

UTAH STATE

FALL 2022



Thirsty

Facing Down Drought in the West



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The Moment to Lead in Land, Water, & Air

USU President Noelle E. Cockett outside the Matthew Hillyard Animal, Teaching and Research Center. Photo by Levi Sim.

My first awareness of limited water was in 2009.

Our neighborhood's well was shut off after nitrates were discovered in the water. Although we were reconnected to the local town's water supply, our neighborhood was informed we couldn't use culinary water for landscape watering.

As an avid gardener I had already planted my gardens, and that summer I watched helplessly as our fruit trees and lawn roasted and vegetable plots withered. I tried reusing water after the dishwasher and washing machine's wash cycles and had family members post 5-gallon buckets in the shower to capture the water that would typically have gone down the drain.

Parts of town outside our neighborhood weren't restricted from watering their landscapes. It was frustrating to drive through town and pass bright green lawns and I would lament being unable to keep vegetables alive. One day, at the end of my rope, I pulled everything in my garden.

Perhaps it takes an experience of water scarcity before we take water usage seriously. I know that experience shaped how I have gardened ever since. For instance, before 2009, I believed that a vegetable plant needed water every day but now my garden is watered every third day. My lawn is no longer a single, continuous lush green. I've incorporated more rocks,

gravel, and bark into my landscaping.

In the past, it would rain and people would say 'See, we're not in drought.' They don't say that anymore. People see how much water levels have dropped in Lake Powell and the Great Salt Lake. They may already be experiencing the effect of low water in the Great Salt Lake on air quality. They know about water quality issues affecting Utah Lake. In Utah, the years ahead are going to become even more challenging in terms of water, fire management, and air quality. As we continue to experience population growth, we need to consider how to preserve the recreational opportunities and quality of life we treasure. The time to address these issues is now.

USU's new Janet Quinney Lawson Institute for Land, Water and Air (ILWA) can help. The institute was created in 2021 to bridge USU's research and outreach expertise in natural resources with legislative leaders and agencies. I'm particularly excited about hiring ILWA's first director, Brian Steed '97, M.A. '00, who was formerly executive director for natural resources in Governor Spencer Cox's administration. Brian will serve as the key liaison between the institute, USU, and civic partners.

Brian is an Aggie. He earned both his undergraduate and graduate degrees

in political science from USU before getting his Ph.D. in public policy with an emphasis in environmental policy from Indiana University Bloomington and a J.D. from the S.J. Quinney College of Law at the University of Utah, with a certificate in natural resources and environmental law. He has spent his professional career tackling natural resources issues. Prior to his position in Utah's Department of Natural Resources, he was deputy director for policy and programs for the U.S. Bureau of Land Management. Brian has also taught political science and economics at USU. He understands the valuable role researchers play in generating scientific data and evaluating solutions. And he knows how to communicate such findings in a way that translates to workable policy. I cannot imagine a better person to lead this institute.

After two decades of western drought, I think we need to learn to limit how much water we are using. It isn't just going to be business as usual or gardening as usual. I'm ready to do my part. I hope you will join me.

Noelle E. Cockett
President, Utah State University



The walls of Glen Canyon reveal both the ancient sand dunes that once blew across the region and the bathtub rings marking water height changes in recent years. Photo by Levi Sim.

A Shared System with Shared Problems— and Solutions

The first time I saw the bathtub ring circling Lake Mead was in 2003 during a cross-country road trip.

I was plotting a move out West and swerved to check out the Hoover Dam. Admittedly, I didn't fully appreciate its importance in delivering water — and hydropower — to millions of people across the Southwest. I didn't understand the complexity of managing the Colorado River. And I didn't know that the country's two largest artificial reservoirs were formed when humans decided to flood a canyon. What I did know was that the water seemed to be a long way down.

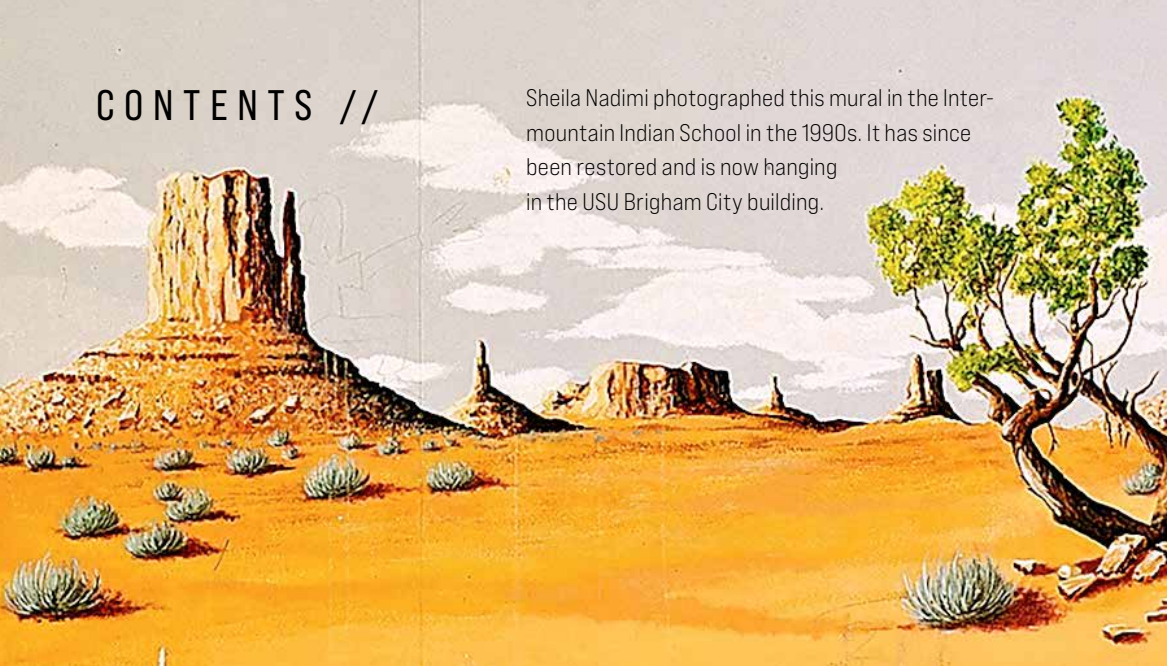
Back then, the water level of Lake Mead was just over 1,143 feet. It's 100 feet lower today and inching towards dead pool status — the point at which the water is too low to generate power. Lake Powell is facing the same uncertainty. You've likely encountered the term dead pool over the last few months as water levels at Lake Mead and Lake Powell continue to fall. The 20-year drought plaguing the West is predicted to worsen, making every last drop of water even more precious.

That is why we devoted the fall issue of *Utah State* magazine to cover some of the critical issues facing Utah's natural resources. We want to highlight the important work that Aggies are doing in the field and the researchers at Utah State University's new Janet Quinney Lawson Institute for Land, Air and Water are tackling every day. For instance, Dan Keller '08, M.S. '13, is working to keep native and sport fish populations in Lake Powell healthy, as well as promoting this majestic place to tourists. The communities around these reservoirs depend on the fish and the people who come to catch them.

As Sarah Null, professor of watershed sciences, explains in the cover story "Thirsty: Facing Down Drought in the West," drought is everyone's problem: "This is a shared system." And we have some work to do.

Kristen Munson
Editor, *Utah State* magazine

Sheila Nadimi photographed this mural in the Intermountain Indian School in the 1990s. It has since been restored and is now hanging in the USU Brigham City building.



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30 // Cover Story

Thirsty: Facing Down Drought in the West

A severe drought has plagued much of the American West for more than 20 years. This summer the Great Salt Lake dropped to the lowest level ever recorded. Utah State University researchers explain the impacts and adaptations needed for Utah to thrive with less water.

Features:

20 // Bringing War Home

A photo essay exploring an effort by historian Susan Grayzel and anthropologist Molly Boeka Cannon to preserve the everyday artifacts of war for generations to come.

24 // A Fish Tale

Idaho Congressman Mike Simpson '77 has an ambitious, complex, and potentially unpopular plan to preserve the state's wild salmon and steel-head runs. But could it work?

28 // The Connector: Brian Steed Links Natural Resources Research to Policy

Brian Steed '97, M.A. '00 believes many questions legislators have about natural resources policy have already been answered by scientists. His new job at USU is to connect the two.

38 // Aggies in the Field

The problems facing Utah's natural resources are complex and require all hands on deck. Snapshots of five Aggies working to keep Utah's lands productive and protected, its air healthy, and its waters flowing.



48 // Finding Their Place

In 1996, Sheila Nadimi M.F.A. '96 was testing out a new camera at the abandoned Intermountain Indian School property in Brigham City when she came across murals she's spent the next 25 years thinking about. Who painted them — and why?

Departments:

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Watch for these QR symbols throughout the magazine to view web extras such as videos, conversations, and survey data.

On the Cover: Boaters at Lake Powell may recognize this view near Wahweap Marina. Photo by Levi Sim.

Where is This?



Photo by Levi Sim.

First right answer wins Aggie gear.
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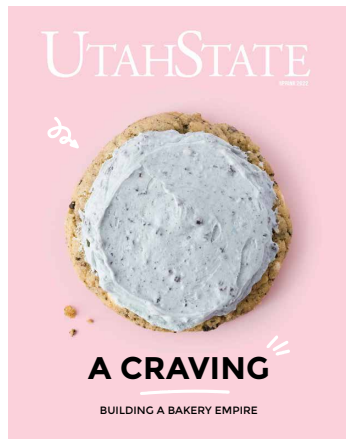
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**SPRING 2022:
TINY THINGS**



**RECOGNIZING A
FORMER MENTOR**

Loved the “Tiny Story” about Dr. Leila Schultz and the Maguire primrose. I was a graduate student in 1991, and had a work-study position in the Herbarium with Dr. Schultz. I went home to California and lost touch. She was a good friend and mentor. Glad she is still teaching about the flora of our unique state.

— **Fran Wasielewski, M.S. '91**

**CENTRALIZED IN
MEMORIAM LOCATION?**

From time to time I receive the *Utah State* magazine. I often check the In Memoriam for any of my long-lost friends, which thankfully, none of them have appeared. However, I was wondering if USU has a complete In Memoriam listed somewhere in case I missed an article? Thanks for keeping the magazine alive.

— **Michael Datur-Soliday, '79**

Editor's Note: Michael's email spurred a query about creating a centralized, searchable location for the In Memoriam section. USU's Advancement Services team developed a way to make this happen. Visit www.usu.edu/alumni/memoriam to find the complete listings.



**From
the Web**

**From A CRAVING: BUILDING
A COOKIE EMPIRE**

I want this on Wikipedia as “Noteable Alumni” so I can brag about the best cookies out there coming from USU!

— **Blake Nemelka, '12**

So proud of my fellow Aggie alumni! Whenever I eat one of their cookies it's like eating a piece of home. When is Aggie blue mint coming back nation wide?

— **Paula Stuart Medlyn, '93**

I still remember getting the fliers for warm cookie delivery straight to your dorm while I was a student at USU ... crazy to see how much this business has grown since then! Congrats!

— **Madison Mackay, '18**

In college I lived next to their first location (in the old Dominoes on 5th south and main Logan) and now they are opening up a franchise in my current town of Eagan, MN. We have come full circle. Or full cookie.

— **Missy Wegener, '07**

**From PINNED: A LOOK INSIDE
USU'S INSECT LAB**

So great to see Dr. Frank Parker's specimens included here, since he is the source of so many important specimens for so many decades!

— **Eric M. Coombs, '77, M.S. '83**

Used to love looking through the displays as an undergrad.

— **Ronald L. Dunn, '78**

CLARITY NEEDED

I know it's been a long time since I attended USU but I don't think math has changed since then. The SDL article recognizes its 64 years of influence, with this being 2022, that would mean 1958. There is no clear indication as such.

In the third paragraph, it attempts to describe the history, but it is one of the most confusing, convoluted, chronological paths I've even seen attempted. I read and reread that paragraph 12–15 times, trying to link it all together, much more time spent that reading the entire article! This seems to be a common trap of someone writing an article that is too close to it and understands it inherently and thinks anyone can follow, without consideration for the lay reader.

Unfortunately, it detracts from the influence and success the lab has achieved.

Please take this as constructive criticism, and not a personal attack. GO BLUE!

— **Steve White, '77**

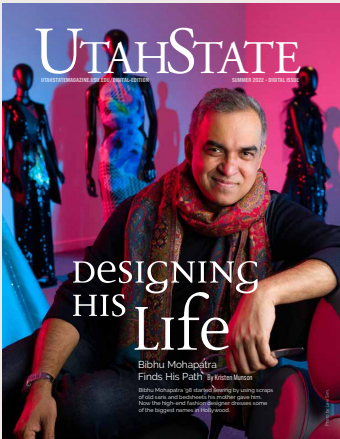
Editor's Note: SDL and USU do share a long history dating back to the founding of the university's Electro-Dynamics Laboratories in the late 1950s.

**AGGIE BLUE MINT
COOKIES, PLEASE**

The cover the spring 2022 *Utah State* magazine caught my eye and I wondered what is this all about. It is an amazing story of two young men having a dream and turning it into reality. It is incredible after only 5 years there are 345 Crumbl shops spread from coast to coast and a major part of this expansion happening



SUMMER 2022 (digital): PERSISTENCE



From REAL BEEF. DONE WELL. AN ECO-FRIENDLIER MEAL USING 'SMART FOODSCAPES'

Very disappointing article about some interesting research. Many of the facts stated early in the article are debatable at best and fabrications of the anti-meat environmental crowd at worst. Carbon released into the atmosphere by grazing animals is merely a part of the ongoing carbon cycle that has been in place for thousands if not millions of years. Unlike the burning of fossil fuels which brings carbon buried deep in the earth and releases it into the atmosphere, carbon generated by grazing animals resides in the forages they consume and a part of a natural cycle. Ruminant animals have been producing these gases for a very long time. In fact, long before domesticated cattle occupied the plains of North America, bison roamed the prairies in numbers at least as large as today's domesticated cow herd. These ruminants ate grass and produced carbon dioxide and methane just as cows do today. Don't turn

to agriculture and specifically the cattle industry to solve your "global warming issue." Agriculture produces food today for the 8 billion people on this planet with significantly less land and water than in years past. With the proper support, Dr. Villalba and other researchers at Utah State will continue to find ways to do this more efficiently.

— David Secrist

From FINISHING WHAT THEY STARTED

I came back to school at USU in 2018 after a 15 year break. I have 25 credits left before I graduate! It's been one of the most rewarding experiences of my life thus far!

— Aimee Olson Parkin

From A TALE OF TWO INJURIES

Very interesting and inspiring article. Read it!

— Pat Carnes-Dalton

What a way to recover.

— Sam Tuttle

I loved going to Utah State University "way back when." I had to delay my last 2 years to finish also. But I'm so glad I did finish and with a lot of work did find a good job. I don't know what the university is like now but I do hope that it is still a wonderful place to learn, and to be able to get a job when a person graduates.

— Penny Irvine Cooper

during a pandemic. My siblings and I spent one of our weekly Zoom get togethers discussing Crumbl. We discovered that each of us live within 2 to 3 miles of a Crumbl shop with one living in Las Vegas, another in St George, Utah, two living in Idaho Falls, Idaho, and me in Fredericksburg, Virginia. All their cookies we have eaten are delicious. Yes, I have a craving for their chocolate chip cookie and can't wait until the Aggie Blue mint appears on the menu here.

— Kenneth Traveller, '71

COMPELLED TO WRITE

I have been getting this magazine for years and this is the first time I have felt compelled to write. I loved this issue! I have found interesting articles in others over the years, but this was just delightful. Such a diverse selection, yet a common theme. And, I read every article!

— Faye Whitworth '72, M.Ed. '79

CONVERSATIONS

What was your best failure?

Write us at mageditor@usu.edu.

We welcome your thoughts. Please email letters to mageditor@usu.edu. Please include your full name, address, phone number/email address, and class year, if available, for confirmation of your identity. Letters should be 200 words or less and respond directly to an article in a recent issue of Utah State magazine. Letters may be edited for length, style, and clarity, and fact-checked as appropriate. While Utah State magazine endeavors to publish all letters that meet the guidelines, space is limited, and letters from members of the Utah State community that contribute to a diverse range of perspectives will be prioritized. Letters that violate USU's Principles of Community will not be considered.



RESEARCH

Utah Legislature Funds New Dementia Research Center

Nearly 35,000 Utahns were living with Alzheimer's disease in 2021 — a figure expected to increase 20% by 2025. Anyone who has cared for someone with Alzheimer's or related dementia (ADRD) understands the emotional, physical, and even financial toll. In 2020, Utahns provided about 144 million hours of unpaid care to family and loved ones, a value estimated to be upwards of \$2 billion.

The Utah Legislature approved \$850,000 per year to support a new **Alzheimer's and Dementia Research Center** at USU's Emma Eccles Jones College of Education and Human Services to provide research, training, and support for people living with ADRD, as well as their families and caregivers. The center will build on the research and intervention work of specialists like Beth Fauth, a professor of human development and family studies who examines ADRD and its impact on caregivers.

"Utah State's mission has always been to conduct research that benefits people throughout the state," she says. "This center fits that mission well. Alzheimer's education and support can be made available even to those who live far from Logan, and people throughout the state can have opportunities to participate in research."



Our country has a wealth of water-related data, but the infrastructure doesn't exist yet to put all of the pieces together.

We're excited to have the opportunity to translate more than a decade of research on hydrologic information systems into operational infrastructure that can improve our country's modeling and forecasting systems.

— **Jeff Horsburgh**, an associate professor at the Utah Water Research Laboratory, regarding USU's partnership with a consortium of universities to improve the nation's ability to manage water resources and forecast water-related hazards like drought and floods. The National Oceanic and Atmospheric Administration awarded up to \$360 million to establish the new Cooperative Institute for Research to Operations in Hydrology headquartered at the University of Alabama.



What's For Dinner? Potentially, Hazardous Metal Pollution

Toxic metals deposited in the Great Salt Lake

Lake from runoff and atmospheric pollution can be absorbed by wetland plants and passed up the food chain. A team of USU researchers led by **Edd Hammill**, associate professor of watershed sciences, sampled three native plants and invasive phragmites to see where in the plants they accumulated — belowground in roots, bulbs, and rhizomes or aboveground in shoots, leaves, and seeds. While all the plants sampled stored selenium and arsenic belowground, phragmites had the highest concentrations of lead and mercury in their seeds, and all the plants contained significant concentrations of other metals in their aboveground tissues, Hammill explains.

This is problematic because metals are fat soluble. Insects that feed on vegetation accumulate the metal in their tissues, which gets passed on to predatory insects that waterfowl and migratory birds may ingest. The study also found copper and cadmium levels 10 times higher in predatory insects than in wetland plants. One upside to the findings: wetland plants are useful for cleaning up lake pollution, Hammill says.

Citizen Science Apps Are For the Birds. No, Really.



Citizen science has benefited efforts from sorting images of the cosmos to mapping mosquito populations.

Erica Stuber, assistant professor of wildland resources, led a team of researchers to examine the accuracy of information produced by citizen science apps for monitoring bird populations. They compared publicly-produced data from the popular app **eBird**, developed and maintained by the Cornell Lab of Ornithology, with officially tracked numbers from monitoring programs.

Currently, the app produces an inordinate amount of data, but not always in a form that researchers can directly use. Every three years the U.S. Fish and Wildlife Service estimates the number of bald eagle nesting sites across the U.S. to track how the population is faring. Stuber partnered with the agency and the eBird science team to identify the type of information that could benefit agency efforts, and to compare that filtered app data with official bald eagle counts. She found them surprisingly well-matched. She is repeating this analysis with other bird counts and is finding patterns.

For instance, the data from citizen scientists seem to be a good match for tracking the timing of migrating waterfowl but it's not always super accurate in pinpointing waterfowl abundance across seasons, she says. "If we can begin to identify the circumstances when it is most accurate, and when it misses the mark, and why, we'll be able to use this massive resource to augment official monitoring efforts."

BOOKMARK IT

USU Eastern's Prehistoric Museum // "Horns & Tusks" •

July – December 2022

A special exhibit "**Horns & Tusks: Ceratopsians and the Evolution of Bizarre Headgear**" features 50 odd, outlandish, and sometimes comical animals ranging from the time before the dinosaurs up through the last Ice Age.



Photo by Rob Gaston. Mention you heard about the exhibit in *Utah State* magazine and get free admission.

NEHMA // Looking Backward & Forward Forty Years with NEHMA & What's Next • February 5 – December 17, 2022

A collection showcasing **40 pieces of the Nora Eccles Harrison Museum of Art** to celebrate its founding in 1982, as well as 36 pieces representing each year that George C. Wanlass has purchased work for the museum through the Marie Eccles Caine Foundation and the Kathryn C. Wanlass Foundation.

USU Research Landscapes // Joanna Endter-Wada • November 3, 2022

Joanna Endter-Wada, professor of natural resource policy and social science, studies the human dimensions of ecosystem science. She will share research focusing on water, public land, forest resources, fisheries, and urban landscapes.



Researchers Call to Close Gaps in Plastic Waste Cycle



Microplastic — broken-down plastic often invisible to the human eye and carried for miles by wind and water — has been found in arctic snow, inside human breast milk, and within the intestinal tracts of marine animals. Despite millions of tons of plastic produced every year, much remains unknown about the plastic cycle. For instance: how much microplastic is pulled into the atmosphere and deposited into the world's oceans? How much remains floating in the atmosphere for animals to breathe and plants to absorb? A team of international experts in atmospheric, oceanography, and plastic pollution, including USU's **Janice Brahney**, associate professor of watershed sciences, published a paper in *Nature* that identifies gaps that need closing and outlines a global observation and research strategy.

Still Left Behind: Utah Women in STEM



While Utah ranks among the top 10 states for tech growth by the U.S. Bureau of Labor Statistics, it lags in “STEM-friendliness,” a metric that considers the gender disparity in STEM field occupations and degrees. The university’s **Utah Women & Leadership Project** first studied Utah women and STEM in 2016. A 2022 update found that the number of women in STEM careers has increased, comprising 21% of STEM occupations — up from 18% but about 6% below the national average. Increasing networking opportunities, mentoring, and visibility is important to grow the ranks of women in STEM.

“The low participation rate of women in STEM occupations is troubling,” says **Susan Madsen**, founding director of the UWLP and a report author. “Particularly since STEM jobs tend to have higher salaries, and women are already financially disadvantaged given the large gender wage gap in Utah.”



As migratory animals have to face a rapidly changing climate, species that can process information and quickly adjust their behavior to match present environmental conditions will have a better chance for survival.

— **Danielle Berger**, USU wildland resources Ph.D. student, on a recent study where researchers found that following the herd is just one strategy bighorn sheep use to make decisions about seasonal migration, in addition to using past experience and what they observe about their world from the rocky crags of the Sierra Nevada. Findings were published in the journal *Frontiers in Ecology and Evolution*.



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USU Launches Gender-Inclusive Housing Option

A pilot program started this fall allows USU students who live in on-campus residential housing to request gender-inclusive housing arrangements. Traditional, same-sex room assignments are not always ideal for some students, and this flexibility enables **USU Housing Services** to respect the diverse nature of the USU student body and meet the needs of all students. All students who participate in the new program must enter into any roommate arrangement as a willing partner.



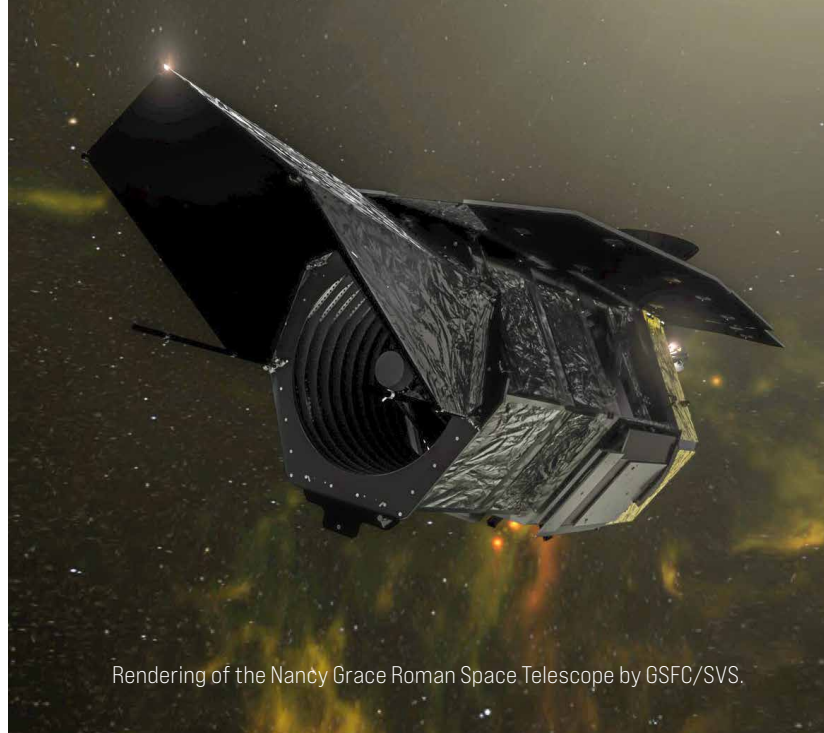
A Cost-Saving Approach to Instruction

A side project by Merrill-Cazier librarians interested in **Open Education Resources (OER)** — free learning materials that can be created, adopted, or adapted for classrooms — has saved Utah State University students upwards of \$3.3 million since 2014 when the library began tracking numbers. Last year alone, 8,020 students in courses using OER saved over \$888,400, and **Stephanie Western**, USU's OER Program Manager, hopes that figure grows as more faculty members make the switch from using pricey textbooks.

“The cost benefit is massive and is one of the reasons why instructors are willing to put in so much work,” she says. “OER make a huge difference for their students, and for students at other universities. Because when these things are available anybody can use them.”

OER often use Creative Commons licensing, which is different from traditional copyright and gives people flexibility in how they share and publish material. This can also improve accessibility for students who may need to use assistive technologies like screen readers and can be printed for those who prefer hard copies. OER may even enhance educational experiences by offering interactive features like chemistry simulations or audio files accompanying music theory texts. Another benefit of OER? They can be easily updated as current events emerge and allow instructors to tailor material to be culturally responsive to their students, Western says.

More than 260 USU faculty members have used OER in their classrooms to date. However, creating or modifying OER for individual courses is labor intensive. So, USU began a grant program offering between \$500 and \$3,000 to fund



Rendering of the Nancy Grace Roman Space Telescope by GSFC/SVS.

SPACE DYNAMICS LAB

USU's Space Dynamics Laboratory designed and built a critical subsystem for NASA's Jet Propulsion Laboratory that will integrate onto the **Nancy Grace Roman Space Telescope**, a spacecraft that will operate at the Earth-Sun Lagrange point, where the gravities of the Earth and Sun balance each other, to answer fundamental questions about dark energy, exoplanets, and infrared astrophysics, and to measure the history of cosmic acceleration. SDL developed the Cryogenic Thermal Subsystem to provide cooling for the Roman Coronagraph Instrument. The system includes two space-qualified radiators, two thermal straps, and support structures that will reject heat generated by the detectors.

OER development — an effort that began in 2017 with the College of Humanities and Social Sciences and has expanded across the university. This is good news for students on a budget.

“Some of these students are really struggling to pay for this stuff, or they are just not buying the textbooks and are just hoping that their grades won't suffer because of it,” explains Western.

As the OER library team seeks to expand into more courses, particularly general education classes, they survey students at the beginning and the end of semester of courses using OER about their expectations and experiences. “Students say that they did more of the class readings than they expected,” Western says. “We are trying to find out what is making the biggest difference, and what is helping, so we can do more of that.”

MISSED IT?



USU Moab Ribbon Cutting

On April 1, 2022, after decades of planning, USU Moab's new campus opened its doors to the community. The campus building is USU's first net-zero energy facility, meaning it creates more energy than it uses. Estimates suggest it will prevent 196 metric tons of CO₂ emissions from being released into the atmosphere. The new campus expands existing programs and provides upgrades to classroom facilities for programs such as fabrication and welding to nursing.

Noelle E. Cockett speaks at the grand opening of USU Moab's new campus. Photo by Levi Sim.



Photo by Levi Sim.

Water Optimization on Utah's Farms



Matt Yost an assistant professor in the plants, soils and climate department, discussed current irrigation research and techniques to optimize water to support Utah's food producers in last month's Research Landscapes talk.

LEADERSHIP CHANGES

New USU Leadership

In July, Laurens H. (Larry) Smith became USU's provost and **Robert W. Wagner** stepped into the university's new executive vice president role. This represents a reconfiguration of positions after Executive Vice President and Provost Frank Galey retired. He played a key role in the university's COVID-19 pandemic response and leading the effort to create an on-campus testing center. Wagner, USU's former VP of Academic and Instructional Services, will focus on day-to-day operations while Smith will focus solely on academics in the provost role. He served as the VP of Statewide Campuses and dean of USU's Office of Research and Graduate Studies and interim provost from 2016 to 2018.

Chief of Police Brings Transformational Experience to USU

Blair Barfuss, M.S. '11, took the helm of USU's police department this summer, bringing more than 20 years of public safety experience in Utah to the force. USU's chief of police serves as an adviser to the university on matters related to law enforcement and is responsible for police operations on both the Logan and Eastern campuses. Barfuss holds a master's in human resources from the **Jon M. Huntsman School of Business**. He is a graduate of the FBI National Academy who is recognized for using transformational policing service models that build community partnerships, embrace diversity, and provide transparency to the campus community.



Photo by Levi Sim.

The opportunity to lead USU in this important role gives me a measure of excitement but also an awareness of the hard work ahead of us. I appreciate that there are many ongoing DEI initiatives at USU's different campuses, and I look forward to working with university leadership, faculty, staff, students and other stakeholders to take us to the next level.

— **Dr. Jane Irungu**, USU's first vice president of diversity, equity, and inclusion who began in July. She will guide practices to define, assess, and promote inclusive excellence, access, and cultural proficiency for USU students, faculty, and staff. According to the university's first diversity and inclusion survey, students with an underrepresented identity status are less likely to report feeling safe and that they belong on campus. The creation of the cabinet-level position was a top recommendation from USU's Diversity and Inclusion Task Force.



ATHLETICS

Aggies Successful in the Classroom and on the Field

USU's nearly 350 student-athletes earned a combined 3.37 cumulative grade point average, the second-highest cumulative GPA in the history of **USU athletics**. Almost 75% of Aggie student-athletes earned a 3.0 or higher GPA as 49 student-athletes were named to the Dean's List for having at least a 3.5 or higher with 15 or more credit hours. USU women earned a spring semester GPA of 3.50 and carried an overall cumulative GPA of 3.55, the highest cumulative GPA by female student-athletes in USU history.

Men's Ultimate Club Team Caps Season with No. 13 Finish

USU's men's ultimate team finished No. 13 in the country during the program's second-ever appearance at nationals. Two Aggies led the competition in personal stats, including first-year student **Ben Hoffman** with 32 goals, and senior captain **Garrett Martin**, who topped the leaderboard with 25 assists. In their final game of the season, the Aggies beat the Michigan Wolverines 15–11. For the Aggie seniors, the win marked the end of their collegiate careers.

"I wish I could play college forever," Martin told the *Utah Statesman*. "But it's also what makes college so special, that you don't get to do it for that long."

This story was adapted from student Jake Ellis' story in the Utah Statesman.



The men's ultimate club poses for a team photo after winning the 2022 Northwest Region championship.



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AWARDS

Reshaping Wireless Communication

Rose Hu, a professor of electrical and computer engineering, is working to enhance efficiencies in next-generation wireless networks. She was awarded a \$165,000 National Science Foundation (NSF) grant, part of a \$500,000 collaborative project which Hu leads, to accelerate communication and computation-intensive tasks such as channeling state information processing — how a signal travels from transmitter to a receiver — by orders of magnitude in massive multiple-input, multiple-output communication systems.

“We are designing what we call **lightweight artificial intelligence (AI)**,” Hu explains. “We can use this to greatly reduce the training time it takes artificial intelligence to make a decision by extracting the most important information.”

Currently, the massive amount of data these networks require is centralized, which slows down the decision-making process. Through decentralization, optimization of data features, and simplification of AI structures, lightweight artificial intelligence has the potential to greatly reduce the time it takes for tasks to occur without losing accuracy.

Predicting Costly Solar Flare-Ups

Solar activity can wreak havoc on satellite communications, causing disruptions from minor inconveniences to hazardous outages on Earth. **Soukaina Filali Boubrahimi,** assistant professor of computer science, was awarded a three-year, \$527,129 NSF grant to develop novel methods using physics and machine learning-based models to predict solar energetic particle events.

Micro-Brain Researcher Rewarded with NSF CAREER Grant

Yu Huang studies micro-brains — brain organoids generated from stem cells to replicate human brain function. The assistant professor of biological engineering received \$600,000 from the NSF’s Early Career Development Program to fund a new project investigating the impact of the **Zika virus** on human brain architectures and expand collaboration with math and antiviral scholars on campus.

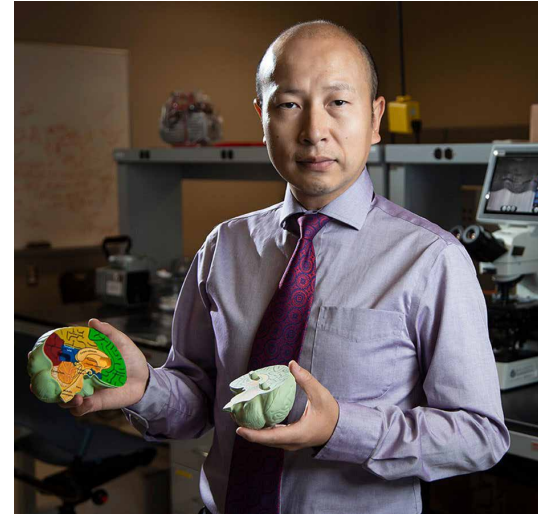


Photo courtesy of USU’s College of Engineering.

Nine Aggies Named 2022 NSF Graduate Fellows

In April, nine USU students and alumni were named 2022 NSF Graduate Research Fellows and will receive up to three years of support, including a \$34,000 stipend and yearly \$12,000 for tuition and fees.



Undergraduates Strike Gold

From left, USU scholars Bruce Brewer, Cristina Chirvasa, and Wesley Mills.

Three USU undergraduates were named 2022 Goldwater Scholars for their outstanding achievements in science, technology, engineering, and mathematics. The Barry Goldwater Scholarship and Excellence in Education Foundation funds scholarships of up to \$7,500 per year toward annual tuition and expenses. Aggie recipients include **Bruce Brewer,** a mathematics major; **Cristina Chirvasa,** a fisheries and aquatic sciences and wildlife ecology management double major; and **Wesley Mills,** a physics major.

New Building, New Quad

Construction of the Mehdi Heravi Global Teaching and Learning Center begins this fall, replacing a parking lot beside Old Main with a hub for building international connections. The 37,700 square-foot building will house programs in the Department of World Languages and Cultures, eight language labs, and serve as welcome site for language and international students to build relationships with one another. The center is possible by funding from the Utah State Legislature, the Church of Jesus Christ of Latter-day Saints, and private donors, including **Mehdi Heravi, '63, M.A. '64**, a scholar and philanthropist. “My hope is that any person, especially the students, who go through this building will become a changemaker for the betterment of this society, this country, and the entire world,” he says.



A rendering of the new Mehdi Heravi Global Teaching and Learning Center courtesy of the College of Humanities and Social Sciences.

Huntsman to Build Experiential Learning Center

A new building will house experiential learning programming at the Jon M. Huntsman School of Business in Logan thanks to a recent \$2.5 million gift from the **Larry H. & Gail Miller Family Foundation**. The gift adds to the more than \$4 million previously given by the foundation to the school to support initiatives aimed at preparing students with the skills needed in today’s fluid business environment. Research has shown that students who have the opportunity to engage in hands-on experiential learning are more likely to both land work after graduation and be engaged and excited about their jobs.

Indoor Practice Facility Coming to Campus

A \$1 million gift from Tom and Patty Willis will help fund a new state-of-the-art indoor practice facility. The 110,000-square-foot \$30 million facility, located next to the Stan Laub Indoor Training Center, will have a full-size football field and accommodate a full-size soccer field. The project will also house USU’s new golf training facility and locker rooms and office space for the soccer program. The new indoor practice facility will free up the Laub training center for more access for all sports.

“We are grateful for the generous gift from the Willis family on this facility that will be a positive game-changer for our student-athletes across all sports,” says **John Hartwell**, USU’s vice president and director of athletics. “Tom and Patty’s buy-in to our vision will serve as a catalyst for our development team as we raise the funds to build the practice facility.”

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Photo by Alexander Vuksta.



USU CELEBRATES JUNETEENTH

“All visitors welcome,” reads the handwritten sign tucked underneath a long, slender windshield wiper of the Utah Black History Museum’s mobile exhibit.

Below it, sharing space with the same bus windshield, a poster advertises events for Utah State University’s Juneteenth celebration — the first since it became a state holiday in 2022. If you’re unfamiliar with Juneteenth you’ve come to the right place.

The museum’s mobile exhibit features paintings of prominent Black figures of the American West, including Mormon pioneer Jane Manning James and explorer James P. Beckwourth, who was born into slavery and later freed by his owner and father. The bus was deployed to USU for Juneteenth activities June 17–19.

For many Americans, slavery ended when President Abraham Lincoln issued the Emancipation Proclamation on January 1, 1863. But it wasn’t until Union Army General Gordon Granger posted General Order No. 3, which announced that the Emancipation Proclamation would be enforced, in Galveston on June 19, 1865, that enslaved people in Texas understood they were free.

“Juneteenth to me is a reminder of how far we’ve come as a country, and how far we still need to go,” said junior Nura Omer, USU’s Black Student Union incoming president and former marketing manager, in a USU video before the event. “It’s also a commemoration of the millions of people that this country was built on the backs of who weren’t even seen as people at the time.”

Omer (right) is pictured with past BSU president Hal Magnuson (left), who works to make all students feel safe and that they belong at USU. The BSU helped organize panel discussions with USU alumni, an interfaith devotional, community 5K race and BBQ, and bring the Utah Black History Museum’s mobile exhibit to the Logan campus. The goal was to celebrate the end of slavery and build unity in the community and beyond.

“[Juneteenth] reminds me that I’m super privileged where I am and I have all of these opportunities,” Omer said. “And it kind of makes me sad because there are so many dreamers that never got to fulfill that.” **A**

— Kristen Munson

► **RONALD RED-ELK ATEWUTHTAKEWA**, a historian of the Comanche tribe, participated in the April roadshow for the *Bringing War Home* project at Hill Air Force Base.

BRINGING WAR STORIES HOME

By Kristen Munson Photos by Levi Sim

The artifacts of war often reflect the everyday aspects of it. Birth certificates from babies born on overseas military bases. Art etched onto artillery shells out of sheer boredom. Knickknacks carried for luck or something like it. Draft orders of a soldier who never came home. Two Utah State University scholars are collecting the stories attached to the objects we keep stashed in closets and displayed on mantels as one way to understand the history of war.

For Susan Grayzel, a history professor co-directing the two-year *Bringing War Home: Object Stories, Memory, and Modern War* project, one item is her grandmother's civil defense volunteer pin, a relic of the training she underwent in World War II while living as a wife and mother in Brooklyn. Most of the time the pin sits in Grayzel's jewelry box. Sometimes she fastens it to her lapel before lectures.

"What our project is trying to do is capture the personal history associated with objects," she explains. "Someone is living with this piece of history that tells a family story but also contains part of all of our history. We want to preserve these objects and histories so they don't get lost."

In 2021, the National Endowment for the Humanities Dialogues on the Experience of War program funded *Bringing War Home* to help document ordinary objects and stories of war to capture the diverse experiences of

veterans, military families, and civilians. While the project emphasizes stories about material culture from World War I and the Vietnam War, artifacts from all conflicts involving the U.S. military will be preserved in a digital archive housed at the USU Libraries.

As part of the project, co-directors Grayzel and Molly Boeka Cannon, an anthropologist who heads USU's Museum of Anthropology, jointly taught a class on the history and material culture of modern war to involve students in the process. Boeka Cannon is well versed in using objects to share stories. She is less familiar in collecting war histories.

"I am pretty much a student in this class along with the undergraduates learning the history of each of these wars," she confesses. "What I really like about this project is we are building a public history. It's your history, and it's my story, and it's where those come together."

At its core, the project centers on community participation. Grayzel and Boeka Cannon have held several roadshows around the state for people to share their stories about artifacts of war. They are also teaching the next generation how to document these experiences. Senior Becca Crummitt, a history major from Preston, Idaho, is no stranger to preserving narratives. She is Native American and grew up listening to relatives talk of their history and the need to share it.





▶ **AMONG THE ITEMS** people brought to the April event included framed letters home, like this one from a World War II soldier.



▲ **PHOTOS FROM U.S. SOLDIERS** stationed abroad are a staple at roadshows. This set includes images that show the human side of war.

▼ **SOME ITEMS** in the project, like the hats pictured below, are from more recent conflicts.



▶ **A SCRAPBOOK** containing letters from servicemen in Vietnam.



“We are from the Comanche Nation and the Comanche Nation are warriors,” she says. “Many of my family members were in the military and in World War II when there were Comanche code talkers. ... I’ve always been interested in learning about that part of my culture.”

In April, as part of her Museum Studies class she signed up to record stories for the event at Hill Air Force Base. She realized her great uncle Ronald Red-Elk Atewuthtakewa, a historian of the tribe, would be passing through the area from Oklahoma. She floated the idea of him sharing the story of his brother Roderick Atetewuthtakewa Red Elk, who served as a Comanche Code Talker deployed to the European Theater during World War II.

“He [Ronald] is one of the people who actually helped create the written version of the Comanche language,” Crummitt explains. “Some of his siblings were the ones in WWII who were the Comanche code talkers. ... He is like the one person still alive who can give that information.”

Witnessing people describe the items they came to share underscored for Crummitt how important it is to stop and listen.

“There were so many older people who were in the military who didn’t really get the chance to share their story

and share how their lives have been affected and how they have affected others’ lives,” she explains.

And it’s important to listen to stories you think you’ve heard before. Crummitt’s uncle shared how sometimes war isn’t a series of battles.

“He was talking about how there was a war on his language,” she says. “When [I] do think about war, I just think about World War II. ... There are so many other definitions of the war that people don’t think of. And I think that is really interesting that he brought that up — that war isn’t always just like a battle between people, it can be against objects or things.” **A**

Details can be found on the Bringing War Home website:
www.usu.edu/mountainwest/bringing-war-home.

▶ UPCOMING ROADSHOWS

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October 22, 2022 • USU Moab Center

November 5, 2022 • Historic Wendover Airfield Museum



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A Fish Tale



By Jeff Hunter '96

Mike Simpson '77 was having lunch with his mother and two of his uncles in November 2021 when he felt it necessary to divulge his ambitious plan. A U.S. congressman from the state of Idaho since 1999, Simpson was about to unveil the Columbia Basin Initiative (CBI), a proposal that calls for breaching four dams to help preserve the Gem State's wild salmon and steelhead runs.

"I told them, 'Well, all hell's going to hit the fan about February,' and they said, 'Why?'" Simpson recalls. "I said, 'I'm going to put out a proposal to save Idaho's salmon runs that are going to extinct in the next 10 to 20 years if we don't do something. And it's going to involve the removal of dams on the Lower Snake River.'"

Simpson says his uncle Ferrol Simpson, a retired engineer, looked at him and declared, "That's the stupidest idea I've ever heard of. ... We need the power."

Simpson explained that since the construction of the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams in the 1960s and '70s, a variety of new ways to produce electrical power have been introduced, including wind, solar, and smaller, more efficient nuclear reactors. Simpson says he dropped the topic after that, but soon his mother and uncles started recalling horseback trips into the rugged mountains of central Idaho. During one of those family adventures, the Simpsons encountered a stream full of what they originally believed to be black rocks. But the "rocks" turned out to be hundreds of spawning salmon.

Simpson acknowledged that those sounded like "great memories," and then asked his Uncle Ferrol, "Do you want your great-grandchildren to be able to create those same kinds of memories?"

"He looked at me with a tear in his eye and said, 'You know, I would.' And he's become one of the best supporters of this because he realized that we're not doing this for us," Simpson notes. "I'll probably be dead before these fish go extinct. We're doing it for future generations so that they can also have the same opportunities to enjoy the great Idaho outdoors that we had."

Needless to say, the idea of breaching hydroelectric dams to save Idaho's salmon runs is a controversial and expensive one. And one that's been proposed by various environmental groups in recent decades with no success. But Simpson is passionate about the Columbia Basin Initiative because, "I can see the train coming down the tracks. And that train is these fish going further and further extinct."

"I'm trying to look down the road some," Simpson adds, "and if you're in this job and you're not trying to solve a problem, then you have to ask, 'Why the hell are you here?'"

Simpson, who grew up in a family of Aggies, says "I thought you went to Logan after you finished high school. I just assumed that was the next step." He attended USU with his wife, Kathy '72, after graduating from Blackfoot High School in 1968. Although he eventually followed his father into a career in dentistry, he toyed with the idea of

pursuing a degree in political science. It wasn't until he decided to seek a spot on the Blackfoot City Council in 1980 that he got into politics, and Simpson ended up serving seven terms in the Idaho State Legislature, including Speaker of the House from 1992 to '98.

When longtime U.S. Congressman Mike Crapo opted to run for the Senate in 1998, Simpson successfully ran for his seat, and he will be seeking his 13th term in Congress this November.

The veteran Republican, who originally unveiled the details of the Columbia Basin Initiative in February 2021, strongly believes that the Lower Snake River dams will be taken out sometime in the future regardless due to a court order to preserve Idaho's wild salmon runs via the Endangered Species Act. Simpson says he feels it would be far better to orchestrate the breaching of the dams in a timely manner that would better accommodate large changes in transportation, agriculture, recreation, and electrical power.

"It's complicated and potentially very expensive," acknowledges Simpson, who calls for \$33.5 billion of federal funds in the CBI.

Adding to the obvious challenge of replacing water storage and hydropower is that the locks attached to the dams allow for grain to be transported downriver from Lewiston — the furthest inland port in the country — to the Columbia River. The CBI calls for the use of electric trucks and trains to help transport the grain, while Simpson notes that 487,000-acre feet of water from southern Idaho is

All of Idaho's wild steelhead and salmon are currently listed as threatened or endangered. Congressman Mike Simpson's Columbia Basin Initiative calls for the removal of four dams along the Lower Snake River in an effort to increase the probability that the fish, after reaching the Pacific Ocean, will then be able to better navigate the Columbia and Snake rivers and return to their native rivers and streams in the state of Idaho. The map below shows the location of those four dams — Lower Granite, Little Goose, Lower Monumental, and Ice Harbor — in relation to the watersheds of central Idaho that flow into the Snake River, as well as the four dams along the Columbia River that salmon must also traverse in order to reach their spawning grounds. Illustration by Liz Lord '04.



used every year to help flush salmon over the dams.

“And guess what? We’ve been doing that for a number of years, and it hasn’t done anything. The fish are still going extinct,” Simpson says. “And we end up losing all of that water in southern Idaho, and we’ve already got an aquifer that’s being depleted.”

The dams, which are all located in Washington, are a huge hinderance in the salmon’s 900-mile journey to return to the rivers and streams of Idaho after going down the Snake and Columbia rivers to the Pacific Ocean. The salmon already have

to navigate four dams on the Columbia via fish ladders while heading east, and their rate of survival drops dramatically compared to the salmon who may swim north or south into their native drainages in Oregon and Washington rather than continuing on and encountering the dams on the Lower Snake River.

“All of those fish have had to deal with the same things in terms of predators and ocean conditions and other conditions, the only difference is the number of dams they’ve had to go over,” Simpson points out. “The fish passage on the dams is tre-

mendous, between 90 and 95%. That’s good fish passage. But that’s between 90 and 95% at each dam, so you if you go over eight dams, there’s just a point where that’s too much.”

Sarah Null, an associate professor of watershed sciences at USU’s Quinney College of Natural Resources, compares the monumental effort by salmon to return to the river of stream of their birth to the running of a “gauntlet.”

“It’s not easy. A lot of people think, we’ll just build a fish ladder, and the fish will be fine,” Null says. “But we know

that there can be problems like predation, or that sometimes fish ladders are dependent on specific flows or temperatures. And that too often leads to putting fish in trucks and hauling them around these barriers. And we lose a lot when that happens.”

Null says in the long run it might also be more feasible to breach the dams “rather than put tons of money into programs that, after decades, we don’t have a lot to show for.”

“The Snake and Columbia are both basins that taxpayers have been paying a lot of money for restoration,” Null continues. “So, from an economic standpoint, is there a better way to do this? And as far

as dams being the only solution to water problems, I think it’s important that we think more creatively or innovatively looking towards the future. Sometimes dams that were built 50 or 100 years ago no longer make sense in the 21st century.”

When the Biden Administration proposed the \$1 trillion infrastructure bill in early 2021, Simpson attempted to get the \$33.5 billion for the Columbia Basin Initiative included in the package. The CBI was left out, but Simpson says it certainly doesn’t mean the end of the plan which needs to be drafted into legislation. The 72-year-old, who now lives in Idaho Falls, continues to work with other politicians, particularly those in neighbor-

ing Washington and Oregon, to build additional support for the proposal which calls for the removal of two dams in 2030 and the final two in ’31.

“There’s still a lot of work that needs to be done,” Simpson admits. “But I will tell you, in the future, I firmly believe those dams will come out. It is the best chance we’ve got. In fact, I think it’s the only chance we’ve got.

“When you look at the facts, you’re going to have to either take the dams out or you’re going to sacrifice salmon. We’ve come to the conclusion that it’s one of the two.” **A**



We’re doing it for future generations so that they can also have the same opportunities to enjoy the great Idaho outdoors that we had.

— Mike Simpson

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The Connector:

Brian Steed Links Natural Resources Research with Policy

By Jeff Hunter '96

Brian Steed '97, M.A. '00, the inaugural executive director of the new Janet Quinney Lawson Institute of Land, Water and Air (ILWA), is pretty familiar with Utah State University.

As the youngest son of Allan Steed, the first director of USU's Space Dynamics Laboratory, Steed recalls spending "a lot of time hanging out and buying food out of the vending machines as a kid, and spending time with my siblings on Saturdays when my dad was doing work over there on the latest instrument."

Steed earned both his undergraduate and graduate degrees in political science at USU and has taught as an economics instructor in the Jon M. Huntsman School of Business. After spending seven years in Washington, D.C., serving as chief of staff to Utah Congressman Chris Stewart, then as the Deputy Director of Programs and Policy at the Bureau of Land Management, Steed returned to the Beehive State in June 2019 to head the Utah Department of Natural Resources.

But he left the cabinet of Governor Spencer Cox, '98, a former classmate, to lead the fledgling institute, established in 2021 to demonstrate USU's expertise in land, water, and air issues with civic and legislative leaders.

"Utah State is home," Steed says. "Logan and Cache Valley are home. So, it was an easy decision, especially to do something that I genuinely love doing."

We talked with Steed during an on-campus visit a couple of weeks before he officially stepped into his new role on July 1. This conversation has been lightly edited.

I assume when you were a student here that you didn't really envision yourself in a position like this. What helped steer you in this direction?

When I started my freshman year, I didn't know what I wanted to do for sure, then I went on a mission to Guatemala (for the Church of Jesus Christ of Latter-day Saints), which has all of the natural resources and amenities and beauty of any place you would ever want to go. The people are hard-working. It's an amazing place. But I noticed that rivers ran different colors, depending on the day and who was dumping there. I realized that one of the major differences between the lifestyle that I had growing up and what I was witnessing in Guatemala was governance, and how that governance could have a big impact. And so that's how I ended up studying political science. I got a minor in economics because I saw there was a lot of crossover with how people behave based on whatever incentives they're provided.

What was your experience at the BLM like, especially while

basically serving as the director for a couple of years?

It's a big agency — one that's really important to the state of Utah. The BLM manages 245 million acres of land, and that's just surface area. It also manages 700 million acres of subsurface. And while most of BLM land is in the western United States in big forests and huge deserts, there are assets all over the country and interesting properties that you would never think about like a lighthouse in Florida.

There are really dedicated people at the BLM. There are 9,000 employees who have a hard job because they're tasked with this idea of multiple-use lands, and how you do preserve the landscape, but also allow different uses? That means that there's a ton of discretion, and then during each administrative swing, there gets to be a pretty big swing on that pendulum.

Have your experiences in Washington prepared you for a role where you're trying to serve as an intermediary between research involving land, water, and air, and civic and legislative leaders?

I think having experience on the federal side, as well as on the state side, that you're able to see that sometimes there are questions for which people have a ton of interest and a desire for solutions, but sometimes we're not aligning our research institutions towards those questions.



Logan native and Utah State alum Brian Steed has returned home to head up the recently created Institute of Land, Water and Air. Photo by Levi Sim.

I'm sure you've noticed some changes in Cache Valley since leaving, which you'll likely address at ILWA.

We had inversions here when I was growing up, but it's worse now. And it's going to be a difficult problem to solve, but it's something we really need to get a hold of.

We're also eating up all the land in a place that is known for its agricultural value. But that's the state experience right now, in part, because people have decided that you can live anywhere and work anywhere. Technology's a blessing, but it's going to put constraints on places that haven't really experienced it before. And I think that's what makes this new job opportunity so exciting. I would argue the top three limiting factors for growth here concerning natural resources are availability of land, availability of water, and quality of air.

Being in the middle of a brutal drought, it would seem that availability of water would be at the top of that list.

Water is certainly driving much of the conversation right now because we're in this drought that's unprecedented in the last 1,200 years and dealing with water scarcity, combined with increased demand. We are the fastest-growing state in the nation.

On the air side, we have a unique situation here in the West, but especially here in Utah where we have inversions and trying to determine how we can have improved air quality. There aren't a lot of really easy solutions, but there are lots of things that we can do better. And marginal changes can make a big difference.

On the land front, the conversion from ag to an urban space has real impacts on how people view the landscape around them. And it has real impacts on wildlife. Trying to figure out how to understand how they interface is going to be really challenging but also really fun. **A**

I've found that often times the answer already exists, you just have to go look for it. Someone has already answered your question, it's just that there's been no linkage connecting the answer to the questioner. And trying to align those two is something I think ILWA is really well set up to do.

What did you enjoy most about your time at the Division of Natural Resources?

On the federal side it's frustrating because it's so big. You can make changes on the fringes, but it's really hard to make major changes on speeding up processes or getting better quality processes. But in state government, it's a lot easier to make those changes and put out policy reforms that make big impacts.

Over the last three years, we've had hard conversations in Utah about water. Being able to lead the charge at DNR to say, 'What are we going to do about the water resources we currently have? How are we going best manage those?' and come up with broad-based solutions has

been a challenge. During the last legislative session, the legislature came up with more policy solutions. And to be part of that — feeding ideas, helping testify, or analyzing those proposed policy solutions — was really rewarding.

So, why leave the DNR for this position?

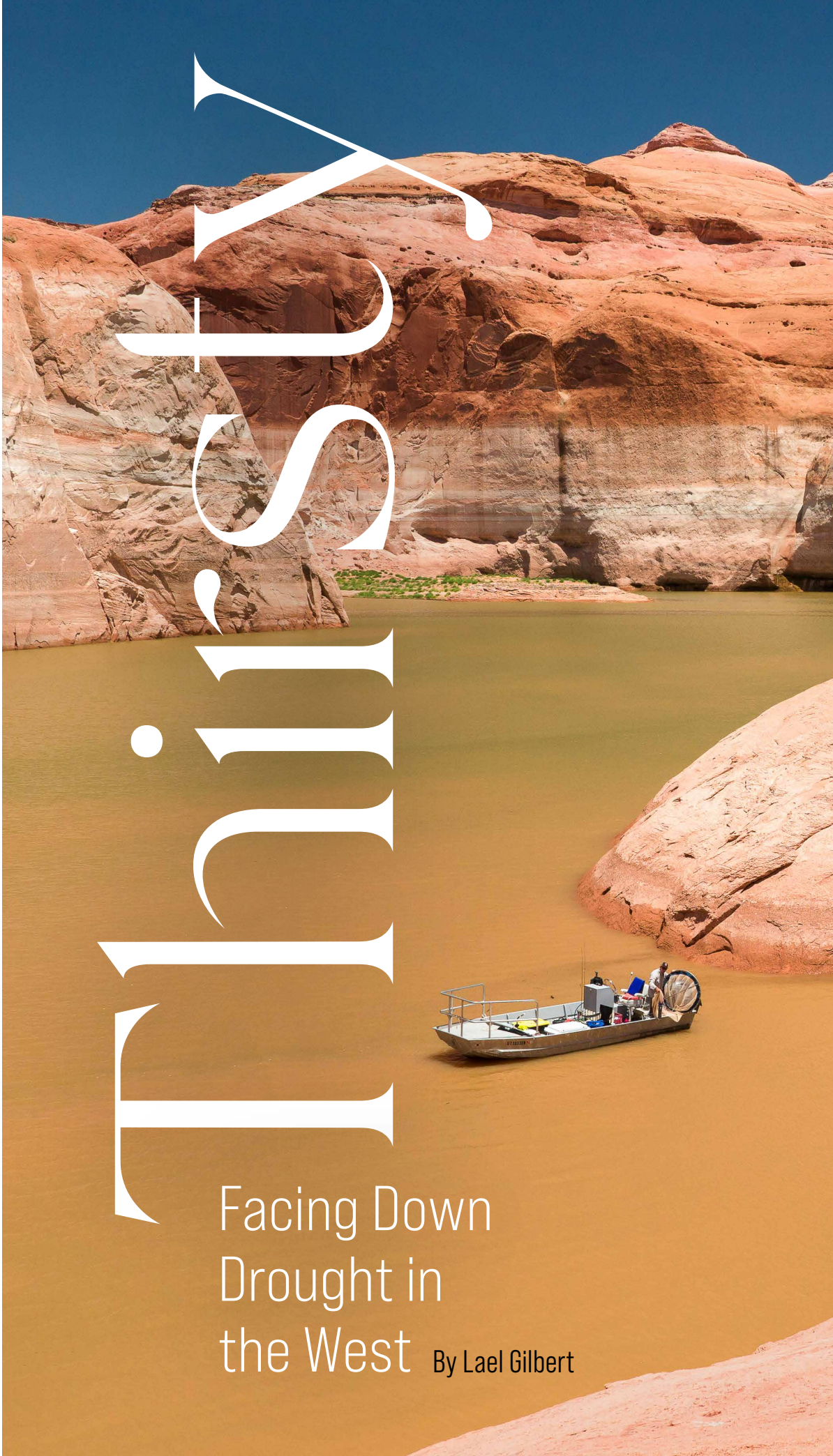
I loved my job at DNR. I've loved working on the issues I worked on and working with the governor. But these types of opportunities don't come along very often — to work in a center doing the things that you're passionate about and to do in a place that you love like Utah State.

When you look at what this institute is set up to do — answer the hard questions on land, water, and air — that's intellectually exciting and emotionally appealing to me. And ultimately, it's something I'm very much looking forward to doing. I hope we have an impact on the state in aligning the brainpower of the university, the real-world problems presented by land, water, and air, and devising solutions.

Lake Powell is a popular destination for anglers and boaters. As the water level has dropped, opportunities to explore the lake have expanded to include hiking to once-covered petroglyph sites. Photo by Levi Sim.

Lake Powell

Facing Down
Drought in
the West **By Lael Gilbert**





Let's be blunt: the outlook isn't rosy.

For more than two decades

trends for above-normal temperatures and below-normal rainfall have ruled the West. Official maps are painted in wide swaths with angry red and dark-red stripes — category markers for extreme and exceptional water shortages. Water percolating through the Colorado River Basin has dwindled — every drop is allocated to farms and cities before it ever reaches the sea. Mountains that should be getting one to two inches of snow every week of the winter are averaging one-tenth of that. Existing mountain snowpacks are melting in March instead of April.

We are smack dab in an ongoing 20-year drought, says Robert Gillies, state climatologist from Utah State University's Department of Plants, Soils & Climate.

It's a slow-moving disaster, making it somewhat difficult to process, especially when there are still adequate flows coming from kitchen faucets and garden taps. But consequences are lurking in the wings: Lakes Mead and Powell, the reservoir resource for 40 million people to flush toilets, grow alfalfa, and water their peonies, has dropped to record lows and could reach dead pool within a year (the level at which turbines can no longer crank out power). California's groundwater is overused to such an extent that

the land in some places is physically sinking. The iconic Great Salt Lake now sits at half its historic average with hundreds of square miles of dry lakebed surrounding the briny waterline.

Forecasting models show maximum temperatures rising — and minimum temperatures rising even faster, preventing snowpacks from building and melting them earlier each year, says Gillies.

Like ripping off a bandage, there is a certain catharsis in finally having to face the quiet calamity that's hovered at the edge of our desert-dwelling western consciousness — we are running out of water.

The good news is that this drought isn't news for many researchers and scientists at USU who've spent years studying strategies to help communities use water in smarter ways, to decipher the consequences of drought on natural systems, and to understand what will happen next so that we can continue to adapt.

If you've lived in the West for long, drought may not actually seem like that big of a deal anymore. We've coped before by squaring our shoulders, tightening our hydrological belts for a year or two, and hoping for a good wet spring. But because of a warming climate, these conditions may not be temporary, says Sarah Null, a professor of watershed sciences in the Quinney College of Natural Resources. Something is permanently shifting.

Warming temperatures are making a bad drought worse. Less precipitation falls as snow. Even when we get a good, solid storm, we can't seem to hang on to it. It slips through our fingers as liquid water, back to the atmosphere through evaporation, into dry soils, or through sun-warmed leaves by transpiration.

These new climate patterns are also volatile, teasing, harder to predict, Null says. Precipitation comes at the wrong time and in the wrong form to do the landscape much good. There might be an intense snowstorm that piles on the ski slopes — and then months of bone-dry sky. Or a hell-raising storm that floods the sandstone gulleys of Washington County — and then weeks of above-average temperatures that suck that soil moisture right back into the atmosphere rather than sending it to reservoirs. Or even an above-average year for precipitation — embedded in a decade of below-average conditions.

This variability has bigger consequences than just yellowing lawns. The hydrologic system in the West is a huge, slow-moving, and complex machine. Groundwork for its structure was established a hundred years ago, in a period when



Janice Brahney & Kim Hageman

Watershed Sciences & Chemistry

Investigating how the dry lakebed at the rapidly disappearing Great Salt Lake is producing airborne dust and toxins which could have major impacts on regional air quality.

the climate was unusually wet and when the idea of a million-person metropolis sprawling across a desert landscape was no more than a coyote's fever dream. Now we face a colossal triple-whammy that includes agricultural fields staked for a hungry population, growing urban demands for water, and less water available when we need it most — factors that are pushing the current system to its limits, says Jack Schmidt, from USU's Center for Colorado River Studies.

You might imagine that a good finale to drought would come in a wash of water. And indeed, give the West a good four years of soaking, above normal precipitation, and we could actually catch up on reservoir losses, says Gillies (although it's not in the forecast). But that's just one piece of a complex puzzle. Climate change is not so easily reversed, and unfortunately, more water won't necessarily mean less drought in the big picture. Because of warming temperatures, we may never revert back to the landscapes and relationships with water that we've known.

For USU researchers, the next chapter looks more like ongoing adaptation — for farms, in communities, and by the way we manage natural landscapes. There are still plenty of unknowns as this multi-decade drought continues to percolate alongside climate change and urban growth. USU researchers offer insight into what life might look like in a new warmer, drier, and smarter future.

Rain or Shine



Kelly Kopp

Plants, Soils & Climate

Works directly with local, state, and federal agencies to help citizens of the Intermountain West move toward more efficient use of landscape irrigation water and water-wise practices.

Alfonso Torres-Rua first learned to monitor the amount of moisture in a farm's soil the old-fashioned way — by rubbing a handful of dirt between his fingers.

"You can actually tell a lot about what is going on in the soil using just your hands," he says, demonstrating the technique. It's still how many Utah farmers gauge whether it's time to irrigate crops. But with current water shortages there is a lot less flexibility for over-watering error. Hydrological supplies to agricultural users are becoming more limited, and it makes less sense to offer thirsty crops too much water, rather than just enough.

Alfonso Torres-Rua
helps farmers maximize
their water allotments
by advancing precision
agriculture technologies.
Photo by Levi Sim.



It's easy to indignantly point at agriculture as an obvious culprit during drought, but it's not so simple, says Alfonso Torres-Rua. We all eat. The romaine lettuce, shredded cheddar, and hay-fed beef you enjoyed for dinner are a direct product of the way we use that water. The beneficiary of agricultural water use is you.

Big Gulp:

The Perilous Link between Drought, Wildfire, and Reservoirs in the West

Those were good days, so it seemed. It was the 1960s, the tail end of a 50-year dam building blitz. Hundreds of new reservoirs brimmed with water across the West. Intense suppression efforts had slowed wildland fires over the last half-century, and forests were growing green and thick. What many managers didn't know was that aggressive suppression of wildfire only put off (and exacerbated) the inevitable; the West would eventually burn, and all those new reservoirs would begin to fill with the post-fire erosion sediment.

Aggressive wildfire suppression had allowed dead wood and vegetation debris to stay undisturbed on forest floors. Add to that ecosystem stressors of the ongoing 20-year drought, and today you have a recipe for huge, damaging, and uncontrollable wildfires.

High-severity fires erase vegetation and remove the stabilizing system of roots that hold soil in place. After that, streams and rivers in burned watersheds can transform into muddy deluges, pulling sediment, ash, wood, rocks, and even boulders into the system. The dark surge churns across landscapes, disturbing the environment as it goes, and ultimately dumping the mess into the nearest reservoir, literally filling it from the ground up.

Denver Water recently spent \$27 million removing debris and sediment from Strontia Springs Reservoir. The Los Angeles County Public Works will spend \$190 million dredging four reservoirs impacted by sediment from a 2009 fire, according to the U.S. Department of the Interior. Despite soaring costs, the impact of wildfires on reservoirs has been largely overlooked until fairly recently. A team from USU is among the first to document and measure the impact of post-fire erosion on water storage.

Forest ecologist Larissa Yocom and ecosystem hydrologist Patrick Belmont teamed up with researchers to create a model to identify which watersheds are most at risk, how much sediment a particular erosion event might produce, and how far downstream the sediment could reach.

Projections show that future wildfires may cause sediment yields to at least double in one-third of western watersheds over the next three decades, potentially causing catastrophic losses in water storage for tens of millions of people. Outright solutions are hard to pin down, says Belmont, but increasing the number and size of well-managed, low-severity prescribed burns seems a solid strategy in ecosystems adapted to that pattern.

"A future without wildfire is not an option in the western United States," he says. "By using prescribed burns, at least we can choose when and where we want the fire and smoke. Extending the lives of reservoirs will have to include addressing the exacerbating effects of drought, which is directly tied to fossil fuel-driven climate change. It's not going to be an easy fix, but one that we are going to have to inevitably face."

Torres-Rua, M.S. '06, Ph.D. '11, an assistant professor of civil and environmental engineering, is developing precise watering tools for farmers that monitor a field's water levels in real-time using drone footage and satellite images that he feeds into data-driven models. His work will make it possible for irrigators with smartphones to see a season-long summary of water use and the current soil moisture status of their crop. It lets individual farmers monitor water consumption to plan future irrigation timing and levels, as well as allow canal and reservoir operators to monitor total water use to plan future irrigation demands for the entire system.

Utah's farms, orchards, and fields require a lot of water. The stretches of alfalfa, peach trees, rows of onions, bales of hay, and other agricultural products grown in the West consume more than 80% of all the water available for human use. Knowing this, it's easy to indignantly point at agriculture as an obvious culprit during drought, but it's not so simple, says Torres-Rua. We all eat. The romaine lettuce, shredded cheddar, and hay-fed beef you enjoyed for dinner are a direct product of the way we use that water. The beneficiary of agricultural water use is you.

Agricultural producers in Utah have already accepted deep cuts into their water shares in response to dwindling supplies, explains Torres-Rua. Cherry orchards in Santaquin, for example, cut water use by 40% in recent years. Other producers with fairly senior water rights were told this summer that they'd get just 25% of their shares. If farmers have to face further drawdown, trees and crops may (at the very least) become stressed and diseased. That's not a temporary setback. Water decisions today have long-term consequences for more than just farms, says Torres-Rua. They create a cascade of economic and social consequences that ripple across the whole economy.

Less water for farms means fewer planted fields — and that means fewer workers hired for harvest, fewer supplies purchased from businesses, a tighter food supply, more demand for produce in the grocery store, and rising prices.

On the flip side, since agriculture requires such a high proportion of the available water, every small improvement in conservation and efficiency also delivers big benefits to available supply. And Torres-Rua is assisting with that.

Dry Run: Urban Growth and Water

Meanwhile farmers are fending off an existential threat on another front — increasing calls to sell water rights to thirsty and expanding urban populations.

Utah is growing fast, with a population projected to increase by 66% over the next four decades. The state ranks second-highest in per capita water use (behind Idaho). We use water to drink, shower, raise gardens, and maintain our lawns. Every new community in the growing state needs access to this resource. But considering the reality of the current drought, it may be time to rethink our foundational relationship with the landscape, says Null.

“We are still trying to make Utah’s desert landscape look like Kentucky,” she adds. “We need to start looking more like Utah.”

Bathing and drinking are certainly non-negotiable. But there is room for improvement in plenty of spaces.

The water that falls in northern Utah shouldn’t necessarily all stay in here. Every gallon that runs through our sprinklers is one less gallon that makes it downstream into the shrinking Great Salt Lake or the diminished Colorado River. It’s one less gallon that supports healthy trout populations and sustains water-scrubbing wetlands, explains Null. Utah is also one of the sources for water for other large populations in Arizona, Nevada, California, and Mexico.

“It doesn’t work to think of the drought as ‘their problem,’” says Null. “This is a shared system. In two more decades we are going to be facing the same big conundrums that California is facing right now. Their pain is ultimately our pain.”

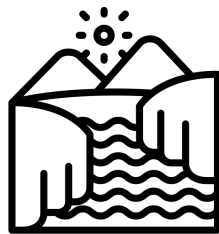
There is no one magic bullet solution to balancing the management of urban water, but key strategies include urban conservation and water banking, she says.

Until recently, encoded in Utah law is a



Karin Kettenring
Watershed Sciences

Works to restore native plants despite water shortages in Great Salt Lake and Utah Lake wetlands — critical stopovers for millions of migrating birds — which may soon be completely dry.



Belize Lane
Civil & Environmental
Engineering

Studies the effects of diverting river water for agriculture on water systems using digital models and real-world measurements.

‘use-it-or-lose-it’ trigger, designed to encourage development of water supplies and to discourage speculation by those who own rights. If a farmer didn’t use their water rights, they risked losing them completely. This deterred farmers from offering unused water toward other temporary needs — such as refilling the Great Salt Lake, boosting a struggling fish population, or supporting outside communities. It created deep motivation to literally pour surplus water onto empty fields rather than lose access to a valuable right.

With recent changes in Utah law (the Water Banking Act of 2020), new opportunities are opening for change. Under the modifications, owners of water rights have an administrative mechanism to temporarily lease their water to those who can’t afford to be without. It could work for drought mitigation, to address aquifer overdraft, to negotiate competing uses, provide more water to meet ecosystem and water quality needs, and meet interstate commitments. But it would be a complex social, legal, and practical change.

Null’s team investigates how water banking through a market system could respond to drought while supporting agriculture, ecosystems, and communities. The strategy, if managed well, could encourage water conservation and allow willing sellers to lease extra water to farmers, cities, or the environment.

Eco- system Roulette

You’ve likely seen the scenario in movies — someone hands a terabyte of weather data to an expert in a lab coat, which she feeds into a black box. Ten minutes later — ping! Out comes the exact GPS coordinates and trajectory of the asteroid (or tidal wave or sharknado). It seems easy. In the real world there is no black box — unless you count the work of Wei Zhang, assistant professor of plants, soils, and climate, and Hamid Karimi, assistant professor of computer science. It takes them significantly longer than 10 minutes, but their research is an intense effort to organize the mass collection of

data about snowpacks in Utah's mountains to improve forecasting for the spring runoff.

It's a complex task, but the importance of dependable snowpacks to Utah's water situation can't be overstated. Snowpacks act as a huge natural reservoir, storing a full 90% of the state's water resources safely frozen on mountain slopes until it is needed as the weather warms. When they melt too early, water slips downstream out of state and isn't accessible at the right time of year. If the soil is too dry, the snowpack seeps into the ground rather than into streams and rivers. If the snowpack isn't deep enough, there won't be enough water to distribute to farms and cities over the coming summer months, says Zhang.

In this new, fickle climate, northern Utah — unlike the rest of the drying West — is actually receiving as much precipitation (and sometimes more) than historical averages show that we should, says Gillies. But because of rising temperatures, it is consistently arriving as rain rather than snow. Rain just can't deliver the same hydrologic punch, he adds, so the extra precipitation doesn't change the reality of drought.

Zhang and Karimi are working to better understand how snowpacks accumulate and melt, and how much of that water will make it downstream to reservoirs. They are short-term clairvoyants, forecasting out to 12 months so that farmers can know what to plant during the coming season and cities can plan for summer water use, while colleague Yoshi Chikamoto, assistant professor of earth system modeling, works on 10-year time scales using data from oceans to forecast long-term trends.

Ecological systems have complex relationships with water and temperature. Droughts in the Southwest can feed on themselves in aggravating ways — dry soils across a region change regional weather pressure systems, pushing late summer monsoons out of their normal position in a way that creates intensified drought in some places, and flash floods in others, says Gillies.

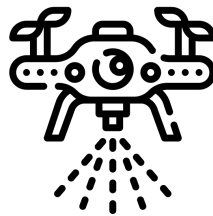
Some landscapes also participate in a sort of ecological roulette with drought and wildfire, says Larissa Yocom, assistant professor of wildland resources. When there's scant moisture, fewer quick-growing plants are able to establish in wildlands over a summer, reducing the potential for wildfire to carry from one spot to the next. Or you may instead land on option two — drought and extreme temperatures kill trees and shrubs that are already established, creat-



Matt Yost

Plants, Soils & Climate

Collaborates with Utah farmers and water managers to optimize water use through cutting-edge irrigation technology and crop management.



Steve Petruzza

Computer Science

Develops techniques to use real-time data from drones to quickly assess the health of crops and manage water-related challenges.



Larissa Yocom & Patrick Belmont

Wildland Resources & Watershed Sciences

Created a model to indicate regions most at risk for wildfires that could trigger erosion events, and how much of the sediment might reach reservoirs.

ing a packed tinderbox of dry, dead wood, and further drying what's already on the ground, to support bigger and hotter wildfires.

With the intense severity of the current drought, researchers are seeing more of the latter scenario. Even the hardy and (usually) drought-tolerant trees of southern Utah — juniper, ponderosa, and pinyon — are kicking the bucket in numbers higher than normal, creating the potential for intense and disastrous wildfires in the near future, Yocom says.

Zoom out a bit more, and you can see even bigger shifts happening across ecosystems due to long-term drought. The trees that eventually burn or decompose aren't being replaced by similar trees. Instead, new ecosystems are established with plants that thrive under disturbance and can survive these harsh new conditions — such as cheatgrass.

“Entire ecosystems are fundamentally shifting along the trailing edges at lower elevations,” says Yocom. “They are not reverting back to what they used to look like. So far, we haven't been able to define exactly where those thresholds are, where change is inevitable, but in many areas we don't have much choice but to watch those changes happen.” **A**

USU Extension's drought resources provide tips for urban and agricultural producers to reduce water. Learn more at extension.usu.edu/drought.

Larissa Yocom knows wildfire belongs on western lands. But the fire ecologist studies how to minimize the negative consequences of wildfire. Photo by Levi Sim.



Entire ecosystems are fundamentally shifting along the trailing edges at lower elevations ... They are not reverting back to what they used to look like. So far, we haven't been able to define exactly where those thresholds are ... but in many areas we don't have much choice but to watch those changes happen.

—Larissa Yocom

Owens stands at the base of Deer Creek Reservoir in Provo canyon. "Most of the water for 80% of Utahns comes from here," she says. Photo by Levi Sim.



A Purpose-Driven Career in Water Quality

By Matilyn Mortensen '19, M.S. '22

“Drink more water” is the phrase Marie Owens’s children say they’ll carve into her headstone.

And while Owens admits she gives this advice often, for her, the words are more than just a reminder to hydrate. For over 20 years, Owens, ’95, has worked to ensure all Utahns have access to safe drinking water. Though her career in drinking water began with an internship at a water conservancy in the Salt Lake Valley, her love of the liquid stems from her childhood on a dry farm in Northern Utah where her father grew thousands of acres of wheat using only rainwater.

“I grew up always hearing about the rain and the soil moisture,” Owens says. “That was all-consuming.”

When Owens began attending Utah State University she originally planned to major in electrical engineering; however, she found the study of tiny electrons too abstract. This led her to switch to the recently created civil and environmental engineering program. At the time, USU’s program was one of only a few in the nation.

“Once I made that switch, I loved the program,” she says. “It was just technical enough to challenge me, but I loved what we were studying.”

At USU, Owens took a rules and regulations class. While many of her peers disliked the course because it wasn’t related to math or formulas, she didn’t mind it and realized if she focused her career on this less-popular niche, she would always have a variety of job opportunities.

Upon graduation, Owens’s first full-time job was with the Metropolitan Water District of Salt Lake and Sandy in what was supposed to be a three-year position but turned into 10 years. Afterwards, Owens spent another decade as the water quality manager at the Jordan Valley Water Conservancy District before being tapped in 2017 to direct the Division of Drinking Water at the Utah Department of Environmental Quality.

During her five years in this position, Owens served as Utah’s compliance officer for the Safe Drinking Water Act, meaning she was in charge of ensuring that all 1,200 public water systems in the state had routine water quality monitor-

ing, infrastructure built according to standards, treatment processes that were sufficient and appropriately monitored, adequately trained operators, and water systems that protected their sources from new contamination. She also handled any drinking water event or emergency that arose.

“Drinking water has always provided a purpose for my career,” Owens says. “I could always say in my heart that I was doing something really important. I am protecting every infant whose mom is making a bottle for them out of tap water in the morning. I am protecting every individual who is struggling with their health. I am creating a standard of life for people in ways that they just don’t even know. You can’t build a community without water infrastructure.”

Owens retired from public service last year and took a job in the private sector working as a senior project manager for Advanced Engineering and Environmental Service. Currently, she is helping Washington County develop a drought contingency plan. The work couldn’t be timelier. **A**

“You can’t build a community without water infrastructure.”

— Marie Owens

Sensing a More Sustainable Path for Agriculture

By Matilyn Mortensen '19, M.S. '22

Manal Elarab's career has taken her quite literally across the globe. And while her career path has evolved over the years, from agronomy to irrigation, to precision agriculture, to regenerative growing practices, one thing has always tied her work together — land.

Elarab, Ph.D. '16, was born in the Bekaa Valley, a prolific agricultural region in Lebanon. She first learned about Utah State University when earning her master's in irrigation sciences at the American University of Beirut. Her advisor Musa Nimah was a USU graduate and this exposure led Elarab to set a goal to join the university.

It was during this time that she met Mac McKee, then director of the Utah Water Research Laboratory, who told her about the remote sensing research team he was putting together. Elarab says his passion and excitement confirmed that she wanted to be an Aggie.

"I was very impressed with his extensive global experience in the industry and his contributions to science," she says. "When I met him, I saw a potential mentor that could shape my learning experience beyond textbooks and research."

Elarab came to USU to earn a Ph.D. in remote sensing and precision agriculture, where McKee served as her advisor. She became part of the interdisciplinary team that started the AggieAir drone program under McKee's guidance.

"I got a lot of experience working in a team setting with my AggieAir colleagues to achieve something bigger than the individual," she says.

The work she did to solve real-world problems with individuals from a variety

“Technology enabled them to be the best stewards of their land.” — Manal Elarab

of backgrounds made it clear to Elarab that she wanted to work in industry after graduation. This is in large part because the global food system is responsible for a significant chunk of annual greenhouse gas emissions — a 2021 study found it may be up to 37%. The Intergovernmental Panel on Climate Change suggests reducing agricultural emissions is an important part of climate change mitigation.

This can be achieved through precision agriculture and regenerative agriculture techniques. Precision agriculture allows farmers to produce food more efficiently and reduce waste associated with nutrient runoff and additional greenhouse gas emissions. Regenerative practices can help build soil health, which reduces emissions, and help sequester carbon in soil.

Elarab's first job after graduating was working at MicaSense, a precision agriculture start-up. There she got to work improving the sensors drones use to gather images of crops. She worked at MicaSense for three years, advancing sensors technology before joining Regrow Ag, a start-up that develops software solutions that empower regenerative agriculture to combat climate change.

Regrow develops products that assist food companies like General Mills, Kel-


logg, and Pepsi in encouraging and supporting their growers with adopting more sustainable agricultural practices.

"This technology is able to deliver value to stakeholders across the agrifood supply chain," says Elarab, the company's chief operating officer. "Everybody wins."

Her company helps organizations identify the places along their supply chains where they can use regenerative agriculture to reduce greenhouse gas emissions. Regrow also builds programs that empower growers to adopt sustainable farming practices. The company then monitors, reports on, and verifies the implementation of those practices.

For Elarab, this mission and the environmental impact of her work is the most rewarding part of her job. Regrow builds solutions with one mission in mind: to make regenerative agriculture ubiquitous on every acre, across the globe.

"The vision is in a couple of years I'm going to walk down the aisle of the local supermarket and see products sourced from growers using regenerative practices and know that Regrow's technology enabled them to be the best stewards of their land," Elarab says. **A**

A portrait of Manal Elarab, a woman with long brown hair, smiling and wearing a dark blue button-down shirt. Her hair is blowing in the wind. The background is a soft-focus green field.

Manal Elarab is chief operating officer for Regrow, a company developing software solutions to promote regenerative agriculture. Photo by Levi Sim.

Tyler Elgjar has been researching the effects of atmospheric mercury while completing a master's in toxicology. Photo by Levi Sim.



Sampling

Mercury at 10,000 Feet

By Jeff Hunter '96

It's admittedly a complicated work commute. But for a lifelong snowboarder like Tyler Elgiar, who used to dream of working at a ski resort, the journey to the Storm Peak Laboratory above Steamboat Springs, Colorado, is about as good as it gets for a young research scientist.

When there's snow in the Colorado Rockies, the master's student takes one ski lift up the mountainside, then snowboards down to another lift. He then takes that lift to access the backside of the mountain, before going up another lift that drops him right near the lab site, which sits at about 10,500 feet.

Then after calibrating and collecting data from instruments designed by researchers at the Bingham Research Center (BRC) at USU Uintah Basin to measure levels of atmospheric mercury, it's all, well, downhill for Elgiar from there.

"It's not bad at all," he acknowledges.

While getting to Storm Peak is a little complicated, it's certainly not as circuitous as the route Elgiar took to working on a master's in toxicology. A native of Vernal, the 29-year-old says he didn't anticipate attending college after graduating from Uintah High School, but after plans fell through for a career in the military, he started looking into taking some general education classes at USU Uintah Basin while working for a trucking company.

Elgiar soon decided to seek a bachelor's in wildlife ecology management, but just when he was ready to graduate and pursue a career as a wildlife biologist, he was approached by BRC director Seth Lyman about the Storm Peak project. In addition to senior research scientist Huy Tran and research technician Trevor O'Neil, Lyman wanted a master's student to help deploy and monitor an instru-

ment which measures the amount of elemental and oxidized mercury in the atmosphere.

Mercury emitted into the atmosphere via either natural and human-made sources can negatively impact wildlife and human health, so the Bingham Research Center developed a dual-channel oxidized mercury measurement system capable of detecting mercury in the atmosphere at ultra-trace levels. It also created an automated calibrator that can verify measurements made by the dual-channel system.

"Before this, I didn't even know mercury was present in the atmosphere at all," admits Elgiar. "But I thought about it for about a second; it was just too good of an opportunity to pass up." **A**

Mercury emitted into the atmosphere ... can negatively impact wildlife and human health.

Managing for the
and the

Public Land

By Lynnette Harris '88

Grand Staircase Escalante National Monument seems to be a place for which the word “vast” was created. The monument’s 1.87 million acres are bounded on all sides by national parks, monuments, and forests, that combined cover most of southeastern Utah. It is a place where 4 billion years of geology are on display with water- and wind-cut formations. It is big country made of all the colors in southern Utah’s palette.

Grand Staircase can also be a place where your focus is captured by patterns on the skin of a 3-inch-long spiny lizard and held there watching its tiny eyes dart while the rest of the world melts from your consciousness.

It is the place where Allysia Angus, M.L.A. '99, a Tennessee native, feels at home and it has been her stewardship for more than two decades. Angus is one of the four Bureau of Land Management (BLM) employees in landscape architecture positions, one of just two in Utah, though she notes that others with degrees in landscape architecture work for the agency in different roles.

“Something that resonates for me is that the landscape on the broad scale is incredibly impressive, but it becomes even more so when you take the time to pay attention to the micro scale of things at your feet and at your fingertips,” Angus says. “Those things can also inspire awe. I have friends who have done the drive-thru sort of visit and appreciated the sweeping views and scenery, but then we go for a walk, and they notice the patterns and the textures and the beauty embedded at close range, and it starts connecting with them in a totally different way.”

The BLM manages nearly 22.8 million acres of public land in Utah, about 42% of the state. Grand Staircase Escalante is the first national monument managed by the BLM rather than by other agencies. The BLM’s mission is to “sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.”

That mission means different things to different people. It can be tempting to think of managing resources for one big “general public,” but there is no such thing and the BLM manages for multiple uses. Part of Angus’s job as a public servant stewarding public lands means understanding and balancing the various needs and expectations of people who view and experience Grand Staircase.

Visitor numbers increased rapidly in the past few years and then the COVID-19 pandemic made the world’s great outdoor spaces even more attractive destinations. Angus says employees try to keep up with the people discovering Grand Staircase, but they do it with fewer amenities and less staff than the national parks and 12 times the acreage of nearby Zion. Even as the pandemic wanes, it seems unlikely that visitor numbers will decline.

“One of the management precepts of Grand Staircase is about the sense of discovery and preserving its frontier character,” Angus says. “I’m enamored with small-scale details and finding something new, like a cool or strange rock, a new plant, or a canyon. I don’t feel like I’ve even begun to scratch the surface and I’ve been there over 20 years.”

Angus says that while wandering has

been her preferred pastime since childhood, that it’s not what everyone wants to do. Some visitors want to camp or hike. Others arrive ready to reach a specific destination and check it off their list. Some prefer driving through and stopping at a few overlooks with panoramic views. A big part of her job is re-envisioning sites that may not be designed in ways that best serve visitors and the environment, including places where trailheads and camping spots resulted from human use rather than good planning. She is proud of several projects where campsites, parking areas, restrooms, and trails have been redesigned, adjacent land restored, and people are enjoying the benefits.

Some of what Angus appreciates about Grand Staircase isn’t about the geology or botany, it’s the quality of the light and also the darkness. She has been involved in dark sky research and values the remarkable stargazing that happens in one of the largest natural dark places left in the lower 48 states. The expansiveness of the monument also means people can get away from the noise they may not realize they’ve grown accustomed to until they experience the quiet there. She tells how researchers came to measure sound levels in various parts of the monument but had to return with more-sensitive instruments to measure the quiet.

“Most people don’t live in environments where they get to experience these qualities anymore,” Angus says. “If people take the time to immerse themselves in the place, and you may not get there quickly, but if you’re able to slow down and fully be there, the place can work some of its magic on you.” **A**

Allysia Angus is one of just two landscape architects for the BLM in Utah. Her goal is to balance the unique needs and expectations of visitors to Grand Staircase Escalante National Monument. Photo by Levi Sim.



Dan Keller, an aquatics ecologist, recently took the helm of managing the fishery at Lake Powell for the Utah Department of Wildlife Resources. Photo by Levi Sim.



Navigating the Unstable Waters of Lake Powell

By Kristen Munson

Two decades of western drought have slowly drained Lake Powell, revealing canyons and petroglyphs not seen since the 1960s when the reservoir first filled the desert floor. While patrolling the water for the Utah Division of Wildlife Resources this winter, Dan Keller '08, M.S. '13 saw the top of a stone arch boaters once easily floated over. People hike underneath it now.

The aquatics biologist recently took over managing Lake Powell's fishery from Wayne Gustaveson '75, M.S. '78, who spent 45 years building the lake's angling reputation — an important economic engine for the state.

Anytime during the year, you will see fishing boats heading down to Lake Powell and stopping and getting gas and using restaurants, Keller says. "Maintaining the excitement about the fishing there is my priority."

Gustaveson wrote a weekly fishing report (he still does) that taught a lot of people how to be successful there, Keller says, admiringly. While he sees promise in holding fishing tournaments to boost tourism, Keller believes the lower lake level provides opportunities for people to also explore formerly underwater places by kayak or hiking.

"People are adaptable and people find opportunities where they are," he says. "I think that is going to be the story of Lake Powell and the Colorado River in the future. I'd love to see the big snowstorms of the '80s come back. But if they don't, we are going to have to do things differently with water."

That day may come soon.

Lake Powell has always fluctuated as spring snowmelt flows into rivers and into

the lake, flooding the margins and creating nursery habitat for young fish. By June, the water begins to drop. The level changes again as water is released into Lake Mead. Good water years make the bad ones easier to endure. And lately, the bad water years keep coming.

"2018 was good," Keller recalls. "The water came up over 40 feet, but it's just amazing how quickly it went down. ... Hopefully we can get another good year like that — quickly."

In March, Lake Powell dropped below 3,525 feet, placing hydroelectric power for millions at risk. Even forecasting reservoir rise is trickier as drought has parched watersheds, leaving dry soils that soak up more snowpack runoff. And low, relatively stable lake levels create conditions where invasive Quagga mussels thrive, which can alter the lake's ecosystem as they filter out zooplankton, starving some species of young fish.

"It's just another competitor for a limited resource," Keller says.

His path to managing the fishery begins while stationed at the Baghdad International Airport during a tour of Iraq with the National Guard in 2003. Keller watched carp in the canals and thought about catching shiners in cups as a kid while camping in the San Rafael Desert, and sport fishing as a teenager at Lake Powell. He knew he wanted to do something he was passionate about when he returned.

Keller earned his associate degree at the College of Eastern Utah (now USU Eastern) and then studied conservation and restoration ecology in Logan. Keller spent 14 years as DWR's native aquatics ecologist in Price, working on river

restoration and native fish habitat in the Colorado River Basin.

"Not only do 40 million people depend on the water and that system, but [so do] a lot of wildlife and lot of fish," he says.

At Lake Powell, Keller alternates spending days on the water, taking depth and temperature profiles at monitoring stations, and collecting zooplankton for analysis in the lab. The data help fishery managers predict which species can be fished and which need more protection.

"That is what fish management is all about — getting good biological data and making sound harvest and limit recommendations and ensuring that the anglers are having a positive influence on the fishery," Keller explains.

He hopes anglers also help improve data collection by using citizen science apps to record their catches and wildlife observations that automatically populate scientific databases. He also wants people to keep coming to Lake Powell. To see that things have to change. We have to change.

"It's daunting," Keller says. "If you look at the Great Salt Lake and what's happening here in northern Utah or the Colorado River Basin and what's happening at Lake Powell, it's just a reflection of how we are using water. And what ends up at these terminal bodies of water is a good indicator of things to come."

He worries that if Utahns don't learn about steps to reduce water consumption or support actions that promote it, these problems will get passed on into the future.

"People started talking about making big changes to the way we do things with water 20 years ago and it never happened," Keller says. "I don't think we have the luxury of waiting another 20 years." **A**



FINDING THEIR PLACE:

Preserving Intermountain
Indian School Art

By Jeff Hunter '96

The above painting is one of 11 pieces of artwork salvaged from the Intermountain Indian School in Brigham City. Photo courtesy of Evelyn Funda.

Sheila Nadimi M.F.A. '96 isn't from Brigham City, Cache Valley, the state of Utah, or even the United States. Her mother is Iranian, her father is Dutch, and she was raised in Canada. But Nadimi inexplicably developed a deep affinity for a collection of dilapidated buildings in Brigham City and a little-known assortment of artwork housed inside them.

"I don't know if I'll ever be able to explain the draw I have to it," she says of the remnants of the Intermountain Indian School. "Even before I ever stepped foot into it, it just seemed to be fascinating somehow."

Nadimi first came to Logan and Utah State University (USU) via North Africa. She was working on a master's in natural resource management in the Sahara Desert when she met and fell in love with Jim Rogers, who was serving in the Peace Corps. Rogers later secured a teaching position at USU, which led to Nadimi relocating to Cache Valley and the couple getting married and having two children. Along the way, she exchanged geography for art and completed an M.F.A. in sculpture at USU. A desire for studio space first led her to visit the site of the Intermountain Indian School.

Originally the Bushnell General Military Hospital, which served soldiers coming back from World War II from 1942 to '46, it was transformed into a boarding school by 1950 with the purpose of teaching and assimilating Navajo children into mainstream American culture. In 1974, it became the largest boarding school in the country, accommodating more than 3,000 Native American students from 100 different tribes.

The school closed in 1984, leaving dozens of large buildings vacant for more than a decade before a developer from New York purchased the property and renamed it Eagle Village — the Eagle referencing Intermountain's mascot. The plan called to renovate the buildings into a new urbanist community adjacent to Eagle Mountain Golf Course, which was built on the eastern edge of the site in 1989.

While curious about the yellow-brick buildings when driving past on U.S. Hwy. 89–91, it wasn't until 1996 that Nadimi actually drove into the area. She met a caretaker who told her studio space was out of the question because there was no electricity, but showed her inside some of the vacant buildings.

"He had a flashlight, and we didn't go in very far at all, but I just knew," Nadimi says. "I needed to come back. I was just fascinated, and I kind of allowed that place to lure me in even further."

That fascination led to more excursions with the help of the caretaker, where she discovered stunning artwork, much of it created by the students, often on the walls of hallways, or dorm rooms, as well as some more intricate murals. Over time, Nadimi learned that acclaimed Apache painter and sculptor Allan Houser served as the art teacher



at Intermountain from 1952 to '62 and shared his gift in some of the public space areas.

About that same time, a relative passed away and left Nadimi \$5,000. Despite having almost no experience with photography, she purchased a Hasselblad medium-format camera, a lens, and a tripod to chronicle the decaying buildings of the Intermountain Indian School.

Nadimi continued the personal project for years, collecting hundreds of negatives and photographs, not knowing what she would ever do with them. A divorce in 2005 led to her returning to Quebec where she worked as an art professor at John Abbott College, but she never forgot about the Intermountain Indian School.

Caretakers of Art

Eagle Village never materialized as the developers hoped. Just a couple of the buildings became townhomes, a handful were used by local businesses, and the rest sat empty. In December 2010, USU acquired 40 acres of land and 18 structures on the Intermountain Indian School site to construct a statewide campus. Soon afterwards, work began clearing out most of the structures to make room for the current USU building, as well as future campus facilities.

Thomas Lee, director of the USU Brigham City region from 2008 to '18, says he heard about artwork removed from some of the buildings by the previous owners. Some were on doors or brick walls, while others were on plywood or sheet rock and cut out by a chainsaw and placed in a shed. Others were exposed to the elements outdoors.

Zaira Arredondo inspects some Intermountain artwork, which is now housed in a climate-controlled storage unit. Photo by Levi Sim.

The art that could be moved was relocated to the abandoned Kmart building nearby. A prized piece, the painting of a Native American on horseback running across a desert landscape believed to have been painted by Houser on the wall of the school gymnasium was carefully removed, a steel frame placed around it, covered in plastic, and put in a crate. The university brought in an art conservationist to assist as it was painstakingly taken apart in a USU facilities warehouse in Logan.

“There was condensation inside of the plastic, and so as soon as we took it off, the paint started flaking off in front of our eyes,” laments Lee, who retired in 2019. “Unfortunately, it was not able to be preserved. It was quite a day.”

Another mural featuring Monument Valley fared better. It was retouched and now hangs above a stairwell of the USU Brigham City building. But there were other pieces in various states of deterioration in need of a better home, which led to USU bringing in additional resources, including Evelyn Funda, then the director of the Mountain West Center, and Brad Cole, former dean of libraries.

Funda was stunned to find that most of the art had been housed adjacent to chemicals in a lawn-maintenance shed.

“We were like, ‘Oh my God! This is nuts! We have to do something about this,’” she says. “As far as I was concerned, we didn’t own them; we just kind of inherited them when we bought the land. So, by default we’re the caretakers of these works of art, and we have a responsibility to do something.”

Eventually, 11 pieces were relocated to a temporary storage location on the main USU campus. Two of them were large murals that were in public spaces like the cafeteria, while the rest were likely painted by students on the walls or doors of the dormitories, including a bull elk, a tepee, a Native American dancer, and a horse missing its nose.

“This was art that was part of their everyday lives,” notes Funda, who retired in 2021. “So, it was an exciting

thing to work on. But they were all deteriorating, so who knows what’s been lost to time?”

Home Away from Home

Ronald Geronimo grew up in southern Arizona the youngest of nine children. An older brother attended Intermountain, and shortly after going to his graduation, Geronimo asked his mother if he could attend, as well. In 1978 at the age of 15, he took a daylong bus ride to northern Utah, and spent the majority of the next four years in Brigham City.

“I enjoyed it,” he says of his time at Intermountain. “It was home away from home.”

Geronimo would have graduated from the boarding school in 1981, but failed English. He returned home to the Tohono O’odham Nation assuming he would never get a diploma, but he got a call saying that he could return mid-school year if he could get back to Intermountain by the next day.

After another long bus ride, Geronimo resumed his studies, and he credits his English teacher for helping get him where he is today, co-directing the O’odham Language Center at Tohono O’odham Community College in Sells, Arizona.

“After I got my bachelor’s, I called Mrs. (Evelyn) Pohmajevich and thanked her for not letting me graduate,” explains Geronimo, who completed a bachelor’s in education and a master’s in linguistics at the University of Arizona. “She made me earn it.”

Geronimo has attended several reunions of former Intermountain students through the years. It was while at one that he saw a picture by Logan-based photographer Brad Peterson of a painting in a dormitory just before it was torn down. The self-portrait created by Geronimo’s friend Nolan Lopez, includes the date of 1981 and the term “Papago,” the name for the Tohono O’odham people of the Sonoran Desert used by early Spanish colonizers.

Geronimo had Peterson’s photo of the painting reprinted on canvas and surprised Lopez with the large image more than three decades after it was created.

“He was surprised and happy when I gave it to him,” Geronimo says. “He remembered drawing it.”

Geronimo fondly recalls some of the other artwork created by Intermountain students in the dorms, as well as the larger murals in public spaces like the cafeteria and the theater.

“The school had more than 100 different Native American groups there, and me coming from southern Arizona, I was really only familiar with the Navajo, the Hopi, and the Apache,” Geronimo notes. “But when I

Sheila Nadimi started taking photographs of the vacant Intermountain Indian School in Brigham City in 1996. Photo by Sheila Nadimi.



got there, there were so many other Native American groups that I wasn't really familiar with, and each had their own language, their own traditions, customs, songs. And a lot of times you want to show your own culture and your own language, things like that, and I think the artwork there reflected that."

Representations of Themselves

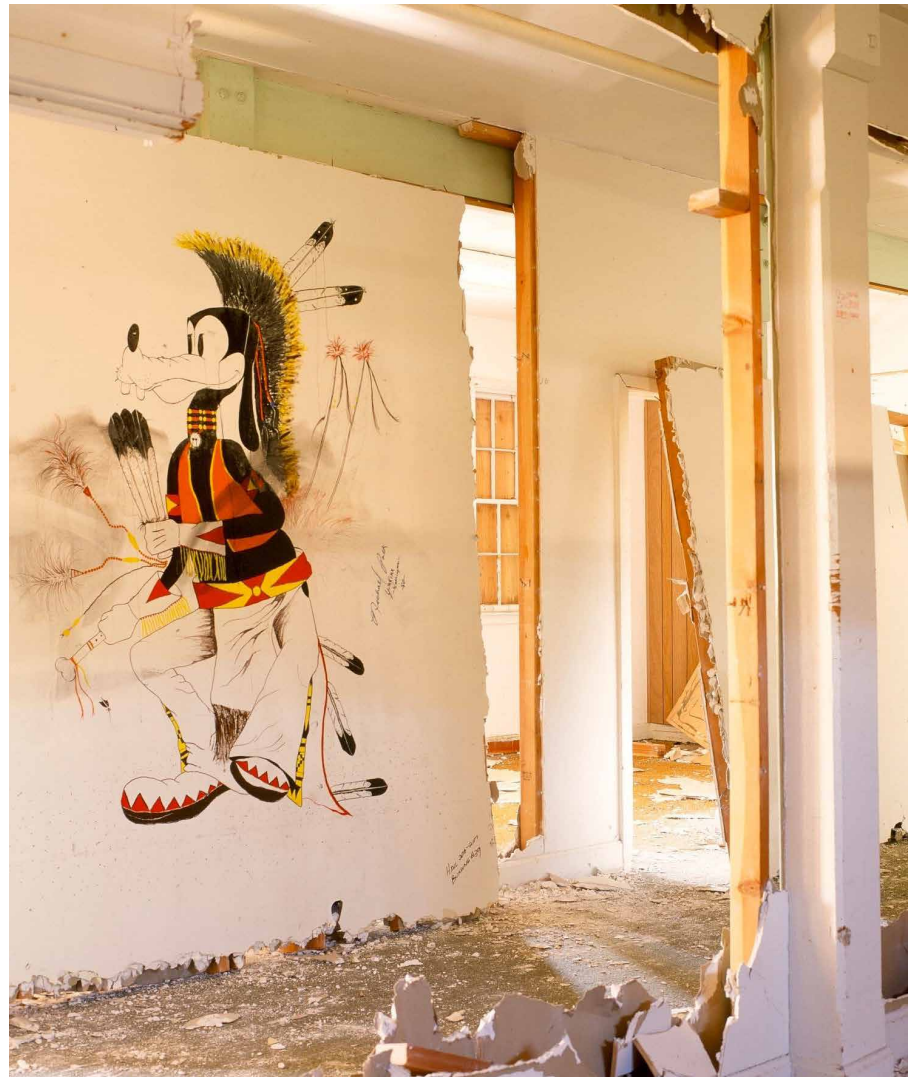
For his master's thesis, USU graduate student Carlos Guadarrama, '16, M.S. '18, who grew up in Brigham City, wrote about the artwork at Intermountain. The thesis, entitled *An Analysis of Murals Painted by Students at Intermountain Indian School in Brigham City, Utah*, includes an interview with former Intermountain art teacher Peggy Barker, who came well after Allan Houser but felt the renowned artist's work played a significant role at the school many years later.

"These paintings were incredibly empowering for the students as it showed students — for possibly the first time in their entire lives — that their culture was important enough to be placed on a public wall," Barker told Guadarrama. "I believe that Houser's paintings worked with the school's art curriculum guidelines to encourage students to paint their own representations of themselves on their dormitory walls. Because most of the murals that were painted came after Houser left Intermountain, the students used what they saw in the gym and theater to paint the murals in their dorms."

A statement like that re-emphasizes the significance of salvaging some of that artwork, mostly notably the 11 pieces now in USU's possession. Katie Lee Koven, executive director and chief curator of the Nora Eccles Harrison Museum of Art, had the Intermountain art placed in a climate-controlled storage facility and formed a committee to help decide what should be done with it all. She had the pieces evaluated and received an estimate of \$90,000 for treatments and framing, the majority of which she expects to be covered by a grant.

Once the paintings are restored, Koven plans to host an exhibit at NEHMA, augmented by Nadimi's photographs, which is scheduled to open in January 2024. After the exhibit closes, the artwork will be returned to Box Elder County where it will be placed permanently in the USU Brigham City building not far from where it was originally created. The hope is to continue the legacy of pride in one's culture and native land that Allan Houser helped foster 70 years ago.

Houser's teaching was instrumental to the creative expression of students who painted and drew the stories, imagery, and symbolism of their tribes, Koven explains.



Top: Sheila Nadimi poses for a portrait with her daughter, Marina, in the fall of 1996. Bottom: Nadimi is turning her photographs into a book entitled *Eagle Village: A Deep Mapping of Fallow Architecture*. Photos courtesy of Sheila Nadimi.



Left: Nadimi took nearly a thousand photographs of the Intermountain Indian School while exploring the abandoned buildings in the 1990s. Photo by Sheila Nadimi. Right: a mural by acclaimed artist Allan Houser was unable to be saved. Photos courtesy of Thomas Lee.

“It’s not just that they were given pieces of the paper. It was on the walls; it was in their dorm rooms; it was in private spaces that were just for them.”

Eagle Village Encounters

More than 25 years after spending hours taking long-exposure images in the dark halls and rooms of the Intermountain Indian School, Sheila Nadimi finally knows what she’s going to do with all of the photographs she took: she’s compiling them into a book.

Entitled *Eagle Village: A Deep Mapping of Fallow Architecture*, the book is slated to be published this fall and tells the story of the Intermountain Indian School and Bushnell Hospital. During the fall of 2021, Nadimi returned to Utah on sabbatical, working with BYU historian James Swensen, who co-authored a book *Returning Home: Diné Creative Works from the Intermountain Indian School* with Farina King, a Navajo professor from Oklahoma who is also a member of Koven’s Intermountain artwork committee.

Nadimi walked the vacant grounds of the Intermountain Indian School and came to realize that it was a place of transformation.

“You were supposed to arrive in one condition and leave in another,” she says. First, the wounded soldiers coming back from war needed to regain their health in order to return to society, and then young Native Americans, “brought there hopefully to give them the skills and the vocations, the world views, and the aspirations to kind of buy into the American dream.”

Because of recent events in Canada, as well as the United States, where it’s been unveiled that Indigenous children sent to residential schools often suffered physical abuse in an effort to impose “cultural genocide,” Nadimi struggled with her book project amidst the complicated legacy of government supported Indian schools.

In May, the U.S. Department of the Interior released an investigative report into the events and outcomes, including generational trauma and family separation, of federally run (and funded) Indian boarding school policies. The analysis found that between 1819 and 1969 there were over 400 federal schools across 37 states or territories, including seven in Utah, and, alarmingly, more than 500 American Indian, Alaska Native, and Native Hawaiian student deaths at them. The interior department will continue to address “the lasting legacies of these policies,” Interior Secretary Deb Haaland said about the investigation.

For Nadimi, after learning more about Intermountain through conversations with alumni at reunions, she realized that many students had positive experiences there — at least those who attended later in the school’s history when expressions of Native American culture, such as artwork, were no longer discouraged. After those conversations she felt more compelled to “try and capture the history of that little, 250-acre plot of land” primarily through photographs.

“Now I’m proud of my photo archive, and I’m proud of the book,” says Nadimi, “And I hope other people will be happy that place can live on now through these images.

“I know there were murals that I never found,” she adds somberly. “And I would do anything to go back into those buildings and do it all over again.” **A**

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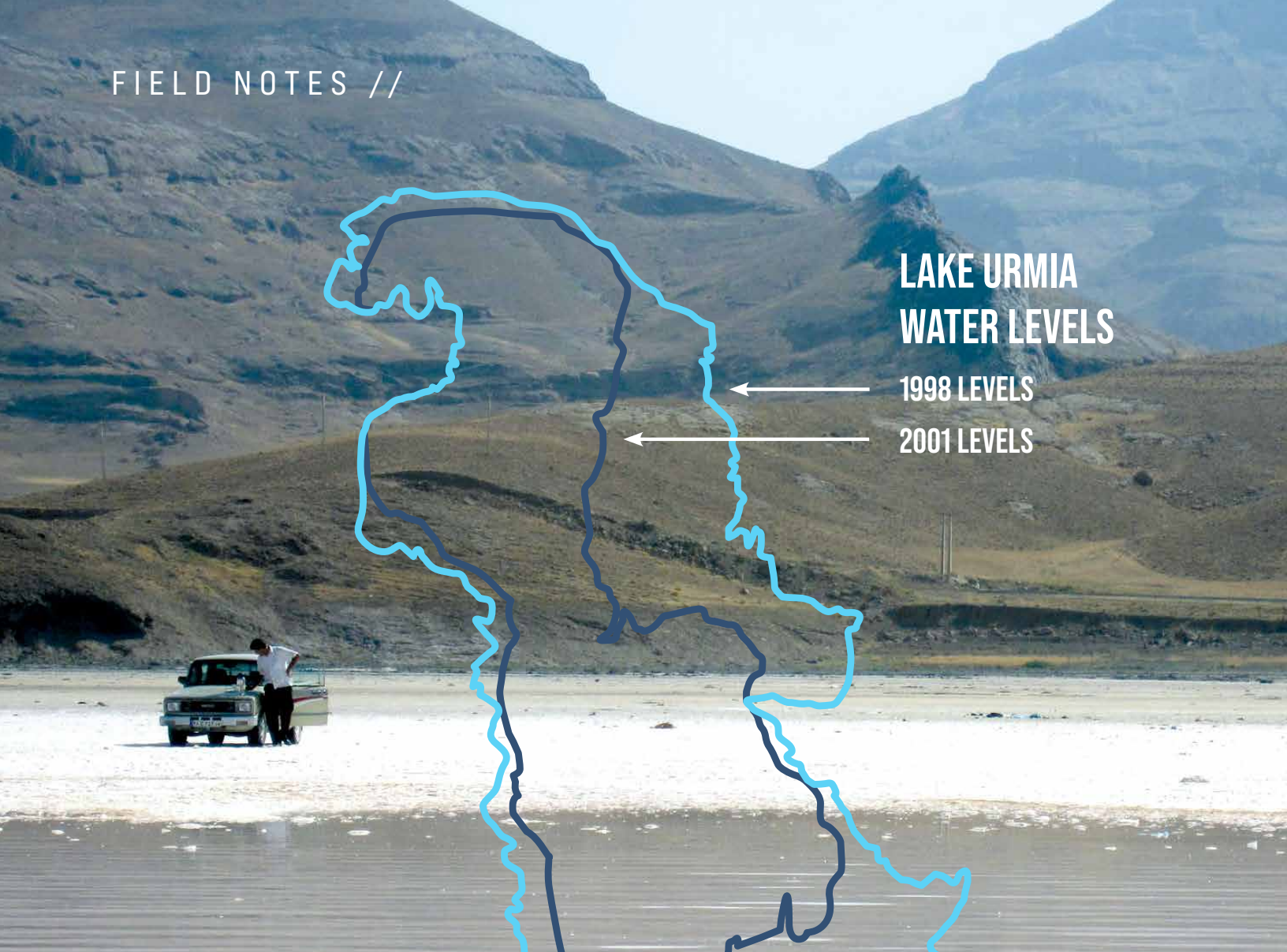
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LAKE URMIA WATER LEVELS

1998 LEVELS

2001 LEVELS

Lake Urmia is a sister lake to Utah's Great Salt Lake. Both provide habitat for migrating birds. And both are shrinking from overuse. Photo courtesy of Somayeh Sima.

Uniting to **SAVE** **SALINE LAKES**

By Kristen Munson

For centuries, large saline lakes in Utah and Iran have served as feeding grounds for millions of birds. And lately, the lakes are disappearing.

Dust from the drying lakebeds threatens the health of millions of people nearby. The remaining water is saltier and less hospitable to life — potentially killing off once robust *Artemia* (brine shrimp) populations. Fewer birds and visitors flock to their shores.

Lake Urmia in Iran may be halfway across the world, but its challenges are both a cautionary tale and a playbook for

what Utah might do to restore its own Great Salt Lake, which has dropped to its lowest level since recordkeeping began over a century ago. A collaboration between Iranian researchers and Utah State University scientists may create a blueprint for advancing the health of other desiccated saline lakes. But it's not simple.

"These aren't issues that are going to be solved in one journal article, or in a month, or a year," says David Rosenberg, associate professor of civil and environmental engineering at USU and a water modeling expert. "These are long-term efforts. That is the kind of approach that our countries need to take if we are going to tackle these really complicated, complex problems that couple humans and nature."

Lake Urmia and Great Salt Lake are sister lakes. They have similar latitudes, similar lake depths, and millions of people living nearby, he explains.

The lakes also have similar problems — namely, the upstream diversion of water. Since the 1970s, Iran has erected dozens of reservoirs, dammed rivers, and grown its agricultural sector in the region, ultimately starving Lake Urmia of inflow. Thousands of illegal wells have further depleted the water. The lake level plummeted in the mid-'90s and has never recovered.

In 2013, the Iranian government funded the Urmia Lake Restoration Program (ULRP) with about \$1 billion and set a target level of 1274.1 meters. Initially, the plan called for curbing agricultural expansion and reducing water use by 40%. The idea was to reduce salinity to preserve *Artemia* populations, which are an important food source for flamingos and other birds.

However, unknowns can stymie good intentions. The USU-Iranian research team found that the proposed lake level of 1274.1 meters may not sufficiently lower salinity and preserve the ecological benefits of the lake. Last summer, they published their findings in the open-source *Journal of Hydrology: Regional Studies* to encourage greater cooperation between scientists, as well as to increase transparency.

"We are suggesting that management is a much more dynamic process," Rosenberg explains. "It is not just the lake magically rises to 1274.1 meters and we just go home; all the problems are solved."

Despite record precipitation in 2018-19, which replenished the lake for a spell, the lake's future is hazy. In July 2020, 45% of the lake had shrunk in area and dropped in volume by 85% from its historical maximum. Recreational tourism disappeared along with the water.

"It's kilometers from the resorts to where the water is deep enough to boat," Rosenberg says.

In 2018, Somayeh Sima, assistant professor of civil and environmental engineering at Tarbiat Modares University in Iran, became the first visiting scholar funded by the Semnani Family Foundation to collaborate with USU researchers on Lake Urmia's restoration. The team outlined eight restoration objectives such as improved water quality, ecology, economic benefits, and human health, and suggested to track how various objectives are met as the water level varies over time. They also identified significant problems with the restoration plan, particularly, the limited monitoring of the lake ecosystem.

"We're at the tipping point," said Sima, the paper's lead author. "Every single step matters. We have to take action now. ... Restoration is not an easy task. It is everyone's responsibility, and we'll need public support to make meaningful change."

Upon her return to Iran, Sima shared the team's findings with members of the country's Department of Environment and Ministry of Energy. A second Iranian scholar, Marsoud Parsinejad, recently came to USU to continue the project. He, Rosenberg, and a team of eight USU and Iranian researchers synthesized 40 years of Lake Urmia data, including satellite imagery and field observations, to outline additional recommendations for lake recovery. The paper, published in August in the journal *Science of the Total Environment*, calls for monitoring undercounted water flows throughout the basin, working with farmers to shift to higher-value crops that use less water, and expanding data-sharing capacities between stakeholders.

We're at the tipping point ... Every single step matters.

— Somayeh Sima

They cited an urgent need to determine and quantify unknowns such as the extent of illegal water use, lake evaporation, and the characterization of food webs, along with emerging issues like drought intensification from climate change. A key recommendation involves building public support for the effort. And that isn't as easy as it may sound.

"The fundamental challenge is human behavior," Rosenberg explains. "Essentially, it's 'how do you voluntarily get someone to conserve water?' That's like the key question. It's true here in Utah, and in the Great Salt Lake, and it's true in Iran."

Ultimately, the scientists want to connect with the people on the ground.

"Our thinking on this is that we have to start on the bottom up, working with individual farmers and with individual canal companies, and demonstration projects," Rosenberg says.

The reality of American and Iranian relations affects this work. The USU team will not be traveling to Lake Urmia anytime soon and obtaining visas for Iranian researchers can be tricky. Nevertheless, the USU-Iranian team has forged a path forward by collaborating over email, Zoom, and using shared data centers. It's an important start.

"It's an opportunity that USU could catapult on in future," Rosenberg says. "A small group of professors collaborating with a small group of professors in Iran, we can do something bigger. We are building trust. And when you have trust, you can do a lot of great things." **A**

To join or support this effort, contact David Rosenberg at David.Rosenberg@usu.edu.

Rethinking the Origin of SPACE WEATHER

By Eric Warren

IMAGINE THIS FRUSTRATING START TO YOUR DAY:

Late for work, you rush out the door, forgoing your usual breakfast routine of eating while scrolling through the morning news. As you start the car, the glowing low-fuel indicator glares back. You zip to the neighborhood coffee shop for a scone and double-mocha-whatever only to find their debit card machines down. In the car, the satellite radio station cuts out. At the gas station, the pumps have stopped working.

Let's hope this string of seemingly unconnected events never happens. But if it does, the cause may be disrupted communication from satellites. Such interruptions can result from adverse weather in space but could also be caused by activity in Earth's atmosphere influencing the upper mesosphere and ionosphere. In this area of the upper atmosphere, where space begins, both space weather and Earth's weather may disrupt satellite communications.

Utah State University Physics Professor Michael J. Taylor has studied the characteristics of gravity waves from Earth's upper atmosphere for decades. In 2018, NASA selected him to lead a study of Earth's gravity waves from an instrument on the International Space Station called the Atmospheric Waves Experiment (AWE) mission. The following year, NASA awarded a contract to USU's Space Dynamics Laboratory to build the AWE instrument, which is also responsible for AWE's total project management, systems engineering, safety and mission assurance, and future mission operations.

"The scientific community once believed solar activity was the only factor affecting the upper atmosphere," Taylor explains. "But

there's more at play. Recent studies show effects from the sun's solar flares and eruptions that blast through space are not enough to drive these changes in the upper atmosphere. We are rethinking the origin of these changes on the ionosphere, and evidence suggests the Earth's weather likely affects it. AWE will help solve this cosmic mystery by investigating how gravity waves in the lower atmosphere influence the upper atmosphere."

The project, planned for launch in late 2023, is a Mission of Opportunity under NASA's Heliophysics Explorers Program.

"AWE illustrates SDL's capability to lead NASA missions, enabling the agency and its principal investigators to explore, study, and understand our universe for the benefit of all on Earth," says Burt Lamborn '90, M.S. '92, SDL's project manager for AWE. "We are honored to work with Dr. Taylor and NASA to provide the technologies and mission management that will enable this important research."

WHAT AWE DOES

Atmospheric gravity waves are pulses of air primarily formed by weather disturbances on Earth such as strong thunderstorms, hurricanes, or winds rushing skyward over massive mountain ranges that relentlessly ripple upward into space.

From low Earth orbit, about 400 kilometers above us, AWE will scan Earth using an imaging radiometer to identify major forces controlling gravity waves near the mesopause, the mesosphere's upper boundary. With information provided by

the AWE instrument, scientists will be able to estimate the wider role of gravity waves at the edge of space.

HOW IT WORKS

Once integrated onto the exterior of the ISS, AWE will focus on colorful bands of light in the upper atmosphere, called airglow, to understand better the effects of atmospheric waves on space weather.

Using an Advanced Mesospheric Temperature Mapper, an imaging radiometer, AWE will produce high-quality temperature maps of atmospheric gravity waves near the mesopause region using infrared cameras.

WHY IT'S IMPORTANT

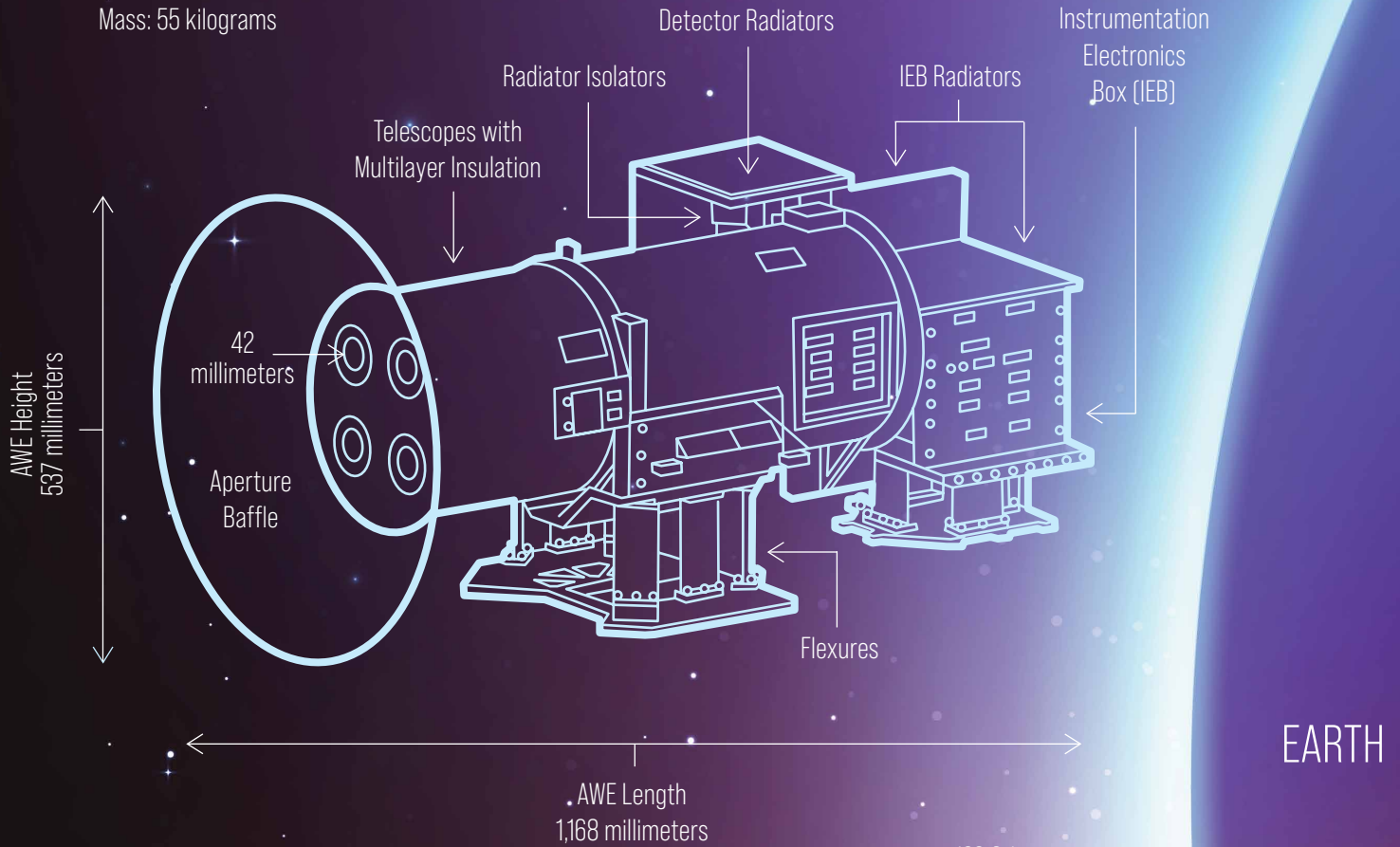
The region AWE will observe is dynamic, with forces that can affect space weather and disrupt space-based communications and navigation, as well as impact satellite orbits. Understanding how gravity waves affect space weather will help scientists more accurately forecast space weather, while allowing mission planners and satellite operators to plan contingencies.

AWE joins a fleet of heliophysics missions positioned at key places around the solar system, which together seek to understand the way the constant outflow of energy and particles from our sun affects interplanetary space — information that not only teaches us more about our astrophysical neighborhood, but helps protect astronauts and technology in space. **A**

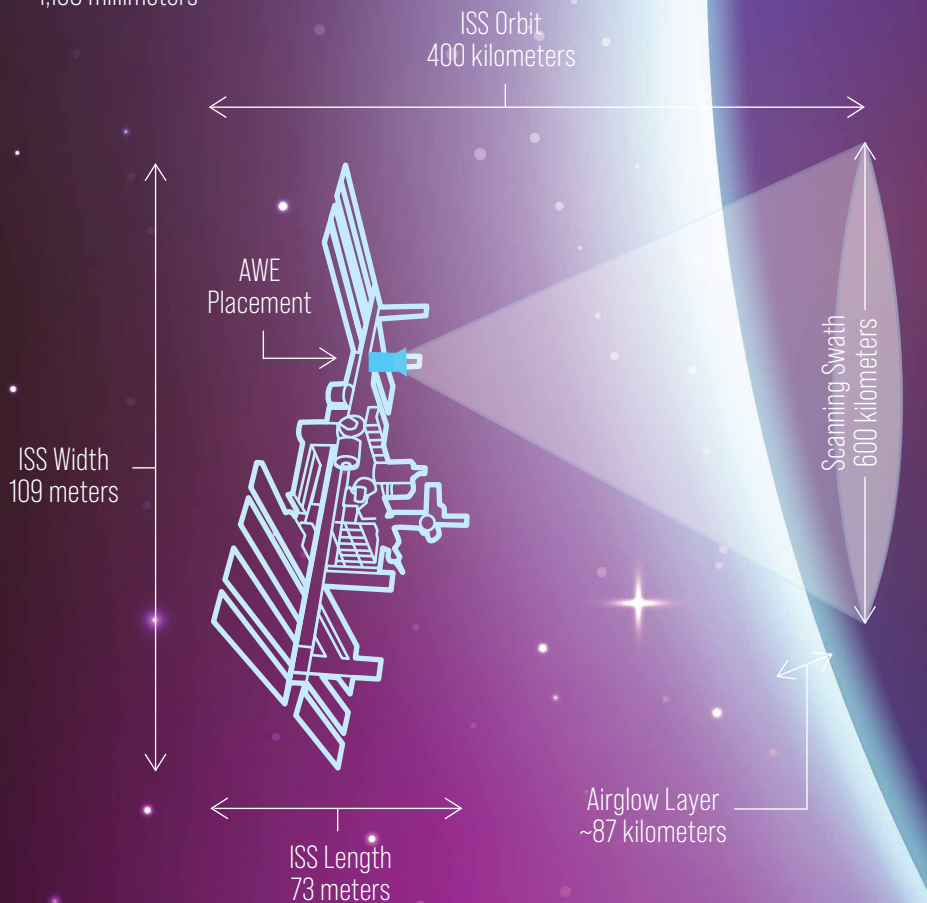
AWE Instrument

Opto-Mechanical Assembly (OMA)

Mass: 55 kilograms



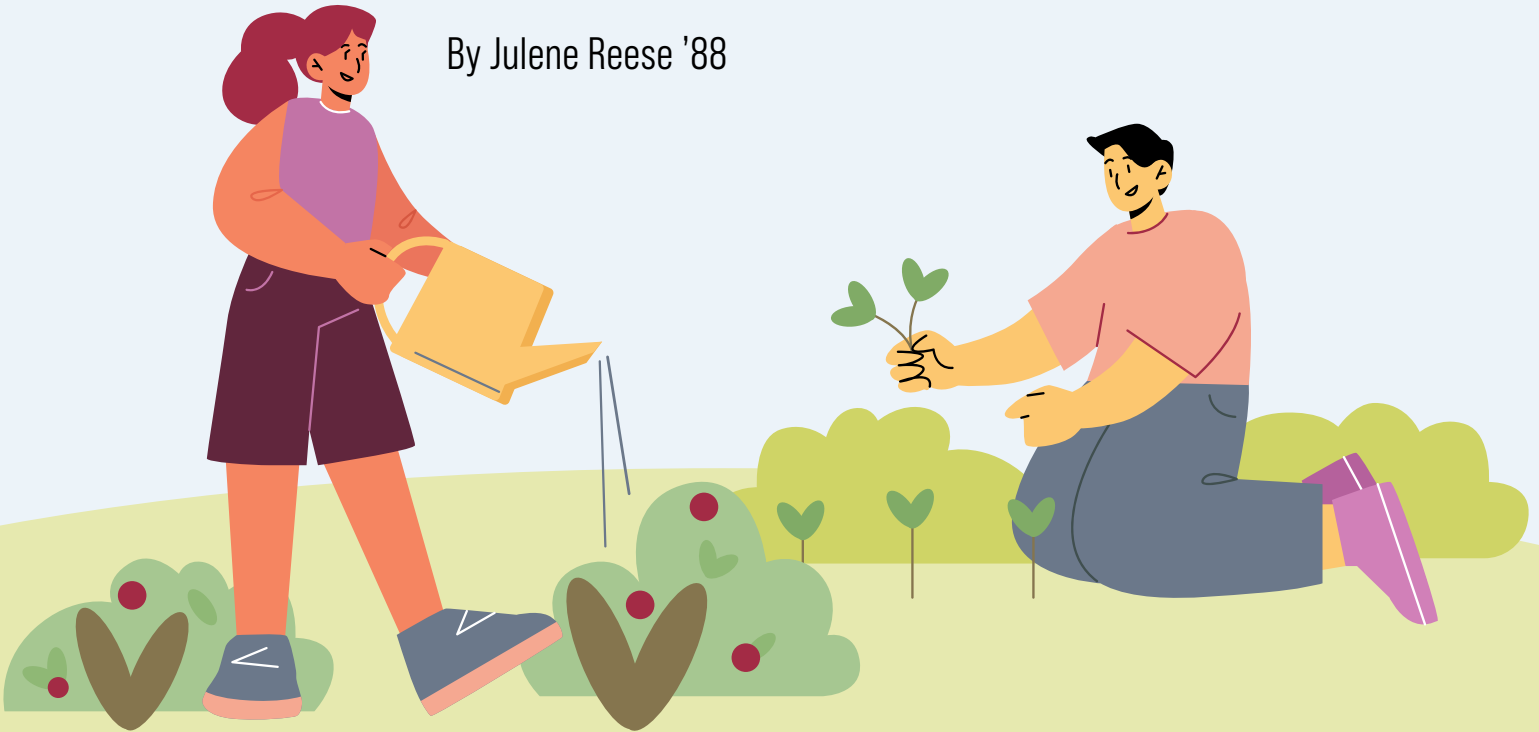
AWE on the International Space Station (ISS)



Making Landscapes

Water-wise

By Julene Reese '88



Illustrations by Freepik and Liz Lord '04.

In April, with most of Utah in severe or extreme drought and following a winter with below normal snowpack, Governor Spencer Cox '98 issued an executive order declaring a state of emergency, asking residents to conserve the water we have.

Utah is the second-driest state in the nation based on average annual precipitation, yet one of the top per capita users of water, says Kelly Kopp, Utah State University Extension water conservation and turfgrass specialist. Urban landscape irrigation accounts for up to 65% of the annual municipal water use, and much of that is applied in excess of what plants actually need.

“We all need to conserve in every way possible so we have enough water for public consumption, instream flows, and agricultural production,” Kopp says. “Scheduling landscape irrigation according to plant water needs will reduce water waste, and proper irrigation encourages deeper root growth and healthier, more drought-tolerant plants.”

And this fall, as temperatures cool, consider planting water-wise landscapes that save water in the future. **A**

Visit USU Extension's drought information website, drought.usu.edu, for more information. USU's Center for Water-Efficient Landscaping website at extension.usu.edu/cwel includes resources on water-wise and native plants, sustainable turfgrass research, and urban water conservation.

7 Principles for Water-wise Landscaping



[from USU's Center for Water-Efficient Landscaping]

#1. Planning and Design

Pay attention to sun, shade, soil conditions, slope, etc., and determine where plants should be placed for both function and aesthetics. For example, deciduous trees can be planted to increase summer shade as well as winter sun.

#2. Soil Preparation

Proper soil preparation improves plant water use efficiency in the future. Consider soil texture, structure, organic matter content, nutrient status, and pH when choosing plants.

#3. Plant Selection

Choose plants for the size and function of the area. Consider irrigation requirements, adaptability, mature plant size, and climate hardiness zones.

#4. Practical Turf Areas

Choose species and varieties with lower water requirements and mow to a height of 2-4 inches for deeper rooting. Properly fertilize to improve drought tolerance and recovery, and leave grass clippings when mowing.

#5. Mulch

Cover bare soil in gardens and flower beds with mulch to prevent crusting, compaction, and evaporation of moisture. Organic mulches include wood or bark chips, nut shells, pine needles, grass clippings, etc. Inorganic options include gravel or crushed stone, lava rock, and cobblestones.

#6. Efficient Irrigation

Group plants with similar water requirements in the same irrigation zone(s). Use drip irrigation systems to apply water directly to plant roots, penetrating the soil 6 inches for flowers and vegetables and 2 feet for established trees and shrubs. Water trees and shrubs less frequently than grass areas, but for longer periods of time.

#7. Landscape Maintenance

Control weeds, fertilize regularly, and control plant growth through pruning. Also monitor for and control damaging diseases and pests.

Tips for Keeping Plants Alive During Drought:

Limit use to

½ inch of water

with each irrigation, or 1 inch of irrigation per week. While it's tempting to water more, that amount is more than sufficient to keep grass alive. With limited water, prioritize which plants to water first. Do not rely on a sprinkler clock to water lawns on a schedule. Determine how much water the lawn actually requires and water accordingly.

Priority #1: Trees

Provide shade, help cool your home, and produce oxygen. They are the most valuable plants in your landscape.

Priority #2: Shrubs

Filter dust and pollution from the air and help dampen traffic noise.

Priority #3: Perennials

Plant roots, over time, help improve the soil.

Priority #4: Annuals

Provide pollen for bees and other pollinators as well as food for hummingbirds.

Priority #5: Grasses

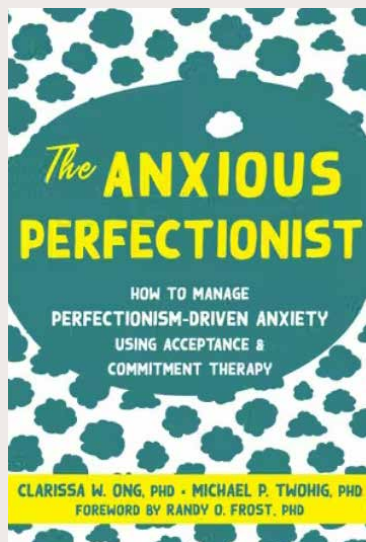
Hardy plants that enter dormancy during drought and recover when conditions improve.



People who are overly perfectionistic do not see perfectionism as a problem;

most likely, they see perfectionism as an attribute. Like most attributes, there are times they help us and times they hold us back. Look at the outcomes of perfectionism and see if there are parts of it that could use a little adjustment. Are you late on lots of things? Do you worry about things long before you need to? Do you judge others for the way they do things? If so, it might be worth looking at how you interact with your perfectionism.

— **Mike Twohig**, professor of psychology and co-author of *The Anxious Perfectionist: How to Manage Perfectionism-Driven Anxiety Using Acceptance and Commitment Therapy*.



Faculty

The Anxious Perfectionist: How to Manage Perfectionism-Driven Anxiety Using Acceptance and Commitment Therapy

By Clarissa W. Ong and Michael P. Twohig

New Harbinger Publications
March 2022

Navajo Women of Monument Valley: Preservers of the Past

By Robert S. McPherson

University of Colorado Press
July 2021

Catholic Social Networks in Early Modern England: Gender, Kinship, and Coexistence

By Susan M. Cogan

Amsterdam University Press
June 2021

Young Subjects: Children, State-Building, and Social Reform in the 18th-Century French World

By Julia M. Gossard

McGill-Queen's University Press
March 2021

Alumni

Forensic Forestry: A Guidebook for Foresters on the Witness Stand

By Robert P. Latham '62

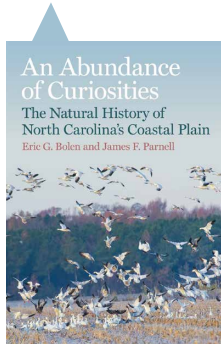
CRC Press
August 2021

An Abundance of Curiosities:

The Natural History of North Carolina's Coastal Plain

By Eric G. Bolen M.S. '62, Ph.D. '67 and James F. Parnell

University of Georgia Press
June 2022



Preparing the Way

By Barry A. Baker '66

Archway Publishing
September 2021

Discoveries:

Essential Truths for Relationships

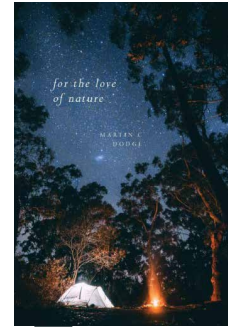
By H. Wallace Goddard '90

Walnut Springs Press
July 2021

The Mystery of Luci's Missing Lantern

By Melissa C. Marsted (Author), Liesl Cannon '15 (Illustrator)

Lucky Penny Publications
March 2021

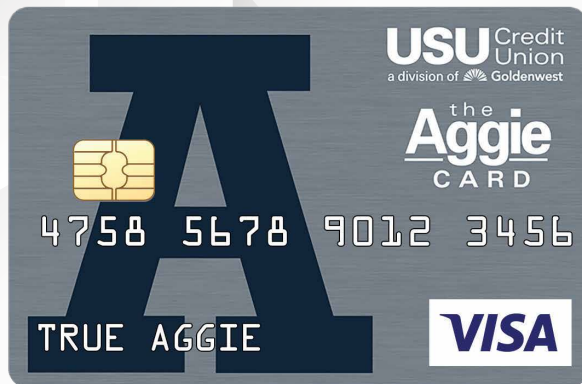


For The Love of Nature

By Martin Dodge M.S. '72

FriesenPress
March 2021

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1940s

Haven J. Barlow '44, Feb. 6, UT
 Louise Johnson (Haymie) '45, Apr. 13, UT
 Jean Pugmire '48, Mar. 11, UT
 Maxine M. Ransom (Smith) '46, Jun. 12, ID
 Amasa M. Rich '49, '57MS, Jun. 15, OR
 Charles E. Rigby '43, Mar. 6, UT
 Laine E. Sevy '49, Apr. 22, UT
 Hoyle L. Sorenson '49, Feb. 21, UT
 Roma I. Stephans (Freeman) '45, Mar. 27, UT
 Walter D. Talbot '49, '66EDD, May 21, UT
 Nuhla Teichert (Brady) '41, Feb. 22, WY
 Norma Thompson (Sorensen) '49, Mar. 22, NV

1950s

Charles M. Alexander '59, Mar. 25, OR
 Ferron L. Andersen '57, '59MS, '63PHD,
 Feb. 27, UT
 Rayma Stevens Anderson '53, Feb. 13, UT
 LaMoine D. Anhard '55, Feb. 2, UT
 Clive Wendell Arave '56, '57MS, Apr. 2, UT
 Rodman N. Barker '59, Mar. 26, ID
 Roland J. Beck '54, Mar. 24, UT
 Martell Beeton '58, '62MS, Jun. 9, UT
 Julia E. Bernston '53, Jul. 4, UT
 Margaret W. Bickmore (Wilhite) '50, May 14, OR
 Deaun Bishop (Christensen) '51, Jul. 15, UT
 Patricia H. Blauer '52, Jun. 11, UT
 Carol Rae Brown '55, Jun. 1, UT
 Paul Brown '56, Mar. 12, UT
 Jay W. Christensen '56, Feb. 21, ID
 Ralph Barlow Clark '59MS, May 17, UT
 Betty Condie (Westberg) '54, Jun. 8, UT
 Jay L. Cornelison '59, Jul. 4, ID
 Joan J. Coulson '54, Mar. 13, WA
 Thomas Cracas '54, '58MS, Feb. 3, UT
 George T. Crane '58, Mar. 7, UT
 Clifford Don Crompton '51, Apr. 27, UT
 Kris Corry Davis '57, Apr. 4, UT
 Janice J. Dec (Judge) '54, Mar. 19, WA
 Darrell L. Deem '54, Feb. 26, UT
 Stephen B. Douglas '59, Mar. 5, UT
 Mehl Ree Downard (Draper) '56, Jul. 7, NM
 Lee Durrant '58, Mar. 2, UT
 Joyce A. Eckenbrecht (Bithell) '50, Mar. 29, UT
 Lewis M. Edwards '54, Feb. 12, UT
 John W. Ellertson '53, Feb. 4, AZ
 Doris K. Gardner '55, Jun. 18, UT
 Colonel Donald Gillespie '53, May 20, UT
 Audrey M. Godfrey (Montgomery) '57, '90MS,
 Jul. 2, UT
 Stanley H. Griffin '52, Apr. 21, UT
 Harold L. Hancey '57, Mar. 24, UT
 Larry L. Hansen '58, May 21, CA
 Ted L. Hansen '52, '58MS, May 23, UT
 Barbara Higgs '59, Apr. 14, UT
 Elaine Holman (Anderson) '56, Mar. 13, UT
 Louise G. Hubbard (Garff) '58, '76MFA,
 Jun. 11, UT
 Peggy H. Hunsaker (Potter) '56, Jul. 3, UT
 Jens C. Jensen '53, May 17, UT
 Robert B. Johanson '55, May 3, UT
 Calvin P. Jorgensen '50, Jul. 4, MT
 Emma Lou Jowers (Hansen) '54, Mar. 23, UT
 Jack E. Keyser '57, Jun. 4, PA
 Charlene L. Kinney (Swan) '58, Jun. 24, UT
 Reg D. Kirby '57, Jul. 2, UT
 Rita M. Leonhardt (Mouritsen) '52, Mar. 6, UT
 Sherman J. Lindhardt '58, Feb. 23, UT
 Norma M. Lisonbee (Condie) '53, Feb. 19, UT
 James N. Lund '57, Apr. 9, UT
 Richard Denton Mathews '51, Jun. 24, UT
 William H. McDonald, Jr. '50, Jun. 10, ID
 Larry L. McDowell '58, May 26, ID
 Warren H. McEntire '50, Mar. 5, ID
 Joseph B. McMurdie '59, May 28, UT
 Mary W. Mecham (Christensen) '52, Jul. 8, UT
 Gail J. Miles '56, '60, May 31, UT
 Dixie H. Mitchell (Howard) '57, Feb. 2, UT
 Elvin Guy Mitchell '58, Apr. 9, UT
 Clair Morris '54, '62MS, Jul. 11, UT
 Marilyn K. Neilson (Brown) '57, Feb. 9, UT
 Arlo R. Nelson '51, Jun. 14, ID
 Ashby D. Nelson '52, Mar. 11, ID
 Parley W. Newman '50, '51MS, Feb. 21, UT
 Ora Fay Oviatt (Wardle) '58, Feb. 10, UT
 Grant S. Owens '53, Mar. 23, AZ
 VerNon O. Packer '51, Jun. 14, UT
 John W. Pehrson '58, Feb. 11, CA
 UnaJean W. Peterson (West) '57, Apr. 26, WA
 Barbara Pingree (Schaub) '59, Feb. 21, UT

Charles Pocock, Jr. '55, May 14, CO
 Therald P. Quayle '58, '64MED, Jul. 16, UT
 Joann Rice (Siebers) '58, Apr. 25, FL
 Darlene T. Rogers '51, Apr. 3, ID
 Fred H. Ross '58MS, Jul. 10, WI
 Ralph M. Roylance '50, May 9, UT
 Betty H. Seamons '58, May 13, UT
 Merwyn Searle '53, May 4, ID
 Alan W. Shaw '55, Feb. 8, UT
 Kay Darrell Smith '57, '59MS, May 23, UT
 Charles D. Tate, Jr. '54, '58MS, Mar. 6, UT
 Paul Archibald Thorpe '58, '78MS, Apr. 14, UT
 F. Carl Veibell '55, '63MS, Feb. 25, UT
 Colen H. Waddoups '55, '67MED, May 4, UT
 James E. Williams '54, Jun. 8, UT

1960s

Dixie G. Allen (Gunderson) '61, Apr. 29, UT
 Edwin Taylor Anderson '63, Feb. 7, UT
 Ronald G. Anderson '62, Mar. 23, WA
 Michael E. Bates '68, Feb. 5, ID
 Donald M. Batty '66, '70MS, Feb. 11, UT
 Thomas M. Beck '61, May 15, ID
 Fenton W. Billings '60, Jun. 10, UT
 Cheryl A. Blodgett (Cordon) '67, Mar. 20, UT
 Kathleen Bradford (Olsen) '61, Jun. 27, UT
 Illene B. Broadhead (Brown) '62, Apr. 10, CA
 Max E. Brunson, Jr. '68, '72MFA, Feb. 10, UT
 Rodney L. Burt '60, May 29, OH
 Richard J. Clark '61, Mar. 25, OH
 Carolee Pay Coleman '66, '86MED, Jun. 15, UT
 Walter Cox '62, Mar. 19, UT
 Norman D. DeVries '65, '72MED, Jul. 10, UT
 Arden E. Draney '62, Mar. 30, UT
 Marianne Dubois (Dean) '67, May 16, UT
 Wallace E. Elliott '64, Feb. 16, MT
 Terry LaMar Erickson '67, '75MED, May 7, CA
 Donald R. Evans '62, Apr. 17, UT
 Don Ray Fielding '63, Jul. 11, UT
 Edwin W. Frantz '69, Feb. 4, UT
 Ted Gashler '69, May 15, AZ
 Bette Gibbens (JARDINE) '60, Mar. 1, UT
 Paul C. Goebel '61, Mar. 6, CO
 Jerry K. Good '66, Feb. 9, UT
 Donn Calvert Goode '63, '69MS, Apr. 11, UT
 Leon R. Grover '66, Jun. 12, UT
 Terry Hammond '68, Jun. 29, UT
 Walter E. Hanks '64, Jun. 23, UT
 Phil Harris '61, Feb. 7, CO
 John M. Hasteey '60, '64MS, Jul. 6, FL
 Lerleen E. Hatch '64, May 26, AZ
 Patricia Ann Henrie '62, '70MS, May 5, UT
 Jay Mack Holbrook '61, May 17, UT
 Ted Hougaard '60, Feb. 17, UT
 Max F. Jacobson '68, Apr. 14, NV
 Linda A. Jensen (Fitzgerald) '64, Feb. 3, UT
 Lynette B. Jensen (Bair) '61, May 1, UT
 Melvin F. Jensen '60, Mar. 30, ID
 Nelson W. Jensen '63, May 27, TX
 Pamela Andersen Jensen (Andersen) '65, '94MS,
 Feb. 20, UT
 W. Neil Jensen '68, May 2, ID
 Robert H. Jensen '62, Feb. 15, UT
 Wynn Johnson '67, Apr. 15, UT
 Joyce Juchau '63, Mar. 4, UT
 Edwin Lavar Judd '62, May 10, UT
 Theodore R. Kaufmann '61, Feb. 15, GA
 Linda A. Keller (Wursten) '66, Jul. 7, UT
 Allan S. Kinsey '63, May 31, UT
 Carroll C. Lambert (Carman) '60, '61MS,
 '69EDD, Apr. 16, ID
 Marie Larkin (Spackman) '69, Feb. 20, UT
 Sybil La Rue Larsen '68, Feb. 18, UT
 Edward S. Lewis '68, '70MS, Jul. 5, ID
 Devona D. Luke (Dean) '61, '68MS, Mar. 21, UT
 Richard Q. MacFarlane '61, Apr. 24, CO
 Marian Mangelson (Swan) '61, Jul. 3, UT
 Larry H. Matthews '68, Mar. 7, UT
 Dixie A. McCann '63, May 13, UT
 David L. McChesney '66, Jun. 4, CT
 Sherry Meibos (Bluemel) '65, Apr. 23, UT
 Ruth Melling (Olsen) '60, Mar. 16, UT
 Steven P. Miffitt '69, Jun. 13, VA
 Richard K. Morrill '61, May 9, UT
 Barry G. Mortenson '67, '68MBA, Apr. 10, UT
 Margaret M. Nielsen (Miner) '65, Feb. 23, UT
 Jack S. Oyler '66, Feb. 20, ID
 G. Lee Parks '61, Jul. 10, UT
 Jane Partridge (Peterson) '66, Mar. 29, UT
 Carol M. Pears (Mcdermott) '63, Feb. 9, UT

Dale H. Pingree '62, Apr. 8, UT
 Lorna R. Pymm '63, Apr. 20, UT
 Fay N. Ralphs '64, Mar. 18, ID
 Gray Francis Reynolds '64, Mar. 31, MD
 Douglas J. Rollins '68, Feb. 6, AZ
 Dennis Hatch Rosier '64, Feb. 9, UT
 Jerry Gene Schofield '61, Mar. 26, FL
 Thayne C. Smedley '60, '64MS, May 26, UT
 Rodney G. Smith '60, '67MS, Mar. 7, WA
 Sidney A. Smith '63, Jul. 9, UT
 Larry D. Sprouse '66, Mar. 16, TX
 Dennis Stephenson '60, Feb. 18, UT
 Shiril H. Stewart '67, Apr. 6, CO
 Marjorie A. Stringham (Armstrong) '61,
 May 9, UT
 Joyce Sweep (Ward) '65, Apr. 17, UT
 Katherine J. Taylor (Jackson) '64, Mar. 10, UT
 Jerry L. Thain '68, Apr. 12, UT
 Warren R. Thiem '63, Feb. 15, MT
 Doris P. Tuft (Porth) '66MED, Mar. 6, UT
 Jeanine H. Vaughan '67, '69MS, Jun. 8, UT
 Wallace W. Waite '64, May 31, UT
 Charles G. Ward '62, Jun. 2, ID
 Robert E. Warnick '63MS, '70PHD, Jun. 28, UT
 Julian L. Wilkinson '61, '66MS, Jul. 1, UT
 Leo Clair Williams '60, '75ME, May 1, UT
 Brent Demar Yeates '66MS, Jul. 11, VA
 Bob Young '66, Feb. 24, UT
 Neil T. Young '65, Jun. 1, UT

1970s

Richard K. Austin '71, May 16, UT
 Jane Frances D. Blair '79MBA, Jun. 12, UT
 Joann Boddell '71, Mar. 9, ID
 Tom Boisvert '77MED, Mar. 14, MA
 Annabell Bondurant (Bondurant) '71, Jun. 2, AR
 Dorothy Boyle (De Lapp) '73, Jun. 6, UT
 W. Leigh Brinkerhoff '76, Apr. 9, ID
 Sandra Jensen Burton '75, Feb. 24, UT
 Steven Lee Burton '76, Jul. 12, UT
 Shiril J. Christensen '70, Apr. 18, UT
 Stephen A. Christensen '75, May 30, ID
 David Grant Clawson '72, Apr. 1, NM
 Kevin Larsen Creer '77, Mar. 21, UT
 Roger Wayne Cyfers '77, May 6, WV
 V. H. Daugherty '71, Apr. 16, UT
 Del W. Despain '77, Apr. 10, UT
 Kenna Durfee (Olsen) '71, Apr. 23, UT
 Vincent L. Fernelius '70MS, Mar. 27, CA
 Charles W. Frewert '78, May 6, UT
 William K. Glanville '76PHD, Jun. 1, TX
 Brian Greenwood '73, Feb. 22, CO
 Carol Jean Gubler (Wagner) '73, May 24, NV
 Rosemary Hanks (Hogan) '73, May 6, UT
 George F. Heiner '72MBA, May 28, UT
 Richard M. Howell '71, May 1, ID
 Rex J. Hulet '71MS, Mar. 2, UT
 Scott Kilpatrick Hurst '71, Apr. 9, CO
 David W. Jensen '71, Jun. 19, UT
 Jon E. Jensen '72MED, Feb. 20, UT
 Delois B. Johnson (Balls) '77, Mar. 25, UT
 Ronald S. Jones '73MS, Apr. 9, UT
 Carl Melvin King '75, Apr. 17, WA
 Marijane D. Lambert (Johnson) '70, May 29, UT
 Merlin N. Lindsay '72, Mar. 21, UT
 Michael T. Mark '72, Mar. 10, IL
 James P. Marsh '78, '82MED, May 18, UT
 Jay L. Martin '70, Jun. 13, WY
 Roy C. McDonald '71, May 13, UT
 Belinda Meek (Van Dyk) '75, May 2, LA
 Deanna Hall Morse '71, Jul. 6, UT
 Bryant D. Nelson '71, '03, May 24, CO
 Hong Y. Park '75PHD, Apr. 7, CA
 Scott K. Parrish '76, '82MS, Jun. 29, UT
 Rollo Peterson '77MED, Jun. 28, UT
 L. Howard Pollard '71, '77MS, Jun. 5, NM
 Robert N. Radtke '74MED, Mar. 13, UT
 Ted Fredrick Reinwald '73MS, Mar. 28, WY
 Lenore R. Robbins (Rasmussen) '78, '93PHD,
 Jun. 5, UT
 Gaylin W. Rollins '77EDD, May 14, UT
 Louise L. Schill '70, Feb. 23, UT
 Dick E. Schuman '74, May 6, ID
 Raymond W. Smith '70, Apr. 14, UT
 Claudia Solinko (Erickson) '78, May 25, PA
 Howard R. Starr '70MSS, '74EDD, Apr. 4, UT
 Peggy Linn Toone (Christensen) '75,
 Mar. 14, ID
 Mary Jane Warner (Newell) '72, Mar. 12, UT
 Faye Poulsen Watts '73, '83MS, Apr. 27, UT

James H. Weir '77MIE, Apr. 25, UT
 John A. Whitby '77, Jun. 25, UT
 Elzo C. White '71MED, May 23, ID
 William P. Wigle '71MS, Jun. 22, AZ

1980s

Cheryl Tingey Allred '84, Mar. 7, UT
 Lance Anderson '89, Jun. 5, UT
 Craig L. Barney '80, Mar. 5, UT
 Kent W. Boam '86MSS, Apr. 7, AZ
 Teresa Bodrero '83, Jun. 30, UT
 Jerrold V. Bradshaw '81, '83, '92MA,
 May 5, UT
 Naoma W. Braithwaite '84, Feb. 8, UT
 Arlene Burgener '84MS, Feb. 5, UT
 Lisa E. Carter '86, Feb. 22, UT
 Brian Christopherson '85, Feb. 27, CO
 Dan Espenosa '85, Mar. 13, KS
 Chuck Folland '88, Mar. 20, ID
 Lori Forsyth (Jeppson) '82, Apr. 28, UT
 Barbara Gardner '83MS, Apr. 6, UT
 Clifford N. Grover '83, Jun. 11, UT
 Linda Louise Hansen (Robbins) '80,
 Jul. 10, UT
 Susan Rae Harbertson (TURNER) '81,
 '85, Mar. 7, UT
 Renee O. Hazen (Ogden) '80MED,
 Feb. 3, UT
 Valene Houston '87, Feb. 18, UT
 Richard Jameson '85MSS, May 30, UT
 Colin C. Jensen '86, Jun. 16, UT
 Linda S. Jensen '89, May 25, UT
 Richard Gregg Johnson '82, Mar. 15, UT
 John Kaseanoas '83, Jun. 2, ID
 Mary V. Kolesar (Mason) '84MS, Jul. 12, UT
 Joyce Obry Leaman (Obry) '84, Mar. 6, ID
 Alice E. Lorrigan '86, Mar. 21, UT
 Robert Don Mander '83, Feb. 2, UT
 Gerald D. Marshall '85, Feb. 9, TX
 Jack S. Meyerhoffer '86MED, May 13, UT
 Alison Mitchell '86, Apr. 2, UT
 Russell T. Peterson '86MED, Mar. 28, UT
 Paul D. Pitts '89MED, Mar. 5, UT
 Richard A. Pole '88MS, May 1, UT
 Steven Robert Rasmussen '88, '90MBA,
 Mar. 22, UT
 Brent B. Rhees '80, Jun. 18, UT
 Kevin John Rohrer '87, May 19, UT
 Gerald Simmons '83MS, Jun. 16, UT
 Kirk D. Slauch '87, Apr. 20, UT
 Paul M. Smith '84, May 21, UT
 Rebekka Ann Smith '86, Feb. 27, UT
 Sheila E. Stephens (Evans) '82MED,
 Mar. 6, UT
 Anne K. Sterbenz-Duuf '80, Mar. 2, MN
 Jeanne W. Taskar '91, Apr. 21, UT
 Richard M. Vandenberg '83MS, Mar. 15, UT
 Laurie Wallace '88, Mar. 21, UT
 Anita Weston '80EDD, Apr. 9, UT
 Mark Anthony Woolf '85, Jun. 14, UT

1990s

Sabra Lynn Ball (Pearson) '91, Mar. 18, CA
 Brandon E. Banham '95, Apr. 21, UT
 Lisa Marie Barrington '98, Jul. 7, UT
 Linda A. Bergso (Friedli) '97, Jun. 26, UT
 Ellen A. Bolingbroke '94, Mar. 5, UT
 Charlotte A. Chapman '99, Apr. 29, UT
 Douglas Denys '91, Mar. 1, UT
 Heidi Dunkley (Ballard) '99, Feb. 24, UT
 Darlene Gubler '96MSS, Mar. 5, UT
 Lawrence W. Hills '97MBA, Mar. 17, UT
 Susan Renee Hומר (Cartmel) '90,
 Jun. 17, UT
 James W. Hunt '98, May 2, UT
 Ronald A. Jacobson '95MED, Feb. 17, AZ
 Annette Lorraine Johnson '96, Apr. 16, UT
 Valena Karcich '92, Feb. 11, UT
 Shawn Wallace Lawlor '96, Feb. 3, UT
 Cory D. Lundberg '99, Jun. 29, UT
 David W. Mathews '96, Feb. 14, UT
 Randall Curtis McMurdie '91, '94MS, Jun.
 8, UT
 Sherrie Mecham '98, '03MS, Mar. 23, CA
 Kimberly Montgomery (Montgomery) '92,
 Mar. 2, UT
 Linda L. Nelson '91, Feb. 19, UT
 Penny C. Oakeson '90, May 18, UT
 James Zane Parmer '93, Feb. 18, ID

Robert L. Potts '08, Jun. 27, UT
Damon L. Smith '99, Feb. 3, UT
Stephen R. Swensen '96, Jun. 7, UT
Helen Claire Wight '99MED, Mar. 13, UT
Thomas Williams '93, Mar. 23, UT

2000s

Bobbe M. Allen '00, '06MED, '11PHD,
Apr. 26, UT
Thomas C. Brown '06, Apr. 14, UT
Alvaro L. Calvimonte '00, Feb. 21, UT
Lindsay K. Eatchel '07, Apr. 23, UT
Benjamin M. Galloway '07, Jun. 15, UT
Amy K. Harris '04, May 31, UT
KayDee Jo Martinez '08, Apr. 3, UT
David W. McCollum '06, Mar. 17, UT
Vicki Nielsen '03MED, Feb. 21, UT
Shem W. Smith '02, '10MS, '14MED, Jun. 17, UT
Rex T. Williams '00MBA, Apr. 16, UT
Colleen C. Wilson (Callor) '02, Apr. 3, UT

2010s

Johnathan David Hambleton '12, Jun. 10, UT
Nickoli Hambly '10, May 1, UT
Chelsea Brittney Infanger '18, Apr. 13, UT
Jessica Tawn Jarvis '12, '13, May 23, UT
Gerald V. Lind '14MBA, Feb. 10, UT
Kelci Anne Santy '17, Mar. 16, UT
Jennifer K. Warburton '17, Jun. 5, UT
Jeff S. Webb '10, Jul. 5, UT

2020s

Rebecka Denney '20, Jun. 23, UT

ATTENDERS

Ernest Aalona Jul. 11, UT
Edward Ernest Abel May 23, UT
Harry Abeyta Jun. 29, OR
Ted Abeyta Jun. 16, UT
Anthony Elias Adams Feb. 22, UT
Craig Emerson Adams Jul. 4, UT
Brent Ronald Allen Jul. 7, UT
Mark Dan Allen Jul. 4, CA
Archie Allred Jun. 5, UT
Bill Allsop Jul. 1, UT
Bob Andersen May 15, UT
Lois Dickson Anderson Jun. 16, UT
James Andre Jun. 4, CO
Marianne Andrus Apr. 1
Carley McMurtrey Arave Feb. 17, UT
Sterling C. Argyle May 24, UT
Louise N. Baines (Needham) Jun. 27, CO
John Balle Mar. 27, UT
Dale Jay Bankhead Apr. 26, UT
Arlene R. Barton Apr. 19, UT
Peggy L. Basso Apr. 16, UT
David Behling Mar. 19, CA
John Lawrence Behunin Feb. 9, UT
Kathleen C. Benedict Apr. 16, UT
Boyd Berensen Apr. 13, UT
Julia Evans Bernston Jul. 4, UT
William R. Blackham, Jr. Feb. 8, UT
Brenda Bogdin Apr. 25, UT
Marian Elaine Bohm (Hybl) Apr. 6, UT
John Clifton Bonzo Jul. 2, UT
Keith T. Borup Mar. 1, UT
Gordon Lee Bowling Mar. 18, UT
Marsha Anne Bradbury (Limburg) Apr. 28, UT
Margene Bradshaw (Rigby) Mar. 3, ID
Susan M. Brady Feb. 4, UT
Dianne Rose Brown Feb. 9, UT
John A. Brownlee Mar. 28, CA
Melvyn K. Buel Jun. 8, ID
LaVern Richards Buist Feb. 12, UT
Kenneth Ray Burgess Feb. 13, UT
Marilyn Burgoyne Jun. 19, UT
Ann Marie Bushman (Budge) Apr. 4, UT
John E. Butterfield Feb. 7, UT
Monte Bye Apr. 18, UT
Camden C. Campbell Apr. 27, UT
Beverly LaRue Sharp Carling Jun. 6, UT
Michael A. Carpenter Jun. 24, UT
Kenneth Paul Carr Mar. 26, CA
Max Floyd Casperson Apr. 2, ID
Mary Lou H. Cheney (Hansen) Apr. 28, UT
Barry L. Christensen May 8
Paula M. Cloward Jun. 1, UT

Carol Coleman (Ritchie) Jun. 6, UT
Donald Eugene Cologie Feb. 12, UT
Mary Catherine Conrad Mar. 6, UT
William Coulam Mar. 22, UT
Dale V. Coy Jun. 29, UT
Rose O. Craven (Oliveto) Apr. 21, UT
Janae Crawford Jun. 28, UT
Robert P. Davenport Jun. 15, UT
Rosalie B. Dimick (Bergamo) May 25, UT
Clark Draayer Jun. 27, UT
Elizabeth L. Draves Feb. 13, UT
Courtney L. Dunn (Blake) May 20, MN
Gar Thayne Elison Jul. 8, ID
Hezalee Ellington Jul. 7, UT
Lynn Elwood Apr. 29, UT
Daniel P. Espenoza Mar. 13, OR
Don Evans Mar. 1
George R. Every Jul. 11, UT
LaMar R. Frandsen Apr. 7, UT
Betty Ann Freeman May 29, ID
Brady Fuhrman Mar. 18, UT
Norma Jean Funk Jun. 28, UT
Rodney L. Galloway Apr. 22, WY
James C. Garber Apr. 7
Joyce Gardner (Denison) Mar. 4, UT
Darvel N. Garn May 31, UT
Marshall Cyril Garr Jul. 18, UT
Jacob D. Garza May 12, KS
Ileen P. Gibbons (Potts) Mar. 30, UT
Leroy Gibson Jul. 9, UT
Troy Gillenwater Jun. 24, MI
Bessie K. Grillos (Katsavrias) Jun. 3, CA
Roderick Lee Groves May 23, UT
Bradley B. Hall Jun. 5, IL
Gail S. Halvorsen Feb. 16, UT
James Kent Hammond Apr. 18, UT
Chet B. Hansen Mar. 29, UT
Raymond M. Harding, Sr. Jun. 2, UT
Taryn L. Harmsen Jul. 1, UT
Geneil L. Harris Feb. 9, UT
Marilee Hart May 5, UT
Jamie Hartzell May 28, UT
Derek J. Henrie Jun. 23, UT
Keith L. Henrie Feb. 10, UT
Douglas Herbert Hileman May 23, UT
Carol Hill Feb. 20, UT
Tory Marie Himonas Jun. 13, UT
I Verdell Hinton Apr. 22
Michael K. Hiskey Apr. 24, UT
Geraldine M. Hodge Apr. 7, UT
James Michael Holmes Apr. 6, UT
Alexander C. Hosier Feb. 20, WA
Karl R. Houskeeper May 21, UT
Stephen Lynn Huffaker Apr. 2, NV
Brandon Lynn Huggard Apr. 19, UT
Mark Reed Huler Jul. 8, UT
Alda Vee Hull Feb. 6, UT
Fern H. Hunsaker (Hirschi) Jul. 14, UT
Kristin M. Jackman May 8, UT
Allen F. Jacobs May 4, UT
Alma DeVon Jensen Mar. 11, UT
Bruce H. Jensen May 7, UT
Tanya Dunford Jensen Jul. 10, UT
Trent Brian Jensen Mar. 16, UT
Wayne Jensen May 27, ID
Carvel R. Johnson Apr. 20, UT
Ida Renee Johnson Feb. 11, UT
Robert Johnson Jul. 2, UT
Kenneth Dean Johnson Mar. 28, UT
Robert J. Jones Apr. 30, UT
Terry L. Jones Apr. 13, UT
Vernon R. Jones Mar. 27, AZ
John Ward Josephson Mar. 29, MI
Margaret A. Kelsey Jun. 24, ID
Kathleen Clawson Killpack (Jeppersen)
Feb. 26, UT
Debra A. King Jun. 3, UT
Janice Knight Feb. 25
Wendy S. Koehler Jun. 5, UT
Rebecca Koeven Mar. 25, UT
Daniel Joseph Kormylo Feb. 10, UT
Billie Jean Koss Mar. 19, UT
Kenneth G. Larsen May 8, UT
Veda P. LeBaron (Pilling) Jul. 4, CA
Samuel Leek Jun. 4, UT
David Rowley LeFevre Apr. 18, UT
Hallie Ann LeRoy Feb. 8, UT
Merrill Rex Lewis Jul. 8, UT
Ronnie L. Lewis May 2, UT
Kathleen Maughan Lind Jun. 12, UT
William Wendell Litz May 2, ID

William Gary Lloyd May 26, ID
Sonja Long (Slaugh) Feb. 27, UT
James R. Lovell May 27, ID
Susan Lowder Jul. 9, UT
Joseph Hugh Lyday Jun. 2, UT
Richard MacFarlane Mar. 25, UT
Timothy P. Madden Feb. 20, CO
Barbara Magnelli Mar. 21, ID
Helene A. Majors (Anderson) Jul. 11, UT
Larae Majors Feb. 8, UT
Troy L. Marsing Feb. 18, UT
Evens Paul Martin Mar. 9, UT
Gary W. Marx May 15, UT
Elaine W. Mayfield (Ward) May 13, UT
Ilene C. McKenna (Causer) May 13, UT
Richard D. McQueary Apr. 3, UT
Wendy W. Meeks Feb. 17, UT
Mel C. Memmott Jul. 4, UT
Jay A. Meservy Mar. 11, UT
Lloyd J. Meyer Apr. 19, UT
Fred L. Miller Feb. 4, UT
Marilyn Monk Mar. 19, UT
Janice Claudine Montgomery (Bottorff)
Mar. 24, UT
Melda Morrill Feb. 15, OK
Betty Alvira Hobbs Morrison May 14, UT
Charlotte M. Moulton (Moulton) May 22, UT
William G. Neal Jun. 4, UT
Coleen Neely (Williams) Feb. 10, AZ
Earl R. Nelson Apr. 20, UT
Randy Nelson Apr. 16, ID
Madeline S. Nickas (Sampinos) Apr. 20, UT
Lewis W. Nielsen Apr. 2, UT
Ron Nielsen Jun. 10, UT
Julie Norman Mar. 18, UT
Wendy Ann Oaks (Wenerstrom) Jun. 1, UT
Keith L. Ockey Mar. 5, UT
Eileen L. Ogden Jun. 13, UT
Naoima Oman Mar. 31, UT
Rudolph Ortega, Jr. Feb. 6, UT
Gereldine D. Osborn Feb. 28, UT
Donna S. Packer (Smith) Mar. 5, UT
Annette Page Jun. 30, UT
Hugh Dellwin Park May 8, UT
Jasmine Haley Parros Jun. 29, UT
Robert E. Pennock Jul. 17, ID
Anna Marie Peterson Jun. 4, UT
Tamara Peterson (Taylor) Mar. 14, UT
Ashley M. Pett Feb. 5, UT
Arlene Pettit (Weber) Feb. 26, UT
Dennis Perry Phillips Jun. 29, ID
Trudy H. Potter (Hammond) May 16, ID
Lynn Eugene Powell Feb. 23, UT
Patric Alan Powell Feb. 15, ID
Joseph L. Preston Jun. 10, AZ
Charles B. Price Mar. 24, UT
Gerald Frederick Radden Feb. 23, WY
Laurel A. Ramstetter Apr. 16, NM
Norman Ravsten Apr. 30, UT
Gwen Merrill Reading Feb. 19, UT
Gale A. Reed Jun. 21, ID
Frank P. Reese Apr. 6, OK
William M. Reese Feb. 2, UT
Jerald Eugene Richman Jun. 8, UT
Norman William Riebe May 17, NC
Dolores Marie Riley Jun. 2, AZ
Carolyn Leslie Roney Feb. 16, IN
Susan Rose Feb. 2, UT
Richard J. Rucker Feb. 15, UT
Richard C. Safley May 14, UT
Bryan C. Salzetti Apr. 10, UT
Jaxen H. Saunders Apr. 15, UT
Sue Elaine Schenck Jun. 10, UT
Dean Alonzo Schiess Jun. 13, AZ
Betty A. Schnell May 29, ID
Allen C. Schofield May 25, UT
Jack Richard Selander, Jr. Feb. 26, TX
Gene Earl Sewell Feb. 25, ID
Dean Shaffer Jul. 9, UT
Nedra J. Sherman May 22, UT
Blake Lamar Shumway Jun. 24, UT
Lana Rae Shurdliff May 18, UT
Carma B. Sitrine (Bunderson) Feb. 13, UT
Ferrol D. Smart Jun. 23, UT
Allison Smith Jul. 1, UT
Ellen J. Smith May 5
Larry Allen Smith Apr. 14, UT
Pamila Smith May 27, ID
Reed Edward Smith Jun. 4, ID
Norma T. Snyder (Tallerico) Jun. 27, UT
Kurt N. Sorenson Mar. 5, UT

Sandra L. Souza Jul. 2, UT
Rachel Frances Spafford (Weddle)
Mar. 23, CO
Nolan K. Steadman Feb. 11, UT
Anne Katherine Sterbenz-Duus Mar. 2, MN
Marcia Rae Stocks Jun. 3, UT
Robert F. Stokes Feb. 2, UT
Stanley J. Stokes May 16, UT
Wanda H. Stone Jul. 7, UT
Nicole Strawn Apr. 1, MT
Gary George Sutton Feb. 24, UT
Wesley R. Tanner May 24, UT
Nickolas James Taylor Mar. 1, AZ
Willard Tharp Apr. 17, UT
Carl W. Trussel Feb. 23, UT
Thomas C. Tucker Feb. 4, UT
James LeRoy Turpin Mar. 13, UT
Rob Paul Valcarce Apr. 8, UT
Ralph Vanderlinden May 6, NV
Louis Volk Feb. 8, NM
Orley W. Waite Feb. 5, CA
Kyle Dean Walker May 23, UT
Robert Edgar Walker Jun. 5
Shelby Jay West Jul. 17, UT
Symphonie Wheeler Apr. 7, UT
Patricia Louise Whitaker (Bonell)
May 8, UT
Jeraldine Whiting Mar. 4, CO
Lee M. Wight Jun. 3, MT
Blaine H. Wilcox Feb. 20, UT
James LeRoy Wilde Apr. 11, UT
Louis Wilhelm May 13, UT
Edwin V. Wilson May 22, AZ
Peggy Wilson (Barton) Mar. 18
Loujean Ellaree Wise Feb. 20, UT
Matthew T. Woodman Mar. 19, UT
Martin E. Worwood Mar. 27
KayLynne Olsen Yorgason Jun. 24, UT
Joel Barlow Zitting May 10, UT
John Zoolakis May 29, UT

EDUCATORS

Frank J. Messina Feb. 25, UT
Betty Hammond Jun. 29, UT
Mary V. Kolesox Jul. 12, UT
Jeffrey L. Walters Feb. 16, SC
Donn Calvert Goode Apr. 11, UT
LaMar R. Frandsen Apr. 7, UT
Clive Wendell Arave Apr. 2, UT
Lenore R. Robbins Jun. 5, UT
Deloy G. Hendricks Feb. 15, UT
Sherman J. Lindhardt Feb. 23, UT
Larry L. Hansen May 21, UT
Joseph B. McMurdie May 28, UT
Doran J. Baker May 3, UT
Carroll C. Lambert Apr. 16, ID
Teresa Bodrero, Jun. 30, UT
Robert E. Warnick Jun. 28, UT
Alan W. Shaw Feb. 28, UT
Lynn Elwood Apr. 29, UT
Jean Pugmire, Mar. 11, UT
Clark S. Hunsaker, Jul. 5, UT



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PLANES, TRAINS, AND WI-FI: A Statewide Reach

By Kristen Munson

For decades, Utah State University professors climbed aboard small aircraft in Logan to hop over 13,000-foot peaks to teach in the Uintah Basin and return the same night, landing long after the valley was asleep.

The effort was “not for the faint of heart” retired USU English professor Glenn Wilde recalled in the book *Upon the Shoulder of Giants: A History of Utah State University’s Regional Campus System 1967–2015* by John Barton (USU Provost’s Office, 2016).

“One time while landing in Roosevelt, the runway was iced over and the plane was unable to stop,” Wilde noted. “It skidded past the end of the runway and through a barbed-wire fence before it finally came to a halt in a farmer’s field. There were no injuries, just pale and scared professors, but most continued to come down from Logan.”

Former USU President Stan Albrecht remembers a similar harrowing flight during a snowstorm pummeling the Uintas. After collecting faculty members in Vernal, the plane was unable to land in Roosevelt and the pilot flew west, eventually picking up the lights of the I-15 and following them to Tremonton.

“The wind was blowing so hard that he couldn’t land at the regular airport,” Albrecht says over Zoom with a smile. “We all got off and sort of kissed the ground. I drove to Roosevelt from that time forward.”

He chose to go, and keep going, because he knows what it’s like to grow up in a rural community without access to higher education. Albrecht was raised on a 40-acre farm in Fremont, Utah, by a father who was a voracious reader and a mother who wrote poetry and dreamed of a college education. They didn’t have much money, but wanted all six of their children to go to college.

“Certainly, in [my mother’s] eyes it wasn’t a question of if, but where,” he says. That life experience “created something in my soul that caused me to want to give back, to want to create those opportunities for others.”

Teaching in the Uintah Basin also allowed Albrecht to see what USU’s statewide campus system might become.

ON THE ROAD AND IN THE SKIES

The flying professors are part of USU’s mission to bring higher education to people in far-flung corners of the region. It began in the early 1900s when USU (then the Agricultural College of Utah) faculty traveled by rail to demonstrate agricultural techniques in Utah and Idaho. As early as 1911, the university began offering courses conducted by correspondence — the snail mail version of today’s online education.

USU’s fly-down program lasted nearly 30 years from 1967 to 1996. The first flights were in a Piper Navajo twin-engine plane before the university acquired

USU’s fly-down program ran from 1967 to 1996. For a few nights each week, several faculty members boarded a small aircraft to teach in more remote regions of the state. Images courtesy of USU Special Collections and Archives.





a Bonanza Beechcraft flown by Leon Hill, a faculty member in the university's aeronautics department. Upgraded airplanes aren't the only advances that propelled changes to USU's distance learning for the better.

"The development of USU's distance education parallels and mirrors the growth of technology and transformation of public higher education," Barton writes in *Upon the Shoulder of Giants*. "Delivery of Utah State courses has progressed as professors traveled to deliver lectures and courses using horse and buggy, train, automobile, air-flight, telephone transmission, and presently satellite and internet delivery."

Barton himself witnessed the system modernize and grow over the last 35 years. In 1988, while finishing his graduate work in history at Brigham Young University, he was offered a one-year teaching appointment at the USU Uintah Basin Education Center. Classes started a week later. Barton still needed to write his thesis and already had a fellowship at the Redd Center of Western Studies, but he accepted the job and put nearly 20,000 miles on his car. It marked the start of a four-decade USU career.

"I feel very much like the Lord gave me that job," Barton says. "I am far from the only person who teaches at Utah State who feels that their job is more than a job, it's a calling."

It was also a homecoming. Barton grew up about 20 miles from his Roosevelt office, which wasn't exactly bursting with employment opportunities. Before USU established a presence there, "if a farmer had four sons, three of them had to leave to make a living," he recalls. "Obviously, the oil industry made a huge difference there, but so too did the education system."

A HUMBLE START

USU's original footprint in the Uintah Basin was modest. In the 1960s, the legislature passed a bill to open USU's first off-campus branches in Roosevelt and Moab. Classes in the Basin were held in a one-room storefront taught by traveling professors. Initially, courses were scattered in county buildings, Extension agent offices, or public-school auditoriums, Barton says. They also might be conducted entirely over the telephone.

"The B-net was solely a dedicated audio line so that the students could only hear your voice," he explains. "When they would have a question, they would have to cue the mic and interrupt the teacher, identify themselves, and speak up. It worked. It really did work. Students had to want to be there."

At 32, Barton was younger than many of his students and shuttled between a rotating set of classes in Vernal and Roosevelt. As new technology came along, it felt like a huge advancement.

The next version included a two-way audio and visual broadcast of the professor and the classroom that operated with a 30-second delay that was eventually replaced with a full motion video that also had a notable delay. (Imagine a clunky precursor to Zoom.) The statewide campuses now use interactive video conferencing (IVC). By continually adopting better technologies, USU's statewide campuses increased academic options and built flexibility into the system as courses could be held in person, via IVC, online, or hybrid formats. It just took some getting used to.

"There is not one way to do it and to do it well," Barton says. "I have adopted and adapted to the changing technologies although, ironically, I am not a very techie person. Thank goodness there has always been IT people

who can do it and who can show me how to do it. I can learn.”

That attitude reflects how the statewide campus system has operated since its inception. While integrating new technologies out of necessity, the campuses became incubators for piloting and validating new distance learning methods. For instance, a decade ago Mike Christiansen, '04, an associate professor of chemistry in the Uintah Basin, began using a flipped classroom where students watch a lecture — often over YouTube — before attending class and use meeting times to ask questions and work through problems. By regularly integrating technology with teaching, shifting to an online format during the COVID-19 pandemic was easy for Christiansen.

“I was able to seamlessly shift from flipped IVC to fully online teaching using Zoom, from my home office,” Christiansen, writes over email in June. “There was only one piece of equipment I needed but lacked: a digital writing tablet.”

Faculty like him were prepared for the unexpected. In March 2020, within days of suspending in-person classes, the university shifted entirely online. Barton believes one silver lining of COVID is that more faculty are trained and willing to teach using distance education delivery.

“Utah State has been an international pioneer,” he says. “We have been on the cutting edge of the technological classroom forever. And we have done a very poor job of singing our praises.”

EXPANDING OPPORTUNITIES

USU's 30 statewide campuses and locations are an outgrowth of the university's Extension service. They were originally housed under USU Extension until 2006 when Stan Albrecht, then USU's provost, moved to get them under the provost office like the rest of USU's academic offerings to ensure consistency across curriculums.

We wanted to make sure we were providing the same experience to statewide campus students, many who are married with families and jobs and can't pick up and move, Albrecht says. “Taking the education to them was really, in many ways, the only way.”



This transformed the statewide campus system and helped expand it, Barton explains, adding that “we had no political clout beyond persuasion that this is good for students in isolated areas, this is good for the state — [But] Stan did.”

Over the years, the number of degrees has increased from a handful of associate degrees to 35 bachelor's degrees, 27 master's degrees, and three doctorate degrees in 2022. There are now more than 170 full-time statewide faculty members. Albrecht credits much of the expansion with USU's merger with College of Eastern Utah in 2010, as well as a commitment to build additional facilities.

“The building is a physical structure with quality classrooms and quality instructional opportunities but it is also highly symbolic in the community,” he says. “It signals to those communities that USU is going to have a long-term presence there.”

USU has heavily invested in upgrading infrastructure over the past 10 years with new buildings or remodels in Brigham City, Kaysville, Salt Lake City, and Moab. Most recently, state funding will support a new building in Monument Valley, which will benefit the Navajo Nation.

Barton attests to the difference having a physical structure makes.

“As soon as we got the building [in Vernal] there was a change in perception in the community, a change in perception from the students,” he says. “It was not just as President Taggart said, ‘a fly by night operation.’ ... We now have hundreds and thousands of people with enhanced careers and enhanced lifestyles because of Utah State distance education. And we've had so many students who are first-generation college students. It changes the way the whole family views what is within their reach.” **A**

Top: While flights were often uneventful, winter storms could create harrowing experiences. According to John Barton in his book *Upon the Shoulder of Giants: A History of Utah State University's Regional Campus System 1967-2015*, most faculty kept coming anyway. Bottom: USU's mission to bring higher education to people in far-flung corners of the region began in the early 1900s when Agricultural College of Utah faculty traveled by rail to demonstrate agricultural techniques.



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