iUTAH EPSCoR

2017/2018 Annual Newsletter

SCIENCE
FOR UTAH'S
WATER FUTURE

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iUTAH EPSCoR 2017/2018 Annual Newsletter

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iUTAH (innovative Urban Transitions and Aridregion Hydro-sustainability) is a five-year project funded by a cooperative agreement with the National Science Foundation's Established Program to Stimulate Competitive Research (EPSCoR).

The vision for iUTAH is to lead the nation in scientific, educational, and innovative solutions for water management and sustainability.

The mission of iUTAH is to enhance collaborative partnerships to better understand how to sustain Utah's water resources by (1) developing novel approaches to integrated research and training, and by (2) expanding the state's economic, educational, and research competitiveness.

Michelle Baker, iUTAH EPSCoR Project Director

> "When we started mapping our activities, we found that we'd covered many miles and had quite an impact all across the state.

Dear Friends of iUTAH,

It has been a busy five years for the iUTAH project. As the project officially comes to a close in the summer of 2018, I would like to share the stories in this newsletter as a reminder about how far we've come and about the capacity we have built for water research, education, training, and outreach in Utah.

When we started mapping our activities, we found that we'd covered many miles and had quite an impact all across the state. There are now 42 GAMUT sensor stations actively monitoring water quality and quantity from mountain to urban settings in real time across the Wasatch Front. Our researchers have conducted field studies in over 62 locations, some hosting multiple studies. In the area of outreach and training, our 12 community outreach partners regularly engage local citizens of all ages in water education. And, our traveling outreach programs such as Utah Water Watch and Taking Learning Outdoors have visited over 371 locations statewide, stretching from Beaver to Blanding.

People have made all of this happen. Our researchers have worked to protect public health and engage Utahns in many ways, from assisting in the early detection of harmful algal blooms to educating Utah's citizens on what they can do to protect local water sources. Our relationships with state agencies and municipalities have been mutually beneficial in helping to better understand people's views about water use in their community.

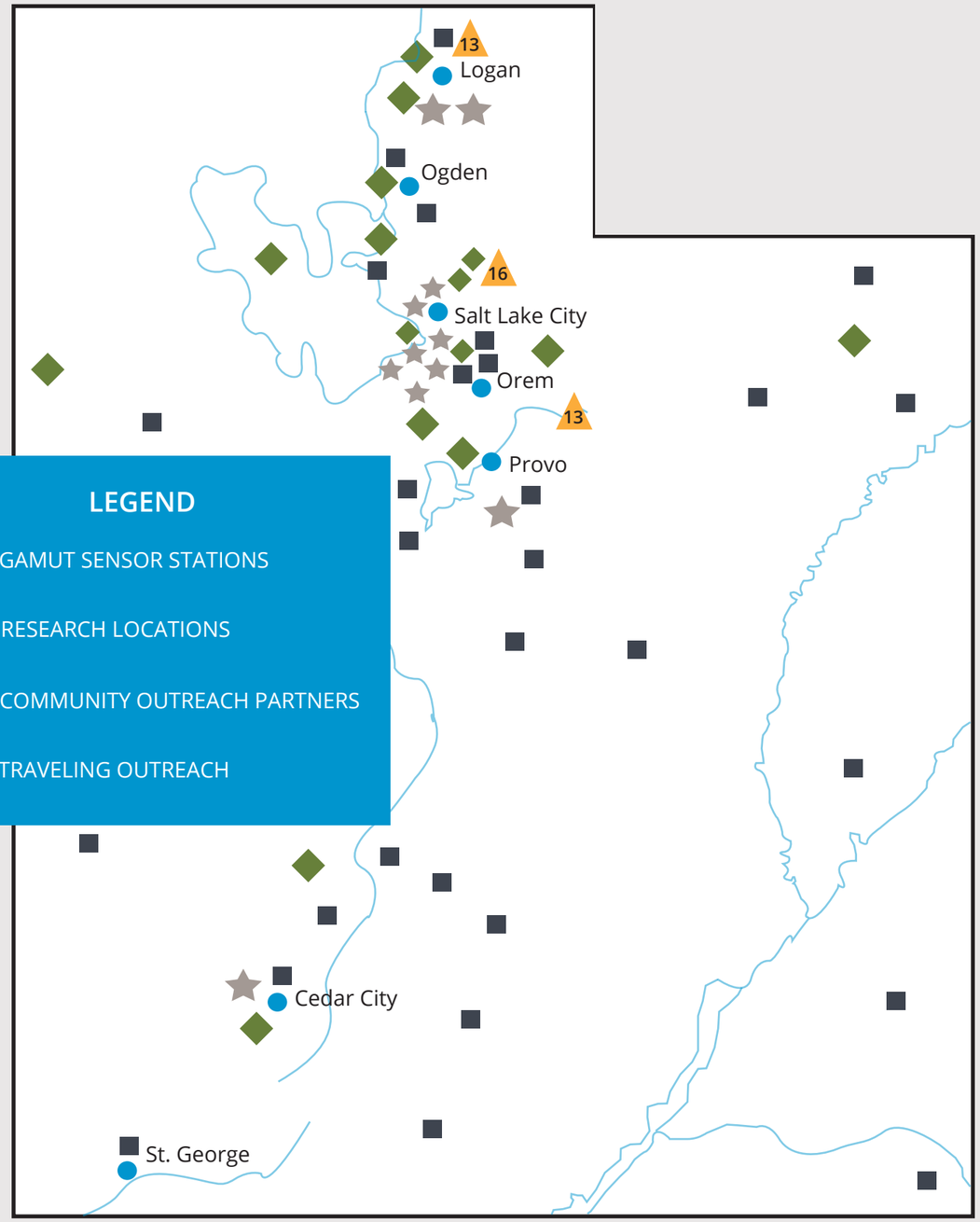
Information keeps rolling in, as the project has produced over 200 million data values over four years, in the form of measurements, models, and analysis of our research stored in iUTAH's data repository. This number grows daily as GAMUT continues to produce data we maintain as an open collection for public access and use even after the project ends.

Moving forward, we have listed places and activities on page 23 where iUTAH hopes to continue engaging with you in the coming year. We encourage you to stay in touch and continue to let us know what you are doing to improve science for Utah's water future.

Sincerely,

Michelle Baker
iUTAH EPSCoR Project Director

iUTAH Research and Community Engagement Statewide



3 EXPERIMENTAL WATERSHEDS

Logan River Red Butte Creek Middle Provo River

13 + 16 + 13 = 42 GAMUT SITES STATEWIDE

62 RESEARCH SITES

Locations with one or more projects underway

Bonneville Salt Flats
Cache Valley
Cedar City
City Creek
Farmington Bay
Great Salt Lake
Heber Valley
Little Cottonwood Creek
Logan Canyon
Ogden Canyon
Provo Canyon
Red Butte Canyon
Salt Lake County
Tushar Mountains
Uintah Mountains
Utah Lake

12 COMMUNITY OUTREACH PARTNERS

Presenting displays or programming on water science

Explore Utah Science
Garth and Jeri Frehner Museum of Natural History
Glendale Middle School
Global Change and Sustainability Center
Monte L. Bean Life Science Museum (open soon)
Natural History Museum of Utah
Rose Park Elementary School
The Leonardo
Utah Education Network
Utah Public Radio
Utah Water Watch
USU Ecology Center

5 TRAVELING OUTREACH PROGRAMS

*Visiting **371**+ locations statewide*

"Leo on Wheels" water carts school visits
iUTAH WaterGirls
Taking Learning Outdoors
Utah Water Watch Tier 1 & Tier 2 training
"Water Runs Through This Book" educational events

RESEARCH

Lasting Infrastructure

Keeping Tabs on HABs: From GAMUT to Utah Lake

Summer is known as a time for fishing, boating, and swimming in Utah's lakes. Unfortunately, Utah Lake and its tributaries have seen more restrictions and closures in recent years due to outbreaks of cyanobacteria, also known as blue-green algae, creating conditions that lead to harmful algal blooms (HABs).

THE PROBLEM

In 2016, an early and large bloom covered 90 percent of Utah Lake's surface, and affected its use throughout the summer. These toxic algal blooms often start with little warning and affect people, animals, and agriculture.

Researchers and technicians from iUTAH worked in collaboration with the Utah Department of Environmental Quality, Water Division (DEQ) to install water quality monitoring buoys in Utah Lake in August 2016. Equipped with sensors, these buoys send water quality data every 60 minutes. The information is recorded in iUTAH's data repository, monitored by the state water quality agency, and used as an early warning system for future HABs.

MOUNTAIN TO URBAN TRANSITIONS

iUTAH is known nationally and internationally for our well-established network of environmental observatories in the state. GAMUT or 'Gradients Along Mountain to Urban Transitions,' is a network of 42 aquatic and climate sensor stations measuring and recording climate, hydrology, and water quality along the Wasatch Front for five years.

PROTECTING PUBLIC HEALTH

Water quality buoys were placed in Utah Lake last summer, after toxic algal blooms hit, to send data to the Utah Division of Water Quality every 60 minutes.

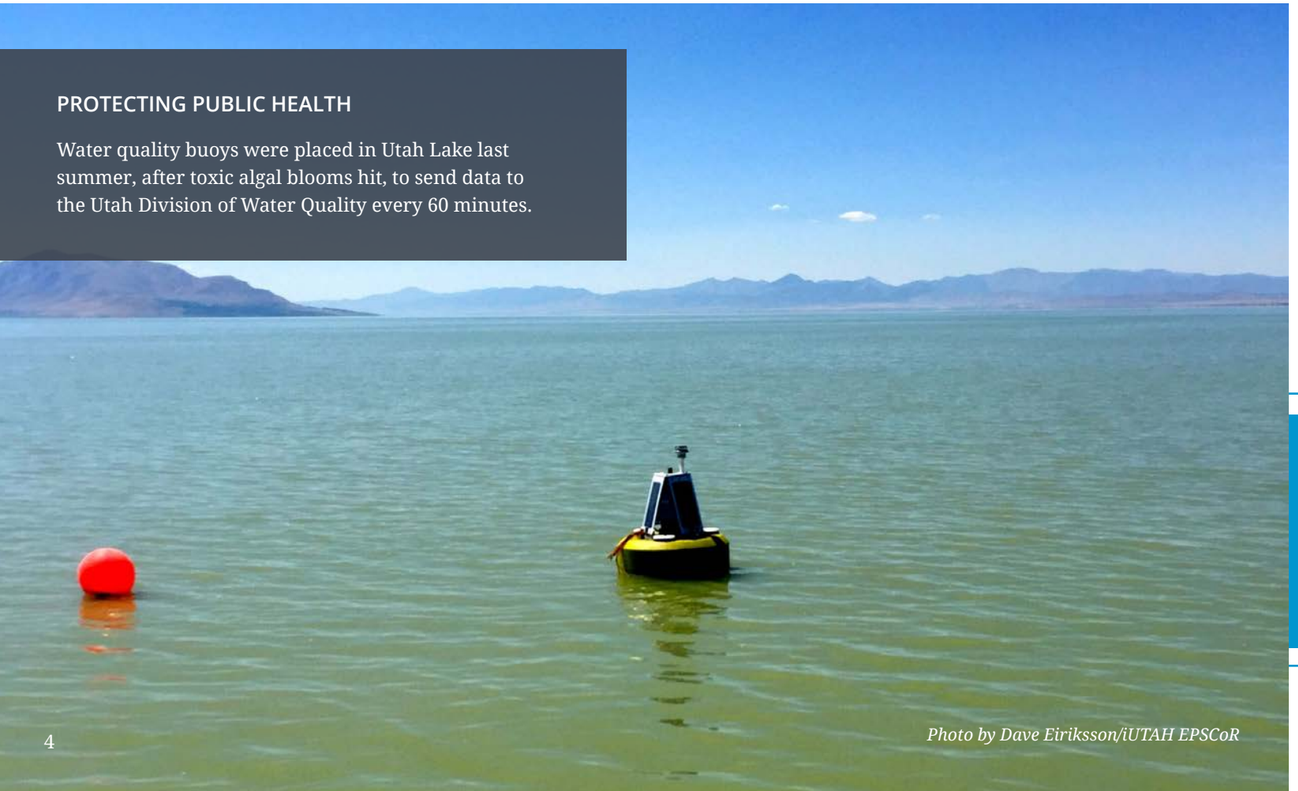


Photo by Dave Eiriksson/iUTAH EPSCoR

GAMUT sensor stations, located in three of Utah's most populated watersheds: Red Butte Creek, Logan River, and Provo River, traverse the landscape from mountain to urban settings. Data from these stations are monitored and used for solving a wide range of water-related problems. From diagnostics and restoration of impaired urban rivers such as the Jordan River to modeling future water availability, the data help identify irregularities in Utah's waterways. With the support of Utah's three research institutions, Brigham Young University, the University of Utah, and Utah State University, data will continue to flow from these observatories long after the iUTAH project ends.

PROTECTING PUBLIC HEALTH

Our scientists and technicians are dedicated to helping detect, monitor, and prevent HABs, working alongside Utah's water quality regulators to protect public health. iUTAH researchers at Brigham Young University led by Zachary Aanderud, an associate professor in the Department of Plant & Wildlife Sciences, continue to sample the water each week at Utah Lake, sharing results with state and local agencies. After collection, the DEQ analyzes samples and shares the results with the public. The research team grows the cyanobacteria in a controlled environment and changes variables to find connections between environmental triggers and conditions leading up to HABs.

ENGAGING THE PUBLIC

Some of these same researchers actively engage the general public as well. In June, they talked to over 800 people at the Utah Lake Festival, making a personal connection between research and local water sources. The BYU team included college students in this research through iUTAH's research experience for undergraduates (iFellows). iUTAH sees the connection between research and education as crucial in helping solve Utah's water problems. Our research brings scientists and technicians together to help solve real problems facing the state now and in the future.

DEPLOYING BUOYS IN UTAH LAKE

iUTAH researchers worked with state agencies to place new water quality monitoring buoys in August 2016.

Photo by Dave Eiriksson/iUTAH EPSCoR

"We have greatly appreciated the opportunity to interact with other universities in Utah on this great project. There's been a lot of collaboration... we have had over 30 faculty, graduate students, and undergraduate students working from three different colleges. "

Alan Harker
Associate Academic Vice President for Research, Brigham Young University

RESEARCH

Catalyst for Change

Collaborations with Utah's Communities

Early research efforts by iUTAH's engineering and social scientists laid the foundation for ongoing engagement with Utah communities by building trusting relationships to answer new questions. In addition to achieving scientific goals, municipality representatives and researchers learned from each other as well as from the research process.

BUILDING TRUST

Since 2012, iUTAH has fostered relationships between researchers and external partners from municipalities and other entities managing water across the Wasatch Front. Some of these interactions have focused on informing local leaders and groups about research findings that may be relevant to their decisions and circumstances.

INFORMING METHODS

In many cases, iUTAH's social and engineered water systems research has involved consulting with local leaders to shape research methods and to help with interpreting findings. At times these consultations have led to deeper collaboration with organizations and groups interested in water research.

The iUTAH Household Survey from 2014 shows the many stages of engagement with local partners. First, consultations with municipal officials informed the development of the initial survey. Follow-up presentations on survey findings to local leaders, led by Douglas Jackson-Smith, formerly a professor of sociology at Utah State University (USU), and Melissa Haeffner, a postdoctoral researcher with iUTAH, highlighted the complex social dimensions of local water use and concerns. Results communicate different stakeholder experiences such as views about water use held by property owners versus renters. Over time, the project was expanded to integrate household survey data with water use data held by municipalities.

BUILDING COMMUNITY PARTNERSHIPS

Relationships were strengthened between iUTAH and partners from municipalities and other groups managing water in Utah.

Photos by Rose Yazzie & Taya Carothers/iUTAH EPSCoR

MEETINGS WITH CITY COUNCILS

Douglas Jackson-Smith reviews details from the iUTAH Household Survey on how local residents think about and use water in their daily lives.

Photo by Melissa Haeffner/iUTAH EPSCoR

"iUTAH gives our students and faculty the opportunity to engage in research, in collaboration with their counterparts at other Utah universities… investigating things like water resource management, which are important not just for Utah and for our nation, but for the entire planet."

Charles Wight
President, Weber State University

CATALYST FOR FUNDING

iUTAH was also a catalyst for new projects integrating social science and engineering research funded by the Environmental Protection Agency and U.S. Department of Agriculture (USDA). These new projects have woven lessons from iUTAH-engaged research into study designs. For example, a new USDA project led by Ryan Dupont, professor of civil and environmental engineering at USU, explores reuse of treated wastewater for irrigation. The project brings together researchers and stakeholders in a local advisory board for the benefit of both groups.

CONTINUING RESEARCH

Additional research phases are planned, led by iUTAH team lead Courtney Flint, professor of sociology at USU, to discuss initial findings with external partners and to inform the next steps. iUTAH experiences have taught us that networks of relationships among researchers and local stakeholders grow and change over time. Being sensitive to local contexts, including the information needs, limited resources, and knowledge and experiences of local professionals leads to better and more impactful science.

RESEARCH

Making Lasting Connections

Real Discoveries That Make A Difference

Building a scientific community in Utah means reaching a wide variety of citizens and students and giving them the opportunity to join in water science research. Many of Utah's students attend universities throughout the state where the capacity to conduct scientific research is somewhat limited. Professors at these institutions, called primarily undergraduate institutions (PUIs), have limited time and resources to involve themselves and their students in current science research.

GROWING RESEARCH CAPACITY

This is why iUTAH established the Research Catalyst Grant program. Over the past five years, we have extended our collaborative culture of multi-institutional research to PUIs across our state. By offering faculty at these institutions the opportunity to apply for research awards, iUTAH is addressing, in a targeted, strategic way, the factors that most limit the participation of PUIs in research.

CONNECTING TO TEACHING

"As a former PUI faculty member myself, I understand the unique pressures and limitations that come with this environment," said Andreas Leidolf, Assistant Director of iUTAH. "It is tremendously rewarding to be able to provide needed support to leverage the ample talent and enthusiasm for research that exists at these institutions on behalf of our statewide research enterprise."

Through iUTAH's Research Catalyst Grant program, over $300,000 has been awarded to PUIs since 2013, up to $20,000 per project. Of the 20 projects funded, half went to female researchers, eight to faculty at Utah Valley University, six at Southern Utah University, and three each at Westminster College and Weber State University. Funding supports research by students, other faculty members, and other research institutions, state agencies, community groups, and other organizations across the state.

EXAMINING THE GREAT SALT LAKE

Westminster College students, led by faculty mentor Frank Black, have been involved in collaborative research examining mercury levels in the Great Salt Lake.

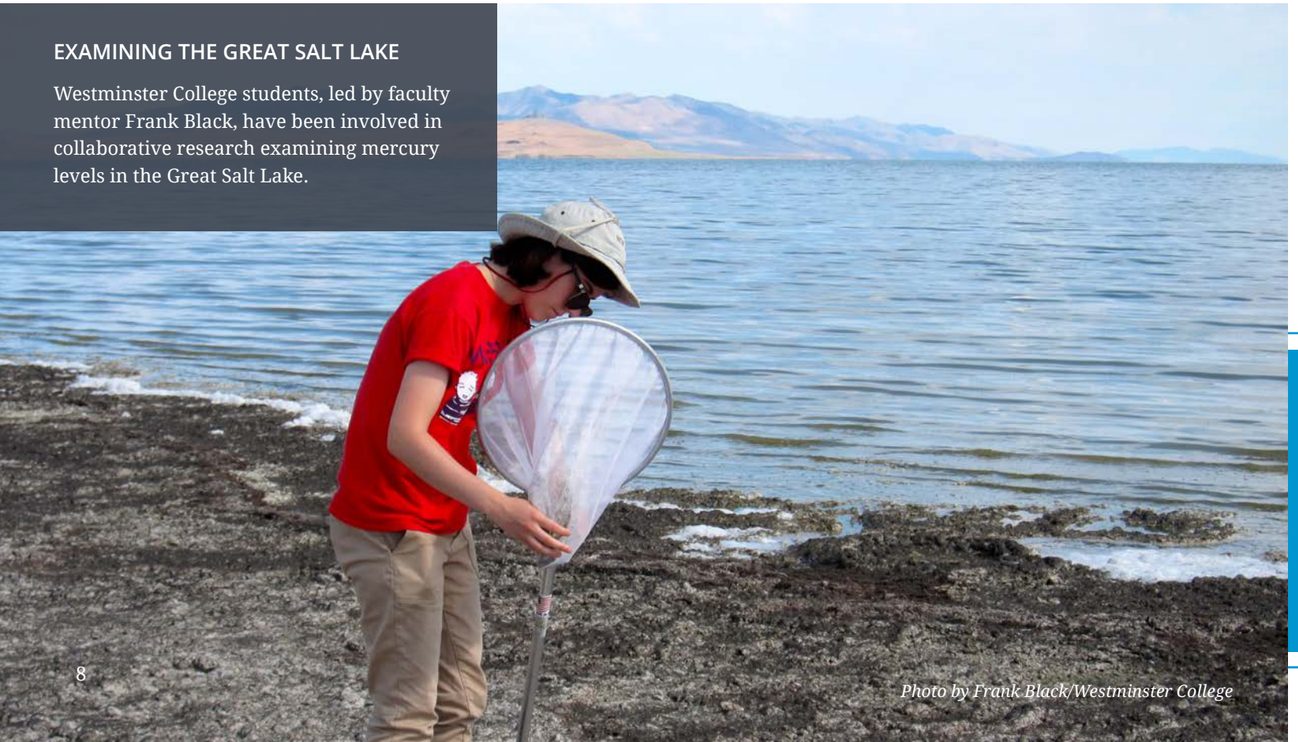


Photo by Frank Black/Westminster College

COLLABORATIVE RESEARCH

Ten researchers from University of Utah, Westminster College, and the Utah Department of Natural Resources examined why the Great Salt Lake's concentrations of mercury dropped.

SOLVING MYSTERIES

One of the many success stories of this program is the collaborative research conducted by Frank Black, an associate professor of chemistry at Westminster College. Black was part of a team of 10 scientists that included researchers at the University of Utah and Utah Department of Natural Resources, looking at the changes in the toxic methylmercury levels in the waters of Utah's Great Salt Lake.

The study examined how mercury cycling in the Great Salt Lake responded to reconstruction of a railroad causeway built in the 1960s. The causeway divided the lake into north and south sections, with just two culverts to allow flow between them. As water from the denser, saltier north arm flowed to the south side, it sank to create a deep brine layer with elevated concentrations of mercury and methylmercury, causing concern about mercury levels in waterfowl feeding in the lake. When the culverts were closed during construction of a new causeway bridge, the deep brine layer disappeared, along with an 80% decrease in mercury and methylmercury concentrations. Ongoing research is studying how the lake responds to the new bridge and likely redevelopment of the deep brine layer.

> "In this past five-year period, Westminster has had three projects that have been funded, and 14 students who have done undergraduate research."
>
> ***Lisa Gentile***
> ***Provost, Westminster College***

ENGAGING STUDENTS

Funding studies such as these involve both PUI faculty and their students in solving real-life mysteries. Black's 2017 funding from iUTAH builds upon his earlier work on the Great Salt Lake by examining wildfire ash and dust as sources of heavy metals in Utah's aquatic ecosystems. His students at Westminster College have presented research at conferences, received recognition from community groups, and contributed to a published study. By supporting PUI research, iUTAH is able to help faculty in making real discoveries that make a difference.

RESEARCH

Data in the Digital Age

Building a Sustainable and Lasting Legacy

Data have been called the world's most valuable resource – digital assets that can be used for the greater good. A challenge for scientists is making data open and accessible to all users. Science, specifically water science in Utah, will benefit from the iUTAH project's aim to collect and openly share data with researchers, scientists, municipalities, and state agencies.

INFORM RESEARCH AND POLICY

One example can be found in the ongoing collection and management of iUTAH's real-time data produced by the Gradients Along Mountain to Urban Transitions (GAMUT) network. GAMUT's aquatic and climate sensors have produced over 200 million values in over four years, and will continue to accumulate data after the project's end, providing baseline information for a wide range of water quality and quantity research along the Wasatch Front. These data are openly accessible in various formats for researchers, educators, and policy-makers to take advantage of and use.

OPEN-ACCESS RESOURCES

Early in the iUTAH project, teams of researchers collaborated on the logistics of developing and maintaining openly published data to ensure consistent and usable outputs. iUTAH's Data Management team created policies and requirements, and educated participants on what it means to produce open data, changing perceptions from "my data" to "our data." Instilling this mindset in all participants has helped to create a spirit of camaraderie and collaboration that is a hallmark of the iUTAH project.

> "iUTAH data resources comprise a growing and vibrant open-access collection with datasets, models, and digital content available for public and private access and use.

Today, iUTAH data resources comprise a growing and vibrant open-access collection with datasets, models, and digital content available for public and private access and use. The data are openly available in multiple formats and can easily be accessed and integrated with a variety of data analysis software.

SUPPORT COLLABORATION

iUTAH is using the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) HydroShare system as a data repository. HydroShare is a flexible system for sharing and collaborating around data and models. Its development included input and leadership from Utah State University researchers David Tarboton, Jeff Horsburgh, Amber Jones, and other iUTAH participants and partners. HydroShare offers users long-term storage options along with enhanced capability for collaboration and sharing of both data and models. Additionally, the system supports formal publication of research products, including issuing citable digital object identifiers (DOIs).

Clear and specific functionality for submitting well-described research results has helped participants overcome the technical challenges for meeting data-sharing obligations. The confidence users have in this framework helps to address the cultural challenges of data sharing by providing a place and a workflow for collaboration and supporting an easily accessible, digital, online presence.

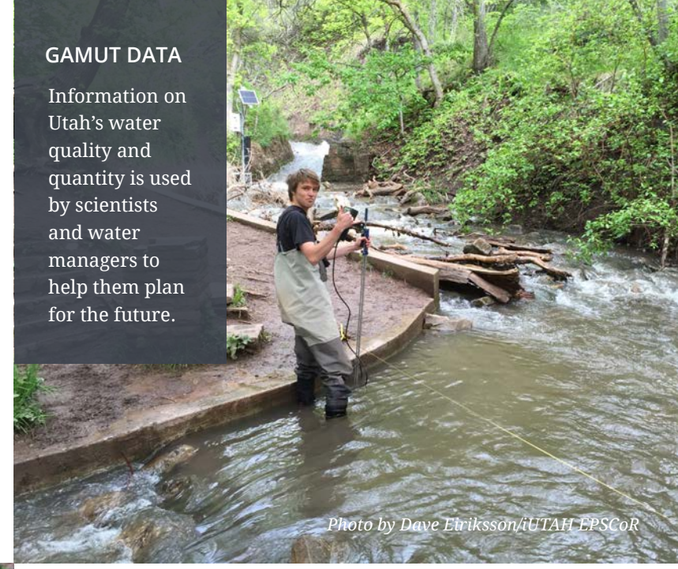
LASTING LEGACY

Science is constantly evolving and asking new and bigger questions that often require data to be repurposed. As such, data repositories need to be flexible to support data storage in a variety of forms and formats to aid in posing and answering specific science questions. Since iUTAH contributed a significant number of datasets to HydroShare, the needs of participants have helped motivate development of features and functionality that will continue to address long-term needs after the project ends.

Looking forward, open science in the digital age allows research scientists, water managers, and the public to access well-documented data that can lead to better understanding of the growing demands on Utah's water supply. By offering publicly accessible data, publications, and models, iUTAH has created a sustainable legacy for Utah's water future.

200+ million data values in over **4 years**

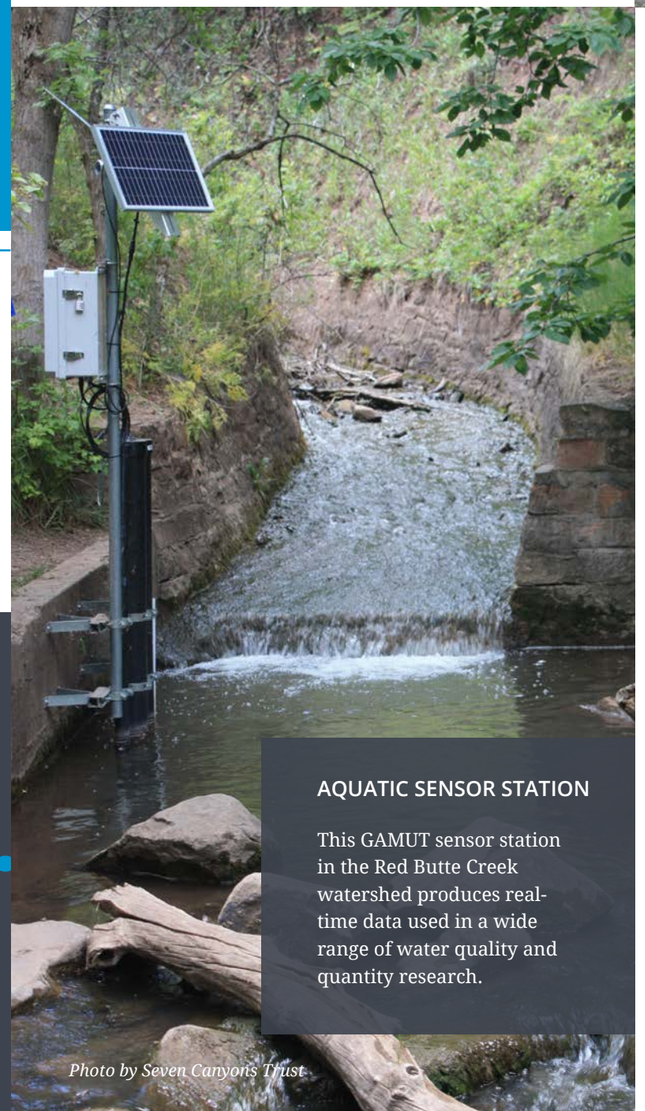
GAMUT's measurements, models, and analysis provide baseline information for a wide range of water quality and quantity research along the Wasatch Front.



GAMUT DATA

Information on Utah's water quality and quantity is used by scientists and water managers to help them plan for the future.

Photo by Dave Eriksson/iUTAH EPSCoR



AQUATIC SENSOR STATION

This GAMUT sensor station in the Red Butte Creek watershed produces real-time data used in a wide range of water quality and quantity research.

Photo by Seven Canyons Trust

iUTAH Project-Wide Successes over Five Years

2012-2017 By the Numbers

$29.5M
funding from
80 iUTAH research proposals

543
presentations
and posters presented at academic conferences

210
publications
communicating water science in peer-reviewed journals

200+
million
iUTAH data values produced and stored

155
collaborations
among individuals

iUTAH's Education, Outreach & Diversity Programs

2012-2017 By the Numbers

412
public events
supported by iUTAH

432,723
individuals
reached through educational outreach events

102,519
students
experienced hands-on K-12 water education

1,232
college students
involved at primarily undergraduate institutions
11% underrepresented minorities and **56%** are female

24,443
students
reached via K-12 teachers attending training

Photo by Molly Malone, GSLC/University of Utah

EDUCATION

Seeing the Bigger Picture

Learning What It Means To Do Water Science Research

Research brings students of all ages together to learn by sharing ideas, challenges, and solutions. iUTAH's educational programs use real research in water science as a catalyst for learning. Programs such as the Summer Research Institute (SRI) engage students at many levels in experiential methods, or learning by doing.

SEEING WHAT SCIENTISTS DO

With its origins in CI-Water, a prior NSF EPSCoR-funded project that brought collaborating institutions in Utah and Wyoming together to address water issues in the West, SRI offered students and teachers the chance to become scientists for one week each summer.

SRI was designed to help teachers and prospective teachers understand what scientists do and how they collaborate on research. Director Louisa Stark and Senior Education Specialist Molly Malone from the Genetic Science Learning Center at the University of Utah organized and led the program using their expertise in developing online interactive curriculum materials for use by educators and their students.

ENGAGING STUDENTS & TEACHERS

Over the four years that SRI was offered, they engaged 96 high school students and teachers, and undergraduates in 13 diverse research projects reflecting iUTAH's cross-disciplinary approach. Over half of the participants were female, and 70% of the student mentors were from schools like Utah Valley, Weber, and Dixie State Universities whose focus is on educating undergraduates.

The impact of the SRI program was two-fold. Students and teachers from across the state were able to engage in iUTAH's water research projects at a single campus for one week each year. Faculty, post-doctoral, and graduate student mentors learned how to prepare curriculum through individual and group interactions. The program succeeded in widening the STEM pipeline in Utah, bringing students and teachers from different geographic, age, and underserved backgrounds together to learn.

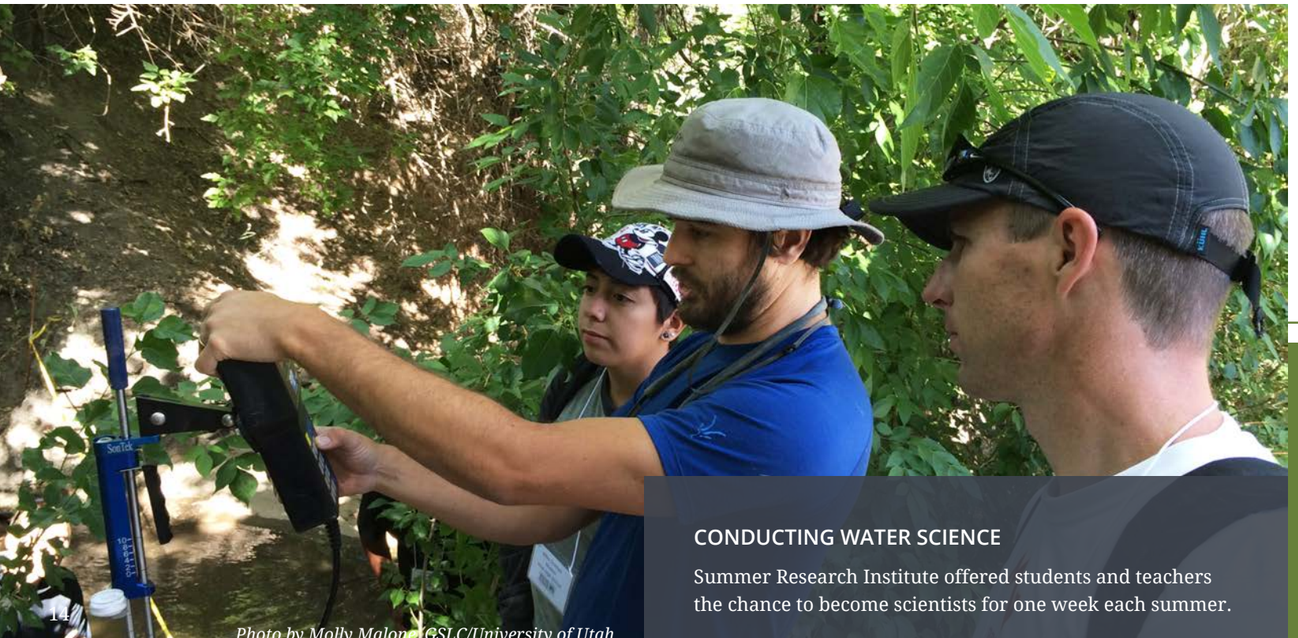


Photo by Molly Malone, GSLC/University of Utah

CONDUCTING WATER SCIENCE

Summer Research Institute offered students and teachers the chance to become scientists for one week each summer.

Photo by Molly Malone, GSLC/University of Utah

WORKING IN SMALL GROUPS

High school students engage in fieldwork related to iUTAH's water research projects.

LEARNING BY DOING

iUTAH researcher and post-doctoral mentor Erik Oerter found his experience with the program rewarding in many ways. First, the teachers in the group educated Oerter by helping him to hone his hands-on lesson about isotopes, food sourcing, and the water cycle. He, in turn, enjoyed "seeing the light bulb go on" in the students as they understood complex concepts while creating their poster presentations. Using what he learned and with the help of collaborators, he published the paper "Every Apple Has a Voice" in *Hydrology and Earth System Sciences*, a peer-reviewed open access journal.

Another example of learning by doing is the iPad survey created in 2014 for SRI by Courtney Flint and Douglas Jackson-Smith, professors from Utah State University. It was designed to teach participants how to conduct survey research. Following its success in SRI, the survey was adapted for use in undergraduate education across Utah and administered by students to gather data from well over 6,500 persons about their perceptions of the state's most pressing water issues.

MENTORING IN MANY DIRECTIONS

The program, as a whole, supported peer mentoring in many different directions. High school students learned from undergraduates, undergraduates learned from graduate students, and teachers and university faculty learned from each other. This entire cross-pollination process produced curricula that has been widely shared, both nationally and internationally. The *Model Earth* curriculum is an open access online resource with over 18,823 visitors and 35,931 page views last year. Within this curriculum, the most popular module is *Manage a Watershed*, which combines lessons from both the CI-Water and iUTAH projects.

All this learning potential was best summed up by Mitzy Ocampo, a high school student on the way to becoming the first in her family to go to college, as she said "I didn't think science was a possibility for me. But now, maybe I could explore it more in-depth."

"At UVU, we have greatly benefited from iUTAH…our students have presented in regional, national, and international conferences, and have published in peer-reviewed scientific journals. In addition, five UVU students participated in the iUTAH Summer Institute, a one-week summer research experience for high school and undergraduate students."

Daniel Fairbanks
Dean of the College of Science and Health
Utah Valley University

Growing a Water-Wise Citizenry

Interactive Learning: Water Carts to Green Roofs

Part of iUTAH's aim is to provide learning opportunities and foster experiences that promote water education for students of all ages. We have worked with our museum partners to create both stationary installations and traveling exhibits reaching well over 400,000 people at 412 public outreach events in the past five years. This number is still growing since many of these displays are still in active use.

PARTNERS IN EDUCATION

With many outreach partners, including The Leonardo, the Natural History Museum of Utah, the Garth and Jeri Frehner Museum of Natural History, and Utah Water Quality Extension, to name a few, opportunities to educate the public on water science have been plentiful.

Focused on water sustainability, iUTAH has funded 20 programs aimed at broadening engagement with a wide and diverse audience across Utah. In 2013, Salt Lake City's science and technology museum, The Leonardo, received an iUTAH Education, Outreach and Diversity (EOD) Innovation Award to develop an interactive exhibit on the properties of water and its sustainable management. Opened in July 2014 and originally intended to last for a few months, the Water exhibit proved so popular with visitors that it remained on display through 2016.

TRAVELING WATER CARTS

Expanding on the work done for the Water exhibit, The Leonardo received a second EOD Innovation Award to develop two water-themed education carts focused on Water Conservation and Water Transportation. These carts became part of the museum's traveling Leo On Wheels science outreach program. Aligned with middle school science curriculum, the carts currently reach over 10,000 students annually since debuting in 2016, and are expected to be in use for years to come. The water carts aren't only educational, they are fun, and have quickly become a favorite component of the museum's Leo On Wheels program.

GREEN ROOF DISPLAYS

Similarly, iUTAH has supported green infrastructure education programs on the campuses of University of Utah, Southern Utah University, and Utah State University. USU's display, located in front of the Quinney College of Natural Resources, measures water runoff from traditional asphalt shingles versus green roof materials. The roof display developed by undergraduate student McKenna Drew is based on her experience working for Utah Water Watch under mentor Nancy Mesner, professor in the Department of Watershed Sciences and leader of USU's Water Quality Extension program.

GREEN ROOF DISPLAY AT USU

The display, developed by McKenna Drew, compares water runoff from traditional asphalt shingles versus green roof materials.

Photo by Dennis Hinkamp, Utah State University

WATER-WISE COMMUNITY

Recent improvements made to the Natural History Museum of Utah's interactive exhibit allow visitors to learn more about their local watershed through accessing iUTAH's GAMUT aquatic and climate sensor station data on Red Butte Creek. A similar exhibit will be installed in 2018 at the Monte L. Bean Life Science Museum on the Brigham Young University campus, and linked to iUTAH's Provo River data.

Public displays such as the Leo on Wheels water carts, the green roof model at USU, and a related project at SUU's Frehner Museum are just a few examples of ways iUTAH has partnered with groups to strengthen and promote an inclusive, diverse, water-wise community in Utah. Students educated today, and through the next ten years that these interactive learning tools will be in use, will be better prepared for Utah's water challenges in the future.

> "Southern Utah University sees itself as a leader in experiential learning and project-based learning.... through iUTAH, dozens of our students have had research experience with projects that have given them a step up in their in their science, and in their career."
>
> ***Brad Cook***
> ***Provost, Southern Utah University***

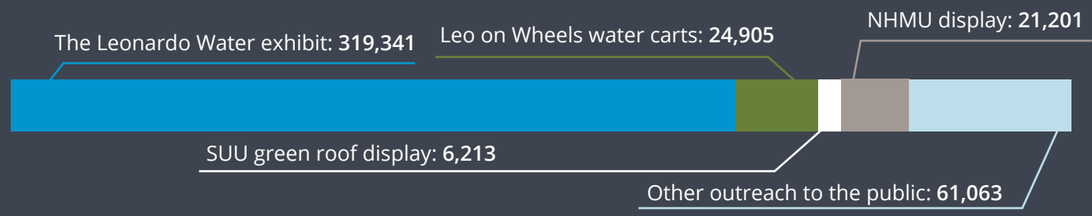
LEO ON WHEELS TRAVELING WATER CART

Students learn about water transportation and conservation in Utah while having fun.

Photo by The Leonardo

Number of People Reached by Exhibits

432,723 people at 412 public outreach events over the past five years



Place-Based Engagement

Partnerships in Utah's Diverse Communities

Salt Lake City's west side neighborhoods of Rose Park, Poplar Grove, Glendale, and Fair Park are ethnically diverse communities that share the Jordan River and its parkway system for recreation and scenery. They also have shared the burden of several Environmental Protection Agency-declared Superfund sites. For the past few years, these neighborhoods have been the focus of a number of iUTAH Education, Outreach, and Diversity (EOD) programs that address water science outreach and education.

INVOLVING STUDENTS

Glendale Middle School was part of a collaborative program between Salt Lake Community College and the local science community called WaterGirls. Focused on place-based STEM-learning experiences for middle school girls, the program received funding through three iUTAH EOD Innovation Awards to involve students in outdoor water science in their community and area canyons, the source for their local water supply.

ENGAGING COMMUNITIES

In 2016, iUTAH began working with community partners to encourage public involvement in a proposed green infrastructure project in Glendale. Utah State University and iUTAH graduate student researcher Taya Carothers worked with faculty mentor Mark Brunson to develop a survey, along with the Salt Lake City Parks and Open Space program, the Three Creeks Confluence project, and others. As a result, nearly 400 people were asked about their connections to the Jordan River and parklands alongside the river.

The Salt Lake City Parks staff had sought iUTAH's help gathering the most representative feedback from neighborhoods that have a high number of Latino residents and a more racially diverse population than the rest of the state. Bilingual surveys were administered in public places such as grocery stores, libraries, parks, and at community events. Students from iUTAH's research experience for undergraduates (iFellows) conducted the survey using iPads, interacting directly with residents.

PLANTING GARDENS

After collecting and formulating the survey data, an online visualization tool was developed to help make the information accessible and easy to understand. This tool was used in meetings with neighborhood council groups to start discussions and answer questions, and is publicly available on the iUTAH database. From this survey, other opportunities for community engagement emerged for Carothers, who researches environmental justice and water issues.

ROSE PARK ELEMENTARY

4th graders engaged in lessons about Utah's water systems through visits to the Jordan River and Farmington Bay for water quality testing.

Photo by Rose Yazzie & Taya Carothers/iUTAH EPSCoR

> "The Salt Lake City Parks staff had sought iUTAH's help gathering the most representative feedback from neighborhoods that have a high number of Latino residents and a more racially diverse population than the rest of the state.

Another recent community partner in place-based learning is Rose Park Elementary School. After receiving an iUTAH EOD Innovation Award in 2017, school administrator Joel Arvizo-Zavala, teacher Rose Yazzie, and Carothers led 4th graders through exercises to engage the students with Utah's water systems through visits to the Jordan River and Farmington Bay for water quality testing. They have also created a youth-led student garden at their school.

FUTURE GRANTS AND RESEARCH

The Poplar Grove neighborhood was one of those spotlighted in the 2014 iUTAH Household Survey. By examining results from these efforts, we are learning more about how west side residents perceive the Jordan River and other water issues. Continued work by Carothers and others will focus on forming community research groups in order to conduct group interviews to both better understand 2016 survey results and community priorities for the Jordan River, and try to address issues of participation in river governance and decision-making.

Survey results have been useful to stakeholders such as Salt Lake City's Open Space Lands program for use in proposal writing for future research grants. "As a researcher who studies human-environment interactions, it's been fascinating to learn about the different ways that individuals are connected to the Jordan, a very urban river that has a reputation more for impaired water quality than for recreation opportunities," said Brunson.

UTAH WATER SURVEY ON iPADS

Bilingual surveys were administered in public places such as grocery stores, libraries, parks, and at community events.

Photo by Taya Carothers/iUTAH EPSCoR

COLLABORATIONS

Speaking of Science Statewide

Growing a Community of Science Communicators

Science is exciting. It asks and answers big and important questions that have the ability to sustain and improve human life both now and in the future. And yet, we are science communication-challenged. The public wants to understand and support what science does. Clear communications can make this happen, but the public perception is that scientists do not know how to effectively communicate what they do.

"Thank you for your tremendous collaborative efforts these last several years…The creativity and good ideas that you have had in the areas of water and sustainability have been second to none. You have led the nation in these efforts."

Cynthia Furse
Associate Vice President for Research
University of Utah

COMMUNICATING BIG IDEAS

As a delegation of eight iUTAH participants attended the National Science Foundation's Established Program to Stimulate Competitive Research (NSF EPSCoR) conference in Portsmouth NH in 2015, they saw a way to help scientists in Utah address communication concerns. They experienced an interactive training session led by actor Alan Alda on science communications. Upon returning to home, they had an idea--What if iUTAH were to bring the Alan Alda Center for Communicating Science to Utah?

Out of this idea, a partnership with the research offices at Utah State University and the University of Utah was formed to bring the Alda Center to Utah in October 2016. As a result, close to 245 faculty members, researchers, and students from across the state participated in interactive science communications sessions and smaller workshops in Logan and Salt Lake City.

WHY THIS MATTERS

The smaller Alda Center workshops of 8 – 32 people allowed for more personalized science communication training sessions. The people in these groups learned how to connect with non-scientists, and how to speak more clearly and conversationally about their work and why it matters. Exercises led to deeper conversations on the importance of connecting with the public and being able to explain specific scientific research to others.

Comments from faculty and students alike found the training beneficial and useful saying "I feel much more confident using my own examples after going through this training." One participant acknowledged that "talking about your research doesn't have to just be boring facts, you can make it interesting."

BROADER IMPACTS

The National Science Foundation and other federal agencies fund projects in part based on how well scientists communicate the "broader impacts" of their proposed research. With the success of the Alda Center training, the iUTAH Project Office focused their next collaborative effort on helping researchers identify, develop, and include broader impact benefits for the public, especially underserved and diverse communities, into proposed research projects.

The "Reflecting and Expanding on Our Broader Impact" forum was developed as a collaboration between iUTAH and the University of Utah's Office of the Vice President for Research to address this topic. Held in March 2017, the forum brought keynote speakers, panelists, and workshop facilitators together to share their expertise and experience. The event involved over 100 researchers from nine institutions across the state in conversation and collaboration to expand their broader impact connections in Utah.

TRANSLATING SCIENCE

One specific example of science communication in action is Julie Kelso. After four years in the iUTAH project, she was interested in communicating science, specifically water science, to a broader audience. As a USU graduate student working with faculty mentor Michelle Baker, she was one of two students in 2016 that received an internship from USU's Ecology Center to work with Utah Public Radio (UPR). Kelso says that she "got started in radio because I wanted to get a better idea of how science in translated to the public." She can be heard regularly on UPR addressing many water-related topics across the state.

Science communications have taken many forms throughout the iUTAH project. From group training sessions to individual outreach efforts directly involving researchers, iUTAH has worked to improve science communication, for the benefit of both scientists and Utah's citizens.

BROADER IMPACTS FORUM IN SALT LAKE CITY

Cynthia Furse addresses researchers participating in conversation and collaboration to expand their broader impact connections in Utah.

Photo by University of Utah Office of the Vice President for Research

Spotlight on iUTAH's Engagements

2016/17 Highlights:

OCTOBER 2016

Alan Alda Center for Communicating Science came to Utah with training for 242 participants, sponsored by iUTAH in partnership with the research offices at Utah State University and the University of Utah.

MARCH 2017

Broader Impacts Forum and workshops were held in Salt Lake City, for 118 participants, co-sponsored by iUTAH and the University of Utah's Office of the Vice President for Research.

JULY 2017

iUTAH Annual Symposium in Logan, included 40 talks in seven concurrent sessions, attended by over 120 researchers and educators from universities, municipalities, and governmental agencies across the state.

Upcoming Engagement Calendar

2017

OCTOBER

iUTAH will come to you! Look for an iUTAH event on your campus during the months of October and November.

NOVEMBER

Hear a variety of iUTAH-themed talks and see what the iUTAH Project Office and Education, Outreach and Diversity staff have been up to at the Salt Lake County Watershed Symposium, November 15 -16.

DECEMBER

Enjoy your break!

2018

JANUARY

Interested in developing a communication strategy to get the word out about your science? Would you like to harness the power of social media to broaden the impact of your work? Participate in the iUTAH Communications Workshop at the University of Utah.

FEBRUARY

Life Beyond iUTAH got you down? We'll show you our ongoing commitment to engaged scholarship in the state at "Beyond iUTAH." Look for us mid-month in Salt Lake City UT.

MARCH

iUTAH researchers and students will be talking sustainability at Weber State University's Intermountain Sustainability Summit, March 1-2.

APRIL

Come and support iUTAH graduate students and researchers during the Annual Spring Runoff Conference's Student Poster Session at Utah State University in Logan UT.

MAY

Stay tuned for an announcement on our latest museum display and/or other activities.

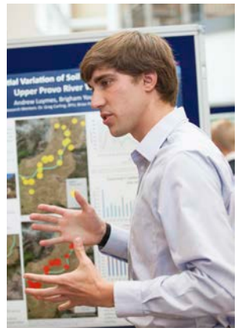
JUNE

Join iUTAH and Brigham Young University at the Utah Lake Festival and learn about the latest research happening on your watershed, HABs, and simple things that you can do to improve your community's water quality.

THANK YOU TO OUR ORGANIZATIONAL PARTNERS

AND HIGHER ED PARTNERS

WE ARE iUTAH



American Association for the Advancement of Science (AAAS)
American Water Works Association
Arizona State University
Arkansas EPSCoR
Arkansas Science and Technology Authority
Bear River Watershed Council
Campbell Scientific, Inc.
Canyon Concepts, LLC
Center for Science and Mathmatics Education
Central Utah Water Conservancy District
Christina River Basin Critical Zone Observatory
Cirrus Ecological Solutions, LLC
City of Logan
Climate Adaptation Science
CUAHSI
Delaware EPSCoR
Dixie State University Sponsored Programs
Edith Bowen Laboratory School
Envision Utah
Explore Utah Science
Four Corners School of Outdoor Education
Garth and Jeri Frehner Museum of Natural History
Genetic Science Learning Center
Glendale Middle School
Global Change and Sustainability Center
Hillyard, Anderson and Olsen PC
HydroShare
International Neuroinformatics Coordinating Facility
Jordan High School
Jordan River Commission
Jordan Valley Water Conservancy
Judge Memorial High School
Logan Library
Logan Northwest Field Irrigation Company
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New Hampshire EPSCoR
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North Dakota EPSCoR
North Dakota State University
North Logan City Library
Pleiades Software, Inc.
Politecnico di Milano
Portland State University
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Rose Park Elementary School
Salt Lake City Dept. of Public Utilities
Salt Lake City Dept. of Parks & Public Lands
Salt Lake County
Seven Canyons Trust
SACNAS
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Southern Utah University SPARC Office
STEM Evaluation Associates
Thanksgiving Point Institute
The Leonardo
Thomas Edison Charter School
Tracy Aviary
Triangle Coalition for STEM Education
Tufts University
USDA Natural Resources Conservation Service
United States Geological Survey
United States National Park Service
University of Alaska
University of Hawaii
University of Idaho
University of Kansas
University of Natural Resources and Life Sciences, Vienna
University of Missouri
University of New Hampshire
University of New Mexico
University of North Carolina at Chapel Hill
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University of Utah Office of the Vice President for Research
University of Virginia
University of Washington
University of Wyoming
Utah Automated Geographic Resource Center
Utah Dept. of Environmental Quality
Utah Dept. of Natural Resources
Utah Education Network
Utah Governor's Office of Economic Development
Utah Partners in Flight
Utah Public Radio
Utah Science, Technology and Research Initiative
Utah State Board of Education
Utah State Office of Education
Utah State University Ecology Center
Utah State University Office of the Vice President for Research
Utah State University Water Quality Extension
Utah Stormwater Advisory Committee
Utah System of Higher Education
Utah Water Research Laboratory
Utah Water Watch
Wasatch Dendroclimatology Research Group
Washington State University
Weber County Library
Weber State University Energy and Sustainability Office
Western Water Assessment