they are and what it means to be tough – a mining community and a melting pot.”

According to the Montana Historical Society, at the time of its founding in 1883, Anaconda was of the state’s more ethnically diverse communities, with many of its residents born outside the United States and employed at the Anaconda copper smelter.

Anaconda High School Principal Erik Swanson and his mom, former Montana State Rep. Kathy Swanson, have deep family connections to the Anaconda Smelter, which was owned at its closing in 1980 by Atlantic Richfield Co.

“When smoke was coming out of the stack, it was a sign of prosperity, and when the smoke quit you knew no money was coming in,” said Kathy Swanson, whose father worked as a boilermaker at the smelter. “I remember you could taste arsenic on your lips. People called it the ‘taste of money.’”

When ARCO closed the smelter, she added, animosity toward the company was palpable in town.

“Everyone wanted the whole plant, including the stack, torn down,” she said. “But now, a lot of people realize the stack is part of our history.”

As the Superfund remediation continues, Swanson takes comfort in seeing new trees growing on nearby hills and – thanks to ongoing soil replacement – lawns that were once perennially
brown turn green each spring. And the stack, she said, is always in sight.

Erik Swanson, whose home attic will soon go under remediation for traces of toxic dust, said his feelings about the stack are a bit different than his mom's.

“I lived in California for 20 years, and when driving home the stack was a sign that we were getting close to town,” he said. “I guess I view it more as a landmark. And we do find that people who come to town ask about the stack and take pictures of it.”

For James Rosien, editor of the Anaconda Leader and town resident for 12 years, the stack is a purposeful feature in his own landscape photos.

“It’s been 40 years since smoke came out of the stack, but it still has a dominating presence in town,” said Rosien. “For a long time, it provided folks with hope that the smelting business might come back. Today, people recognize the value of the structure and it’s more a point of pride in our history.”

Moore’s study comes at a critical juncture for Anaconda as it looks to secure its future by attracting new businesses to town while still protecting what makes the community unique. It’s a delicate balance facing many post-industrial communities across the country.

“For older generations, it’s hard to see things like box stores coming in,” said Rosien of the town’s continuing transformation. “But growth isn’t going to stop because we want it to. The key is how it’s managed.”

Moore said she found it fascinating to see how the town is being purposeful in moving forward.

“They are asking a lot of tough questions,” she said, “such as is there a way they can harvest these memories as the community goes forward? Can they bring in more historic preservation and use history as they move toward a recreational and tourism economy?”

As far as her study, Moore said, she and Metcalf are working with the community to determine how best to share the results. She hopes that in whatever form that takes, Anaconda will find it useful as it steps out of its Superfund past.

Metcalf added that Moore’s research experience typifies the robust exploration encouraged of
UM Study Finds Deep Connections in Anaconda to Town’s Smelter Stack

UM’s students.

“What’s beautiful about our graduate student program is we bring students in and let them
explore ideas,” Metcalf added. “Megan’s research grew out of Superfund studies into
something that is so much more.”

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Libby Metcalf, UM Joel Meier Distinguished Professor of Wildland Management and senior
associate dean of the W.A. Franke College of Forestry and Conservation, 406-243-4448,
elizabeth.metcalf@umontana.edu.

Launch UM virtual tour.
UM Study Finds Deep Connections in Anaconda to Town’s Smelter Stack
UM students Sebastian Driver (left), Bree Knutson and Jack Hanson will join a group of fellow Grizzlies who are volunteering a portion of their winter break to help others in need.

MISSOULA – This spring break a group of University of Montana students is foregoing relaxation and recreation to lend a hand to those living on the margins of their community. They are participating in the University's Alternative Breaks, a campus-wide program providing students with unique opportunities for service and experiential learning.
For seven days this month, the students will travel to St. George, Utah, to work with Habitat for Humanity, helping build a home for a family in need while also learning about issues around homelessness.

“Going to Florida for spring break just didn’t appeal to me,” said biology major Jack Hanson, who has participated in several Alternative Breaks and will be one of the student leaders for the trip to St. George. “I take pleasure in doing something positive for the world.”

Emily Lynch, manager for UM’s Experiential Learning, said the Alternative Breaks program reflects UM’s overall commitment to civic service, a dedication that in 2022 led Washington Monthly – a magazine of U.S. politics and government based in Washington, D.C. – to rank UM the top university in the country for service to its community and the country.

“These experiences lead to friendships, the students get to see other parts of the country and for many it really lights a fire to do even more volunteer work,” Lynch said. “I wish there was something like this when I was a college student.”

Students in the program, she added, represent all majors and class levels, and the volunteer work they’ve undertaken in the past includes restoring native vegetation in Arches National Park and working with early childhood education programs in San Diego.

Last year, Hanson joined fellow students who traveled to Salt Lake City to volunteer at the Utah Food Bank and a homeless shelter.

He said seeing others struggle to access the basic necessities of life can be emotionally taxing, but in the group’s evening reflections “it got us thinking more deeply about what we can do to help.”

This Alternative Breaks will be a first for junior Sebastian Driver, who is earning a bachelor’s degree in wildlife biology and Master of Public Administration through UM’s 4 +1, a first-of-its-kind program that allows students to earn both degrees in five years instead of six.

Driver previously has volunteered with UM’s chapter of The Wildlife Society and said he’s long had a desire to help wildlife and humans alike.
“When I heard about this trip through the Davison Honors College, I thought what better way to help others and learn how we can tackle homelessness?” said Driver, who is also a member of the Montana 10 program and treasurer of the Mortar Board honor society. “I want to be a steward of change for the good.”

Second-year student Bree Knutson was active in volunteer activities in high school, including traveling to Ecuador to work in a homeless shelter, and she was looking forward to an opportunity to help others again.

“I really don’t have any carpentry skills,” said Knutson, who is studying communicative sciences and disorders, “so I am hoping to learn more about what you do to build houses.”

The program, she added, is also a great way to meet new people

“Everybody involved in the program is very friendly and excited to do this,” said Knutson, who recently volunteered to start working for the Flagship After-School Program, which provides out-of-school opportunities for youth at eight Missoula County Public Schools. “I have been to Utah, too, and I love its beauty.”

Lynch said students occasionally couple their Alternative Breaks program with service-learning independent study credits. Most, though, do it on a volunteer basis. The trip costs are sponsored by the Dairy Products Commission, but students are asked to pitch in $100 toward their expenses. Some financial assistance also is available.

“This is such a worthwhile program,” Lynch added. “I encourage all our students to participate at some point in their college career.”

Contact: Dave Kuntz, UM director of strategic communications, 406-243-5659, dave.kuntz@umontana.edu.

Launch UM virtual tour.
UM Students Spending Spring Break Helping Less Fortunate
MISSOULA – Mandy Smoker Broaddus is a former Montana poet laureate who helped implement the Indian Education Act for All Act across the state. John Shaffner is a legendary Hollywood production designer who created sets for many of television’s most beloved shows.
Both will receive an honorary doctorate this spring from the University of Montana.

On March 16 the state Board of Regents approved UM’s request to present the doctorates during Commencement ceremonies on Saturday, May 13. The two will serve as UM Commencement speakers, with Smoker Broaddus speaking at the morning ceremony and Shaffner speaking in the afternoon.

“Mandy and John are both extraordinary UM alumni whose creative talents have had tremendous impact in the world,” UM President Seth Bodnar said. “They are leaders in their respective fields, and it is our great privilege to present them with honorary doctorates.”

Smoker Broaddus will receive an Honorary Doctorate of Humane Letters, and Shaffner will receive an Honorary Doctorate of Fine Arts.

**Mandy Smoker Broaddus**

Smoker Broaddus was born on the Fort Peck Indian Reservation and is a member of the Assiniboine and Sioux tribes. She attended Pepperdine University for her undergraduate work, earned a Master of Fine Arts in creative writing from UM in 2002, and pursued additional graduate studies at UCLA and the University of Colorado. She was awarded the Richard Hugo Memorial Scholarship at UM and also received the Arianna and Yellow Thunder Scholarship at UCLA.

In 2005 she published an acclaimed book of poetry titled “Another Attempt at Rescue,” which explores culture, language, identity, relationships and the natural world. Other publications followed, including 2022’s “Thunderous,” a children’s graphic novel she co-wrote with Natalie Peeterse whose central characters are all American Indian. The novel works to authentically represent Lakota values and traditions.

Early in her career, Smoker Broaddus taught at Fort Peck Community College and was dean of students at Frazer Public Schools. When the Montana Legislature funded the Indian Education
for All Act in 2005, she joined the state Office of Public Instruction as the first Indian student achievement specialist in the Indian Education Program. She was promoted to director of Indian Education in 2009 and served in that role until 2018, becoming instrumental in helping classrooms across Montana learn more about Native history, contributions and issues.

At OPI, Smoker Broaddus also advanced the Schools of Promise initiative, which worked to close achievement gaps for Montana’s lowest-performing schools. In 2015 she was named Educator of the Year by the National Indian Education Association.

In 2019 Gov. Steve Bullock named Smoker Broaddus and Melissa Kwasny co-poet laureates for the state of Montana. They served in that role until 2021.

Now living in Helena, Smoker Broaddus is managing consultant for Native and culturally responsive education for Education Northwest, which works to address pressing education and youth-services needs across the region and nation. She also serves as a member of the National Advisory Council on Indian Education for the Department of Education and the Department of the Interior.

UM alumna Denise Juneau, who was Montana Superintendent of Public Instruction from 2009 to 2017, wrote this of Smoker Broaddus: “She is a phenomenal role model who manages to be as comfortable as a data geek as she is a poet laureate. She is a teacher, mother, advocate and leader who has had significant influence in Montana and the nation. She ensures that tribal voices are included at every table she sits at and brings forward a view of building inclusive systems.”

John Shaffner

John Shaffner stands on the set of "Two and a Half Men."

Shaffner was born and raised in Missoula. He graduated from UM in 1974 with an undergraduate degree in drama, working with both the Missoula Children's Theatre and the Bigfork Summer Playhouse during his early career. He went on to earn a Master of Fine Arts from Carnegie Mellon University as he blazed a path that took him from Pittsburgh to New York City to star-studded Los Angeles.
Shaffner is one of the most celebrated and influential production designers in recent history. By one count, he has served as designer for 134 television pilots and 54 series, including hits such as “Friends,” “Two and a Half Men” and “The Big Bang Theory.”

Often sharing credit with his longtime partner and husband, Joe Stewart, Shaffner has won six Emmy awards: three for David Copperfield specials, two for “The Ellen Degeneres Show” and one for the “George Lopez” sitcom. He also won Art Directors Guild Awards for “The Big Bang Theory” and the “2006 Emmy Awards.” He has been nominated for major production design awards more than 70 times. John served as chairman and CEO of the Academy of Television Arts and Sciences and established the Television Academy Honors.

Shaffner has maintained strong ties with UM, mentoring students and designing scenery for the Montana Repertory Theatre. He has served on the College of the Arts and Media advisory board since its inception and is a recipient of UM’s “Odyssey of the Stars,” which raises scholarships and other funding for CAM. Now retired and living in Missoula, Shaffner will emcee and design the look of the 2023 “Odyssey” on Saturday, April 1.

His letters of recommendation for the honorary doctorate were glowing:

“Hollywood lost a legend in production design when John decided to retire,” wrote Barbara Bruce, a producer for “The Conners.” “I don’t think there is another production designer who has designed sets for as many episodes of television as John.”

J.K. Simmons, the UM alumnus who won an Academy Award for his role in “Whiplash,” wrote: “John Shaffner was a legend by the time I started my education at UM. His work raised the bar for aspiring designers and is still spoken of with reverence in Montana theatre circles.”

Francoise Cherry-Cohen, a production designer for “Bob Hearts Abishola,” wrote: “Not to mention he coined the fabulous name of the ’80s hit show ‘Star Search,’ chose the iconic, floral, tropical couch from ‘The Golden Girls’ and placed the golden picture frame around the apartment door’s peephole on ‘Friends.’”

Contact: Dave Kuntz, UM director of strategic communications, 406-354-5659, dave.kuntz@umontana.edu.
Elaine Gagliardi was hired to lead UM's Alexander Blewett III School of Law.

MISSOULA
– The University of Montana today announced
Elaine Gagliardi will serve as the dean of the Alexander Blewett III School of Law.

Gagliardi, an alumna of Montana’s only law school, has served as interim dean since June 2022 and has been a faculty member at the school since 1995.

“I am thrilled for the opportunity to continue leading the Alexander Blewett III School of Law, an institution that means so much to our state,” Professor Gagliardi said. “Our law school is the launchpad for legal minds in Montana, and I am eager to continue our positive momentum alongside the world-class faculty, top-tier staff and inspiring students that make this place so special.”

Gagliardi brings significant practical experience to the law school, having worked with firms in Missoula, Connecticut, and Washington. She has served as a chair of the State Bar of Montana’s Business, Estates, Trust, Tax and Real Estate Section.

She also is one of a few elected to both the American College of Trust and Estate Counsel and the American College of Tax Counsel, as well as co-authors two multivolume treatises published by Lexis Publishing, “Modern Estate Planning (Second Edition)” and “How to Save Time and Taxes Handling Estates.”
After graduating from the law school, Gagliardi served as a law clerk for two other Alexander Blewett III School of Law graduates: James R. Browning, chief judge of the 9th Circuit Court of Appeals, and William J. Jameson, senior judge of the U.S. District Court of Montana.

Suzanne Tilleman, dean of UM’s College of Business, led the search committee that recommended Gagliardi for the position.

“Elaine’s passion for the Alexander Blewett III School of Law is contagious,” Tilleman said. “She has the experience, the vision and the relationship with Montana’s legal community to lead the school as it continues to bring together top-notch legal and public policy programs to serve the state, region and nation.”

The law school rose in the national rankings in 2022, up 31 spots from the year before. Additionally, the law school welcomed its most diverse class in history to campus this fall.

As dean, Gagliardi also will oversee UM’s Department of Public Administration and Policy, the state’s top public affairs institution.

Contact: Dave Kuntz, UM director of strategic communications, 406-243-5659, dave.kuntz@umontana.edu.

Launch UM virtual tour.
UM's hurling club team is preparing for the national tournament March 25-26 in Louisville, Kentucky.

MISSOULA – Eilís O'Herlihy came to the University of Montana last year on a Fulbright scholarship to work as a teaching assistant for the Irish Studies program and promote her culture.
What she didn’t expect was to connect more deeply with her own Irish heritage while in Montana.

At Missoula’s St. Patrick’s Day parade last Saturday, O’Herlihy was reminded of similar parades in her hometown of Ballyvourney, a village in County Cork, Ireland. She walked in the parade with fellow members of UM’s hurling club team, who play the traditional Irish sport that has been around for more than 2,000 years. O’Herlihy joined the Montana hurling team having never before played her country’s sport.

“I hadn’t a clue. I’m Irish and didn’t know how to play,” O’Herlihy said. “I’ve learned everything since coming here. It’s adding to my own experience. It’s making me more Irish in a way.”

UM’s hurling team was founded in 2013 by another Irish Fulbright student, Naoise Waldron, with the help of an Irish exchange student, Brian Barry. The two saw Montana had strong Irish roots and a popular Irish Studies program at UM, yet nobody was hurling.

The first year they formed the team, the Griz club qualified for the national tournament and shocked the competition by winning the national title. Grizzly hurling went on to win three more national titles in 2015, 2017 and 2018, making it one of the most successful sports programs at the University.

The past few seasons were disrupted by COVID-19, but now the hurling team is back and will compete at the national tournament March 25-26 in Louisville, Kentucky. The competition is hosted by the National Collegiate Gaelic Athletic Association.

“The Griz team has won four of the national titles,” O’Herlihy said. “We are hoping to make it
Myles Maloney, who coaches and coordinates the Griz hurling team, said UM’s team has helped grow the sport in Montana and led to the creation of Missoula’s Thomas Meagher Hurling Club, which consists of several former UM players. Maloney, who grew up in Butte and graduated from UM in 2002, helped form the city club in 2015.

After the St. Patrick’s Day parade Saturday, Maloney played on the Thomas Meagher team in an exhibition match against UM. The match was in Washington-Grizzly Stadium, where mostly friends, family and curious spectators filled the westside of the stadium to watch the friendly game.

A football field is perfect for hurling since the sport requires a goal post at each end. The object of the game is to use wood sticks to shoot a small leather ball above the goal post for one point or in a net under the goal post for three points. The sport reminds people of a mix of soccer, lacrosse and ruby.

The exhibition game on Saturday prepared the Grizzly team for the national tournament later this month. But it also was a warm up for a St. Patrick’s Day match at 2 p.m. Friday in Butte against Montana’s third hurling team, the Butte Wolfe Tones. Before the match, UM’s team will be in Butte’s St. Patrick’s Day parade at noon.

In addition, UM’s team is preparing for a 10-year-anniversary tournament in Missoula April 8, with games starting at 10 a.m. in Washington-Grizzly Stadium.

Maloney expects former players from across the country and possibly Ireland to return for the 10th anniversary celebration.

“To make it 10 years is one thing but to have it as important and as big for people that they want to put this on and get back together, that’s huge,” Maloney said.

Colton Tinnin, president of UM’s hurling club and a senior studying elementary education, said a major part of the hurling team’s success is its welcoming attitude toward new players. Tinnin, who grew up in Kennewick, Washington and played football in high school, didn’t know what hurling was when he stopped by a practice his freshman year.
“There’s not much of a barrier for entry,” Tinnin said. “I went to a practice and everyone was really friendly and I had a really good time.”

Tinnin’s teammate, Caitlyn Sena agrees. Sena transferred from Grand Canyon University last year to study environmental science at UM. She met a member of the hurling team in a calculus class last fall and decided to try it out.

“I went to my first practice and they showed me what the sport was and a week later I was flying with them to Denver to go to our regional tournament,” Sena said. “I got thrown in the deep end, but it was great. I never had so much fun.”

Sena also felt welcomed since UM’s hurling team is co-ed and six of the 14 players are women. Most of the teams UM will play at nationals are co-ed, but few have as many women on their teams. Hurling is traditionally a male sport and women play a similar sport call Camogie. But having a co-ed hurling team is common.

“The team as a whole is so welcoming of every person,” Sena said “There has not been a moment after stepping foot on the field for the first time that I felt like there wasn’t a place for me there.”

Sena’s time on the hurling team has made her more interested in Irish language and culture. She recently discovered her great-grandmother immigrated from Ireland, and this summer she will study abroad for 12 days, visiting Dublin, Cork and Galway.

“Being on the team was definitely the catalyst,” Sena said.

This year, UM’s hurling team has four players from Ireland. There are two traditional exchange students and two Fulbright students, including O’Herlihy, who study abroad for one year to
teach, conduct research and promote their cultures.

John Dineen, an Irish exchange student from the village of Glanworth in County Cork, came to the United States for the first time this year to study within the judicial clinic at UM’s Alexander Blewett III School of Law. He was familiar with the Irish exchange program with UM and thought it would be a once-in-a-lifetime opportunity to see this part of the world.

While growing up, Dineen played hurling with other children in his village until about 12. The sport becomes incredibly competitive as you get older, he said.

Dineen was surprised to see his home’s sport being played in Montana, and even more shocked to see so much talent on the field.

“I couldn’t believe it to be honest when I came over,” Dineen said. “I thought that’s so odd they are playing hurling.”

Since joining the team this year, Dineen has enjoyed playing his childhood sport on another continent.

“It’s great to be able to play it for fun,” Dineen said. “The skills are coming back to me.”

Contact: Dave Kuntz, UM director of strategic communications, 406-243-5659, dave.kuntz@umontana.edu
A major part of the UM hurling team’s success is its welcoming attitude toward new players.
UM Hurling Club Connects Students to Irish Culture

UM students visit the University Center during The Big Give to vote for one of five student support areas to receive the UM Students' Choice Award. The UM Food Pantry received the most votes, earning $2,000 gifted by UM Foundation Trustees and staff.
MISSOULA – The University of Montana’s fourth annual day of giving was the most successful fundraising event of its kind in campus history. Inspiring nearly 900 gifts totaling more than $510,000, it easily surpassed all previous UM giving days, including last year’s record-breaking Big Give total of more than $380,000.

Alumni, donors, parents and friends from 43 states and six countries participated in the 24-hour online giving event, held March 8-9 to support UM students and initiatives.

Top areas of support included the College of Humanities and Sciences, with over 100 gifts totaling more than $100,000, and Grizzly Athletics, with over 200 gifts totaling more than $90,000. The President’s Excellence Fund – which provides UM leadership with unrestricted resources to address emerging opportunities and needs across campus – received 66 gifts totaling nearly $15,000.

Donors designated their gifts to support nearly 50 programs and initiatives, including the Excellence in Native American Education Fund, Student Success Scholarships, intercollegiate athletic programs like Lady Griz Basketball, community resources like spectrUM Discovery Area and many more. Donors also gave to support every UM school and college.

Also new this year, UM students visiting the University Center during The Big Give experienced the power of philanthropy in action. Over 200 students voted and selected the UM Food Pantry to win the UM Students’ Choice Award. The Food Pantry received the more than $2,000 gifted for the Students’ Choice Award by UM Foundation Trustees and employees, who united to jumpstart The Big Give and celebrate the mission of the UM Foundation.

This year’s theme – “One Day. One UM.” – encouraged University supporters to join together and make a life-changing impact for UM students. Members of the UM giving community rallied to celebrate and spread the word about The Big Give. Their collective effort encouraged gifts of every size from alumni and friends around the world.

"Spirited participation throughout our community inspired gifts to impact students and programs across every corner of campus," said Cindy Williams, president and CEO of the UM Foundation. “Our donors’ passion helped exceed the record-breaking success of previous giving days and engaged students like never before."

Big Give donors participated in a record number of 25 matching and challenge gift
opportunities during the event. Matching gift opportunities were created by donors who committed to match gifts to a specific area of the University up to a specified amount.

Challenge gift opportunities were “unlocked” for the Davidson Honors College, Department of History, College of Health, Skaggs School of Pharmacy and Flathead Lake Biological Station after a specified number of donations were received.

Supporters from all over the country and UM campus signed up to be Big Give Ambassadors and help spread awareness for specific giving areas, challenges and matching gift opportunities on their social media channels with the hashtag #UMBigGive. Participants watched the day of giving unfold on the Big Give event website, www.SupportUM.org/BigGive, where giving totals and social media feeds highlighted progress throughout the day.

“To UM supporters, thank you so much for your generosity,” Williams said. “You certainly united for One Day. One UM. Your contributions during The Big Give make a profound impact for students.”

To view the overall or individual priority results and watch a Big Give thank you video, visit www.SupportUM.org/BigGive. Donors who missed giving during the event but would still like to make a difference for students can do so by giving at www.SupportUM.org/Give.

The Big Give is managed by the UM Foundation, an independent nonprofit organization that has inspired philanthropic support to enhance excellence and opportunity at UM since 1950.

Contact: Elizabeth Willy, director of communications, UM Foundation, 970-222-1787, elizabeth.willy@supportum.org.

Launch UM virtual tour.
The Big Give Breaks Previous Giving Day Record for Funds to Support UM Students
MISSOULA COLLEGE SELECTED TO CO-LEAD NATIONAL EFFORT TO BETTER SERVE STUDENTS

MISSOULA – Missoula College has been named to an elite cohort of two-year colleges that are implementing reforms to streamline the student education experience.
Of the approximately 1,500 two-year colleges in the U.S., the National Center for Inquiry & Improvement chose the University of Montana’s Missoula College as one of only 16 two-year institutions to implement evidence-based reforms grounded in what is known as the “Guided Pathways” framework.

“Guided Pathways provides a game plan to redesign institutional processes with the clear goal of preparing colleges to serve students,” said Dr. Tom Gallagher, dean of Missoula College. “It is very different from the traditional philosophy of preparing students for college. It is a tremendous opportunity to improve the social mobility of underserved populations at two-year colleges.”

**Guided Pathways**, a gold standard for community college reform, streamlines students’ journeys through college by providing structured choice, revamped support and clear learning outcomes. This education reform recognizes that current modes of education often lead many students to unintended dead ends in the form of excess or out-of-sequence course completion.

While focusing on the student experience, Guided Pathways seeks to address longstanding educational inequities and ensure that each student has a clear path to livable wage employment or a transfer pathway upon graduation and leaves fully prepared for post-college success.

Missoula College leaders recently joined representatives from 15 other colleges in Birmingham, Alabama, to connect on advancing programming and building more community stakeholders. During the meeting, the leaders from across the country examined how to:

- build better K-12 pathways to two-year institutions.
- enhance cross-sector partnerships to better develop equitable access to education programs that advance economic mobility.
- shrink the skills gap facing employers.

“Missoula College and other two-year institutions across the country are uniquely positioned to solve some of the most pressing issues facing our economy, including addressing the workforce shortage,” Gallagher added. “This is an important step in a process to better serve our students and position Missoula College for further growth in the years ahead.”
Missoula College Selected to Co-Lead National Effort to Better Serve Students

The National Center for Inquiry & Improvement Rural Guided Pathways project is a three-year project that provides participating colleges access to the latest research and a team of leading community college researchers and economic development professionals delivered through a series of institutes. Project partners include the Ascendium Education Group, Community College Research Center, CivicLab, the Aspen Institute and the Ford Foundation.

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**Contact:** Dr. Grace Gardner, Missoula College director of academic affairs, 406-243-7921, grace.gardner@mso.umt.edu.

Launch UM virtual tour.
Missoula College Selected to Co-Lead National Effort to Better Serve Students
Bob Hall, a Flathead Biological Station stream ecology professor, leads students down the Middle Fork of the Flathead River during a summer stream ecology course.
FLATHEAD LAKE – Rivers are critical for Earth’s ability to sustain life. They serve as the connective transport system, much like the circulatory system in the human body, delivering water, energy and matter from the mountains to the oceans.

But our understanding of the role of rivers in the global carbon cycle remains limited, making it difficult for scientists to predict how global change may alter the future health of not only our rivers but the planet itself.

Robert Hall, a stream ecologist with the University of Montana’s Flathead Lake Biological Station, recently joined an international team of scientists to review the state of river ecosystem metabolism research and synthesize the best available estimates of river ecosystem metabolism. Their work was published in a new paper in the prestigious scientific journal Nature.

River ecosystem metabolism refers to the sum of carbon produced by photosynthetic organisms and carbon breathed by all organisms in a given river ecosystem. Scientists often calculate these fluxes by measuring the uptake and release of oxygen, which is produced by photosynthesis and consumed by respiration and is more easily measured than carbon.

Then scientists convert these rates from oxygen into carbon. Rivers tend to have much higher respiration of carbon than production because they receive subsidies of carbon from the terrestrial landscape.

Once considered to be the equivalent of pipes simply transporting organic carbon (carbon derived from living things) from land to the ocean, rivers now are recognized by scientists as biogeochemical reactors that interact with organic carbon in two significant ways.

First, rivers can transform organic carbon in transport, emitting the greenhouse gases carbon dioxide and methane along the way. They also can store organic carbon in the biological community or in the sediments of floodplains and river deltas.

For this study, researchers quantified the organic and inorganic carbon fluxes from land to rivers across the globe, revealing that carbon dioxide emissions shift the balance of carbon from organic to inorganic while traveling through river networks.
“Generally, the Earth’s land mass and terrestrial plants absorb more atmospheric carbon dioxide than it emits,” Hall said. “But a fraction of that carbon does leak into streams and rivers where it is either emitted as carbon dioxide, stored or exported to the ocean.”

Hall said this particular study detailed how much of that carbon dioxide came from the metabolism of organic carbon in the river itself versus the river acting as a simple chimney for carbon dioxide that travels to rivers via groundwater.

Additionally, the study explored how global change may affect river ecosystem metabolism and related carbon fluxes. It also identified research directions that can help better predict the effects of global change, such as changing land use or climate, on river ecosystem processes.

Over the past few decades, global change – a term that encapsulates changes in the global environment that have the potential to impact the Earth’s capacity to sustain life – has altered the planet’s carbon cycle, a natural process that controls the amount of carbon dioxide in the atmosphere. As the largest biogeochemical bridge between the planet’s continents, oceans and atmosphere, river networks play a prominent part in the global carbon cycle.

In the study, scientists address how global change affects river ecosystem metabolism and greenhouse gas emissions. In one example, the study shows how increased amounts of atmospheric carbon dioxide and nitrogen deposition are factors that – combined with increased growing seasons resulting from a warming climate – are increasing terrestrial plant growth, which results in more carbon inputs and recycling in rivers.

In another example, lower snowpack and earlier snowmelt during milder winters have shifted the metabolism of alpine river networks. As winters become milder and precipitation increasingly comes as rain instead of snow, there may be increases in carbon dioxide emissions from alpine rivers.

Additionally, the study highlights the impacts of changing river flow regimes, which are the typical fluctuations of river flows over time. Because the atmosphere’s ability to hold water is highly sensitive to temperature, precipitation extremes will become more frequent and intense as the climate warms. In some regions, river flows will be shaped by drought. In others, flows will be impacted by flash floods attributed to intense storm runoff. Such changes to flow will alter how rivers cycle carbon from increased photosynthesis during drought to higher scour and transport of carbon during floods.
These aren't the only factors impacting our rivers. Researchers raise additional concerning trends, including effects of shrinking ice cover on river flow regimes, higher flow variability in seasonal rivers and large-scale deoxygenation in rivers that could imperil biodiversity.

“Here in the Flathead,” Hall noted, “we might expect earlier snowmelt peak flows leading to longer, low-flow summers that increase both photosynthesis and respiration of stored carbon.”

But focusing research on the scale of individual rivers does not show the patterns that develop over space and time in large-scale river networks. To best understand and predict the future of our planet’s river systems, researchers contend, there is an essential need to expand river carbon research from individual rivers to a global scale.

To address this need, the study’s authors call for developing a global River Observation System (RIOS), similar to those established for other ecosystem types like oceans. Such a monitoring system would help promote important and ambitious research and allow the proper accounting of regional and global carbon fluxes at the interface between land, river, atmosphere and the coastal ocean.

“We need an accurate accounting of how the globe cycles carbon to predict future carbon dioxide emissions and therefore climate,” Hall said. “We cannot ignore rivers, because they emit a large fraction of the terrestrial carbon dioxide sink, and riverine emissions will change, perhaps in unexpected ways.”

This study was led by Tom J. Battin of the École polytechnique fédérale de Lausanne, Switzerland. Additional contributors include Ronny Lauerwald (Université Paris-Saclay), Emily S. Bernhardt (Duke University), Enrico Bertuzzo (Università Ca’ Foscari Venezia), Lluís Gómez Gener (Universitat Autònoma de Barcelona), Erin R. Hotchkiss (Virginia Polytechnic Institute and State University), Taylor Maavara (University of Leeds), Tamlin M. Pavelsky (University of North Carolina), Lishan Ran (The University of Hong Kong), Peter Raymond & Judith A. Rosentreter (Yale University), and Pierre Regnier (Université Libre de Bruxelles).

For the complete study, visit the Nature website at https://www.nature.com/articles/s41586-022-05500-8.

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**Contact:** Robert Hall, UM Flathead Lake Biological Station stream ecology professor, 406-872-4512, bob.hall@umontana.edu; Tom Bansak, UM FLBS associate director, 406-872-4503, tom.bansak@umontana.edu.

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MISSOULA – Warmer and drier climate conditions in western U.S. forests make it less likely trees can regenerate after wildfires, according to new research from the University of Montana published in the Proceedings of the National Academy of Sciences.
Importantly, the research also finds that ecologically based forest management can partially offset climate-driven declines in tree regeneration by limiting fire-caused tree death, but only if action is taken quickly.

According to the authors, the study provides timely information to optimize new state and federal initiatives to increase the pace of ecologically based forest management across millions of acres of Western forests.

Forests are adapted to different types of fire across the West, but hotter and drier conditions in recent decades have intensified the way fires burn, resulting in more trees being killed. All of this can result in fewer seeds available for forests to regenerate after wildfires. Even when seeds are available, a warming climate increasingly limits the chances that seedlings can establish and grow.

“Climate change increasingly limits tree establishment after wildfires because seedlings can be killed by hot temperatures and dry conditions,” said lead author Kim Davis, who completed the study at UM and now works as a research ecologist with the U.S. Forest Service Rocky Mountain Research Station at the Missoula Fire Sciences Laboratory.

The research examined how the severity of a fire – the number of trees it kills – in combination with the climate conditions after the fire affected the chances of tree seedlings regenerating to establish a new forest. It is the most extensive such study to date, assessing regeneration of eight major tree species after 334 wildfires across the West. Information was gathered from over 10,000 field plots and collected by more than 50 research teams.

Researchers found that warmer, drier conditions over the past four decades led to a decline in tree regeneration after wildfires, and this trend is expected to continue in the future. For example, from 1981 to 2000, 95% of the areas studied had climate conditions suitable for tree regeneration after wildfires, but this is projected to decrease to only three-quarters of the West by 2050 under future climate scenarios.

The most vulnerable forests were in drier regions in the Southwest and California, while forests in the wetter and cooler regions of the northern Rocky Mountains and Pacific Northwest are still expected to support conifer regeneration in the near future.

“The impacts of climate change and wildfires vary across the West,” said Philip Higuera, a
study co-author and UM professor of fire ecology in the W.A. Franke College of Forestry. “And the large scope of this study allowed us to highlight where these changes are most concentrated and happening first.”

The study also found ecological forest management in vulnerable dry forests could offset climate-driven changes by reducing the number of trees killed in wildfires. Specifically, in almost half of the study region, regeneration after wildfires is projected to be likely only if future fires burn at lower severities because fewer trees that produce seeds needed for forest recovery are killed in these fires.

“We know from prior research that forest thinning and controlled burns in overgrown dry forests effectively reduces fire severity and subsequent tree death,” said study co-author Marcos Robles, lead scientist for The Nature Conservancy in Arizona. “Land managers can’t do much about drought and climate change in the short term, but they can reduce the area in which forests are vulnerable to severe wildfires by accelerating ecological based forest management.”

Prior research published by The Nature Conservancy demonstrates that ecological forest management in a large restoration initiative in Arizona would not only reduce wildfire-caused tree death, but also provide additional co-benefits. Those include significant reductions in drought-related tree death, while increasing carbon storage, stream flow and tree growth.

“But the clock is ticking,” Robles said. “It’s urgent that we implement these treatments in our forests now, lest we lose them altogether.”

Even in cooler high-elevation forests in the Rocky Mountains and Pacific Northwest that experienced large tree-killing wildfires in the past, the researchers also found that climate change makes it less likely for trees to regenerate after wildfire. In these forests, planting trees after wildfire may take on increased urgency, given a shortening window of opportunity for trees to establish in climate conditions that are warmer and drier than in the past.

The federal government allocated around $3 billion to fund ecological forest management and reforestation efforts across 50 million acres in the next 10 years throughout the West.

“Our paper provides much-needed information that can inform these efforts, particularly given the rapid pace of change our Western forests are experiencing,” Higuera said.

The study was published with 63 co-authors, including 12 current or former UM researchers:
Higuera, Davis, Alina Cansler, Solomon Dobrowski, Andrew Larson, Jamie Peeler, Mark Kreider, Kyra Clark-Wolf, Caitlin Littlefield, Alan Tepley, Julia Berkey and Michael Schaedel.

The new study is online at: https://www.pnas.org/doi/full/10.1073/pnas.2208120120.

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**Note:** Davis and co-authors published a companion article in the Conversation titled “The West’s iconic forests are increasingly struggling to recover from wildfires – altering how fires burn could turn that around.”

**Contacts:** Kim Davis, USDA Forest Service research ecologist, Rocky Mountain Research Station, kimberley.davis@usda.gov; Philip Higuera, UM professor of fire ecology, philip.higuera@umontana.edu.

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MISSOULA – The University of Montana will hold its fourth annual day of giving from noon Wednesday, March 8, to noon Thursday, March 9. The Big Give is an online giving event that aims to inspire UM alumni, donors, parents and friends to support UM students through charitable giving in just 24 hours.

This year’s theme – “One Day. One UM.” – emphasizes how members of the UM giving community can unite to make a collective impact that changes lives. Big Give donors may explore and choose to support the UM area that matters most to them with a gift of any size at
The Big Give, UM’s Annual Giving Day, Returns March 8-9

www.SupportUM.org/BigGive.

Donors can select from nearly 50 Participating Groups, including campus-wide priorities like the Excellence in Native American Education Fund, Grizzly Athletics, the Maureen and Mike Mansfield Library, community resources like spectrUM Discovery Area and more. Donors also can support individual UM schools, colleges and programs, and, new this year, they can select specific programs and initiatives within their favorite college to support. Early gifts and gifts of any amount count toward The Big Give and make a difference for UM.

Also a first for this year, UM students visiting the University Center during The Big Give will be invited to experience the power of philanthropy in action by casting their vote for the UM Students’ Choice Award. Students will choose one of five student support areas that impact everyday student life, including ASUM Childcare, Preschool and Family Resources; Curry Health Center; the Emergency Student Support Fund; Student Success Scholarships; and the UM Food Pantry. The Participating Group with the most student votes will receive donations from UM Foundation Trustees and employees, who united to jumpstart The Big Give and celebrate the mission of the UM Foundation.

Supporters are invited to encourage others to participate by signing up to be a Big Give Ambassador at www.SupportUM.org/BigGive and spreading awareness for specific Participating Groups, challenges and matching gift opportunities on their social media channels with the hashtag #UMBigGive.

Participants also may watch the day of giving unfold on The Big Give event website, where giving totals and social media feeds will highlight progress throughout the day.

“The Big Give exemplifies our giving community’s passion and dedication to supporting students,” said Cindy Williams, president and CEO of the UM Foundation. “To that devoted giving community: Thank you for uniting for One Day. One UM. Your generosity makes a profound impact.”

The 2022 Big Give inspired record-breaking totals and surpassed past UM giving days, including the global Giving Tuesday giving campaigns held annually since 2016. Last year’s event achieved more than $380,000 in donations.

For donors who prefer to give offline, gifts may be mailed to the University of Montana Foundation, P.O. Box 7159, Missoula, MT 59807-7159 or made via credit card by calling 800-
The Big Give, UM’s Annual Giving Day, Returns March 8-9

443-2593. Checks should be made to the UM Foundation, noting the designated Big Give area the donation will support.

The Big Give is managed by the UM Foundation, an independent nonprofit organization that has inspired philanthropic support to enhance excellence and opportunity at UM since 1950.

Contact: Elizabeth Willy, director of communications, UM Foundation, 970-222-1787, elizabeth.willy@supportum.org.
For first-year law school student and former Navy veteran Kimberly Torheim helping fellow vet students settle into life at the UM is not only her job, it’s a passion.

MISSOULA – For veterans pursuing higher education directly after active duty, navigating a university setting can be a challenge. Going from the structure and regimen of military service
to a free-form campus lifestyle can sometimes require guidance and advice from others with shared experiences.

For first-year law school student and former Navy Nuclear Engineering Technician Kimberly Torheim helping fellow vet students settle into life at the University of Montana is not only her job, it’s a passion.

Torheim has a work-study internship through the Department of Veteran’s Affairs and spends 15 hours a week at UM’s Military and Veteran Services Office.

“Each university is different in how they interface with military benefits,” Torheim said. “We help veterans navigate through UM’s processes.”

The Military and Veteran Services Office provides a supportive experience for military-affiliated students as they seek associate’s, bachelor’s and master’s degrees, as well as technical certificates. The office helps active duty members, veterans, military spouses and dependents maximize their educational benefits, including the GI Bill, Yellow Ribbon Program, military tuition assistance, financial aid and more.

Patrick Beckwith, director of UM Military and Veteran Services, said the department can be the first point of contact for students using their military benefits.

“We act as a liaison between the military and university,” he said.

There are currently over 280 student veterans going to school at UM. There also are over 1,000 military-affiliated students, all being helped by the UM Military and Veteran Services Office.

“People come in and ask ‘What do I do?’ and ‘How do I do that?’” Torheim said. “We help point people in the right direction.”

Torheim grew up in the small farming community of Marblemount, Washington. As a teenager, she knew that she wanted to see the world. The Navy became that outlet. After signing up at 17, she tested into the nuclear program and did two years of focused training.

“I come from a middle-class family, and my parents didn’t have the money to send me to
UM Law Student Helps Fellow Military Vets Navigate Campus Life

“After graduating as a Navy Machinist’s Mate Nuclear Technician, Torheim was deployed to the USS Dwight D. Eisenhower, a nuclear-powered aircraft carrier in service since the 1970s. Her job included chemistry and radiation control. It was like working at a nuclear power facility, just on the water, she said.

Torheim was part of Operation Inherent Resolve in 2016. She was stationed in Bahrain, Dubai and Marcelle, France.

“Getting to see other cultures gave me a larger world view,” Torheim said. “This experience helps me relate to others and gives me an understanding of how many places and situations people come from.”

After finishing her service to the country, Torheim used her military benefits to enroll in UM’s Alexander Blewett III School of Law.

“The Navy taught me how to learn and study,” she added. “Now I know how to apply myself and memorize things quickly.”

Initially, Torheim thought she would pursue criminal law, mirroring her major as an undergrad.

“This last semester sparked my interest in environmental law, which was surprising to me,” said...
Torheim. “I am excited to learn more and get into the community practicing law.”

Torheim said she appreciates the flexible schedule offered by the Veteran Services Office, which allows her to focus on her studies while still being able to advocate for others who share similar experiences.

“Student workers are the best conduit between veterans and the campus,” Beckwith said. “Kimberly is able to relate to the wants and needs of students coming from similar situations as herself and has a great ability to help veterans navigate the university system.”

“It feels really good to help out other vets,” Torheim said. “No matter the branch of service, there is a commonality, we get each other.”

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**Contact:** Phil Stempin, director of events, marketing and communications, Alexander Blewett III School of Law, 406-243-6509, phil.stempin@umontana.edu.

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UM Law Student Helps Fellow Military Vets Navigate Campus Life
UM PUBLIC HEALTH STUDENTS EARN AWARD TO STUDY MAJOR ISSUES IN MONTANA

By Kyle Spurr, UM News Service

MISSOULA – Five public health master’s students at the University of Montana are working on projects that tackle some of the largest health issues facing the state and region.
UM Public Health Students Earn Award to Study Major Issues in Montana

The students in UM's Masters in Public Health with Community Health and Prevention Sciences Concentration recently earned the regional Student Leaders in Public Health Award from the Rocky Mountain Public Health Training Center in the Colorado School of Public Health. The award provides $3,500 to each project.

In past years, UM’s public health school saw one to two students receive the regional award. Having five earn the award this year is unprecedented and a testament to the caliber of the students, said Rachel Peterson, an assistant professor in UM's School of Public and Community Health Sciences.

The students have immersed themselves in projects that affect all corners of Montana. Their projects look at a connection between health and access to food in Indigenous communities, how to mitigate mosquitoes in Fort Benton, an analysis of public health worker salaries, the effect of wildfire smoke on residents in western Montana and a program to protect individuals during an opioid overdose.

The students’ projects also are a requirement for them to graduate and necessary to maintain the public health school’s accreditation. “We currently offer the only accredited public health degrees in Montana and provide one of the few accredited public health programs in the region,” Peterson said.

The UM students and their project topics follow:

Sarah Black (submitted photo)

Sarah Black, who graduated with her master’s degree in December and continues to work as a research assistant at UM with Dr. Blakely Brown, is examining the relationship between various health factors and access to food among Indigenous populations.

Black, who grew up in Helena and now works as a nurse at the Missoula City County Health Department, began her project in January 2022. Her research is part of a larger study focused on families and access to nutrition support programs. The larger study originates from a partnership between All Nations Health Center in Missoula and Urban Indian Health Centers in Great Falls and Billings.
“This is almost a silly question: Does food security affect your health status?” Black said. “Yes, it does. Let’s make sure everyone is fed and healthy. But part of the work is to answer those questions and dig more specifically.”

To dig deeper, Black analyzed responses from interviews and a 12-question survey about general health and food security. The survey was sent to people who were recruited by the three Urban Indian Health Centers.

Traditionally when Native communities are studied, the study focuses on reservations and not Native Americans living outside reservations, Black said, and she believes it’s a strength to include urban Native Americans.

Black is still working through the data, but plans to compare the results to other studies and send the findings back to the Urban Indian Health Centers.

“We want it to be something that is useful and helpful for them,” Black said.

Ali Manuel (photo by Kelly Engen)

Ali Manuel, a second-year master’s student from Shingle Springs, California, is working with residents in Fort Benton to build habitats and community support to control the mosquito population, which is a major nuisance in central Montana.

The Fort Benton community currently uses insecticides to remove the mosquitoes. Insecticides are safe for humans but can have a negative impact on the ecosystem, Manuel said. To reduce the use of insecticides, she found another way to decrease the mosquito population: bats.

Manuel, who has a bachelor’s degree in biology with a concentration in zoology from San Francisco State University, plans to teach Fort Benton residents about bats and encourage them to increase bat habitat since the flying mammals are known to feast on mosquitoes. Manuel is familiar with bats from working as an animal research
technician at the University of California, Berkeley.

“I have some experience working with bats from my time at UC Berkeley,” she said. “They are an important part of getting rid of insects and an important part of the ecosystem.”

Later this year, Manuel will host an event to build bat boxes with local families and educate them about other ways to reduce mosquitoes such as removing standing water and cleaning out rain gutters.

Manuel partnered on the project with Kelly Engen, an education master’s student from Western Governors University in Utah, who grew up in Fort Benton and alerted Manuel to the mosquito problem.

Along with the bat boxes, Manuel and Engen have asked local business owners for permission to install “bat mansions,” which are larger versions of the bat boxes. They hope to install one near the water treatment plant.

“The town itself is so engaged in this problem and is interested in a solution,” Manuel said. “That is really helpful.”

Portia O’Connell (submitted photo)

**Portia O’Connell**, who will graduate this May with her master’s degree, is analyzing the salaries of public health workers in local and tribal health departments across Montana.

“The ultimate goal is to provide fresh data to assure public health is providing competitive salaries to recruit and maintain a well-qualified workforce,” she said.

O’Connell, who grew up in Gresham, Oregon, began her research last summer by reading other salary studies and diving into a 200-page document of Montana public health standard occupational classification codes. The document details job descriptions and pay for all public health positions such as epidemiologist, public health nurses and environmental specialists.
O’Connell also reached out to all 56 county health departments in Montana to see if their salaries matched what was listed in the 200-page state document. So far more than 30 counties have responded. From the initial data, O’Connell has seen larger health departments pay similar to the state recommendation, while smaller departments often pay less.

The study was motivated by a trend of public health graduates seeking work in the private and nonprofit sectors rather than public health fields, O’Connell said.

“One of the things we’ve noticed is there are a lot of vacancies in public health and there’s a lot of people who have graduated and they are not going into the local health department sector,” O’Connell said.

Once her project is finished, the findings will be shared across the state to help public health departments set competitive pay.

“The hope is that each of those counties will be able to take this study back with them and talk to their county commissioners and show them they are not up to par with what they should be paying their employees,” O’Connell said. “And hopefully it will lead to some policy change and salary increases.”

Taylor Stewart (submitted photo)

Taylor Stewart, a second-year master’s student from Gardner, Kansas, who will graduate this May, is evaluating the connection of wildfire smoke exposure and health in residents across western Montana.

Stewart’s project evolved from her role as a research assistant on a pilot study under Ethan Walker, an assistant professor in UM’s Center for Population Health Research. In the study, 20 participants across the region were given PurpleAir monitors, a low-cost air monitor about the size of a grapefruit, to record real-time data from June to October last year. The participants also were given weekly health questionnaires.

“This is a study that enabled us to see what air quality looks like at a hyperlocal and household
level,” Stewart said. “Montana is a really big state and we have a limited amount of air quality monitors.”

Since receiving the award, Stewart has completed end-of-study interviews to evaluate feasibility of remote and real-time air quality studies and better understand participant behaviors and beliefs about wildfire smoke exposure and health. As Stewart analyzes the results, she’s noticed changes in participants’ behaviors such as a person closing their windows when the air quality monitor showed unhealthy levels.

“I didn’t come about this project thinking much about citizen science, but after conducting these interviews I’m realizing in a lot of ways data access is power,” Stewart said. “People who have air quality data access to their own homes are making decisions based on that.”

Stewart’s goal is to take the findings and use it for future studies that specifically target cardiovascular patients and those in rural and more vulnerable environments. Her work has inspired her to keep studying air quality and its effects on people and the planet.

“It’s been an impactful experience,” Stewart said. “It’s allowed me to realize that is the field of work I’m interested in pursuing post-graduation.”

**Brandi Williams** is a second year Masters in Public Heath student graduating in May from Havre and she used her award to create a Narcan Distribution Program for the Hill County Health Department.

Williams created a presentation and conducted a training to ensure first responders, law enforcement and community members could protect individuals during an opioid overdose by safely dispensing Narcan – a medicine used during opioid overdose emergencies.

*Brandi Williams (submitted photo)*

“Being passionate about public health, I wanted to ease concerns about Narcan use,” Williams said.

Williams used her trainings to break misconceptions about using Narcan in a life-saving situations, as well as teach the public about opioid use and how Narcan works to prevent fatalities.
Throughout the course of her work, Williams trained 153 individuals and distributed 200 boxes of Narcan across northcentral Montana.

“I want the people I taught to go out and be advocates,” Williams added. “I want them to have an education they can use in the future.”

Since concluding her work for the Hill County Health Department, Williams now serves as an epidemiologist for the Benton Franklin Health District in Washington.

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Contact: Dave Kuntz, UM director of strategic communications, 406-243-5659, dave.kuntz@umontana.edu

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UM Public Health Students Earn Award to Study Major Issues in Montana