

Melding science with fun

EPSCoR programs are important to high school students and undergraduates in smaller, rural areas of ND as they provide access to research opportunities, to new ideas about science, and to equipment, processes, and minds that wouldn't otherwise be available. EPSCoR programs also help promote diversity in our STEM pathway, which benefits everyone.

The EPSCoR funds are well spent in spreading knowledge about science and the impact of research. Coming from a small community, the collaboration with EPSCoR on statewide projects says that although we may be small, we're still important to ND.

Shortly after I started (1991) at Nueta Hidatsa Sahnish College (NHSC) in New Town, I began working with EPSCoR's Nurturing American Tribal Undergraduate Research and Education (NATURE) programs. It brought undergraduate research opportunities to our campus. Both the NATURE Sunday Academy (SA) and Tribal College (TC) summer camps were, and are, successful and effective in introducing high school and college students to STEM disciplines.

Students repeatedly tell us how much they learn from the SA and TC Summer Camp sessions because they are fun and interesting. When I see this, it tells me the programs really work, because we're introducing 8-12th graders to the fun side of science. Over the years, we've built rockets, banded sparrows, learned rollercoaster physics, and constructed catapults using a trebuchet design. Students have learned about and become interested in robots, hydrogen cell cars, load-bearing bridges, bird genetics, and much more.

With our college undergraduates doing NATURE research, I don't pick the topic, I let them come up with something they find interesting. It helps build connection and interest to the scientific research. Beyond that, I like to see students having fun.

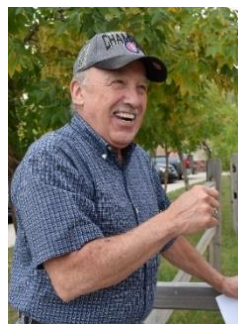
At summer camps middle- and high school students learn how to interact with one another to improve interpersonal skills, all while working on projects together. It gives them real world experience since their future careers may involve small group tasks. They need

the skills to find solutions as a group. I want to help them be successful.

Thanks to the NATURE summer camp programs, our students can take part in hands-on scientific research. When TC students go to University Summer Camp at NDSU and UND, it helps them see what a big research university experience is like. It's incredibly valuable when they decide to pursue more education because it's not so intimidating. It also builds prospects for collaboration, and several of our students have worked with faculty from NDSU and UND.

Probably one of the most important pieces of NATURE is how all the programs include a cultural connection, linking students to their Indigenous Cultures and its modern relevance in scientific applications. SA also contains cultural presentations, discussing the day's lesson in perspective or relevance to the tribal peoples. Our TC Summer Camp is based on the culture of the Three Affiliated Tribes with lessons about native plants, tools, gardening, archery, foods, cooking, or beading. Held at the Three Tribes' Earth Lodge Village, each night features sweats, local speakers, or activities. Often, our undergraduates choose a research topic that is relevant to them and this reservation, such as air quality, mercury in fish, flare gas contents or Juneberry nutritional value. The cultural connection is a unique aspect of these programs and is probably a large part of why they are so successful.

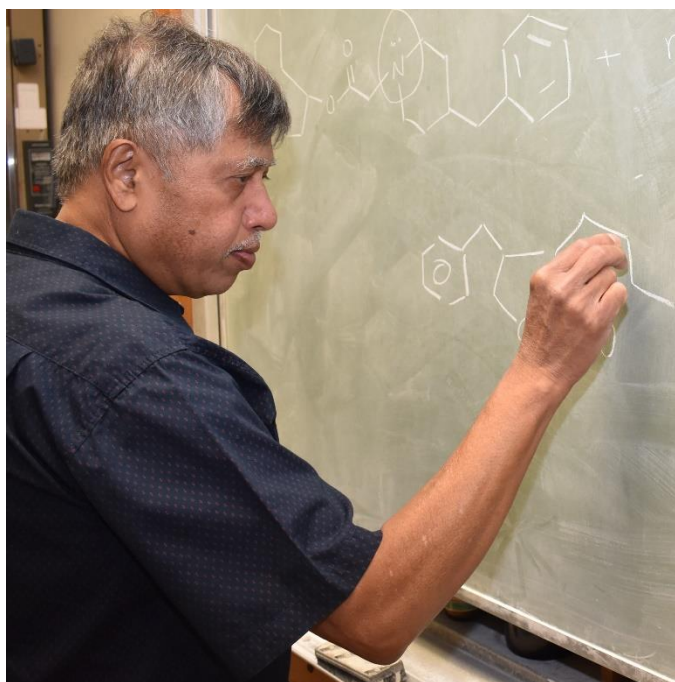
Too often in the past, tribal people have been excluded from opportunities like NATURE. With the NATURE programs, our students are included, encouraged, and trained. Most of all, it works. Many students have furthered their education because of SA or summer camps, and have been successful in their careers. That's valuable for everyone in our state.



Regards,
Kerry Hartman, Ph.D.
Academic Dean, Science
Instructor, NHSC
(Guest editor, CRCS Researcher,
NATURE Coordinator)

Changing his world through science

With decades of experience and research, **Mukund Sibi**, Center for Sustainable Materials Science (CSMS) co-lead and NDSU distinguished professor in Chemistry and Biochemistry, understands that science today requires “constant innovation.” In his role with CSMS, he and his team have often been the foundational source for developing sustainable materials. “It’s an iterative process,” he said. “We modify monomers to fit the need, and it’s a constant process to make the different characteristics that can meet the end goal.” (A monomer, according to the Biology Dictionary is a “small molecule that reacts with a similar molecule to form a larger molecule. It is the smallest unit in a polymer.”)



“We have a very collaborative team,” Sibi (above) said of the CSMS group. “Many of the team members have papers published with other team members, and it’s a good melding of talent.” Their combined efforts have resulted in hundreds of publications and presentations, additional funding from other sources, and dozens of skilled student graduates who have benefited from this research and training experience.

“I was more involved in biological research in my early days at NDSU,” Sibi recalled, “then the former dean of Agriculture Don Anderson, asked if we could work on finding uses for crambe, a new-to-North Dakota oilseed crop. We looked at how crambe could be used, and came up with a new method of breaking it down into a usable industrial material, a process that was patented.”

The emphasis on using ND agricultural products was to continue. Sibi and **Dean Webster**, CSMS lead and chair of NDSU’s Coatings and Polymeric Materials (CPM), guide the ND EPSCoR Track-1 awards that created the Center (CSMS). “Our research focuses on replacing petrochemicals in common materials and coatings with sustainable biomass sources using ND agricultural products,” Sibi explained. “We modified monomers from oil seeds, lignin, and cellulose to create these foundational elements that could be used in end products.”

In research, these few years means researchers can create a good starting point, and that’s where Sibi sees the current research. “We’ve just scratched the surface of what can be done with the new monomers and resulting polymers,” he said. “We’ve developed a safer biobased alternative to BPA (bisphenol A, an industrial chemical used to make certain plastics and resins) and found a biobased replacement for styrene (a toxic substance often used in polystyrene plastics, fiberglass, rubber, and latex).”

Sibi is quick to point out that the products developed have been a combined CSMS effort. Having generated over 200 new monomers during this award, Sibi and his research group have been a creative and innovative inspiration in the development process. Although used in multiple projects throughout CSMS, the monomers are also accessible to other researchers and other projects, expanding the knowledge base and research capabilities for others in North Dakota and around the country. “CSMS has tackled big problems,” Sibi said. “We have shown how a center can build future success for other scientists and that it can continue to help ND.”

Greatest achievement

Sibi counts the greatest achievement of his career as helping undergraduate and graduate students. “It’s been awesome,” he said of his decades-long teaching and mentoring.

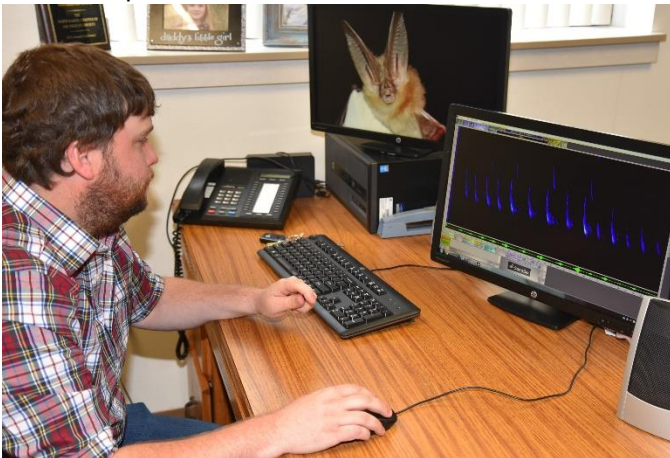
His first student to obtain an NSF doctoral fellowship was in 2002. The most recent NSF doctoral fellow, **Anna Renner** (a Fargo North graduate), was accepted to Harvard in 2018. Some of Sibi’s other students have earned Presidential Scholar designations, including **Dyuti Dawn** (a Fargo Davies graduate) on her way to Columbia University this fall. “I’ve been privileged to work with many excellent students,” Sibi noted. “They have found that science is important, and they will continue to tackle and solve problems throughout their careers.”

The impact of bats

Across North Dakota, a nocturnal predator feeds on agriculture pests and other insects. These mammals are often viewed as unwelcome or creatures to be feared; however, researchers across North Dakota are learning more about bats' useful role in the state's ecosystem and how they interact with their environment. Three research collaborations (stories below) at Dickinson State University (DSU), United Tribes Technical College (UTTC), and North Dakota State University (NDSU) are focused on learning more about the bat populations in North Dakota.

Bats home in on badlands

"The tall grass prairie landscape is historically a 'low bat' region since they often don't have good habitat," said **Paul Barnhart**, CRCS researcher and assistant professor of Biology in Natural Sciences at DSU. "The Yellowstone River corridor, however, is a pristine river system with natural habitat that is home to four different species."



Barnhart (above) became interested in bats while working on his undergraduate degree in wildlife management at NDSU. "I heard Erin (Gillam) talk about bats, and I was intrigued because they're not well researched for their impact on the ecology," he said. Today, he spends significant research time in the ND Badlands, because it creates a unique habitat for bats. "I've become the Northern Prairie expert," Barnhart jokes, "because I've spent so much time in a sleeping bag in the Badlands."

"There's little known information about bats and we don't have good historical data on their population, habitat, migration paths, or their impact from an agricultural environment perspective," he said. "We developed a baseline study in 2009, and we recorded five species in western North Dakota at that time. Now,

we have echo locators which can help track and identify bat species and locations in 60 locations."

The results of this research will hopefully help better identify ND bat species, and what habitats they prefer. The arrival in North America of an epizootic fungus commonly referred to as "White Nose Syndrome" has caused substantial declines in hibernating bats, Barnhart said, and there is great concern for bats in this region. "The infection bothers them during hibernation, so they wake up more often which uses energy," he said. "Because food isn't readily available at that time, they starve to death." One of the species, the Northern Long-eared Bat, is on the endangered species list, Barnhart said, and the Little Brown Bat may also be affected.

Barnhart and his colleagues across the state are hoping to continue studying these insect-loving mammals. "They eat almost their weight in insects each night," he said, "so they are important to our ecosystem. The EPSCoR funding has helped open a window to discovering more about the bat population in ND."

Guano, pollen, and land cover

Three UTTC students, under the mentorship of **Mandy Guinn**, CRCS researcher and chair/instructor in Environmental Science and Research, are studying different aspects about ND bats. "We're not even sure which species are migrating and which hibernate in the state," Guinn said. "We're adding to a baseline of information."



UTTC freshman **Berlin West** (above) is studying non-invasive methods for studying bats, comparing guano (bat feces) with data from tiny wing-punches to see which provides more accurate information. "Bat identification is usually an invasive process," said West. "In order to research the animals, it becomes necessary to take a tiny skin punch from their wings, or sometimes

to euthanize the bat. Any disturbance in bat habitat is stressful to the bats, so I'm trying to compare the DNA information we can get from guano and from the traditional tests. If we can get the same quality of information from collecting guano, researchers may be able to use less invasive methods for research."



Senior **Kimberlee Blevins** (left) is researching the pollen found in the guano to analyze which plants are pollinated by bats, an important factor in an agricultural state's ecosystem. "Different locations have

different species," said Blevins. "Different bats also eat different insects and have an impact on agricultural crops in their area because they are great pollinators." Her study adds to state and regional knowledge about the role of various bat species. From the guano she is able to find out which plants are preferred for pollination, an important element in growing crops and sustaining a healthy ecosystem.



Fourth year student **Amy Jackson** (left) is studying the locations of bat species in central North Dakota to compare with the available land cover, forage, and water resources. Bats are remarkably adept at night

flying and insect trapping, thanks to their highly developed echolocation (using sound to navigate)

capabilities. Jackson spent the summer placing and tracking acoustic devices, learning to identify bat species by their calls. "We're learning that there are critical areas where bats are not locating," she said. "At that point, we look at the land cover and habitat to see what is available for bats." This bat research is part of the North American Bat Monitoring Program, an international interagency program that monitors bat distributions and provides trend data at the state, provincial, tribal, and national levels.

Coming from different Native American tribes, the three students had also compared traditional Native information about bats. They noted that there are few words or stories about bats. "They are mysterious, humble creatures," West said, "that are super cute and help the ecosystem." Jackson added, "there's so much to learn about them—we've just started."



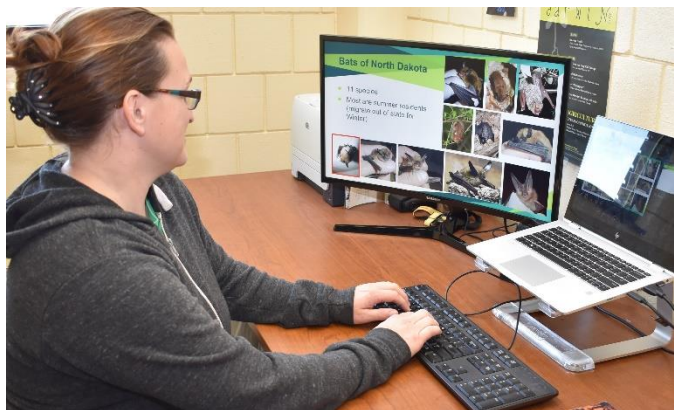
"The research is really about helping the students learn proper research methods, build connections to other researchers, and understand data analysis," said Guinn (above on the right with students West, Jackson, and Blevins). "In addition, we're also learning a great deal about bats, their habitat preferences, and migration patterns in North Dakota. Most importantly, the students know they are part of a larger endeavor that is important to the state's ecology."

Habitat, wind and disease

"Habitat loss, wind energy, and White Nose Syndrome are some of the challenges impacting the state's bat population," noted **Erin Gillam**, associate professor in Biological Sciences at NDSU. "By studying the 11 species in ND, we're getting a better understanding of how they may benefit the agricultural community. At this point we don't even know the size of the bat populations in the state."

As part of a healthy and balanced ecosystem, Gillam said that bats contribute by eating insects in large numbers that can cause crop damage. "Some of their

preferred insects are moths and beetles,” she noted, which helps control some common pests in agriculture. Because of the work being done across the state, researchers are learning more about bat-preferred habitat. “Because the eastern part of the state has limited natural habitat, we’ve only found five species here,” said Gillam. “In the western part of the state, there’s more natural high quality habitat in terms of roosts and caves, so not surprisingly, there are more (11) species there.”



Wind energy in the state has also taken a toll on bats, Gillam (above) said. “The large rotor blades create a pocket of low pressure at their tips and when the bats fly into that area, their lungs explode and they die,” she explained. One mitigation effort by wind tower managers has been a simple, but very effective solution. “During times of spring and fall migration when there is only a slight wind at night, the bats tend to be very active,” she said. “During that migration time, the starting wind speed threshold is slightly raised for the turbines that turn the blades. The result is a tiny loss in wind energy, but the bats can fly without disruption.”

One of the bigger threats to native bat species is the disease White Nose Syndrome, Gillam said. It is a cold-loving fungus that spreads from bat to bat, she explained. So far, there has only been one bat found at Knife River (ND) this year with the disease, Gillam said.

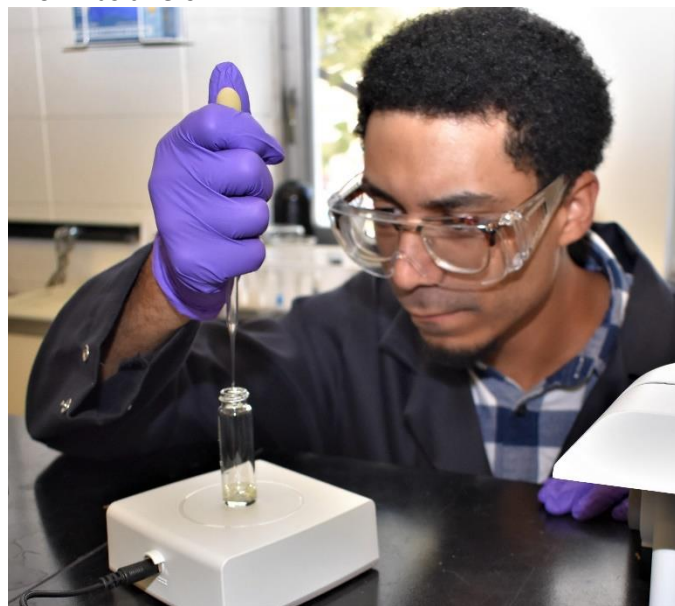
It’s not clear where the bat came from because it likely did not hibernate in that area, but its presence poses more questions for researchers: where did it originate, are there other bats who are carriers in ND, and will the fungus survive in ND under severe cold temperatures. “Bat populations appear to have dropped in the last two years across the region,” she said. At this time the assumption is the reduced numbers are because the bats have died after they migrated to their hibernation sites. But as Gillam noted, “there’s so much we need to know, to understand where and how they migrate. Then we can make more accurate predictions.”

Continuing to learn

Thanks to ND EPSCoR funding, there has been a significant increase in research and data compiled about these nocturnal creatures that quietly help ND and the agricultural community. “ND EPSCoR has helped researchers to learn more about bats,” Gillam said. “We’ve been able to collect data across the state, and we’re pursuing other funding sources to help us continue to monitor sites and collect data. There’s always more we can learn.”

Understanding the “why”

Drying oils are a class of materials used in paints, wood finishes, flooring, and many other applications. They help harden a coating material, changing it from a liquid to a solid coating when the material comes in contact with air. To help speed the drying process with the oils, chemists have added metal-based compounds, known as driers.



“An example of an efficient drier are lead-based paints,” noted CSMS researcher and NDSU graduate student **Andrew Kalbach** (above). “The problem is that these materials are also highly toxic.” In the past few decades, cobalt-based driers have been commonly used, he said, but they have recently been shown to be potentially carcinogenic. Many researchers, including Kalbach, are now searching for a replacement for the cobalt. “I’ve been studying the properties of cobalt driers to understand why they are so efficient compared to other metals,” he said. “So far, I have studied several cobalt-based driers and am correlating their molecular structure to drying performance using a technique called infrared spectroscopy (IR). The IR technique provides a wealth of information and could

be the key to unlocking the mystery of how to replace cobalt with more benign metals.”

“My next step is to use iron as a drier in the coating material,” Kalbach said. The challenge is that existing iron-based alternatives do not cause hardening as quickly or efficiently as their cobalt counterparts.

“The oil I am using in my drier research is linseed oil, which is derived from seeds of the flax plant, a major crop in the state of North Dakota,” he explained. “I hope to follow in the footsteps of Edwin F. Ladd, who developed legislation many years ago that required paint companies to disclose the materials used in paints in North Dakota. I hope that this research can help develop alternative drying oil materials that would be safer since the compounds in them will not be harmful for consumers or manufacturers.”

Distributed Research Experience for Undergraduates impact

Background: One of ND EPSCoR’s goals is to help build a well-trained and informed ND workforce. The Research Experience for Undergraduates (REU) program has been an integral part of EPSCoR efforts for several years. Designed to provide undergraduates with research experience at one of the two ND research universities, it became apparent that distance and life challenges prohibited many students from accessing the program. ND EPSCoR then created an adaptation of the program: a “distributed” REU. The “distributed” element allows students to stay in their home institution and be mentored by collaborating local and university faculty while involved in quality research.

““The distributed REU model is different from the traditional REU model where a cohort of students convenes at an institution such as NDSU and completes a summer-long research experience,” said **James Nyachwaya** (NDSU associate professor in both Education, and Chemistry and Biochemistry) who has been the Distributed REU coordinator over the past four years. Because of the flexibility in the distributed REU model, “these undergraduates are able to conduct research and gain experience they wouldn’t have otherwise. Several of our students were ‘placebound’ and would not have been able to come to UND or NDSU for 10 weeks in the summer. But the distributed REU gave them the opportunity to do research.”

Since the distributed REU was established, 16 students from across the state have been involved in the program (4-Dickinson; 1-NHSC; 2-Mayville; 2-Minot; 1-NDSU; 1-TMCC; 1-UTTC; 2-VCSU; 2-UND). “Each of the students had an opportunity to see what research

would feel like, what expectations might be for graduate school, and to gain knowledge, skills, and confidence in their field of interest,” he said. “The impact for these students has been impressive. Many have continued their research in graduate school in North Dakota or at nationally renowned institutions such as Texas Tech, Harvard, UN-Chapel Hill, and others. The REU played a part in their research experiences which we believe prepared them for graduate school.”



Beyond research experience, the REU experience involved valuable mentoring, said Nyachwaya (above). Each week, he and other research mentors met via IVN (video conferencing) to discuss key professional development topics: maintaining good lab records; conducting literature reviews; writing scientific arguments; collaborating in research; finding and applying to graduate school; and ethical conduct of research. “Research is more than working in a lab,” Nyachwaya said. “We wanted to help the students be successful wherever their careers took them. With the weekly meetings, the students learned about research across ND and built relationships with other researchers.”

For North Dakota, the distributed REU has been a valuable resource in a number of ways, Nyachwaya noted. The undergraduates benefit from a flexible program that meets their needs, their home institutions benefit by having student researchers generate important knowledge and information for the state, and ND is enriched with skilled graduates who are prepared for the next step in their careers.

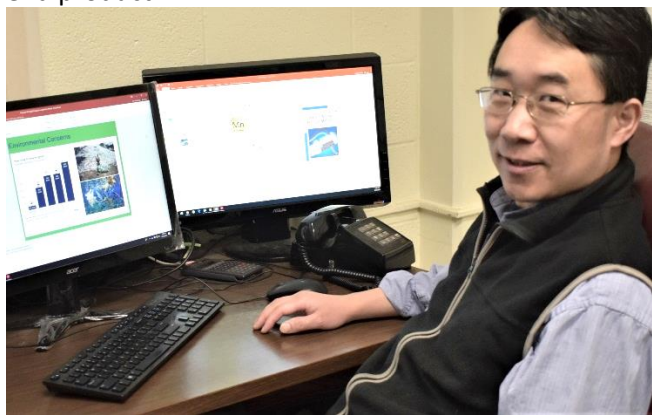
Replacing petrochemicals

Researchers at UND are exploring ways of creating new polymers from biobased sources that can be used as the building blocks. “We have an issue with plastics showing up everywhere,” said **Guodong Du**, CSMS researcher and associate professor in Chemistry. “We need to find a replacement for the petrochemical plastics and find a way to make the new polymers more

degradable. We're tackling the research from both perspectives."

In their current work with CSMS, Du and his students have been utilizing compounds derived from soybeans and corn: two major ND crops. The primary biomass source is cellulose, which is abundant and readily available. "We are not taking food sources," he stressed, "we are using parts of the plant that would otherwise be thrown away."

Du and his research team have used a catalytic approach, which incorporates green chemistry principles. "Previous catalysts used a precious metal, which proved to be toxic and expensive," he said. "Now we're using zinc and manganese which are more abundant and biocompatible. By creating different reactions, we've been able to find highly efficient reactions, where all or most of the atoms go into the end product."



Using the catalytic approach, Du (above) and his students have formed ring-shaped polymers, which are more stable than common linear polymers. In addition, his research has revealed a "self-healing" polymer. He explained that if the polymer is damaged (like a scratch), it can be heated, and the damage self-repairs. "So far, this research is demonstrating that the reaction is feasible—it can be done," Du said. "Now the challenge is to do it in a larger scale. Then it would potentially have an economic impact."

Small bio-based building blocks skillfully manipulated in the laboratory may become the foundation for a new group of polymers; and students are able to take theory from the classroom to the laboratory to help solve one of the challenges of molecular chemistry: important benefits for our state and the developing workforce.

CRCS Stakeholders research update

Students and faculty conducting CRCS research took the opportunity to present brief overviews of their efforts during a September 27 Stakeholder meeting at

UND. The overviews illustrate the scope of the past five years' research, detailing information about soil, water, and weather phenomena.

"It's been a great opportunity for both undergraduate and graduate students to work on a variety of projects," noted **Aaron Kennedy**, CRCS co-lead and researcher as well as assistant professor in UND's Atmospheric Sciences. "The funding from ND EPSCoR has helped many researchers better understand the impact of changing climate on our state, as well as other related issues."

Anne Denton, professor in Computer Science, presented her work with **Rahul Gomes** and **Nick Dusek**, doctoral students at NDSU. Gomes' work focused on creating a sophisticated technique to improve satellite images' topographic feature quality. Dusek has been developing window-based algorithms to extract fractal features from large images more efficiently.

Improved hydrologic models to identify the role of depressions in precipitation-runoff simulations, how sediments are transported, and more accurate flood predictions were the subjects of **Xuefeng (Michael) Chu's** (professor in Civil & Environmental Engineering) research group at NDSU. As Chu noted, the model shows the dynamic connectivity between precipitation, storage in depressions, runoff, and the impact of contributing areas to the probability of flooding occurrences. In addition, Chu's research group developed two new drought indices, calibrated for cold climate regions. For example, he noted that one of the impacts of climate change is a noticeable reduction in snowpack, which may result in a snow drought.

Jon Starr (graduate student in UND's Atmospheric Sciences) working with **Jianglong Zhang** (CRCS co-lead and Atmospheric Sciences professor) presented two studies: one on evaluating how market and policy changes impact individual landowner decisions about crop choices; the second focused on improving satellite images and weather models by considering the impact of surface reflection of sunlight (albedo). The albedo changes throughout the growing season, impacting the information derived from satellites or calculated in weather models.

Kennedy discussed his continuing collaboration with the National Weather Service in Grand Forks, with specific emphasis on blowing snow events. He also reported on his involvement with the NATURE Sunday Academy program, helping provide research experiences related to different types of snow for Native American high school students.

Eric Brevik, professor in Geology and Soils at Dickinson State University, provided a report on

tracking soil nutrient content and ecosystem health that compared three land uses: a Conservation Reserve Program (CRP) site, a no-till site that was harvested, and no-till site that was harvested and used as a winter feeding ground for cattle. Early results indicate the soil health and nutrient content is higher in no-till and no-till winter feeding conditions.

From soil to sky, CRCS research is finding important answers. The Stakeholder group encouraged the researchers to continue to develop means for providing more CRCS research information to the citizens of ND.

Activities of note

Frank Xiao, Emerging Areas Seed recipient and UND assistant professor of Civil Engineering, recently received an Early Career Award of \$500,000 (over three years) from the Environmental Protection Agency to study and treat pollutants called PFAS (per- and polyfluoroalkyl substances), organic compounds found in water, soil, and products. Xiao's proposal was one of 32 submitted to the EPA, and one of three awarded.

Nicolas Negrin Pereira, DDA awardee at NDSU, received a 2nd Place award in the Ph.D. poster competition for the American Society of Animal Sciences Annual Meeting, July 2019.

Mohiuddin Quadir, CSMS researcher and assistant professor in NDSU's CPM, presented *Soysome: A new class of self-assembled colloid from soybean oil fatty acids for nanoscale delivery applications of hydrophobic compounds* at the 256th American Chemical Society National Meeting, Boston, MA, along with co-authors **Ruvimbo Chitemere Wright**, CSMS researcher and graduate student in CPM, and **Dean Webster**, CSMS lead and chair of CPM at NDSU.

Aaron Bergstrom, **Susan Ellis-Felege**, and **Prakash Ranganathan** (all UND), along with Jeremiah Neubert, received an NSF WISE/LEAP award of \$229,390 for *MRI: Acquisition of FlashTAIL - An ALL-NWMe Flash Storage Instrument for the Talon Artificial Intelligence and Machine Learning Cloud*.

Doctoral Dissertation Assistantship (DDA) publications

Strain-Spintronics: Modulating Electronic and Magnetic Properties of Hf₂MnC₂O₂ MXene by Uniaxial Strain by **Edirisuriya Siriwardane**, Pragalv Karki, Yen Lee Loh, and **Deniz Cakir** (UND) in *Physical Chemistry*, 2019, 123, 12451. DOI: 10.1021/acs.jpcc.9b00594

Funding opportunities

NSF Track-2 funding deadlines:

EPSCoR Research Infrastructure Improvement Program: Track-2 Focused EPSCoR Collaborations (RII Track-2 FEC) **NSF 20-504**.

Letter of Intent Due Date (required): by 5 p.m. submitter's local time on **December 20, 2019**

Full Proposal Deadline: by 5 p.m. submitter's local time, **January 24, 2020**

- There is a limit of a single proposal from each submitting organization.
- Each proposal must have at least one collaborator from an academic institution or organization in a different RII-eligible EPSCoR jurisdiction as a co-Principal Investigator (co-PI).

For more information on this RFP, please see the ND EPSCoR website or:

<https://www.nsf.gov/pubs/2020/nsf20504/nsf20504.pdf>

DEPSCoR funding deadlines:

Added information is now available about DEPSCoR opportunities, posted at ndepscor@ndus.edu. Please see the FY19 DEPSCoR Funding Opportunity call at:

<https://www.grants.gov/web/grants/search-grants.html?keywords=FOA-AFRL-AFOSR-2019-0004> (FOA-AFRL-AFOSR-2019-0004) or the registration website: <https://acqupass.noblis.org/ApplyDEPSCoR>

Please note two important dates:

- AcquiTrak Registration (required by) **October 18, 2019**;
- White Paper and Supporting Documentation submission (required by) **October 25, 2019**.

EPSCoR Workshop Opportunities Program

EPSCoR is designed to fulfill the mandate of the National Science Foundation (NSF) to promote scientific progress nationwide. EPSCoR welcomes proposals for workshops from institutions within EPSCoR-eligible jurisdictions for **Program Solicitation NSF 19-588**. These workshops will focus on innovative ways to address multi-jurisdictional efforts on themes of regional to national importance with relevance to EPSCoR's goals and NSF's mission.

For more information, please see the RFP at:

<https://www.nsf.gov/pubs/2019/nsf19588/nsf19588.pdf>

Updates from ND EPSCoR State Office

Coming to your campus soon



(Article submitted by **Jean Ostrom-Blonigen**, ND EPSCoR Project Administrator.)

The ND EPSCoR State Office has begun our annual Fall visits. This year, we have extended our time at each campus to give us the opportunity to work directly with individual faculty who have

questions about competitive research opportunities. With two 2019 visits completed, we extend a warm thank you to Sitting Bull College (9/12) and Minot State University (9/13) for their hospitality.



(Above, Sitting Bull College conversations included [left to right] **Mafany Ndiva Mongoh** [Ag/Science instructor], **Gary Halvorson** [Agriculture instructor/director], **Jean Ostrom-Blonigen**, **Scott Hanson**, and **Shawn Holz** [Academic dean].)



(Above, Minot State University conversations included [left to right] **Jean Ostrom-Blonigen**, **Scott Hanson**, **Laurie Geller** [vice president for Academic Affairs], and **Amy Armstrong** [director of Office of Sponsored Programs].)

Research opportunities

EPSCoR research opportunities are always included in the ND EPSCoR newsletter and on the ND EPSCoR website (<https://www.ndepscor.ndus.edu>). An upcoming funding opportunity, the National Science Foundation (NSF) EPSCoR Research Infrastructure Improvement (RII) Track-2, requires a partnership with another EPSCoR state / jurisdiction.

The Track-2 is an institutional award, which means that each qualifying institution within an EPSCoR jurisdiction may submit one proposal. If you have any questions about this opportunity or need assistance in locating a potential partner in another jurisdiction, please contact our office (701-231-8400).

Opportunity for biology researchers

Another non-EPSCoR opportunity that might appeal to the state's data-rich biology researchers is the NSF iDigBio project (<https://www.idigbio.org>). Under this project, NSF is working to "make data and images of millions of biological specimens available on the web." There are currently over 1.21 million specimen records and 31.8 million media records accessible to scientists, working groups, and citizens.

High performance computing

During last year's campus visits, the ND EPSCoR State Office discussed the preservation of North Dakota's research data. Several campuses around the state took advantage of introductory training sessions related to big data and high performance computing (HPC). One HPC training session presented for EMPOWERED-ND was recorded and continues to be available here: <https://youtu.be/wr8FIH-y2TA>. It is also archived under the *For Researchers* or *For Students* tab on the ND EPSCoR website. Data digitization experts at the NDSU and UND HPC centers are available to assist researchers throughout the state. If you have any questions about working with these experts, please contact our office.

Scheduled upcoming campus visits include: Cankdeska Cikana Community College (10/21), Dickinson State University (10/22), Nueta Hidatsa Sahnish College (10/24), and United Tribes Technical College (11/15). To schedule a visit, please contact scott.martin.hanson@ndus.edu.

We look forward to meeting with each of you!

Center for Sustainable Materials Science (CSMS)-related publications

Emulsion Copolymerization of Vinyl Monomers from Soybean and Olive Oil: Effect of Counterpart Aqueous Solubility by **Andriy Voronov** and **Kyle Kingsley** (NDSU) along with Oleh Shevchuk, Vasylyna Kirianchuk, Ananiy Kohut, and Stanislav Voronov in *European Polymer Journal*, October 2019, Vol. 119, 239-246. DOI: [10.1016/j.eurpolymj.2019.07.008](https://doi.org/10.1016/j.eurpolymj.2019.07.008)

Influence of early stages of triglyceride pyrolysis on the formation of PAHs as coke precursors by **Alena Kubátová**, **Wayne Seames**, and **Anastasia Andrianova** (all UND) along with Evgenii Kozliak, Mark Sulkes, and Ibrahim Alhroub in *Physical Chemistry Chemical Physics*, 2019, 21, 20189-20203. DOI: 10.1039/c9cp02025j.

Protein PEGylation for cancer therapy: bench to bedside by **Mohiuddin Quadir** (NDSU) along with Vijayalaxmi Gupta, Sneha Bhavanasi, Kevin Singh, Gaurav Ghosh, Kritin Vasamreddy, Arnab Ghosh, Teruna J. Siahann, Snigdha Banerjee, and Sushanta K. Banerjee in *Journal of Cell Communication and Signalling*, 2019, 13(3), 319-330. DOI: 10.1007/s12079-018-0492-0

NATURE Sunday Academy sessions

Sunday Academy sessions have been well-attended this fall, with all topics rotating to various TC campuses.

For information about NATURE programs, please contact **Scott Hanson**, NATURE Coordinator at scott.martin.hanson@ndsu.edu. The remaining topics for the 2019-2020 year will be:

Water is Life led by **Ali Alshami** (UND-ND EPSCoR Emerging Areas and Translational Seed Awardee)
November 17, 2019 (UTTC)
December 8, 2019 Turtle Mountain Community College (TMCC)
March 1, 2020 (SBC)

What Lives in Wetlands? led by **Jon Sweetman** (NDSU)
November 17, 2019 (NHSC)
December 8, 2019 (UTTC)
March 1, 2020 (TMCC)

Winter Weather led by **Aaron Kennedy** (UND-CRCS co-lead/researcher)
November 17, 2019 (CCCC)
December 8, 2019 (NHSC)
March 1, 2020 (UTTC)

Oxygen Sensing in Water led by **Julia Zhao** and **Xu (Steve) Wu** (both UND)
November 17, 2019 (TMCC)
December 8, 2019 (SBC)
March 1, 2020 (CCCC)

Synthesis of Gold Nanoparticles led by **Alex Parent** (NDSU-CSMS researcher)
November 17, 2019 (SBC)
December 8, 2019 (CCCC)
March 1, 2020 (NHSC)

Senses and Perception in Nature developed by **Mafany Ndiva Mongoh** (SBC-CSMS researcher and NATURE coordinator)
January 12, 2020 Topic for all sites

Native Achievements in STEM developed and led by **Charles Okigbo** and team (NDSU)
February 9, 2020 Topic for all sites

Upcoming events

- **CRCS and CSMS monthly meetings:** Hosted via IVN to all campuses, with dates posted on the websites.
 - <https://csms-ndsu.org/>
 - <https://und-crcs.org/>
- **ND EPSCoR State Steering Committee:** October 16, 2019
- **ND EPSCoR Annual State Conference:** April 21, 2020 at Alerus Center, Grand Forks, ND

Stay in touch

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- For a link to ND EPSCoR's prior newsletters, http://bit.ly/EPSCoR_Newsletters
- To submit a story or idea by the end of the month to joyce.eisenbraun@ndus.edu, please complete: <http://bit.ly/2m43Eh7>
- To be added to the newsletter mailing list, please email ndepscor@ndus.edu, subject line: newsletter.

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