DISCOVERIES

Research at the
University of Northern Colorado

UNIVERSITY OF
NORTHERN COLORADO

DISCOVERIES

Research at the University of Northern Colorado

Letter 1
Research Notes 2
Skeleton Crews: Examining the Bones of Ancient Civilization 4
Lessons in Listening: Studying the Behavior of Canyon and Rock Wrens 5
Exercise and Cancer Rehabilitation: Groudbreaking Research Improving Quality of Life 6

FEATURES

Increasing Inclusivity in STEM 8
By exploring student experiences in STEM classes, researchers hope to engage students and help teachers support inclusivity and equity in the classroom

Into the Arctic 10
Professor Jimmy Dunn and a crew of five students head north for summer research and discovery

Analyzing Athletes 14
UNC professor offers his sports-science research to Major League Baseball to help project the next great player

Aging: A Global Perspective 16
A Place in Colorado History: Exploring African American Success 18
Building a Model for Healthier K-12 School Children 19
Centers and Institutes 20

FROM THE AVPR: WELCOME TO DISCOVERIES 2018

This edition of *Discoveries* magazine celebrates a sampling of the research, scholarship, and creative works (RSCW) at the University of Northern Colorado. RSCW at UNCO generates discoveries in the public interest, resulting in the creation of new knowledge and its application to our local, state, national and international communities.

As these accounts of RSCW successes in this issue of *Discoveries* attest, the trajectory of RSCW at UNCO continues on an upward slope. Indeed, in 2016 the Carnegie Foundation recognized the steady surge in RSCW productivity at UNCO by upgrading our status from "Doctoral Research University" (R3) to "Doctoral University: Higher Research Activity" (R2). Kudos to the UNCO faculty and students for all of their hard work that contributed to this remarkable achievement!

As you read about some of the research activities by our award-winning faculty and students, I invite you to look for the threads of common interests in projects at UNCO. UNCO's traditional emphasis on education research is manifest in the feature on Increasing Inclusivity in STEM. The use of exercise in cancer rehabilitation, and cannabinoids for cancer treatment address two unique approaches in the battle against cancer. Student research is highlighted in two stories, one related to archeological studies in Italy, and the second covering a research field trip to the Arctic. Finally, two stories look at different aspects of sport and exercise: one that aims to build programs that promote healthier K-12 school children, and the other that uses analytics to predict baseball's next great player.

The articles in *Discoveries* merely scratch the surface of what is happening in RSCW at UNCO! I invite you to learn more about research, scholarship and creative works at UNCO by visiting our website: **unco.edu/research**.

Robert (Bob) Houser, Ph.D.
Assistant Vice President for Research & Sponsored Programs

RESEARCH NOTES

Research briefs from UNC

Understanding Ancestral Homelands

Sally McBeth, Ph.D., (Anthropology) is writing an ethnographic overview of Florissant National (fossil bed) Monument. The three-year project began in July 2017 and is designed to bring Native consultants into Florissant (west of Colorado Springs) to help the National Park Service better understand Native American ancestral homelands. An Ethnographic Overview and Assessment (EOA) is a baseline cultural anthropological study which aims to document traditional associations between distinct cultural communities and landscapes, places or resources.

In partnering with traditionally associated tribes and distinct cultural communities, this project will identify and provide descriptions of resources and sites of cultural importance within Florissant Fossil Beds National Monument, from the perspective of the associated groups themselves. Funded by the National Park Service ($120,000), consultants from tribes are paid to share their expertise and knowledge with the NPS and public.

UNC Researchers Progress on Cannabis Studies for Cancer and Immune System Therapies

Research led by Richard Hyslop, Ph.D., (Chemistry and Biochemistry) is making significant progress in developing a targeted cancer treatment using cannabinoids as a chemotherapy agent. The research has concentrated on the feasibility of developing cells capable of producing an enzyme that can convert inactive cannabis compounds into an active anti-cancer drug. Hyslop is working on the project with PharmaCyte Biotech Inc. and has been involved in cancer research for four decades. UNC Chemistry and Biochemistry faculty Corina Brown, Ph.D., and Ann Hawkinson, Ph.D., along with several graduate and undergraduate students, are also part of the team working on the cannabis project with Hyslop.

In a new project collaboration with UNC Chemistry and Biochemistry faculty Nicholas Pullen, Ph.D., the team is testing the effects of cannabinoids on immune system cells, such as mast cells and T lymphocytes. Specifically, this research seeks to assess the potential anti-parasitic and anti-fungal immunity activated by cannabinoids. Additional work could assess the role of cannabinoids in mitigating problems of immune suppression.

Researching Marijuana Use

Kristina Phillips, Ph.D., (Psychological Sciences), Michael Phillips, Ph.D., (Psychological Sciences), and Trent Lalonde, Ph.D., (Applied Statistics and Research Methods) are studying marijuana use among college students. The study, funded by the National Institute on Drug Abuse (NIDA), one of the National Institutes of Health, is examining how marijuana use relates to academic motivation and performance. Spanning three years and using real-time assessments of 150 college students who use marijuana, Phillips, Phillips and Lalonde seek to better understand factors related to heavy marijuana use.

Doping in Sports Pervasive

A study co-authored by UNC statistician Jay Schaffer, Ph.D., (Applied Statistics and Research) and eight other scientists worldwide relied upon a scientific lie-detector test of sorts they developed and used with 2,167 athletes at two international track and field competitions to determine the probability of doping.

While traditional drug testing through blood and urine analysis typically reveals doping in 1 to 2 percent of athletes, the tests can fail to detect "cutting-edge doping techniques," according to the study. Indeed, the statistically proven and validated survey method used by researchers estimated that 44 percent of athletes were doping at the 2011 International Association of Athletics Federation World Championships in Athletics in South Korea and 57 percent were doping in the 2011 Quadrennial Pan-Arab Games in Qatar.

"We were shocked by the results," say Schaffer, adding the study's goal is to come up with a better way to measure doping for the study, commissioned by the World Anti-Doping Agency (WADA).

Boosting Retention in the Sciences

Assistant Professor Ginger Fisher, Ph.D., (Biological Sciences) is conducting a three-year study to determine whether a research-based class at UNC boosts overall persistence in science. This class was initially implemented at UNC and is now being incorporated at four other colleges and universities across the country. In the project proposal, Fisher notes that half of college students interested in science leave the discipline before graduating. In an attempt to solve this problem, Fisher developed a "Course-based Undergraduate Research Experience" (CURE) for an introductory biology course at UNC.

Initial results indicate that participation in the CURE increases students' content knowledge and improves their motivation to learn biology — both have been shown to increase retention. By expanding the class at other universities and studying outcomes, Fisher will be able to further determine the impacts of CUREs on student research skills and retention in science at a diverse set of institutions of higher education.

The implementation at UNC is funded by an Innovations @UNC (I@UNC) grant; implementation at the other colleges and universities is funded by an National Science Foundation (NSF) Improving Undergraduate STEM Education (IUSE) grant.

Taking A Forensic Look at Forest Fires

Alan Price, Ph.D., (Criminal Justice) and David Pringle, Ph.D., (Chemistry and Biochemistry) mentored four undergraduate students for their study testing accelerants used in forest fire arsons. The students prepared the research as part of their senior project and presented the work at the American Academy of Forensic Science Annual Conference this year.

Creating Youth Media Projects

Dana Walker, Ph.D., (Teacher Education) creates and researches youth media projects. She is directing a Translocal Youth Radio project that links Greeley and Barcelona schools, to promote civic engagement, youth agency and voice, and a broad repertoire of communicative and technological competencies among historically marginalized student groups.

Studying Holocaust Museums

Jeraldine R. Kraver, Ph.D., (English) is studying Holocaust museums around the world. She's been a fellow at the United States Holocaust Memorial Museum in Washington, D.C., the International School of Holocaust Studies at Yad Vashem in Jerusalem, Israel, and the Auschwitz Jewish Center in Poland.

Taking a Look at Nursing Behavior

Lory Clukey, Ph.D., (Nursing) is publishing "Show Your Stuff and Watch Your Tone: Nurses' Caring Behavior," a study about the perceptions patients and family members have about nursing behaviors and what they perceive as behaviors that are caring and those that demonstrate not caring.

UNC Biology Class, BLM Partner to Protect Endangered Plants

Students worked alongside Bureau of Land Management botanist Carol Dawson to collect data aimed at protecting two endangered plants: Osterhout's Milkvetch and Fenland's Beardtongue.

Led by Associate Professor Mitchell McGlaughlin, Ph.D., (Biological Sciences) fifteen undergraduate students compiled the data with the help of three graduate students while completing a weeklong portion of the class that takes students into the field to learn about local flora.

They spent most of their time in the Middle Park region near Kremmling. Students collected data relating to plant abundance, reproductive status and insect damage in long-term monitoring plots. The data is used to determine if the endangered plant populations are increasing, decreasing or stable, which has direct implications for the type of activities that can occur on public lands where the plants grow.

Associate Professor Britney Kyle and her students find clues to the past in skeletal remains.

SKELETON CREWS

UNC anthropologist Britney Kyle and her students reconstruct the past by examining bones of ancient civilizations

A biological anthropologist and associate professor of Anthropology at UNC, Britney Kyle, Ph.D., works with her students to discover how humans evolved, lived, suffered or succeeded nearly 3,000 years ago.

"We study human skeletons from an archaeological context and look at the impacts of colonization in the Mediterranean," Kyle explains.

She co-directs the Bioarchaeology of Mediterranean Colonies Project with Laurie Reitsema, Ph.D., an assistant professor at the University of Georgia. Their project includes research at seven colonies and two mother-cities on the Mediterranean and Black seas. It is currently a National Science Foundation funded Research Experience for Undergraduates (REU) site.

With NSF funding, Kyle spends eight weeks each summer with about eight undergraduates from across the country. In Italy, students examine bones from 12,000 skeletons that are thousands of years old, learn research skills and begin to build the foundation for their own research projects.

Researchers use isotope analysis, a chemical process that looks at elements in excavated bones, and DNA testing to determine an individual's nutrition (malnutrition), health (disease) and geography (migration patterns).

Resulting data can help establish patterns and reveal ethnic inequality, evolution, human adaptation and the impact of social, cultural and environmental disruption.

Kyle and her students can correlate what they've learned with historical documents and social histories and can determine migration patterns using isotope analysis to determine where someone grew up, versus where they died. They've begun using DNA tests as well.

The populations Kyle has studied lived nearly 3,000 years ago, including colonies in Sicily, Greece and an area called Apollonia in Albania. "In Albania, I found that at the colony (which was made up of local Illyrians, with a small amount of Greeks), the local population's health definitely declined during colonization."

That information helps Kyle explore the regional origins of ethnic inequality, evolution, human adaptation and the impact of social, cultural and environmental disruption on populations.

–Debbie Pitner Moors

By recording birdsong in the field, Lauryn Benedict and her team bring the music of canyon and rock wrens into the lab for exploration. They also play the recordings back while in the field studying the birds' communication behavior.

LESSONS IN LISTENING

UNC researchers capture the songs and study the behavior of canyon and rock wrens

It's a gray fall morning at Bobcat Ridge Natural Area just west of Loveland. UNC biology professor Lauryn Benedict, Ph.D., doctoral student Nadje Najar and master's student TJ Hathcock walk along a high path, then stop as Hathcock lifts his binoculars and looks toward a rocky outcropping. Hathcock has picked out the sound of a rock wren (a small, brown bird) and Benedict and Najar hear it too, lifting their own binoculars.

Benedict, Najar and Hathcock have focused their research on rock wrens and canyon wrens, whose iconic songs are part of the acoustic fabric of rocky western habitats. The team studies social behavior and communication, as well as habitat use, in these cliff-associated wren species.

The songs of canyon and rock wrens haven't been studied much, so the team's work at UNC is an important foray into new areas. They're looking at how habitat may affect song, the differences in vocalization of males and females, how they communicate, how birdsong has evolved and how the birds respond to intruders.

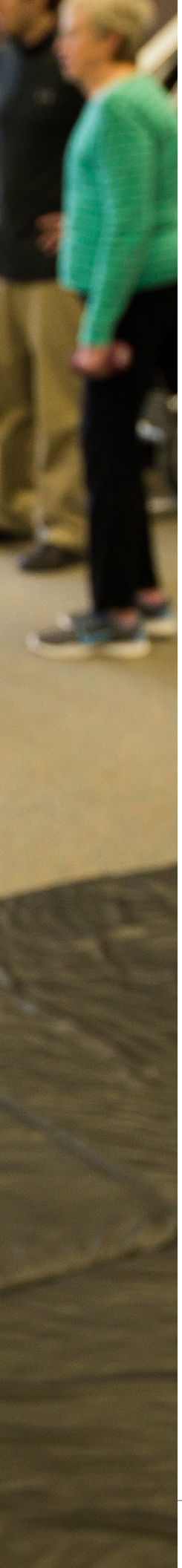
Although closely related, a curious and significant difference between the two wrens has to do with the number of songs in their repertoires. While a canyon wren sings about five different song types, a rock wren sings a loquacious 120 songs. Why have two closely related species evolved so differently from a communication standpoint? That's a question that could bring insight into how bird behavior and communication are shaped by factors like social context, habitat and population density.

Studying how and why these little brown wrens communicate can be an exercise in patience. Describing a typical day in the field, Hathcock says he's often awake at 4 a.m., spends about an hour driving to the field, then hikes in (loaded with recording equipment, binoculars and a backpack), and sets up and waits (sometimes for hours) for the show's star to appear. But it's work that he loves. And it's a love for science that he hopes to share once he finishes his master's degree in Biology by becoming a high school teacher. "My generation is so tech-oriented," he says. "We're really trying to get kids out of the classroom."

–Debbie Pitner Moors

Listen to recordings of canyon wrens and rock wrens at **unco.edu/nhs/biology/lbenedict**

UNC Cancer Rehabilitation Institute Director Reid Hayward, Ph.D., works in the synergy between the research lab and clinic.



EXERCISE AND CANCER REHABILITATION

Groundbreaking UNC research melds scientific lab work with a real-world clinic to reveal benefits of exercise for cancer patients

Sitting in a small lab in Ross Hall is a squat, benign-looking gray tank containing liquid nitrogen. It also contains a spectrum of cancer cells from various lines. But this is one instance where cancer cells are helping make cancer patients' lives better.

UNC researchers use these cells in the lab to determine exercise's effect during and after chemotherapy treatment, then they apply their findings across campus at the UNC Cancer Rehabilitation Institute (UNCCRI). There, cancer patients and survivors participate in exercise programs to combat the effects of chemotherapy and cancer in order to improve their quality of life.

"We use what we learn in the lab and apply it to real life, and take what we see in real life and try to replicate and address it in the lab," says Reid Hayward, Ph.D., director of the institute.

UNC's groundbreaking work in cancer rehabilitation has led Hayward to Washington, D.C., where he's spoken to doctors at the National Institutes of Health, and to Memphis, where he's given presentations to teams at St. Jude Children's Research Hospital.

An estimated 75 to 95 percent of cancer patients endure severe treatment-related side effects. Hayward explains that cardiotoxicity, or heart failure, is a side effect of a common chemotherapeutic drug, which may force patients to choose to either treat their cancer and deal with heart failure, or have a healthy heart but succumb to cancer.

Taking that challenge to the lab, Hayward and his colleagues have shown that exercise during and after treatment can help protect the heart against these side effects.

While speaking to doctors at St. Jude's, Hayward was asked about the impact of exercise on children fighting cancer. Returning to Colorado, Hayward headed to his lab, where he found that exercise significantly decreased risks of heart failure as young rats matured.

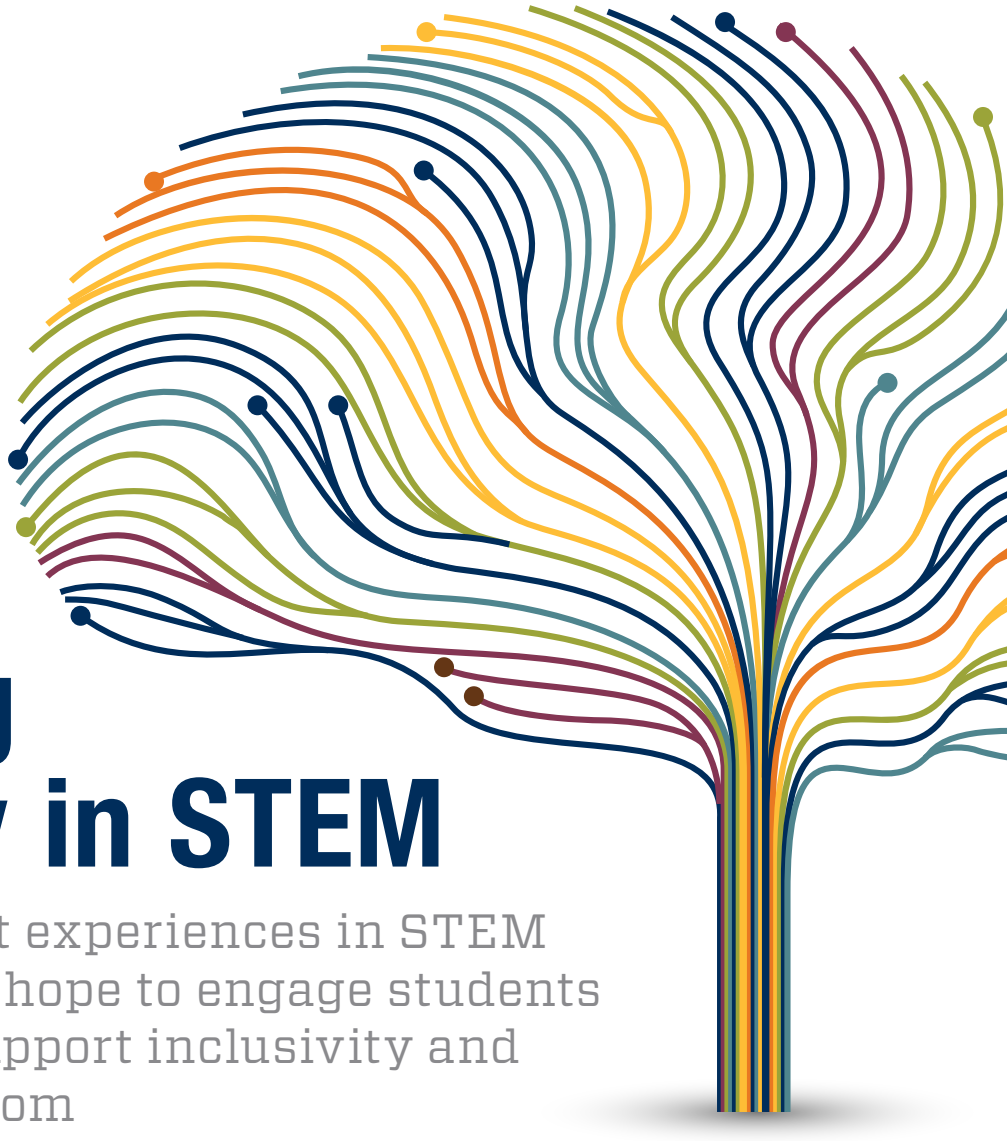
Hayward explains that UNC's work with patients, students and research is unique because all three intersect in hands-on understanding.

"The relationship between patients and students is palpable," Hayward says. That personal touch and customized, research-based approach is something Hayward hopes to see expand beyond UNC's geographical boundaries, and he's developing a certification program through both on-campus workshops and global outreach. UNCCRI recently partnered with Rehabilitation Hospital of the Pacific in Honolulu and with a group in South Korea, where both will be offering UNCCRI's certification course at their facility.

"We have people come from dozens of countries around the world for our workshops," he says. "We're having an impact on not just cancer survivors in our community, but all over the world."

–Debbie Pitner Moors

> *"This is translational research,"* says Reid Hayward, Ph.D., director of the institute. *"We use what we learn in the lab and apply it to real life, and take what we see in real life and try to replicate and address it in the lab."*



Increasing Inclusivity in STEM

By exploring student experiences in STEM classes, researchers hope to engage students and help teachers support inclusivity and equity in the classroom

The Howard Hughes Medical Institute (HHMI) awarded UNC a five-year, $1 million grant to develop a classroom model and establish a new center to engage more students, from all backgrounds, in the sciences.

UNC is one of 24 colleges and universities selected out of 511 in the first round of the Inclusive Excellence initiative sponsored by HHMI, the largest private, nonprofit supporter of science education in the United States.

Susan Keenan, Ph.D., professor and director of the School of Biological Sciences, is the grant's project director.

A non-traditional, first-generation student herself, Keenan says she fell in love with science during a summer Research Experiences for Undergraduates (REU) opportunity funded by NSF as a college junior. After earning a bachelor's degree in chemistry, she went on to earn a Ph.D. in pharmacology and physiology from St. Louis Medical School, with postdoctoral work at University of Medicine and Dentistry of New Jersey. She joined UNC's faculty in 2006, and became the director of the School of Biological Sciences in 2011.

Three years later she attended the White House College Opportunity Initiative: STEM Education workshop — one of several experiences that ignited her interest in student retention, persistence and success. She also attended conferences and workshops for diversity and inclusion, learning about equity and high-impact practices for student success.

Inspired by those experiences, Keenan worked with UNC Professor of Mathematics Jodie Novak, Ph.D., and with Associate Director of UNC's MAST

Institute, Lori Reinsvold, Ph.D., to seek funding that would support student success. The HHMI grant (which also includes Assistant Professor of Psychology Cassendra Bergstrom, Ph.D., as an investigator), is a culmination of their efforts.

"This grant is important as it focuses on faculty and institutional change rather than changing the students," Keenan says. "As an institution, when we accept students and they matriculate to campus, I believe we're morally obligated to provide the support and the environment within and outside the classroom to enable each student to thrive."

As part of the award, UNC faculty are researching student experiences in their own STEM classrooms to better understand the conditions that support intrinsic motivation among students. Faculty will analyze their data and implement instructional practices to help achieve student success.

"Shifts in faculty practice will impact all students positively," she says, "but in particular will impact students entering STEM majors via nontraditional pathways (students of color, first generation students, students from low income backgrounds, transfer students, veterans and members of the LGBTQ community) whose experiences are rarely visible."

Since the grant began in September 2017, Keenan says the team has focused on preparation and learning. They are developing workshops for administrators and faculty to explore equity and inclusive excellence in STEM at UNC, and have collaborated with UNC's cultural and support center directors, who bring a wealth of information and insight to the project.

Additionally, the team collected data that was disaggregated by race, gender and generational status, then worked with the Center for Urban Education (CUE) at the University of Southern California's Rossier School of Education to develop a series of equity workshops for the project leadership team and others (administrators and cultural center directors for example) on campus. The first workshop was held in January this year, with five more scheduled throughout the spring semester.

"By engaging a critical mass of STEM faculty and administrators in understanding students' experiences and perceptions of the conditions for intrinsic motivation, the project will dramatically shift UNC's institutional culture toward inclusive excellence in STEM," Keenan says. "This grant expands UNC's capacity for inclusion to engage all students by leveraging students' experiences in STEM classrooms."

HHMI expects that the Inclusive Excellence grants will produce useful models for other schools that might share similar contexts and challenges.

–Debbie Pitner Moors

The project's goals are four-fold, to:

- Enable STEM faculty to create classroom environments that positively impact student intrinsic motivation within the context of equity and inclusive excellence.
- Increase intrinsic motivation, persistence and graduation rates in STEM programs for students from nontraditional pathways.
- Provide administrators with the knowledge to support faculty to engage in practices to provide an inclusive classroom.
- Advance our understanding as a result of the successes and challenges of project implementation, resulting in a model for adaption and replication.

Into the Arctic

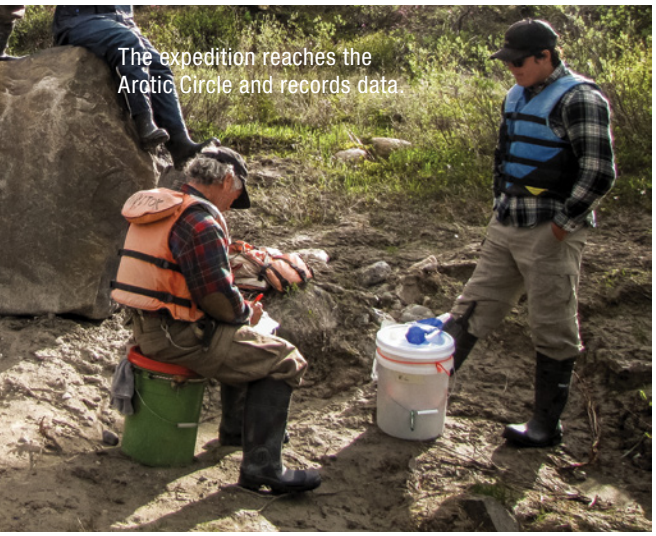
Professor Jimmy Dunn and a crew of five students head north for summer research and discovery

Dunn and Cleason scouting rapids near the Arctic Circle.

Life above the Arctic Circle isn't always as cold as you'd expect. After a six-week kayak trip through the Canadian Arctic this summer, Jane Allen, a senior at UNC, can attest to that.

"The day we crossed into the Arctic Circle, I was wearing a tank top," she says. During the few hours of darkness during the Arctic summer nights, Allen felt a chill in her tent. But on many days of her trip to the Arctic this summer, the temperatures were in the mild 40s, 50s and even 60s.

Expedition members traveled through the icy headwaters of the Coppermine River.



The expedition reaches the Arctic Circle and records data.

> *"I don't think there's a more profound way to learn than to do something like this."*
>
> —Professor Jimmy Dunn

Allen was one of five UNC students who joined James "Jimmy" Dunn, Ph.D., a professor and chair of the department of Geography and GIS, on a 290-mile river trip on Canada's Coppermine River, during which they conducted research about how a changing climate is affecting spruce trees. The project was funded in part by a grant from the Hewit Foundation

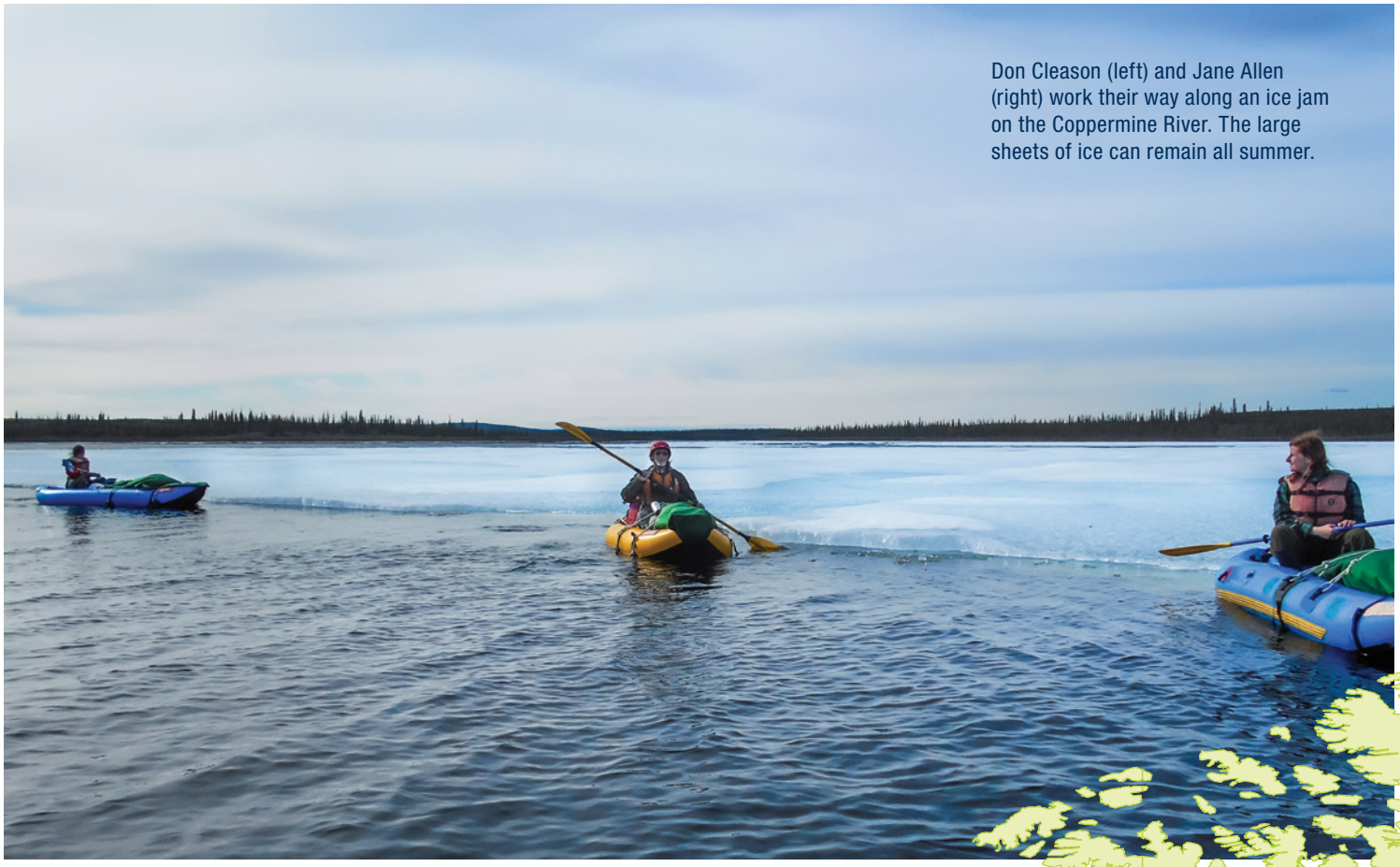
Preparations for the trip took nearly two years. The group of Dunn, Don Cleason, Denise Rettedal, Emily Doerner, Rusbel Contreras Jr., Gretl Galgon, Léo Sinigaglia, and Allen — sewed packs and skirts for their boats. They gathered enough food to provide 4,000 calories a day for each paddler.

All that preparation allowed them to witness an environment many people never experience: Wolves, swans, muskox and grizzly bears. Fields of wild berries. Water so clean it can be consumed without filtration.

"The amount of ice you'd see melting and breaking off and falling into the water was truly amazing," Allen says. "It changed my perspective."

They followed a route Dunn traveled 40 years ago. Notes from the previous trip allowed the students to compare data from 1977 to what they found on their trip this summer.

Dunn predicted that, as global temperatures have risen, trees would be growing farther north than before and would be producing viable seeds and seedlings.



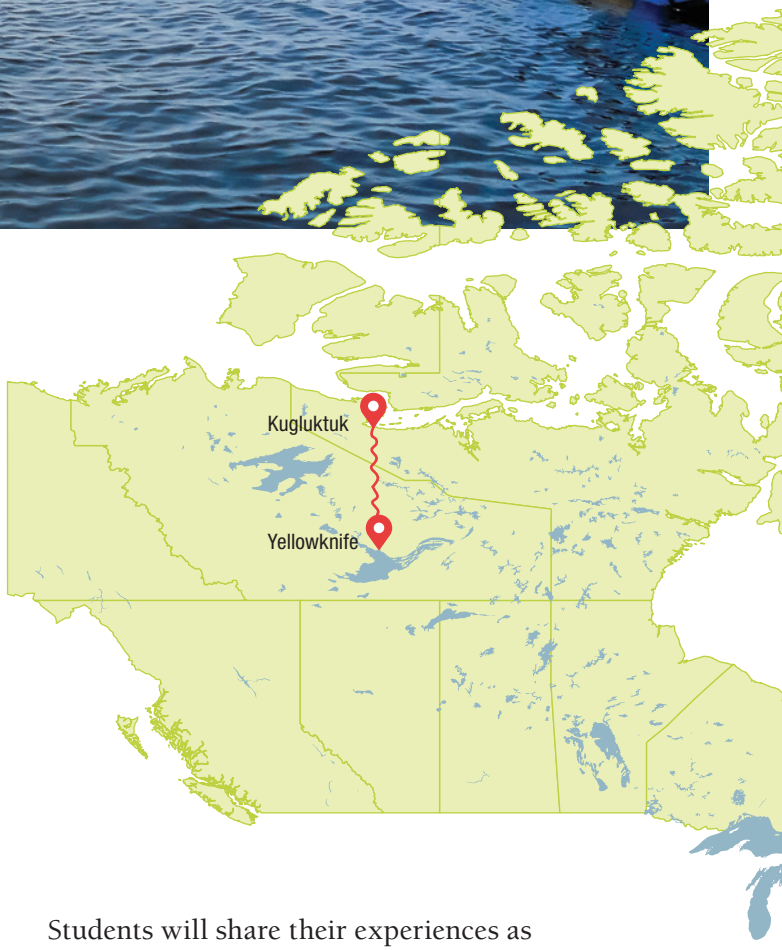
Don Cleason (left) and Jane Allen (right) work their way along an ice jam on the Coppermine River. The large sheets of ice can remain all summer.

"If the world's climate is changing, and the far north is predicted to be warmer than ever before, we should see plants responding," Dunn says. And the Arctic's temperature has been increasing, according to a number of sources, including the Danish Meteorological Group.

In a cold environment, spruce trees survive by forming genetically identical clones. The clones form in clusters, which can survive for hundreds of years. But in warmer temperatures, new, genetically distinct seedlings are able to form. The seedlings grow farther away from their parent trees and stand as single trees.

On this summer's trip, Dunn and the students observed spruce and collected spruce cones from different latitudes. The students kept journals of their observations and compared them to Dunn's notes from the 1977 trip.

The group found that spruce trees seem to be responding to a warmer climate: Spruce seedlings were growing 70 miles north of where they were spotted 40 years ago. Some seedlings are even growing north of the Arctic Circle. The group also brought seeds back to Colorado to study whether they are viable, which would provide more evidence that spruce are responding to a warmer environment.



Students will share their experiences as "ambassadors" of geography in Colorado high schools. Each student will give 10 talks about the trip and the research they conducted.

–Jaquelyn Zubrzycki

View the UNC River Trips at **facebook.com/UNCOrivers**

Analyzing Athletes: Projecting Performance

UNC professor offers his sports-science research to Major League Baseball to help project the next great player

unco.edu/bear-in-mind
Bear in Mind Podcast, Episode 16 – Brustad discusses the advantages and disadvantages of specialization in youth sports.

WHICH PLAYERS WILL OUTPERFORM THEIR TALENT PROJECTION?

DURING HIS PRESENTATION AT THE MAJOR LEAGUE BASEBALL CONFERENCE, BRUSTAD SAID THESE ARE VARIABLES TO CONSIDER BASED ON THE DATA HE ANALYZED:

PHYSICAL GROWTH
"Players who are going to grow the most from the time they get drafted until they play at their major-league age," Brustad says. "When a player reaches maximum rate of growth tells you a lot about growth potential past that point." Body type is also helpful in predicting ultimate growth.

LEARNING
"Some players are simply going to learn more than others," Brustad says. "Learning corresponds a lot to practice history so the more quality practice a person has had, the less learning potential they have. The less specialized the athlete was at a younger age, the steeper the learning trajectory would logically be." Other individual differences that affect learning would include the player's adaptability and receptiveness to feedback.

GROWTH CHARACTERISTICS
"For pitchers what we want to see is... the physical development and change in limb length in particular," Brustad says. "Players who have the greatest growth would be the ones who would seem to have the greatest potential for change over time." As for position players, "we're looking at power more than anything else. … we're looking at strength."

PSYCHOLOGICAL MATURATION
"Some athletes are more capable of psychological regulation, in terms of emotional control, self-regulation, etc. than others," Brustad says. "That's going to play a role because baseball is a game of frustration … it's a very psychologically demanding process."

"From Hidden Gold on the Diamond? The Contribution of the Relative Age Effect to Talent Estimation Errors of High School Players in the June MLB Draft" by Robert Brustad

Numbers crunchers rejoiced when bestselling-book-turned-Hollywood-movie *Moneyball* pulled back the curtain on a major-league baseball team's use of undervalued analytics to identify players to covet.

Since being pioneered by Oakland A's manager Billy Beane, the practice of selecting players based on once-overlooked data is no longer a novelty.

UNC Professor of Sport and Exercise Science Bob Brustad attests to this. A friend of his works with the Tampa Bay Rays, which now employs 11 full-time analytics gurus.

"Teams see the value in this approach," he says. "It drives every part of the decision-making process."

In a way, Brustad is working on the next chapter of *Moneyball*.

Brustad presented his initial findings at Major League Baseball's 2016 annual analytics conference.

His presentation, focusing on talent-projection errors based on players' ages when they were drafted, led to at least three teams expressing interest in working with Brustad.

"I believe the prediction equation we use in projecting talent is wrong — not fatally wrong, but it's distorted," Brustad said during his presentation.

An aficionado of the game, Brustad wants to help teams project the success of players they're considering and seeks to improve sports at all levels for athletes, coaches and families.

Brustad reviewed widely available draft data of high school players from the first 20 rounds from 2005-12 to examine how age influences the probability of being selected in the draft. He expected to find that younger high school players might provide greater value in the long run.

In his presentation at the MLB conference, two players drafted in 2007 served as Exhibit A and Exhibit B. The first, a 19-year-old "can't-miss prospect" who was drafted in the first round by the St. Louis Cardinals. And the second, an 18-year-old pitcher taken in the later rounds by the Colorado Rockies.

The Cardinals' pick, Pete Kozma, was a top-20 prospect who played two years for St. Louis before being optioned to the minors. He spent the 2017 season as a backup infielder with the New York Yankees.

On the other hand, the Rockies' pick, Chris Sale, received much less fanfare, ranking outside the top 1,000 prospects in the draft class. His fastball, a key measure teams use in draft analysis, reached 86 mph (over 8 mph below the average of a major-league pitcher). Brustad says that not only was Sale young for his age group, but he also had a less mature body type and he focused more on basketball in high school. After opting to go to college, he was re-drafted in 2010 by the Chicago White Sox as the 13th overall pick. Last year he made the All-Star team for the sixth time.

Sale clearly outperformed his talent projection from the 2007 draft, and Brustad says he's an example of the importance of taking growth and maturational development into analysis.

"It's remarkable how much growth can take place between ages 17½ and 18½," Brustad says. "The more specialized player looks better now, but he's closer to his ceiling. The players getting greater attention are more likely to be early maturers who have less growth potential."

Brustad discovered that many of the top 20 players in today's game were drafted as 17-year-olds.

In general, Brustad's research shows that teams overvalue players' current ability. "It's a tendency we see across all sports that we make some fundamental errors in the talent evaluation process because we neglect the importance of age, maturity and practice," Brustad says. "We're missing a lot in terms of bringing in the maturational, learning characteristics into our projection system."

Brustad wants to expand the draft analysis another five to 10 years and explore other related factors in a player's development. Specifically, he intends to focus on sport specialization and maturity.

Already a consultant with the U.S. Olympic Committee and the Real Sociedad professional soccer team in Spain, Brustad could be helping an MLB team in the near future with his Moneyball 2.0 approach.

–Nate Haas '04

unco.edu/bear-in-mind
Bear in Mind Posdcast Episode 28 – Susan Collins discusses the stereotypes and evidence-based advantages of cross-generational work environments.

AGING: A GLOBAL PERSPECTIVE

Collaborating across disciplines and engaging graduate students in research, Nancy Karlin and Joyce Weil gather data and explore perceptions of aging in a global context

According to a 2016 report from the National Institutes of Health, "America's 65-and-over population is projected to nearly double over the next three decades, from 48 million to 88 million by 2050." Globally, "8.5 percent of people (617 million) are aged 65 and over… this percentage is projected to jump to nearly 17 percent of the world's population by 2050 (1.6 billion)."

With such a dramatic change in demographics, the need for health care, transportation, financial support and housing for older residents is rising globally. How well prepared are countries around the world and how do people within those populations feel about the aging experience?

These are questions that Nancy Karlin, Ph.D., professor of psychological sciences and Joyce Weil, Ph.D., MPH, CPG, associate professor of gerontology explore through their research on perceptions of aging in a global context.

They've gathered information from participants residing in the United States, Italy, Tunisia, Botswana, South Africa, Japan, Thailand and Saudi Arabia, with interviews from 324 subjects.

From the beginning of their research, they reached out to academic partners in each country to help them revise questions based on cultural appropriateness.

"There has always been someone who would retranslate or make an introduction," Karlin says.

Many interviews were gathered through international students and their connections in those countries.

"They're really integrated into our team," Weil says.

Akiko Watabe, a Japanese student who is working on her doctorate at UNC in Educational Psychology, has contributed to Karlin's and Weil's research by exploring the role of the interviewer when interviewing older adults in Japan.

Culturally I respect the older people and also, I used more polite language," Watabe says. But while conducting interviews, she discovered how stigmatized some topics (like needing financial assistance) were, and she learned more about how to be careful asking culturally specific questions.

"When I asked some questions, elderly people asked me what other people interviewed said. Instead of giving their own response, they wanted to give the appropriate response," she says.

With a network of scholars, and an engaged group of graduate students like Watabe, Karlin and Weil have published a number of studies about perceptions of aging.

In 2016, they published "Healthy Aging in a Global Context: Comparing Six Countries." They interviewed 238 older adults on perceived socio-demographic and economic conditions, asking about social support, resources, activities, economic status and financial support. Respondents crossed the spectrum from rural to urban, and answered questions about what they liked or disliked about their current age, what they were looking forward to, and their advice to young people. Perceptions of aging clearly differ from one culture to the next. For example, in the U.S., the highest ranked response when asked about advice for young people was to enjoy their lives and achieve their goals.

In the conclusion of that article, Karlin and Weil state that Italian older adults are "growing in numbers, but need more services that can support active/healthy aging." In the U.S., adults surveyed were on average happier, with some sort of pension and private health insurance but, paradoxically "65 percent stated no social support was available to them in time of need."

The extreme shift in global aging has far-reaching implications — not only for older adults, but also for the generations that follow. From infrastructure to caregiving, Karlin and Weil agree that countries need to be prepared, and to plan. "If you're not planning for older adults now you're not planning for the lives of the younger generation tomorrow," says Karlin.

And, with a deeper understanding of how older adults feel about aging, and what they may need to be healthy and engaged as they age, global leaders must make informed decisions about changes that will affect people now and far into the future. The research team is currently collecting data from older adults residing in China, the team's ninth country.

–Debbie Pitner Moors

unco.edu/bear-in-mind
Bear in Mind Podcast, Epispde 24 –
Dr. George Junne discusses the role of
African Americans in Colorado's rich history.

A PLACE IN COLORADO HISTORY

Professor George Junne's wide range of research explores African-American success and resilience across the years

About 25 miles east of Greeley on U.S. Highway 34 along the South Platte River, the geography is wide and open. Here, at a settlement named Dearfield, some seven families began to build lives, frame homes and plant crops in hopes of establishing an African-American community in 1910. Over the next 20 years, the small settlement grew to a population of about 200 to 300, with two churches, a school, restaurant, dance hall, market and gas station.

"The people of Dearfield wanted to have their own homes, their own land. They wanted to make it out here," UNC Professor of Africana Studies George Junne, Ph.D., says. "There's so much history out here on the Plains," he says.

Junne's research on the community is one of a number of projects he's completed that spans from the Civil War era through the Civil Rights Movement in Colorado.

Last year Junne was interviewed and filmed for an award-winning PBS documentary called *Clara: Angel of the Rockies*. One of the first African-American women to live in Denver, Clara Brown was emancipated from slavery in Kentucky in 1858 and traveled west hoping to find her four children, who had been sold years before. She went first to Missouri, then walked most of the 700-mile distance from there to Colorado. In Central City, she established a laundry business and invested in mining claims. With a deep sense of community and a strong Christian faith, Brown sheltered those who were ill or homeless, gave money and time to community churches and became known as "Aunt Clara."

After searching most of her life for her surviving daughter, Eliza Jane, Brown reunited with her daughter at the age of 82. She died in 1885, and an estimated 400 community members and civic leaders (including Denver's mayor and Colorado's governor) attended her funeral.

"Clara Brown is a good example of the strength of black women. This woman, who did not have an education, helped shape the Black American West," Junne says. "You have a woman who comes from being personal property to being a successful businessperson.

"Black history is American history as well," he says. And it's history he shares not only with his UNC students, but with young scholars as well.

Back in Dearfield, Junne smiles as he talks about a group of elementary students who travel here from Denver every year. They walk the dusty road with papers and pencils in-hand, taking notes as Junne tells them about the people who lived here and worked hard to make it their own. In that moment, a century after the first families arrived in Dearfield, it is a place that still belongs to them.

–Debbie Pitner Moors

BUILDING A MODEL FOR HEALTHIER K-12 SCHOOL CHILDREN

By researching health and activity in the K-12 setting, UNC faculty and graduate students are providing K-12 schools with strategies for promoting health and wellness

A Colorado Health Foundation-funded project led by UNC aims to get K-12 students healthier and more active in their classrooms throughout the school day.

School of Sport and Exercise Science graduate students recently visited one of the 20 participating schools that UNC has been advising as part of the project. The students observed classrooms at Tozer Elementary School in Windsor to record the physical activity of the children (who wore activity trackers to monitor their exercise levels) and to note how often teachers implement physical activity into lessons during the school day.

Graduate students Ann Kuhn and Mike Capps assist with gathering data for the project. The research-based collaborative, directed by UNC Professor of Sport and Exercise Science Russell Carson, Ph.D., aims to put research into practice to inform development of programming. Schools are mandated by the state to incorporate health and wellness programs but sometimes struggle to implement them.

"The project provides a unique blend of research and teaching for faculty and graduate students," Carson said. "At the same time, it provides a service for K-12 schools who need assistance implementing health and wellness programs."

Project partners include neighboring northern Colorado school districts, Wellness Training Specialists, the Red Hawk Foundation, the Rocky Mountain Prevention Research Center at the University of Colorado-Denver, Colorado State University, the University of Denver and Children's Hospital Colorado.

"I think the biggest thing is the chance to be a part of a collaborative group that has a real chance for impact on teachers, schools, parents, families," said Jaimie McMullen, Ph.D., assistant professor of Sport and Exercise Science, who helped organize a conference at UNC that brought together wellness coordinators from K-12 school districts. "We have a huge group here that's working on it, but there also other universities and other organizations we're working with."

CENTERS AND INSTITUTES

UNC's award-winning centers and institutes lead the way in research, community services and professional development opportunities for students and professionals

Bresnahan-Halstead Center on Disabilities
unco.edu/bresnahan-halstead

The Bresnahan-Halstead Center is committed to work for the advancement of knowledge and quality of services for people with disabilities through research, professional development, technical assistance, and scholarships. The Center works in partnership with the various agencies in Colorado, the nation, and internationally to achieve these missions.

Center for the Education and Study of the Gifted, Talented, and Creative Learners (CESGTC)
unco.edu/cebs/gifted-talented-center

Center for the Education and Study of the Gifted, Talented, Creative Learners supports and promotes gifted and talented education through graduate-level programs and opportunities for consultation, collaboration and research for program development. The center also provides education and support to parents and serves gifted, talented and creative students with day and residential summer programs.

Center for Urban Education (CUE)
unco.edu/cebs/urban-education

CUE offers teacher preparation degree programs for Colorado licensure in elementary, early childhood, and special education. Housed at UNC's Denver campus at Lowry, the CUE program combines classroom apprenticeship experiences, access to a broad liberal arts curriculum and focused methods courses. All of the Center's students work as paraprofessionals in the morning and attend classes in the afternoons.

Colorado Center for Rural Education at UNC
unco.edu/colorado-center-for-rural-education

Rural school districts throughout Colorado continue to experience significant difficulty finding qualified educators to serve as classroom educators, school leaders, and/or special service providers within their individual school districts. The Colorado Center for Rural Education was created to address these issues. The Center works with 23 Colorado Institutions of Higher Education to recruit, prepare, place, and support educators for rural communities to ensure every rural student has a quality learning experience.

East Colorado Small Business Development Center (East Colorado SBDC)
eastcoloradosbdc.com

The East Colorado Small Business Development Center (East Colorado SBDC) helps emerging and existing entrepreneurs maximize their business operations. The East Colorado SBDC works to help foster successful growth and development by creating positive economic impact with the following services; individualized FREE business consulting, assistance with financing opportunities, training seminars and webinars, business planning tools and research resources.

Education Innovation Institute (EII)
unco.edu/education-innovation-institute

The Education Innovation Institute works to leverage applied research to solve practical problems in education and foster collaboration through interdisciplinary academic work and the facilitation of communication among those involved in research, policy, and practice. Examples of EII projects include internships in research and policy for UNC graduate students, production of research briefs and opinion pieces on policy issues, and advisory work with state agencies and nonprofit organizations.

Hewit Institute
unco.edu/hewit

The William E. Hewit Institute for History and Social Science Education supports education in history and the social sciences. Hewit Institute focuses on teacher education, materials development, and history and social sciences teaching and learning research.

Interdisciplinary Center for Early Childhood and Family Studies
unco.edu/cebs/center-for-early-childhood-family-studies

The Interdisciplinary Center for Early Childhood and Family Studies supports positive and equitable outcomes for all young children and their families by promoting evidence-based practices, research, and policies that support young children's health and well-being, development, and learning in inclusive and diverse settings. The Center provides leadership and coordination for innovative projects and programs to improve early childhood and family studies within the University, and in local, state, national and international communities.

Math and Science Teaching Institute (MAST)
unco.edu/nhs/mathematics-science-teaching-institute

The Mathematics and Science Teaching Institute provides leadership and coordination for projects and programs to improve mathematics and science education locally and nationwide in collaboration with partners in the College of Natural and Health Science and the College of Education and Behavioral Sciences. It also provides professional development for teachers, conducts research on teaching and learning, and leads outreach programs to K-12 students.

Retired Seniors Volunteer Program (RSVP)
unco.edu/nhs/rsvp

Retired Senior Volunteer Program connects adults age 55 and older with the people and organizations that need them most by recruiting and interviewing interested retired or senior volunteers and matching them to the appropriate assignment based upon their skills, interests and time availability. RSVP has agreements with multiple nonprofit and civic agencies, and works with organizations to identify specific community needs that may benefit from the program.

Sport Marketing Research Institute (SMRI)
unco.edu/sport-marketing-research-institute

The Sports Marketing Research Institute seeks to enrich the learning experience of graduate students studying sport administration by conducting field research for sport enterprises. Toward this end, the SMRI provides research opportunities for both graduate students preparing for careers in sport management and organizations interested in the business of sport.

Tointon Institute for Educational Change
unco.edu/cebs/tointon

The Tointon Institute provides professional development opportunities to Colorado principals, assistant principals and teacher leaders through residential academies and follow-up experiences that focus on research-based practices that build instructional leadership skills to improve student learning in schools.

UNC BizHub Collaborative
eastcoloradosbdc.com/unc-bizhub-collaborative

The UNC BizHub Collaborative provides virtual incubator services to small businesses to help them grow and prosper. While businesses in any industry can become a member of the BizHub, the incubator focuses on four primary industries: oil and gas, agriculture and agritourism, health and wellness, and manufacturing.

University of Northern Colorado Cancer Rehabilitation Institute (UNCCRI)
unco.edu/nhs/cancer-rehabilitation-institute

The University of Northern Colorado Cancer Rehabilitation Institute is a comprehensive cancer rehabilitation facility that provides individualized prescriptive exercise to aid patients in their recovery from cancer and treatment-related side effects. The Institute provides clinical rehabilitation services, conducts basic and clinical research, and offers an advanced cancer rehabilitation educational curriculum.

UNIVERSITY OF
NORTHERN COLORADO

DISCOVERIES

Research at the University of Northern Colorado

Office of xxxxx | phone | unco.edu/xxxxxxxx