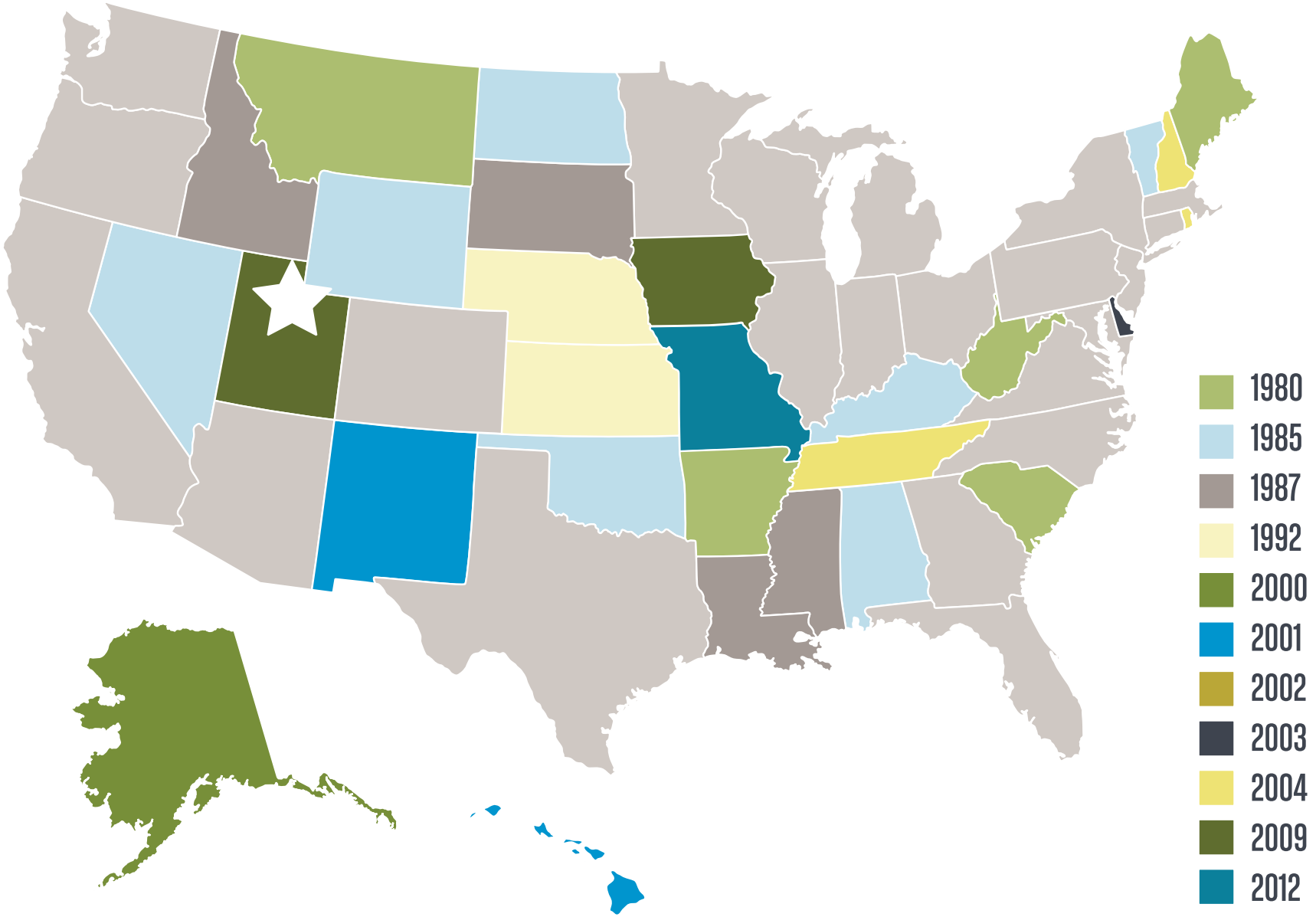

iUTAH
External Advisory Board
Year 2 Meeting

Presentation Outline

- State of the State *(Michelle Baker)*
- Research Focus Area 1 *(Zach Aanderud)*
- Research Focus Area 2 *(Doug Jackson-Smith)*
- Research Focus Area 3 *(Diane Pataki)*
- Education Outreach Diversity *(Ellen Burns and Mark Brunson)*
- Facilities *(Jim Ehleringer)*
- Challenges and Opportunities for year 3 *(Michelle Baker)*

Utah eligible for EPSCoR in 2009



EPSCoR's role in Utah

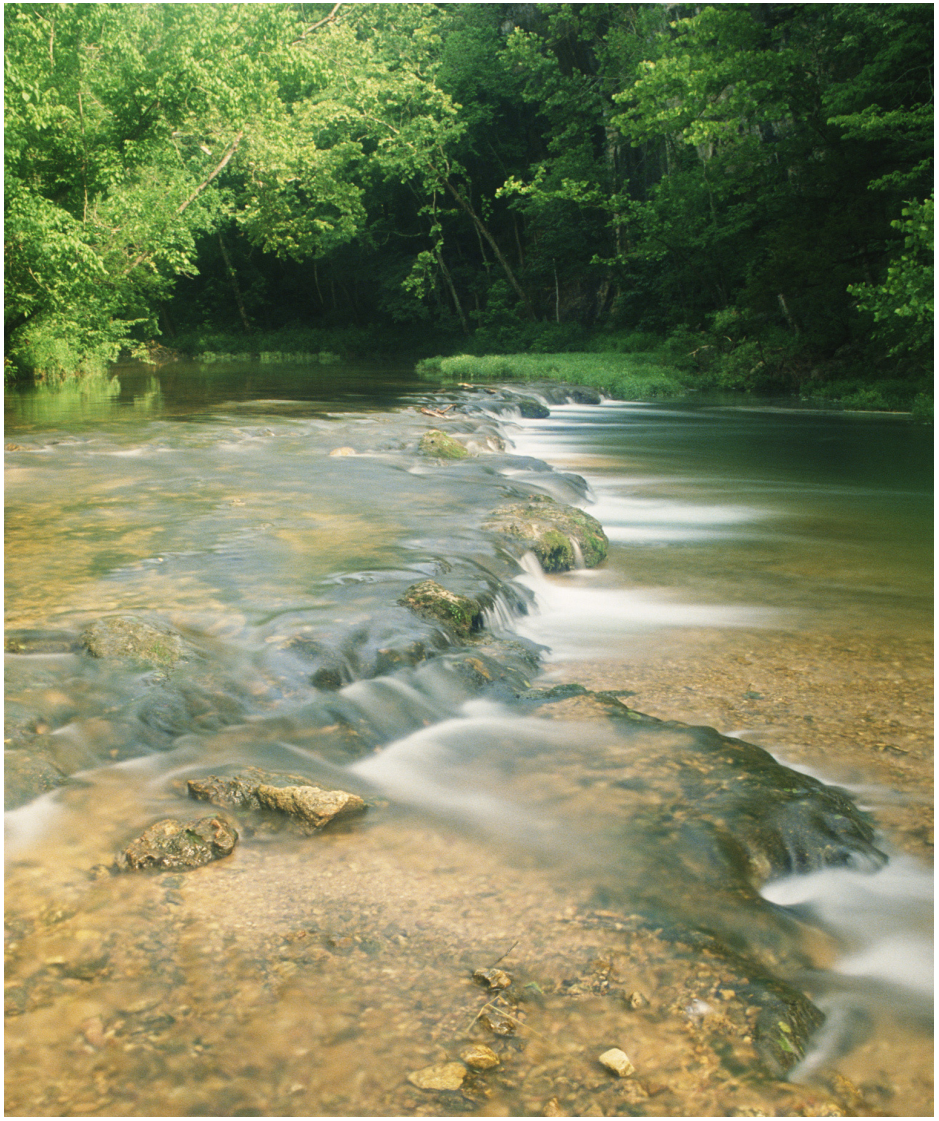
Build statewide research capacity

Strengthen STEM workforce

Enhance economic competitiveness and sustainability

Context of Utah's EPSCoR RII

- Utah's population is growing
  - 5 million people by 2040
- Utah has limited water resources
- Utah's climate is changing
  - Average temperatures increasing
  - Alter rain vs. snow mix
- Snowmelt and water quality will decrease
- How achieve future water sustainability?



Research Infrastructure Improvement (RII) award - Track 1

innovative Urban Transitions and Aridregion Hydro-sustainability

Awarded Aug. 1st, 2012

$20M multi-university effort to boost statewide research infrastructure to manage and protect Utah's water resources

Exploring how interactions among water, people, and ecosystems impact Utah

Transitions in Year 2

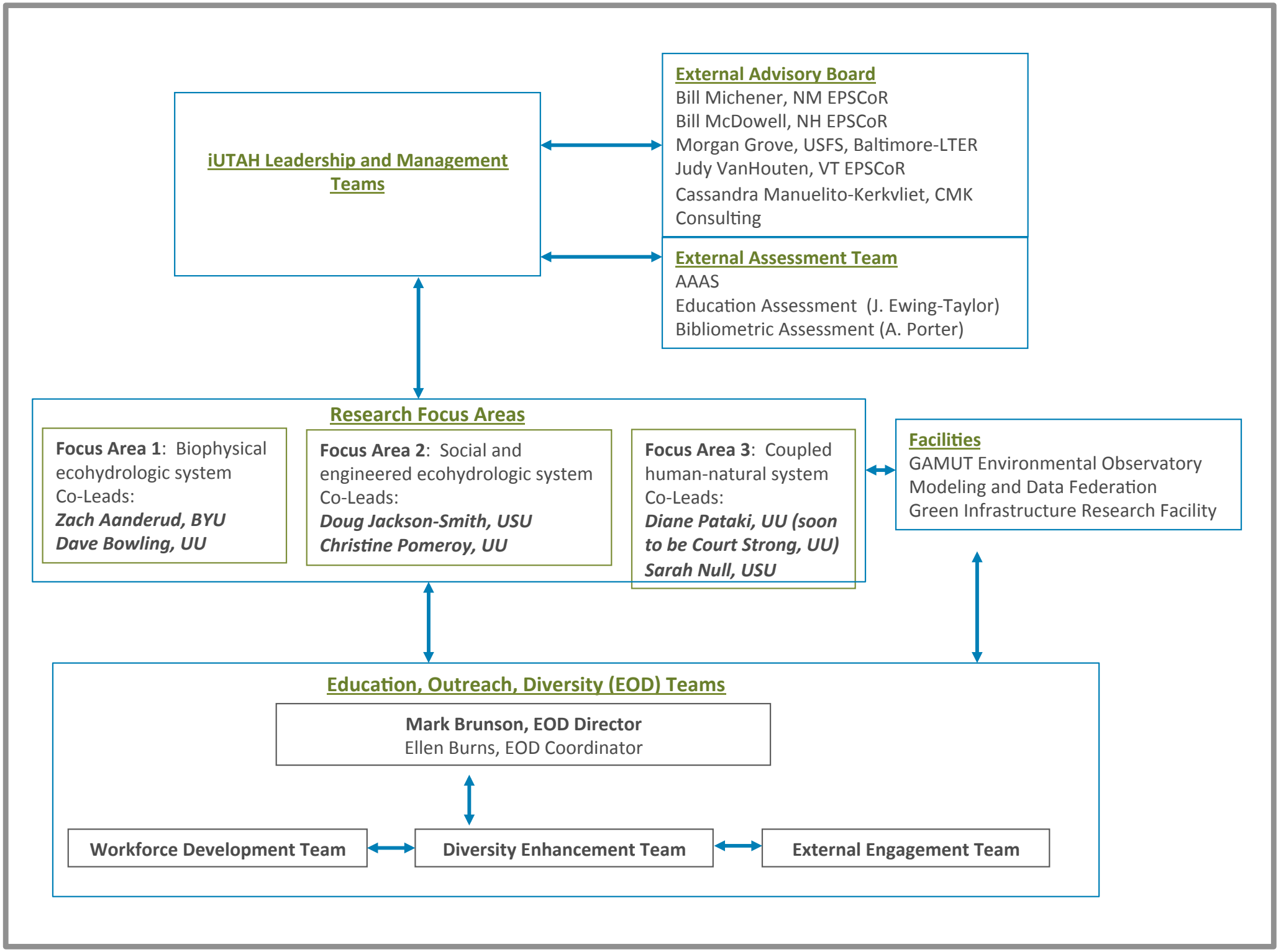
Todd Crowl → Michelle Baker

Rita Teutonico → Mark Brunson

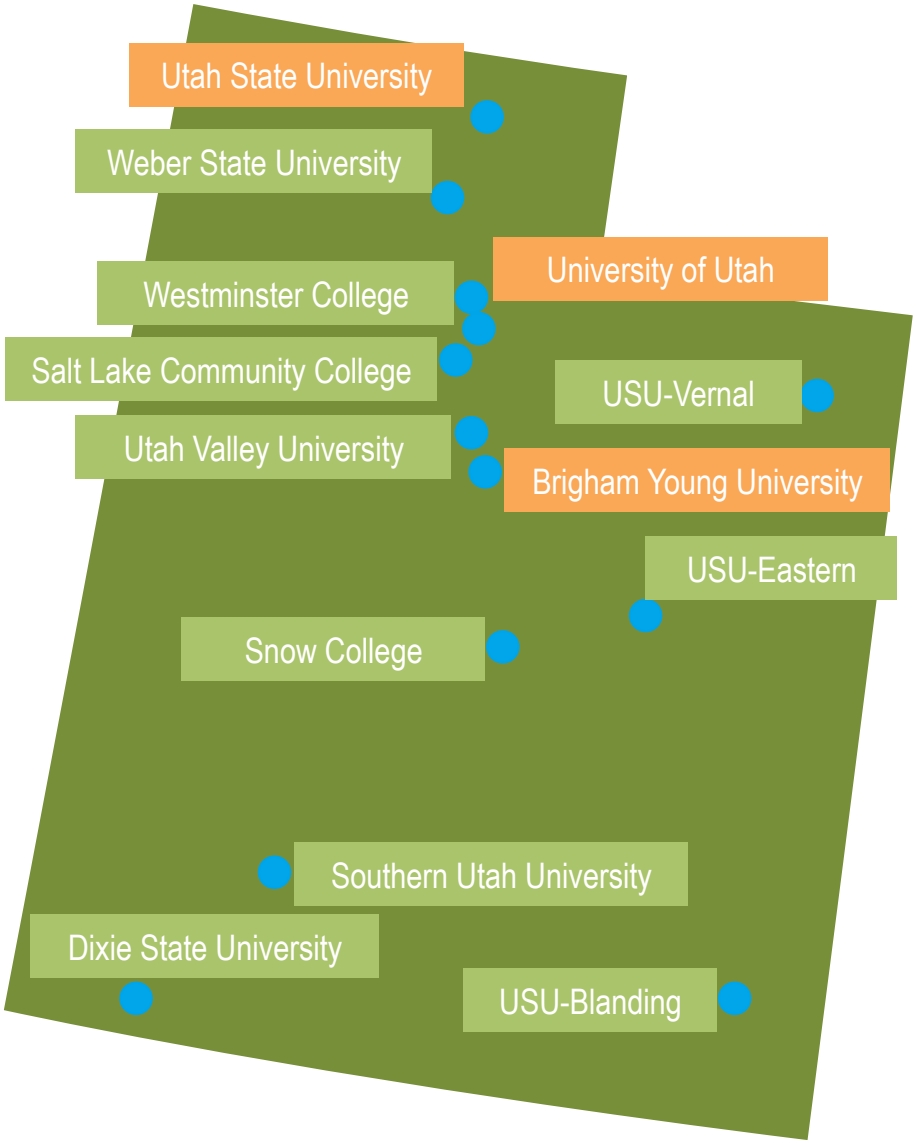
Michelle Baker → Dave Bowling

Diane Pataki → Court Strong

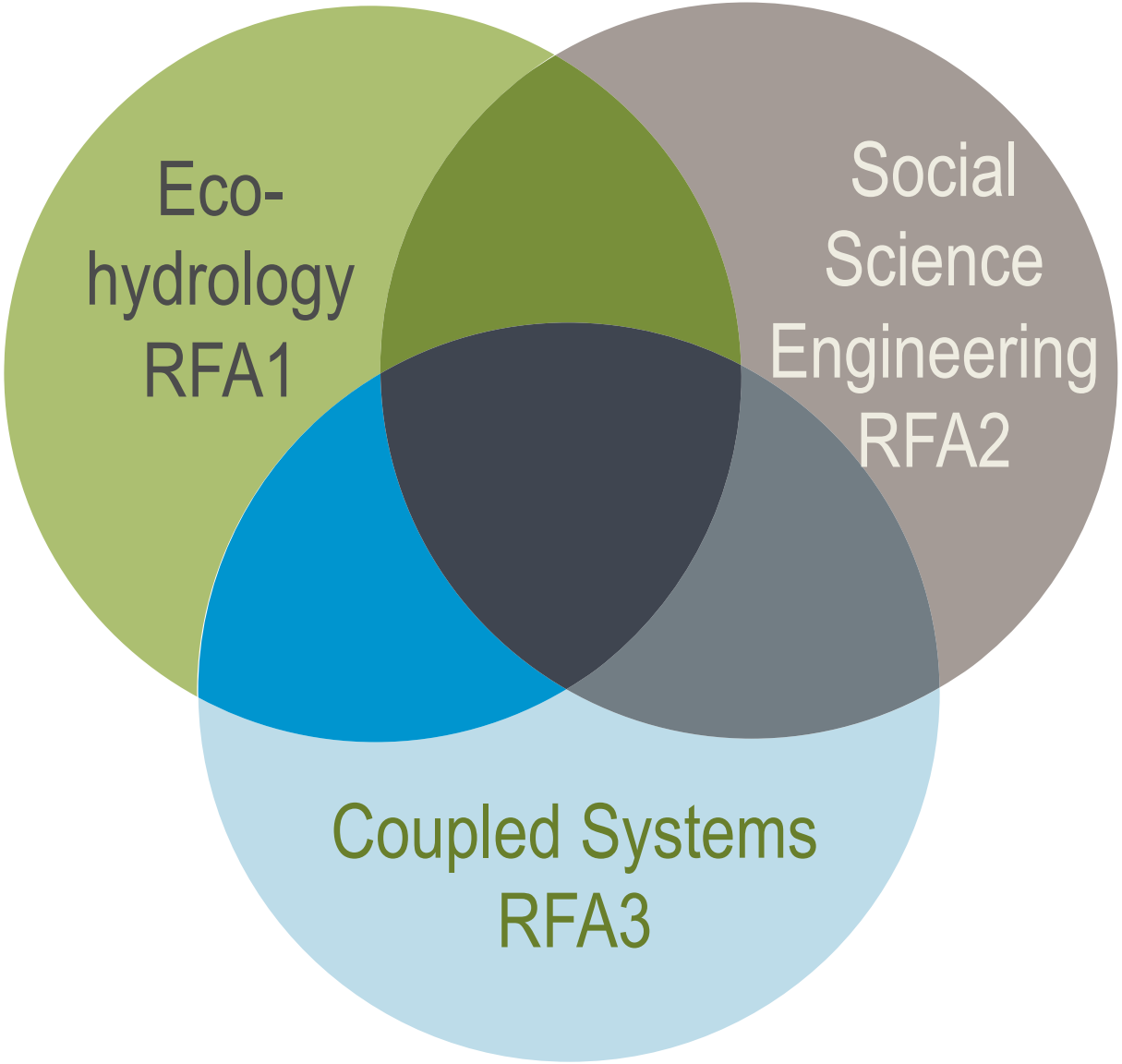
National search for Project Administrator/Assistant Director underway


iUTAH Leadership and Management Teams
External Advisory Board
Bill Michener, NM EPSCoR
Bill McDowell, NH EPSCoR
Morgan Grove, USFS, Baltimore-LTER
Judy VanHouten, VT EPSCoR
Cassandra Manuelito-Kerkvliet, CMK Consulting
External Assessment Team
AAAS
Education Assessment (J. Ewing-Taylor)
Bibliometric Assessment (A. Porter)
Research Focus Areas
Focus Area 1: Biophysical ecohydrologic system
Co-Leads:
Zach Aanderud, BYU
Dave Bowling, UU
Focus Area 2: Social and engineered ecohydrologic system
Co-Leads:
Doug Jackson-Smith, USU
Christine Pomeroy, UU
Focus Area 3: Coupled human-natural system
Co-Leads:
Diane Pataki, UU (soon to be Court Strong, UU)
Sarah Null, USU
Facilities
GAMUT Environmental Observatory
Modeling and Data Federation
Green Infrastructure Research Facility
Education, Outreach, Diversity (EOD) Teams
Mark Brunson, EOD Director
Ellen Burns, EOD Coordinator
Workforce Development Team
Diversity Enhancement Team
External Engagement Team

iUTAH's Reach in Higher Ed



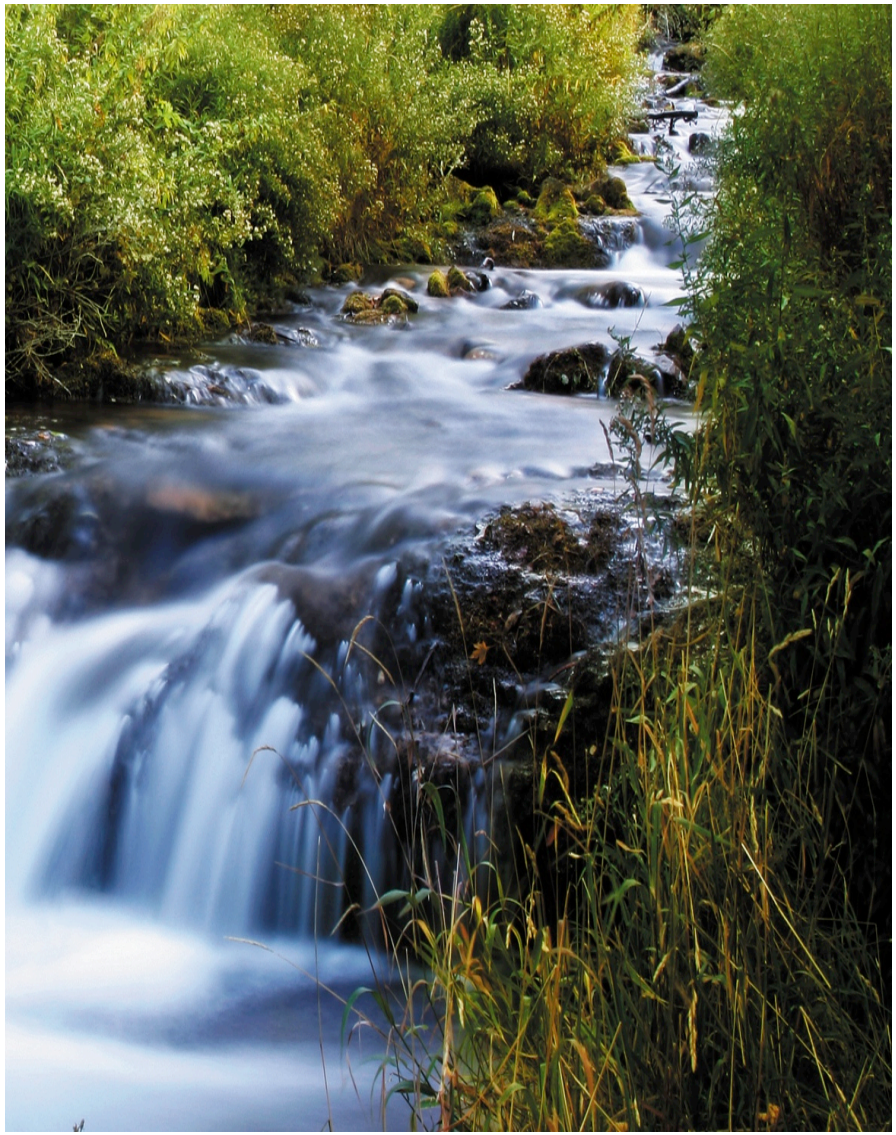
Research Activities in iUTAH



RFA1 Research Questions

What processes control water quantity and quality along mountain-to-urban gradients?

How will the quantity and quality of water change as a result of climate change and land use in forested, urban, exurban, and agricultural environments?



RFA1 - Ecohydrology

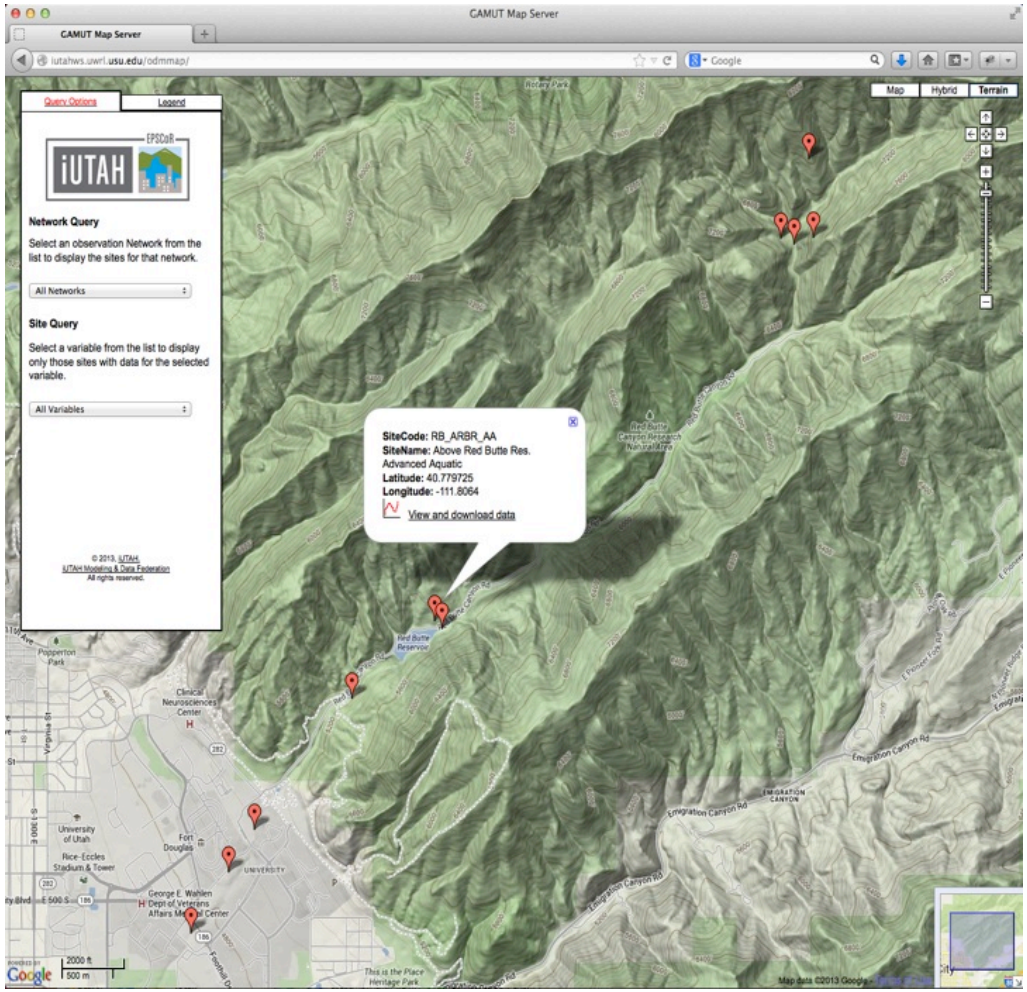
Goals

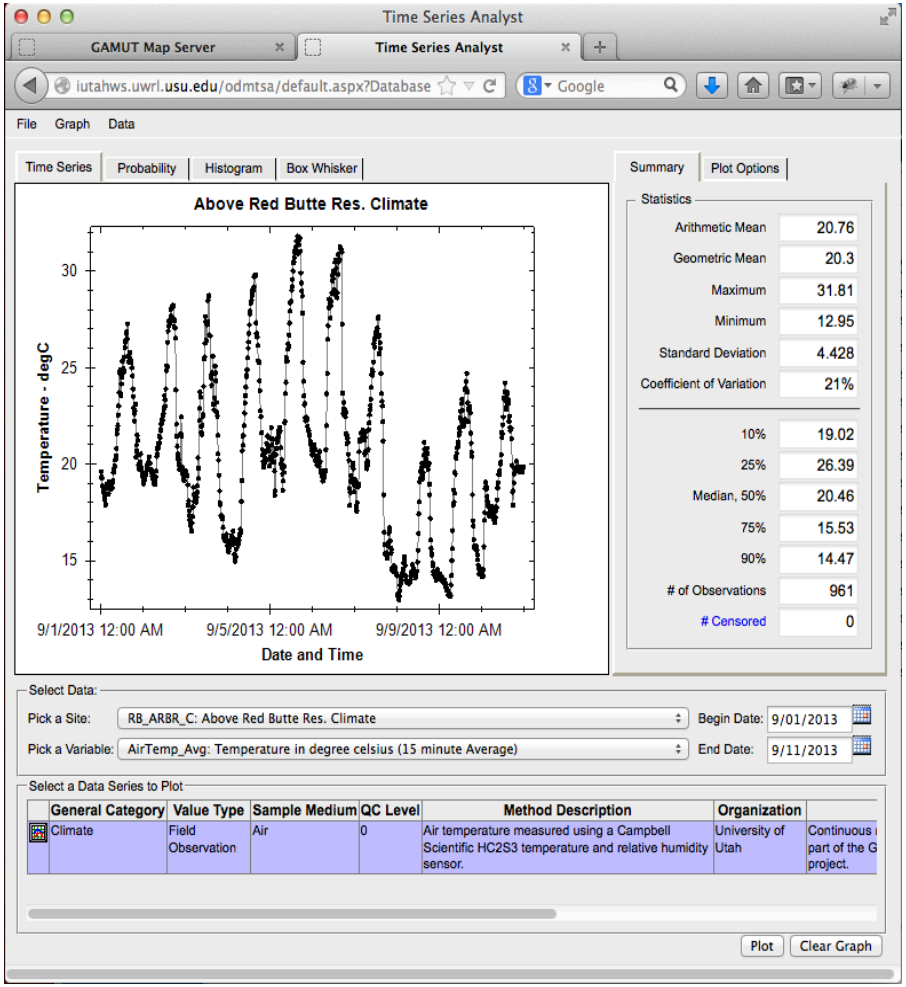
- Improve capacity to monitor WMRA ecohydrologic system on mountain to urban gradient.
- Enhance capacity to understand ecohydrologic processes in the WRMA as they relate to water resource availability now and in the future.

Results of Strategic Priority Targets RFA1

Tasks Completed	Completed the GAMUT observatory providing needed research infrastructure
	Addressing research questions with six graduate students (2013-2014)
	Completed monthly synoptic sampling of water quality as baseline data and evaluated snowpack and snow chemistry
	Mentored and trained undergraduates during the iUTAH Summer Research Institute and during the academic year

GAMUT is Live!





http://data.iutahepscor.org/odmmap/

RFA1 – Plans for Year 3

Goals

- Collect data for collaborative proposals and publications
  - Submit at least three manuscripts (April 2015)
- Finalize SOPs for water quality
- Continue to create collaborative research network across institutions
  - Monthly RFA1 meeting highlighting graduate student research
- Continue to train and mentor graduate and undergraduates students
  - Summer Research Institute / Spring Runoff and national Conferences

RFA2: People, Places & Pipes

CORE QUESTIONS:

What are the current drivers of water and land use management in the region?

How does urban form interact with water use and the quantity and quality of return flows?

How can we design urban infrastructure to enhance water sustainability?

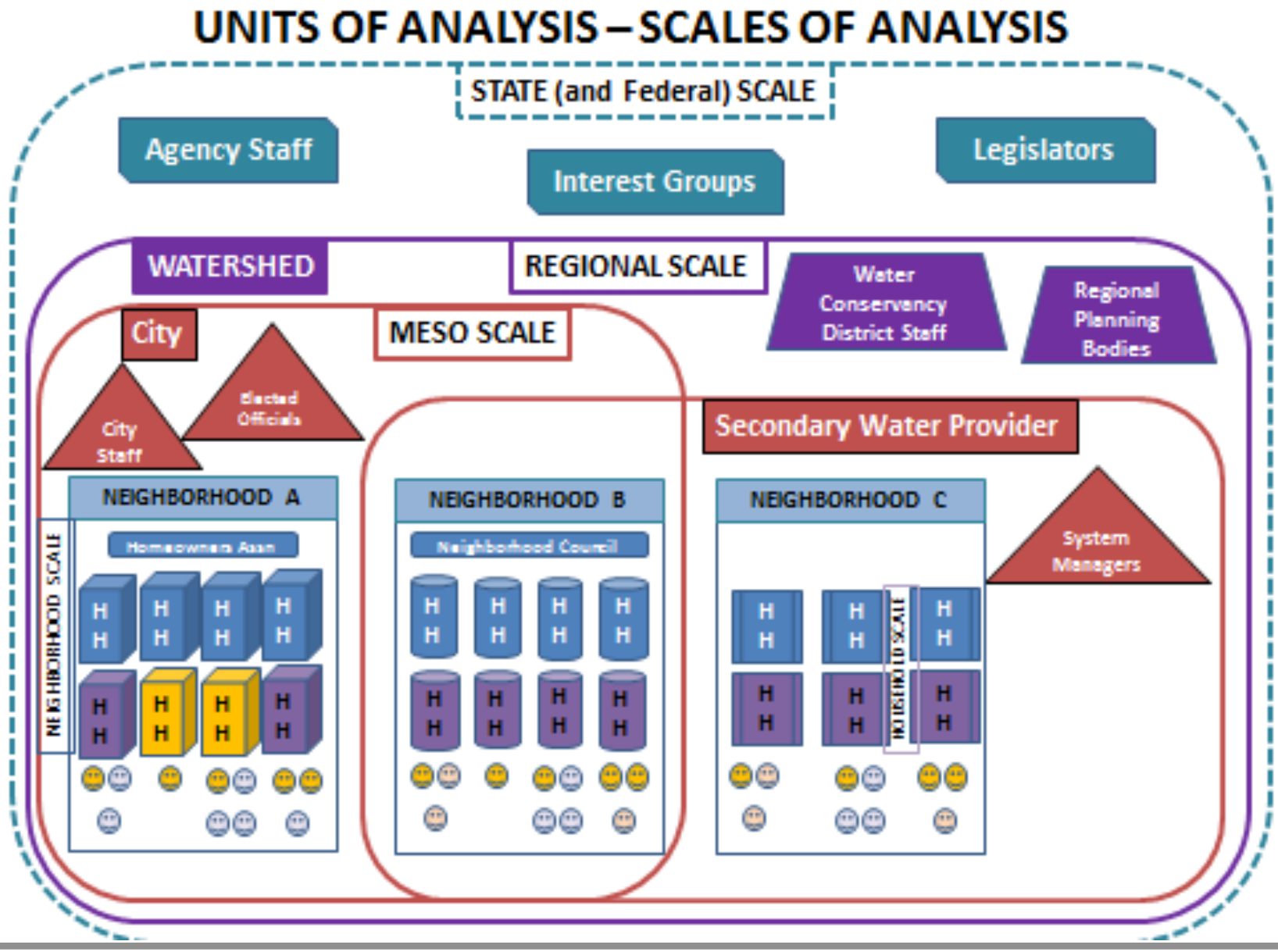
AP photo/Julie Jacobson

RFA2 – People, Places, and Pipes

Overall Goals

- *Improve capacity to gather and analyze social and engineering system data on coupled water systems*
- *Improve capacity to collect intensive data on water use, water decision-making, and stormwater runoff*
- *Improve knowledge of and use of information about built infrastructure to model water system outcomes*
- *Build new collaborative relationships*

Working at Multiple Scales



HOUSEHOLDS & NEIGHBORHOOD SCALE DATA COLLECTION PLANS

1. Develop “TYPOLOGY” of urban neighborhoods
2. Select neighborhoods
3. Collect multiple types of data in selected neighborhoods
   - Individuals and Households *(surveys & interviews)*
   - Institutions & policies
   - Infrastructure & engineered systems
   - Biophysical monitoring

GAMUT NEIGHBORHOODS

MAJOR CLUSTER GROUPS AND NEIGHBORHOOD TYPES

The Expanding City *- 15% pop; 27% area*

- Mature homesteaders (n=91)
- Young homesteaders (n=60)
- Green Acres (n=17)

New Suburban *- 21% pop; 20% area*

- Starter Suburbs (n=124)
- Away-from-it-all Suburbs (n=47)
- Suburban Power Elite (n=47)

Suburban Working Class *- 8% pop; 9% area*

- Working Class (n=99)

The Moderate Middle *- 15% pop; 17% area*

- Working poor (n=112)
- Middle-class with a view (n=106)

Traditional Residential Core *- 18% pop; 11% area*

- Original Residential (n=131)
- Traditional Upper Crust (n=146)

Parkside Residential *- 6% pop; 3% area*

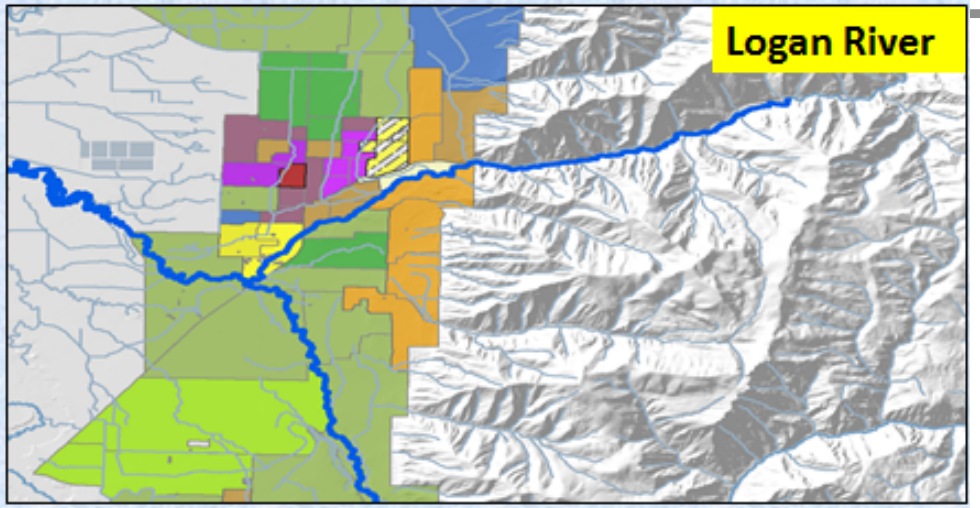
- Neighborhood Parks (n=70)
- City Parks (n=12)

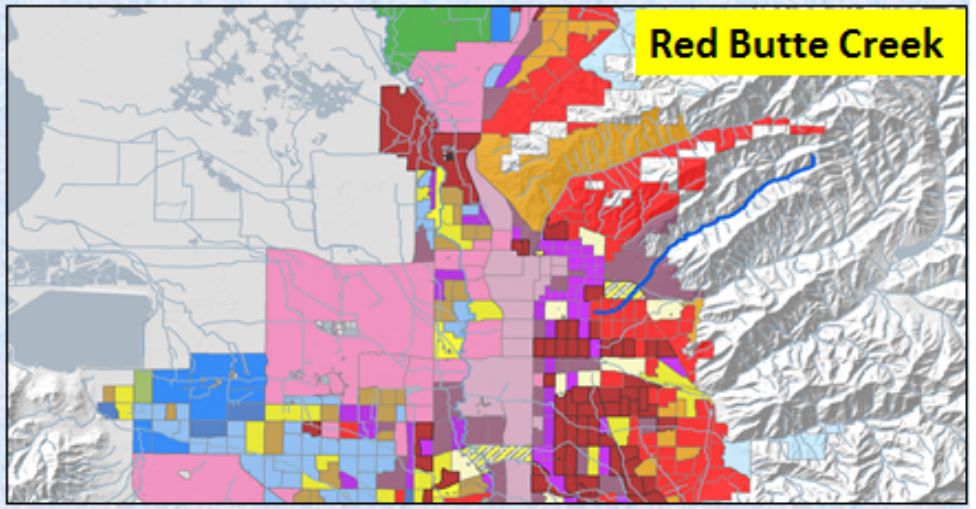
Bohemian Neighborhoods *- 9% pop; 2% area*

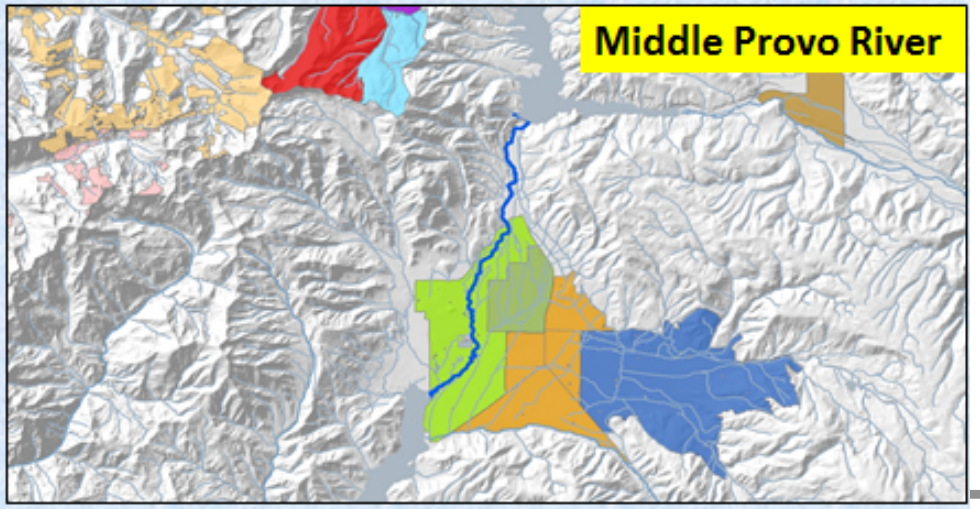
- Wanna-be Bohemians (n=70)
- Wasatch Bohemians (n=62)

The Urban Scene *- 9% pop; 7% area*

- Downtown Residential (n=75)
- Industrial Poor (n=36)
- Downtown Commercial (n=15)







BROADER SOCIAL SCIENCE RESEARCH PROGRESS

Qualitative & Secondary Data

(year 1)

- Semi-structured interviews
- Meeting observations
- Neighborhood-scale data on land use, land cover, etc. to build urban typology

Quantitative Survey and Secondary Data

(year 2/3)

- Systematic household survey (water behaviors, attitudes, values, preferences)
- Stormwater manager survey
- Analysis of media coverage of water
- Municipal data on actual water use

Coupled Data and Integrated Modeling

(w/RFA3; Year 3-5)

- Co-located social and biophysical data collection at parcel and neighborhood scales
- Use of social research results in development of coupled process & agent-based models

DATA

Water Use and Landscaping Behaviors

- HH Survey questions
  - Indoor and outdoor water use, landscaping behaviors
  - Decision-making factors
  - Experiences/interactions with local water bodies
- Qualitative follow-up interviews with selected respondents
- Actual water use data (from municipal provider)
- Measured parcel-scale landscaping patterns (remote sensing, on-site measurements)

Perceptions, Attitudes, Values, Preferences

- Interviews & Focus Groups with campus water stakeholders
- Media analysis
- HH survey questions: Values, Concerns, Risk perceptions, Policy preferences
- Qualitative follow-up interviews with selected respondents

Social and Neighborhood Context

- Aggregate neighborhood characteristics (urban typology)
- HH survey response information
- Local water rates and policies
- Documentation of locally-active social groups and networks

Engineering Team Activities

- Developed formal plans for expanded urban instrumentation; initiating purchase/installation
  - GAMUT extension (3 new aquatic stations)
  - Storm drains & canals (flow monitoring)
- Installed new instrumentation
  - Storm drains in Red Butte Creek
  - Green roofs (UU and SUU campuses)
- Began development of parcel & neighborhood urban hydrology models (stormwater; hydrology/water budgets)
- Design of GIRF/GIRN; GI experiments

Results of Strategic Priority Targets RFA2

Tasks Completed (areas 2.1 and 2.2)	Completed urban typology
	Implemented major surveys
	Expanded urban instrumentation
	Created public datasets
	Papers, presentation, grant submissions

RFA2 – Plans for Year 3

Goals

- RESEARCH:
  - Analyze survey datasets; follow-up studies (orgs, policy, coupled data)
  - Urban instrumentation implementation, data analysis & modeling
  - GIRF pilot studies
  - Collaborate with RFA1 & RFA3 on coupled data
- PEOPLE:
  - Hire/integrate new graduate students, RFA2 postdoc; economist (USU)
  - Find new social science collaborators

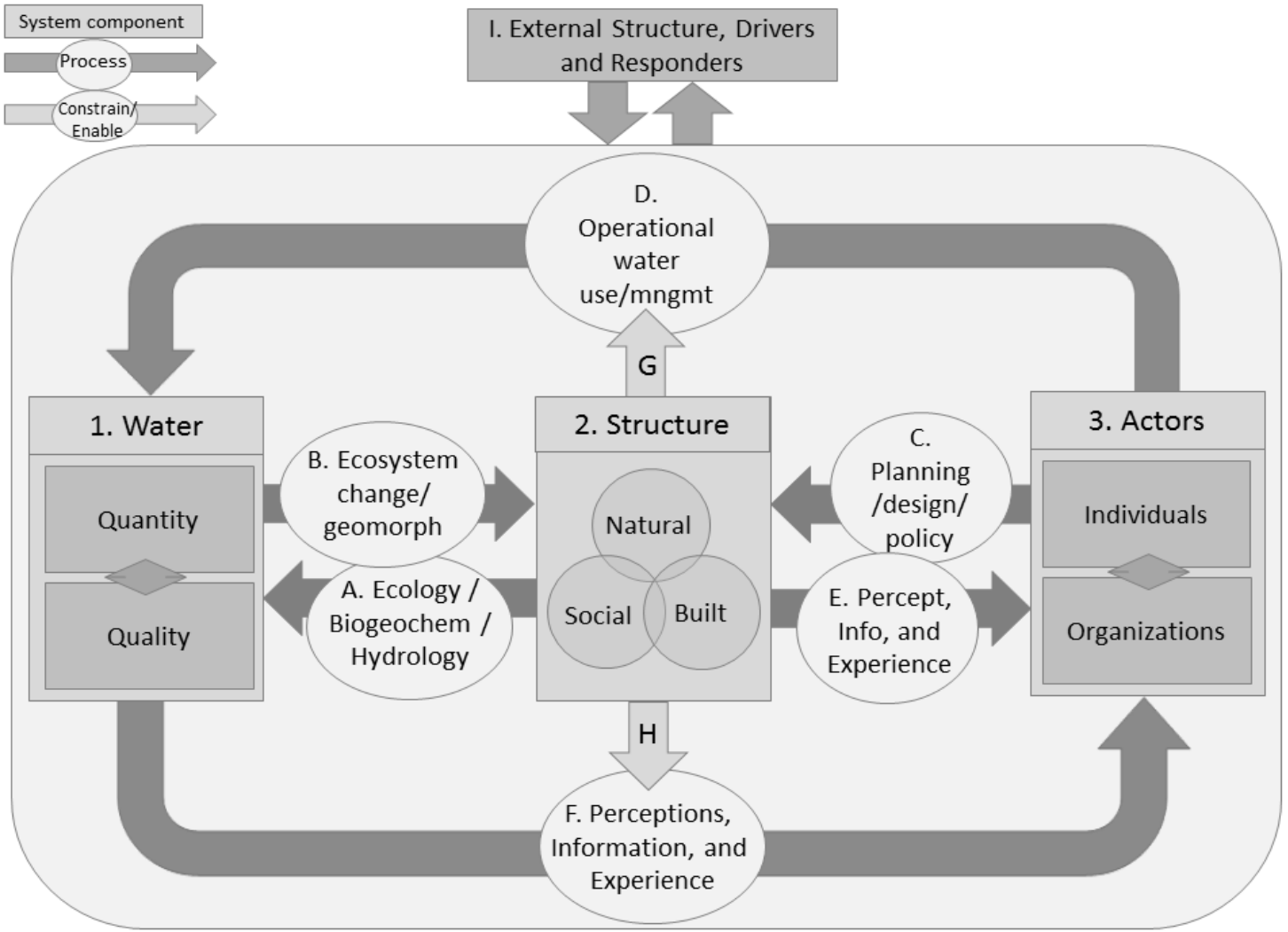
RFA 3: Coupled Human and Natural System

RFA 3: Coupled Human and Natural System

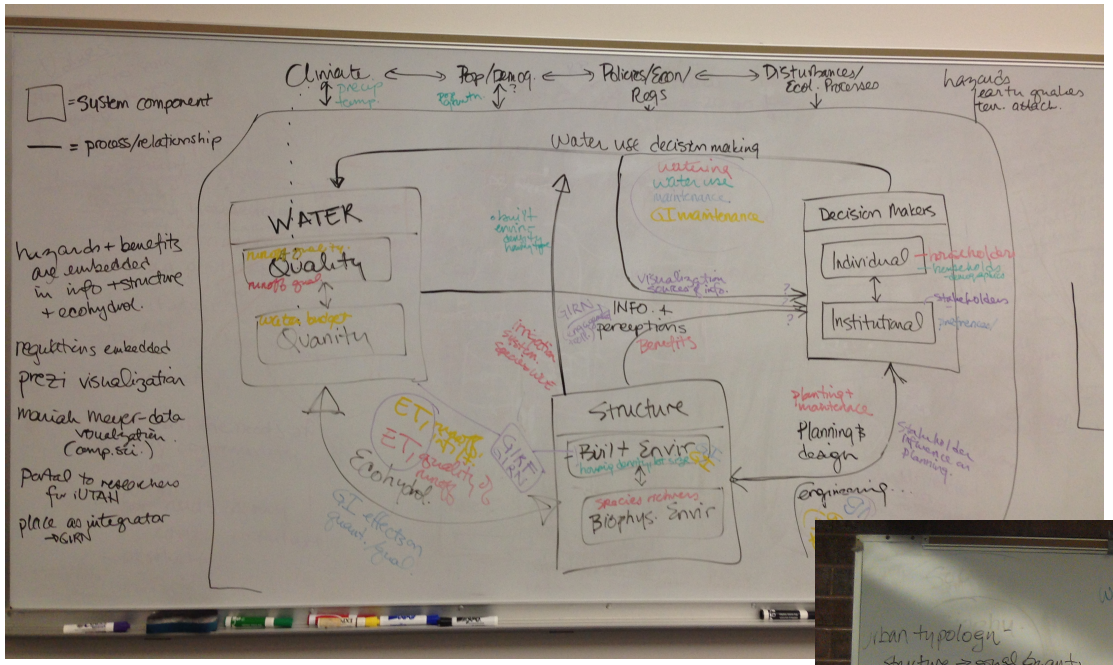
Goals

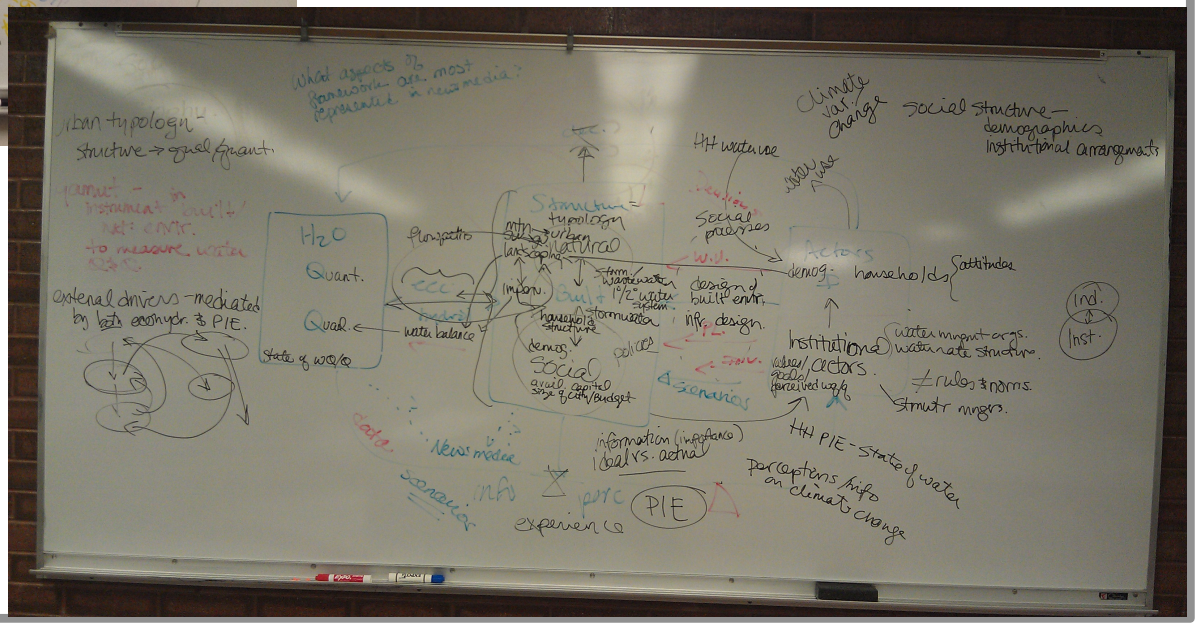
- Identify, categorize, & centralize relevant data and models
- Link disparate models and datasets
- Integrate results from RFAs 1 and 2
- Enhance capacity for interdisciplinary research and training
- Provide participatory modeling tools
- Enhance data/model visualization capacity

RFA 3 – iUtah Conceptual Model

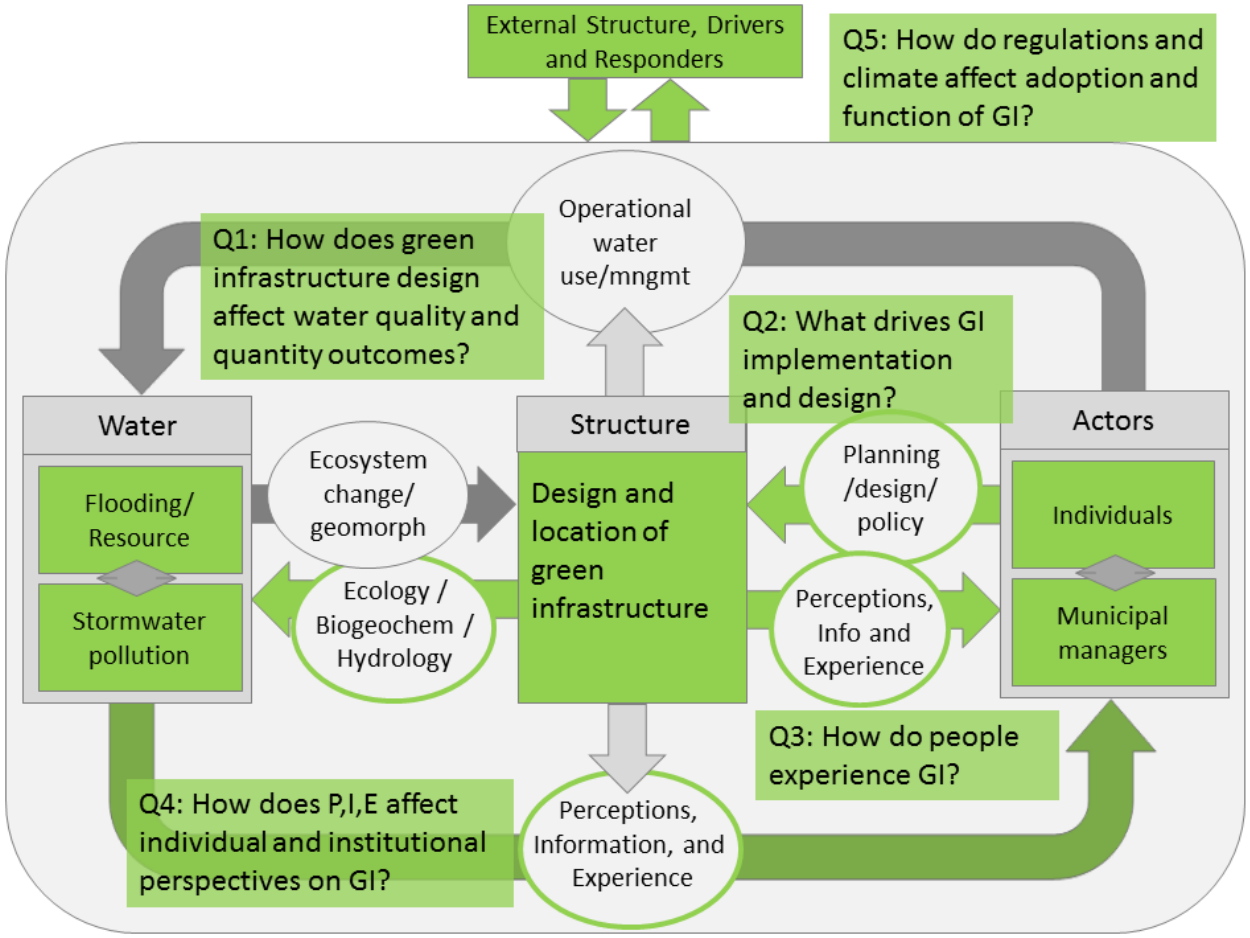


RFA 3 – iUtah Conceptual Model

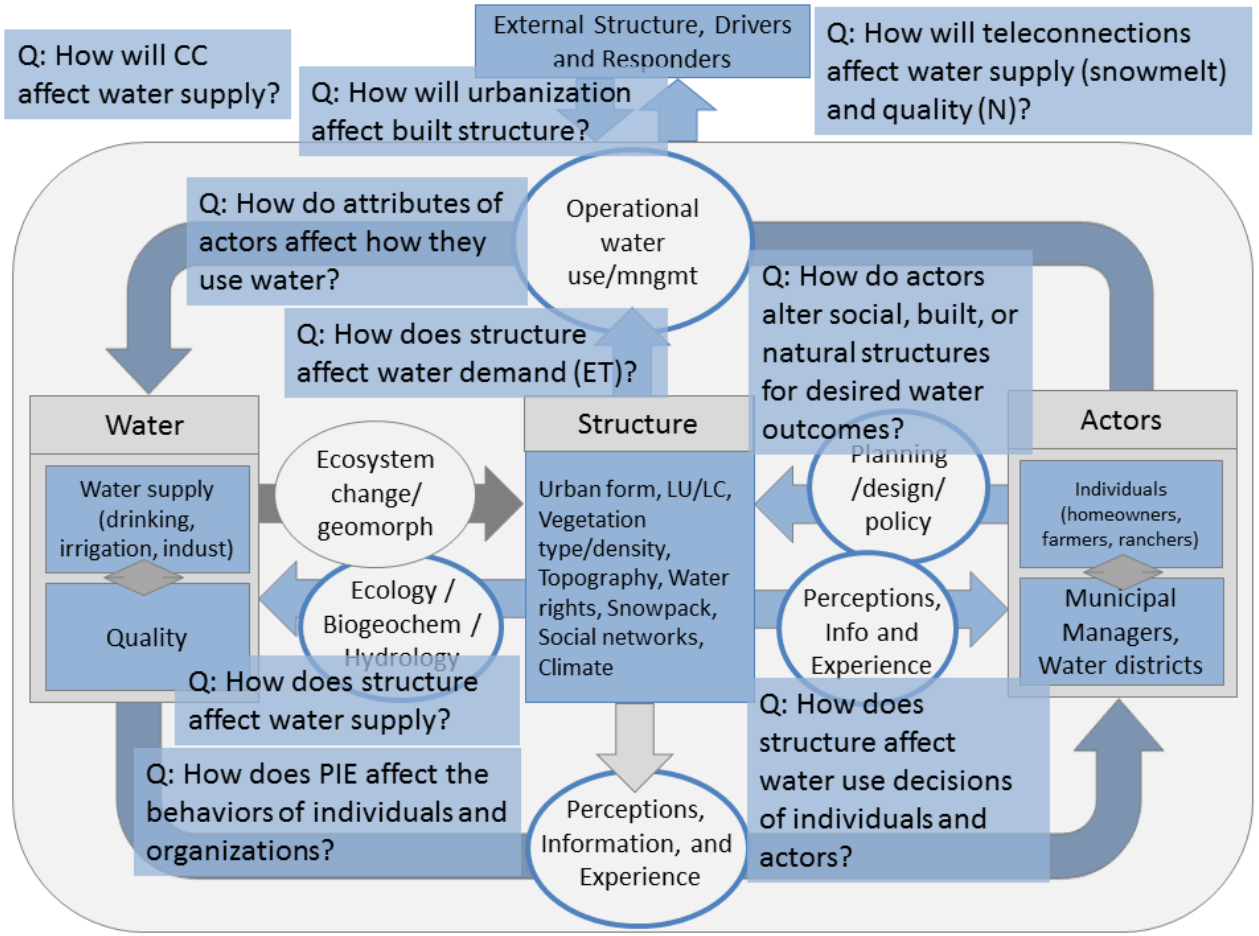




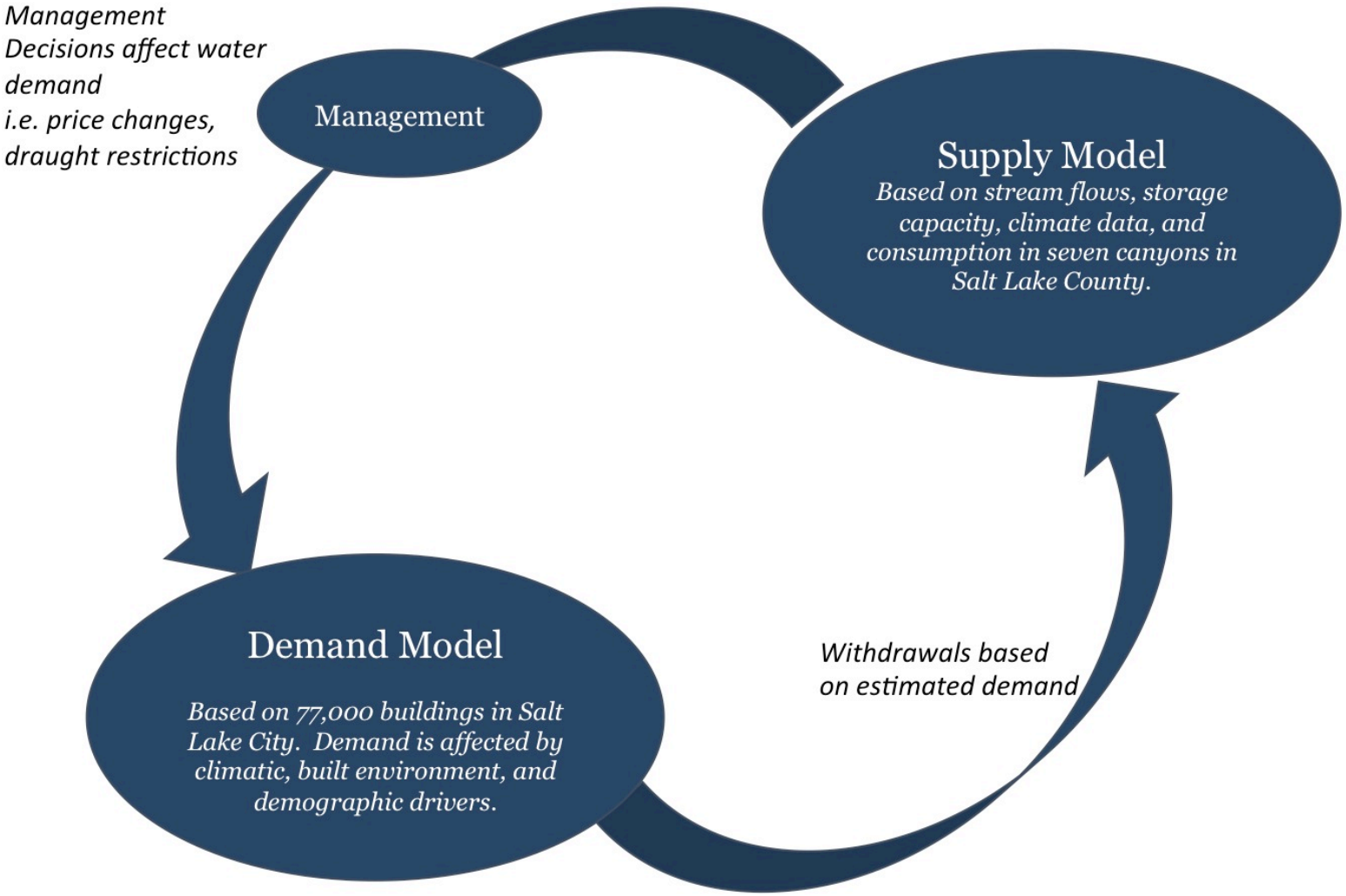
RFA 3 – iUtah Conceptual Model



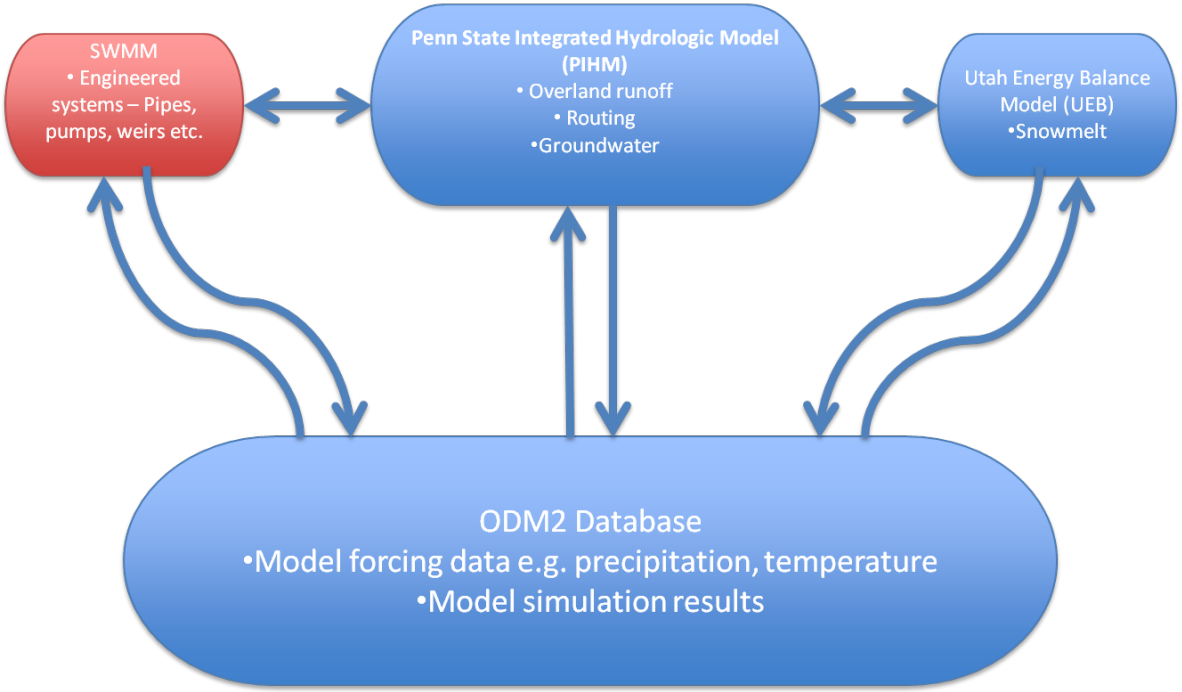
RFA 3 – iUtah Conceptual Model



RFA 3 Coupled Modeling



RFA 3 Coupled Modeling



Bi-directional feedbacks per time step

Bi-directional feedbacks per entire model time domain

OpenMI components to be developed

OpenMI components developed

- Evaluation Metrics
  - Simulation time
  - Memory utilization
  - Mass balance errors
- Variables
  - Increasing computational elements
  - Increasing temporal domain
  - Increasing time steps
  - Spatially decomposed coupled models vs. coupled models from decomposing hydrologic processes

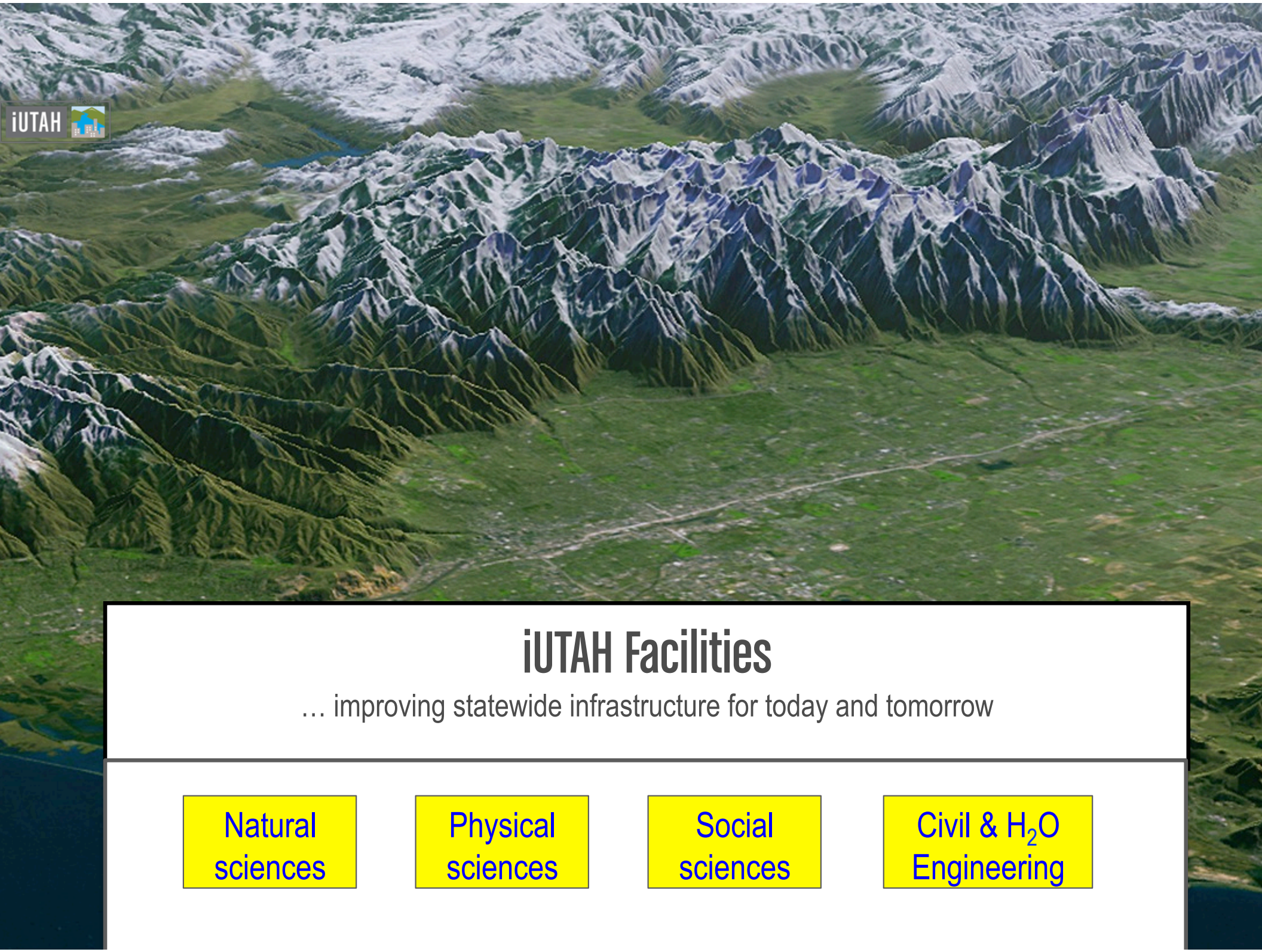
Results of Strategic Priority Targets

Tasks Completed
Collaborative team meetings
Model development workshops
Stakeholder engagement working group meetings
Visualization and coupled modeling personnel
RFA 3 postdoctoral fellow
RFA 3 graduate student fellows and ifellows
Collaborative proposals (at least one funded)
iUtah conceptual model and white paper

RFA3 – Plans for Year 3

Goals

- Expand coupled modeling activities
- Develop visualization products
- Publish conceptual model manuscript(s)
- Integrate RFA1 and RFA2 data collection



iUTAH Facilities

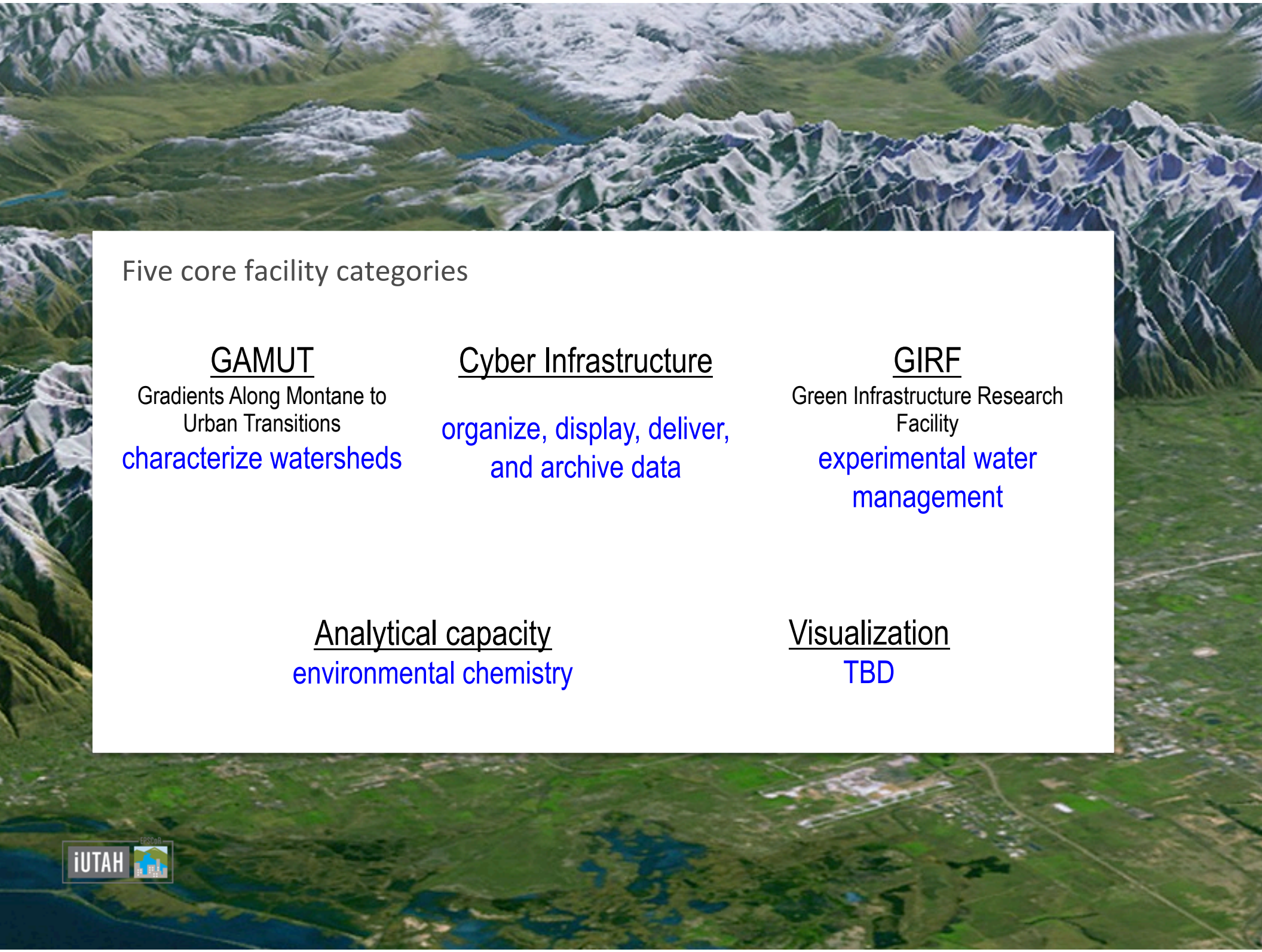
… improving statewide infrastructure for today and tomorrow

Natural sciences

Physical sciences

Social sciences

Civil & H_2O Engineering



Five core facility categories

GAMUT

Gradients Along Montane to Urban Transitions

characterize watersheds

Cyber Infrastructure

organize, display, deliver, and archive data

GIRF

Green Infrastructure Research Facility

experimental water management

Analytical capacity

environmental chemistry

Visualization

TBD

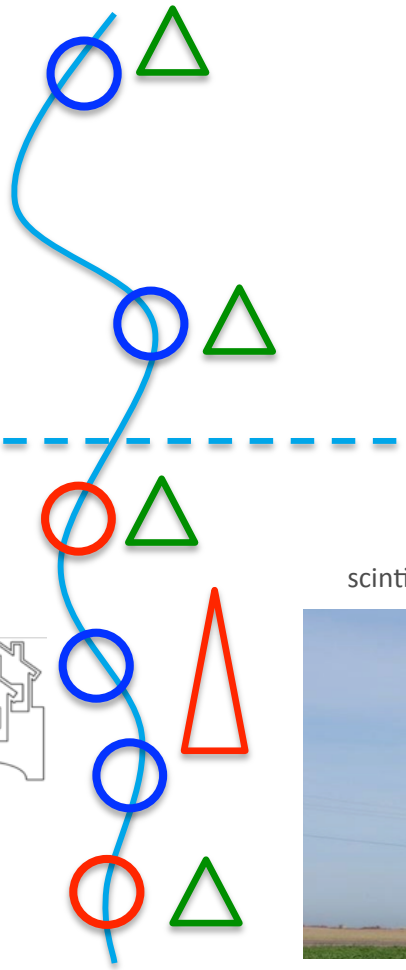
iUTAH EPSCoR

GAMUT

Gradients Along Mountain to Urban Transitions

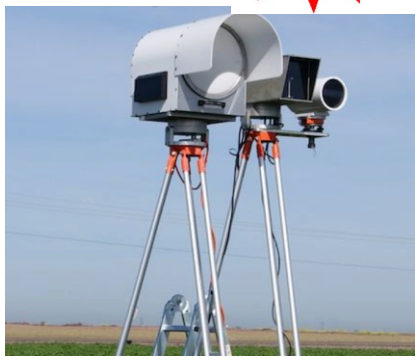
2500+ m

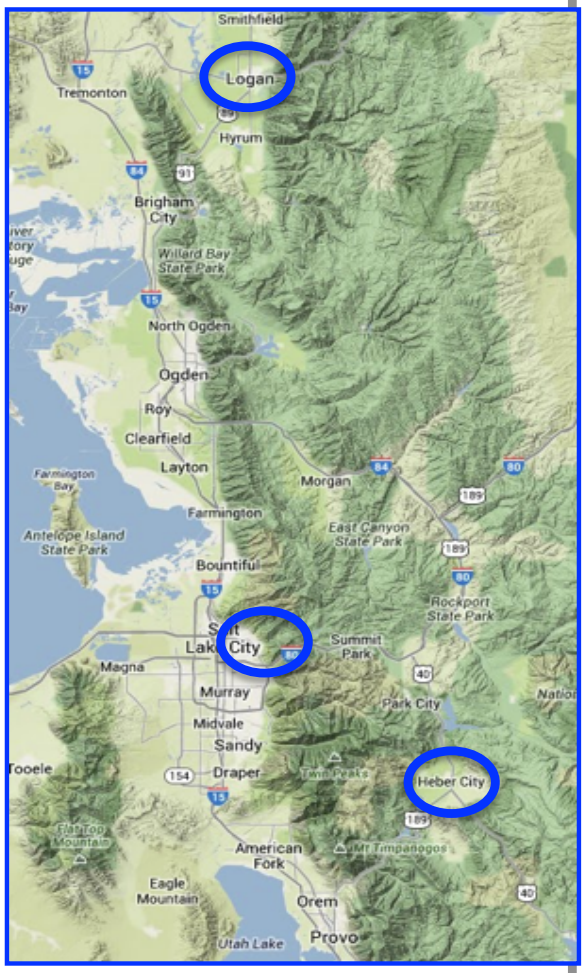
Mountain-to-Valley transition



NEW!

scintillometer





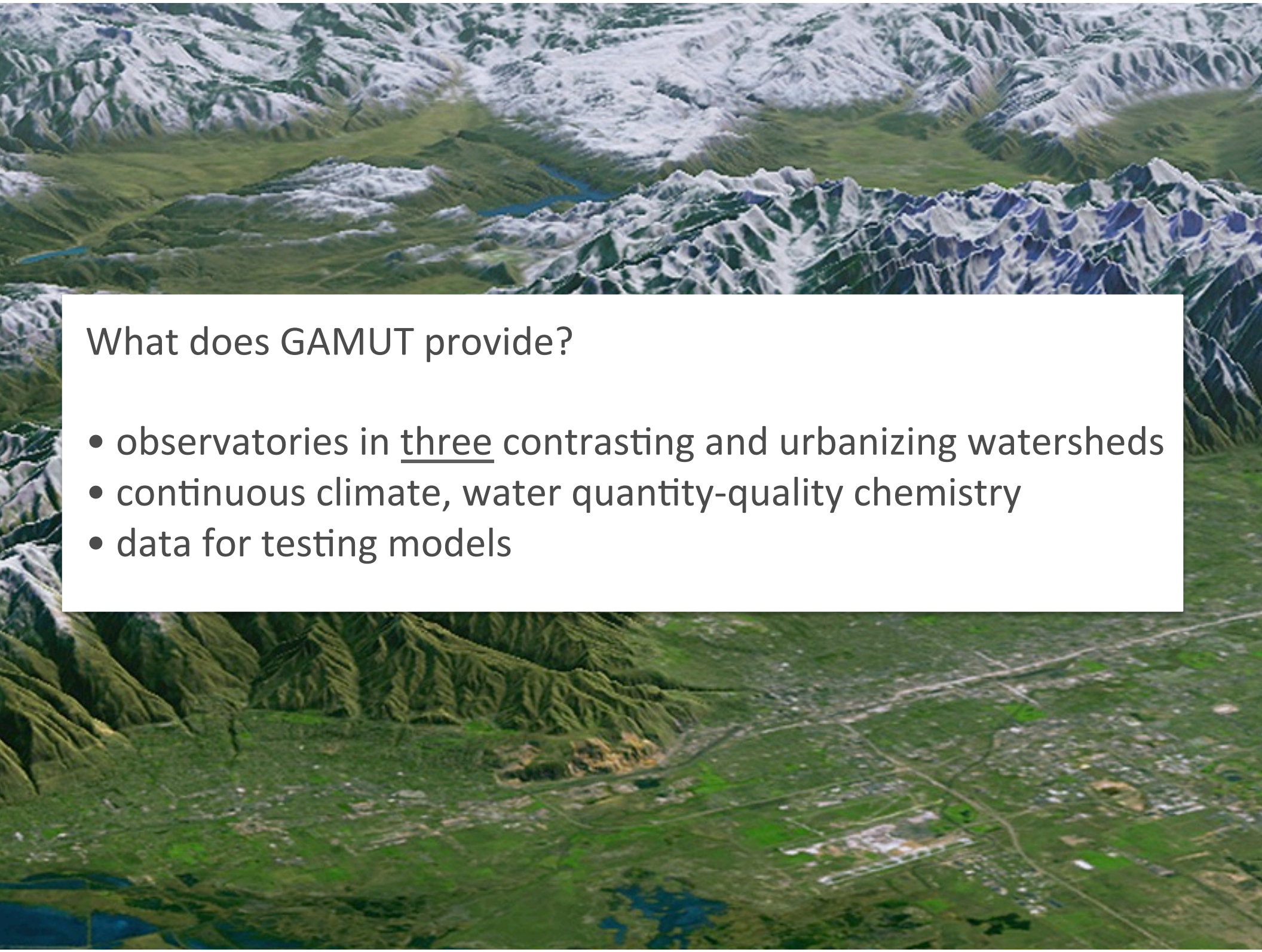
- Fundamental aquatic sensors, *in situ*
- Fundamental aquatic sensors, relocatable
- Enhanced aquatic sensors, *in situ*
- Fundamental terrestrial sensors
- Urban tower and sensors

This has been another ***remarkably*** productive GAMUT year:

Status of GAMUT site installations (installed/planned)

Watershed	Climate stations installed	Aquatic stations installed	Stormwater stations installed	Sapflux stations installed
Logan	4 / 4	5 / 6	0 / 0	1 / 1
Red Butte	4 / 4	5 / 6 *	4 / 4	1 / 1
Middle Provo	4 / 4	4 / 4	0 / 0	0 / 0

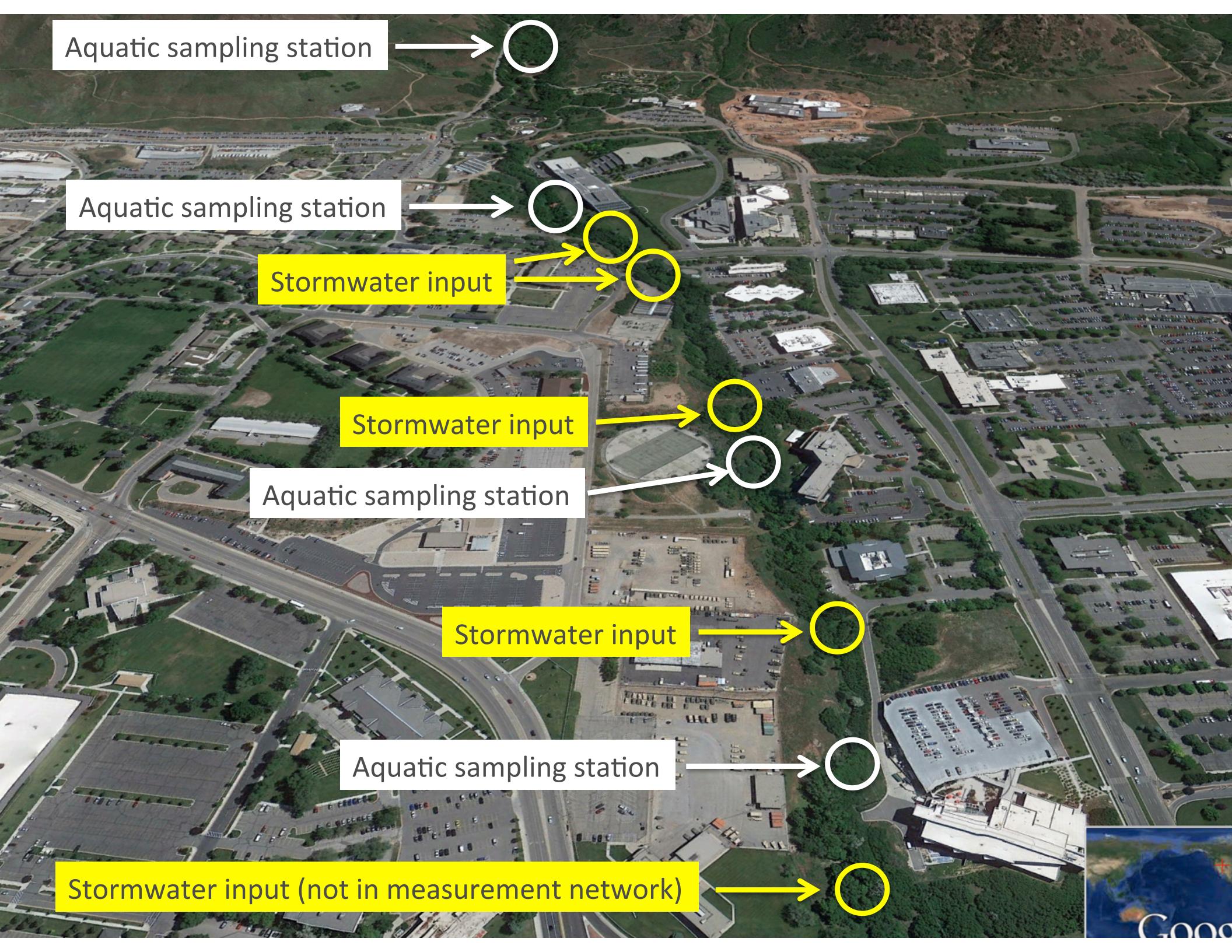
* Awaiting final approval of city permit for additional urban station



What does GAMUT provide?

- observatories in three contrasting and urbanizing watersheds
- continuous climate, water quantity-quality chemistry
- data for testing models

An opportunity to understand GI and parking lot impacts


Aquatic sampling station
Aquatic sampling station
Stormwater input
Stormwater input
Aquatic sampling station
Stormwater input
Aquatic sampling station
Stormwater input (not in measurement network)

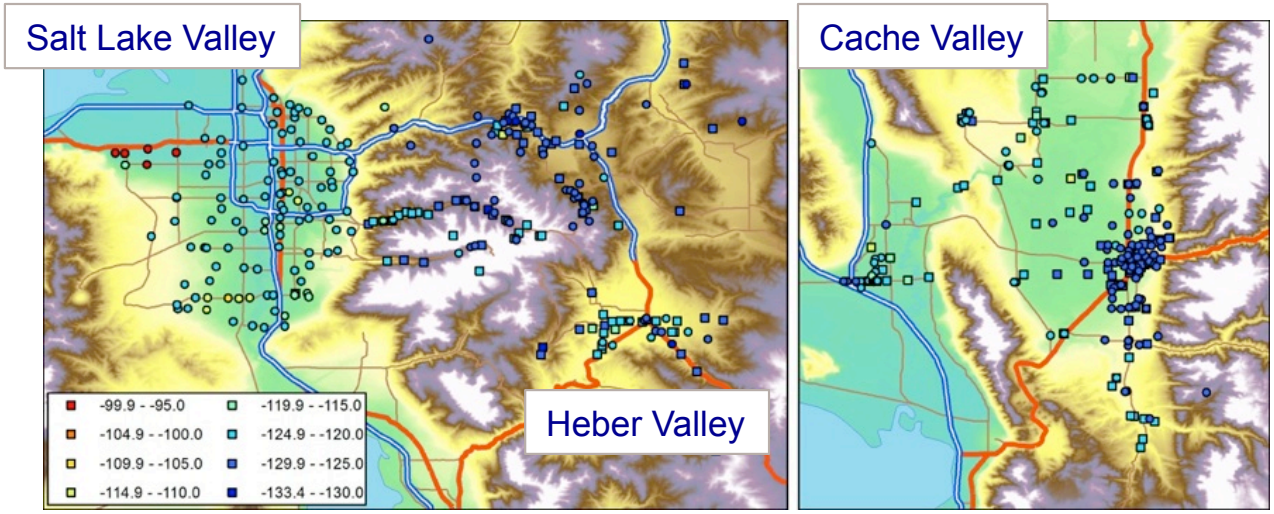
Analytical chemistry

Using ion chromatography wet chemistry
as indicators of change in

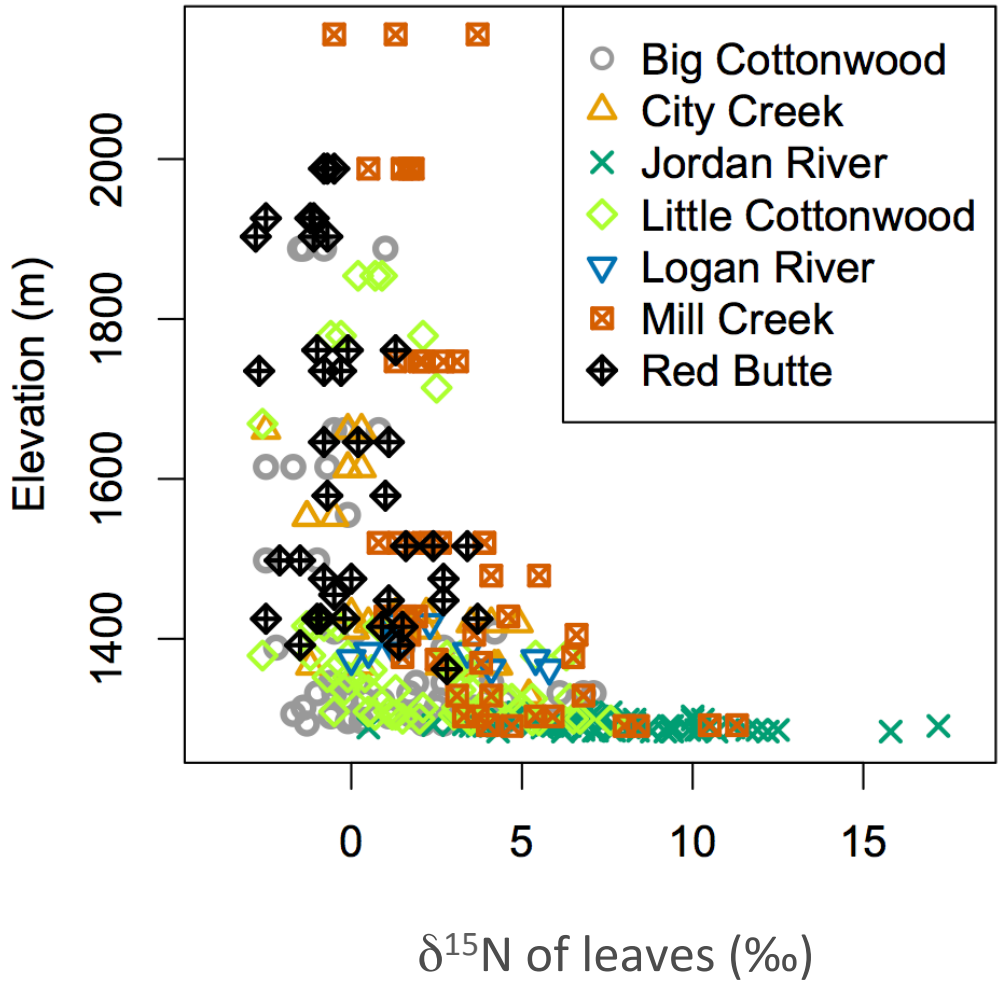
- snow chemistry – changes in watershed inputs
- stream chemistry – changes in terrestrial inputs
- tap water chemistry – source and history of water

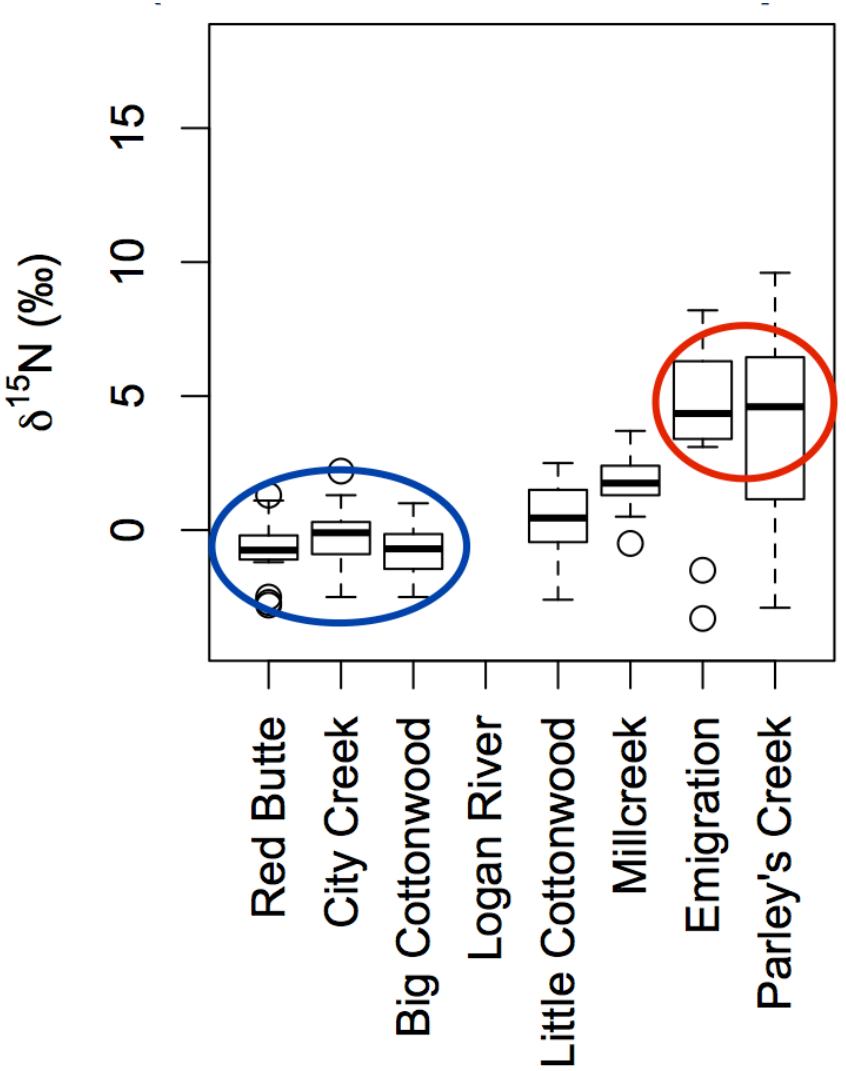
These long-term data will serve as a foundation for current/future studies and as test data to evaluate models exploring terrestrial and aquatic biogeochemistry cycles

Tap water stable isotope data



Nitrogen isotope ratios of riparian leaves reveal anthropogenic N inputs

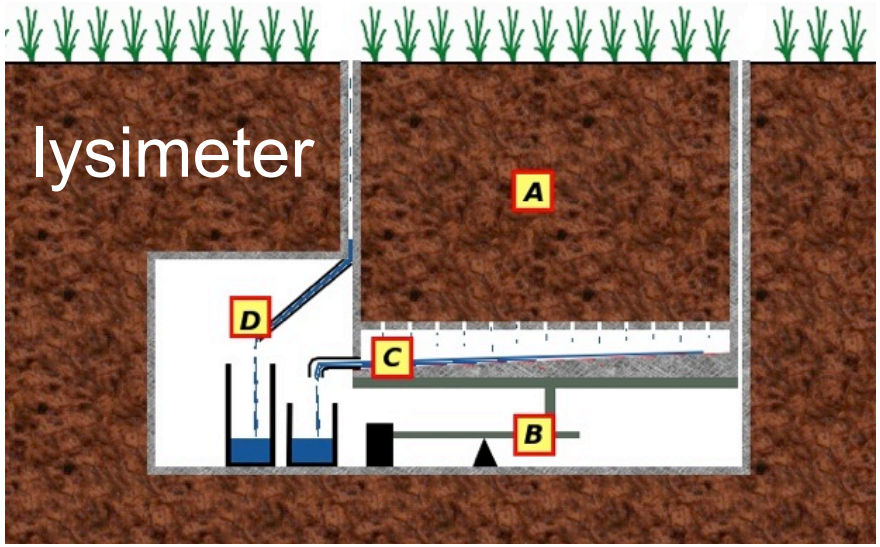




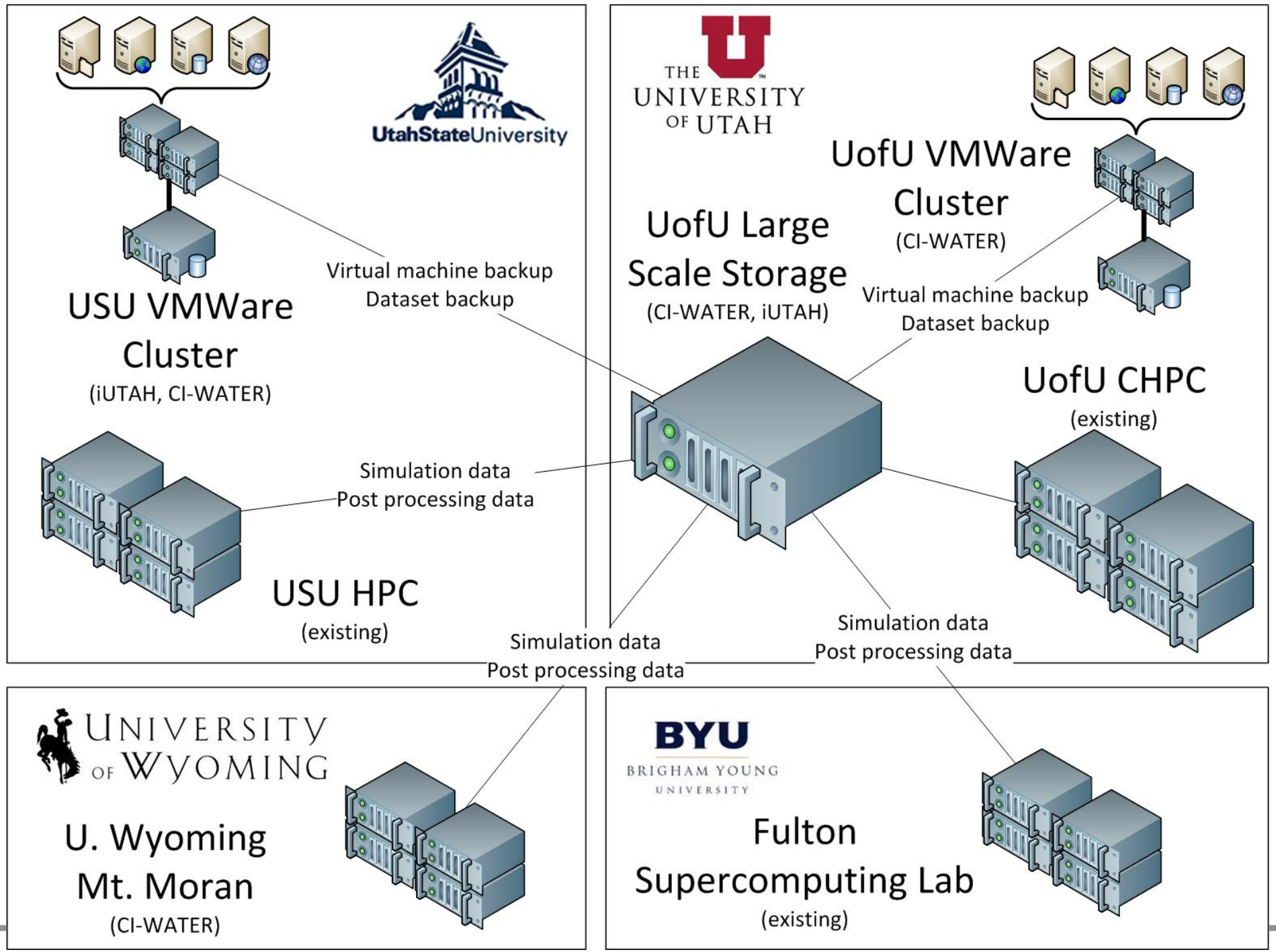
GIRF: Green Infrastructure Research Facility

Onsite management of water and pollutants pilot project funded
- evaluation of species tolerances
- evaluation of pollutant removal

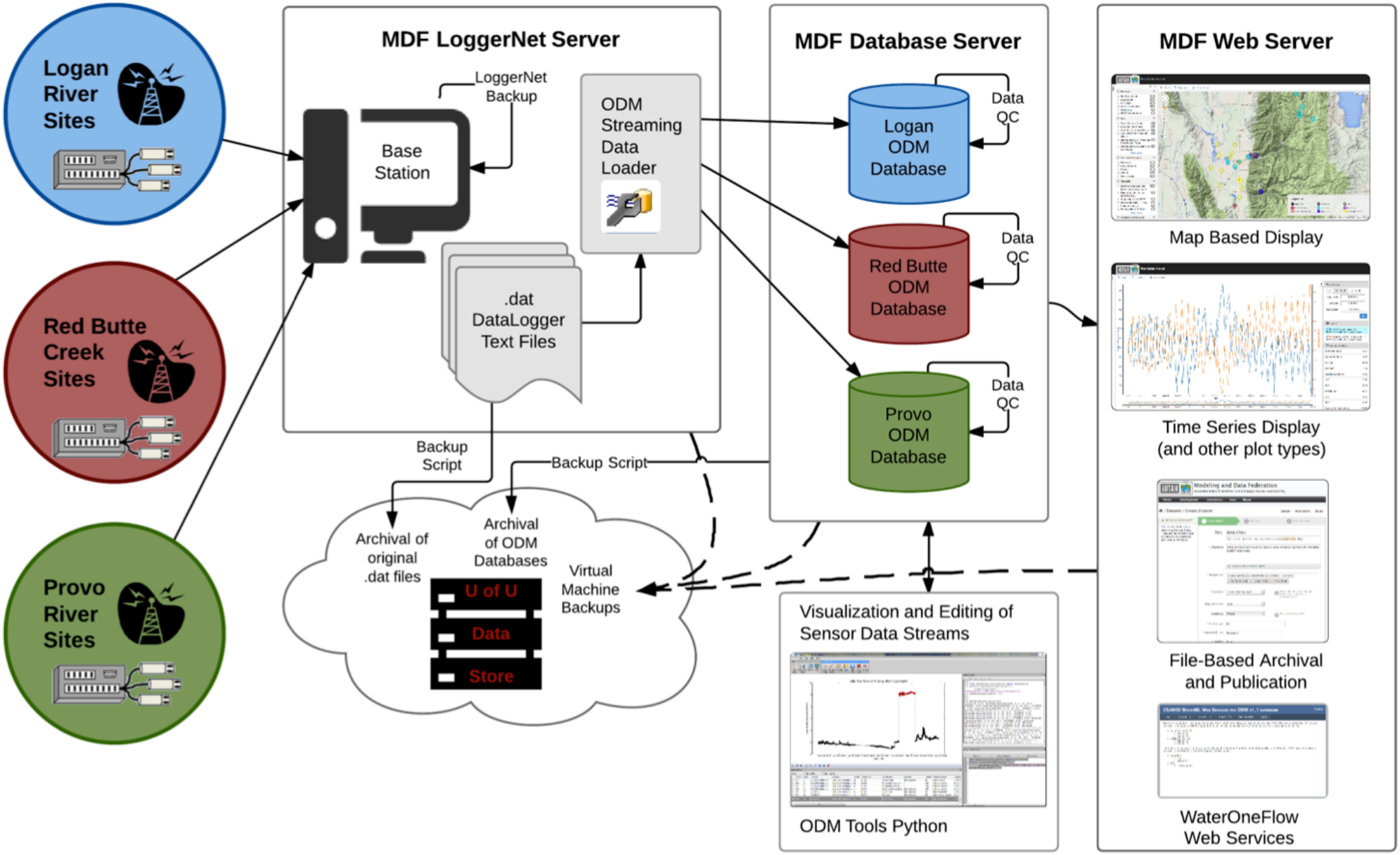
Design of facility under development
- contained bioretention
- lysimeter
- green roof
- replication requirements



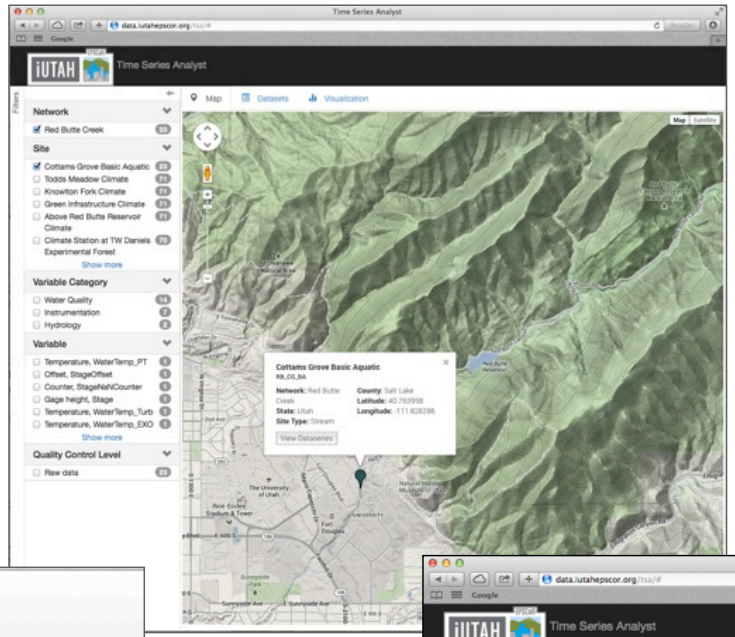
Utah EPSCoR Cyberinfrastructure Hardware

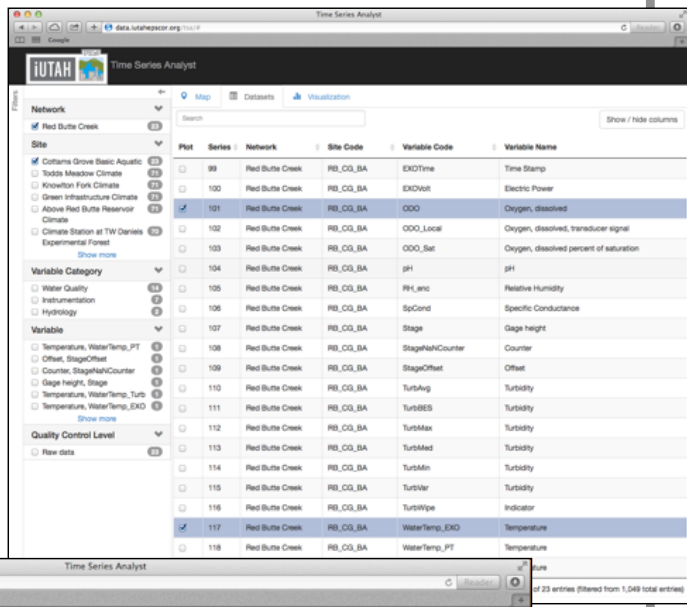


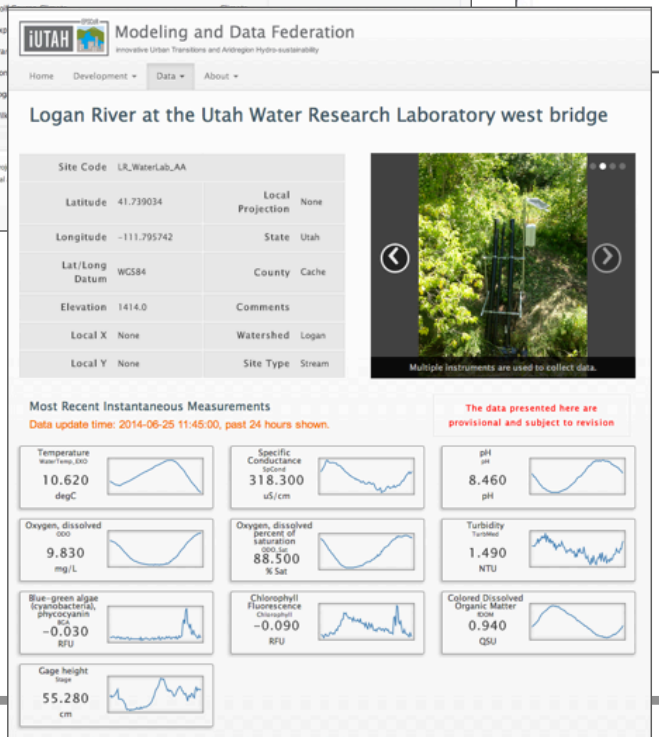
GAMUT Network Cyberinfrastructure

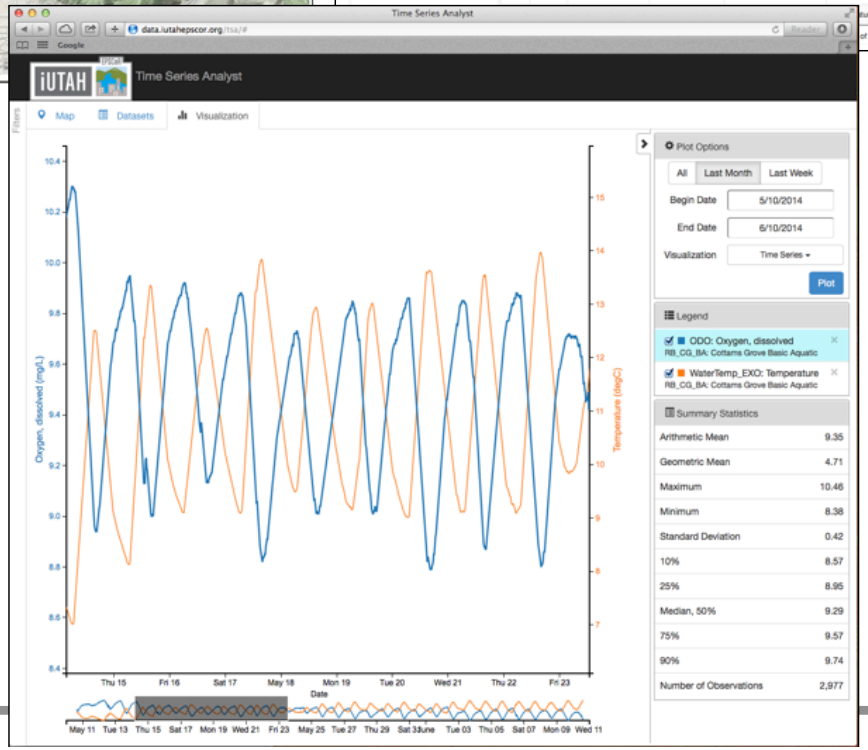


Cyberinfrastructure for Web-Based Data Access and Visualization









Software for Data Management and QAQC

Multiple Plot Types

Plot Display Options

Date Range Restrictions

Dynamic Zooming and Panning

Filters on Data Series

Time Series Selection

Export Data Series

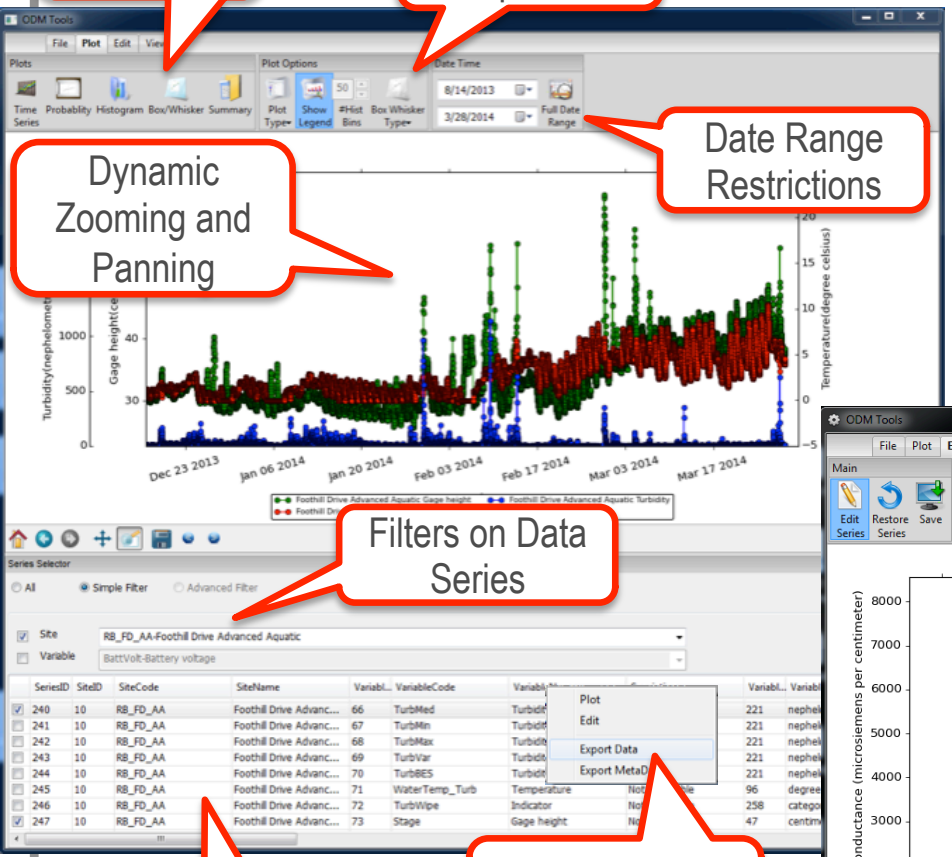
Data Editing Tools

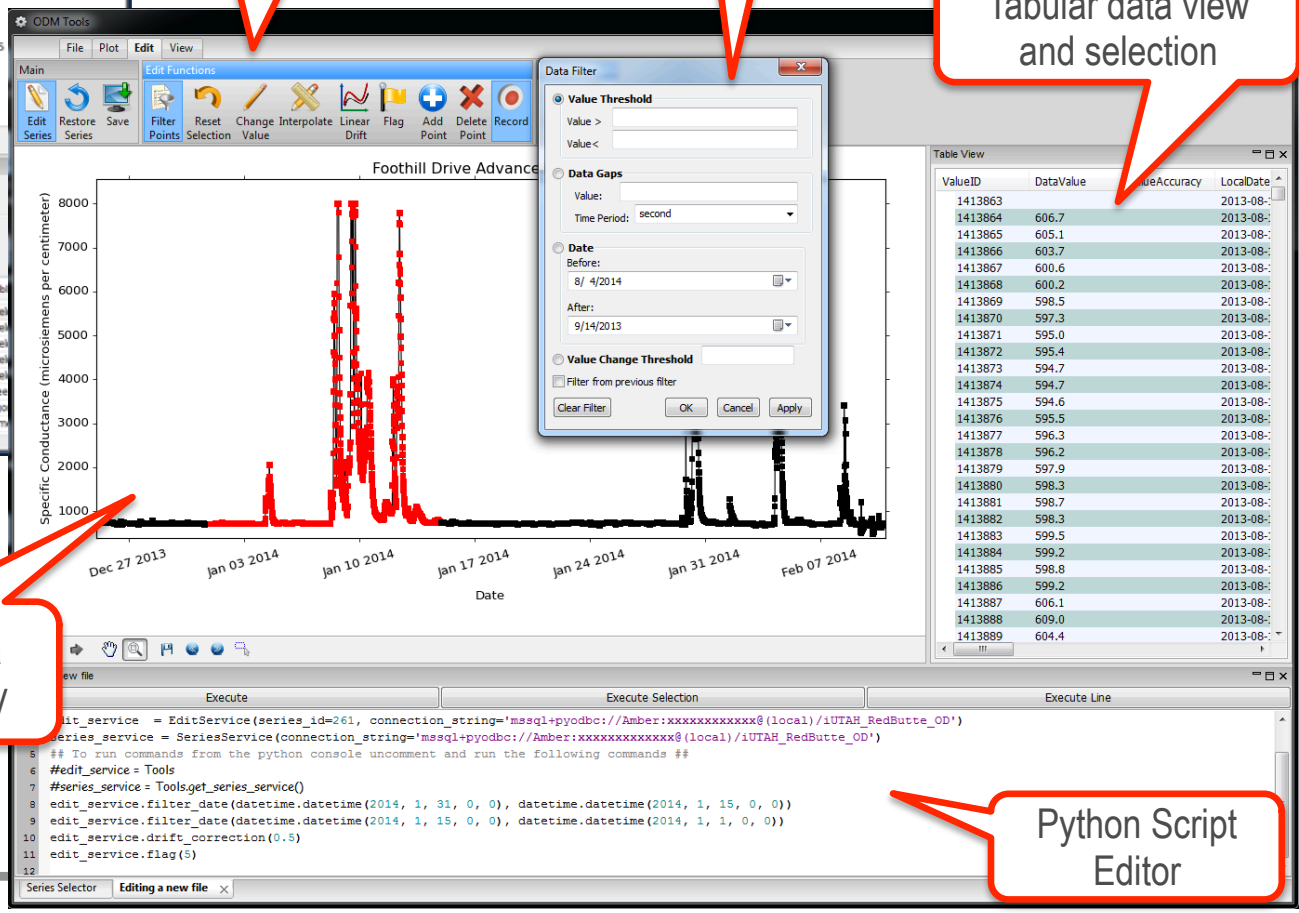
Data selection filters

Tabular data view and selection

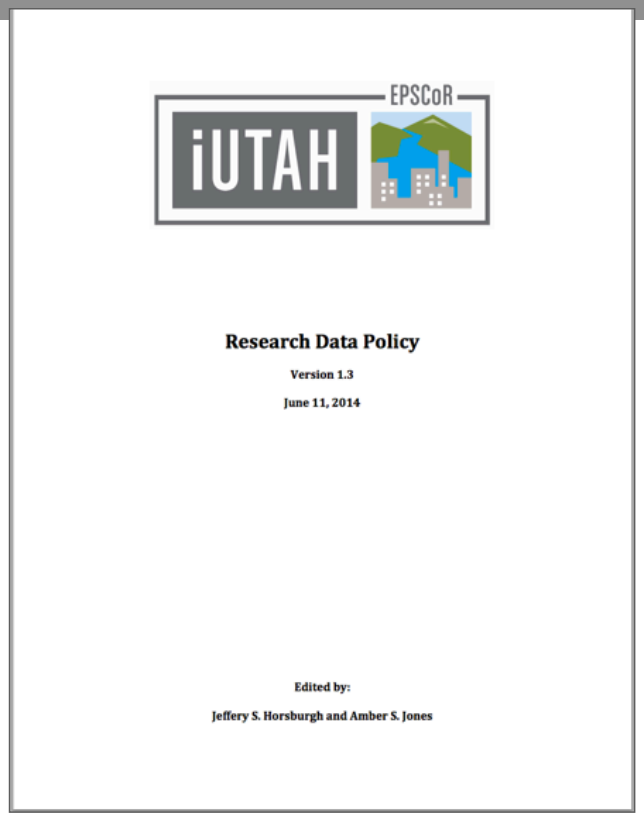
Dynamic Data Editing Display

Python Script Editor





Data Policy and Publication Infrastructure



EPSCoR

iUTAH

Research Data Policy

Version 1.3

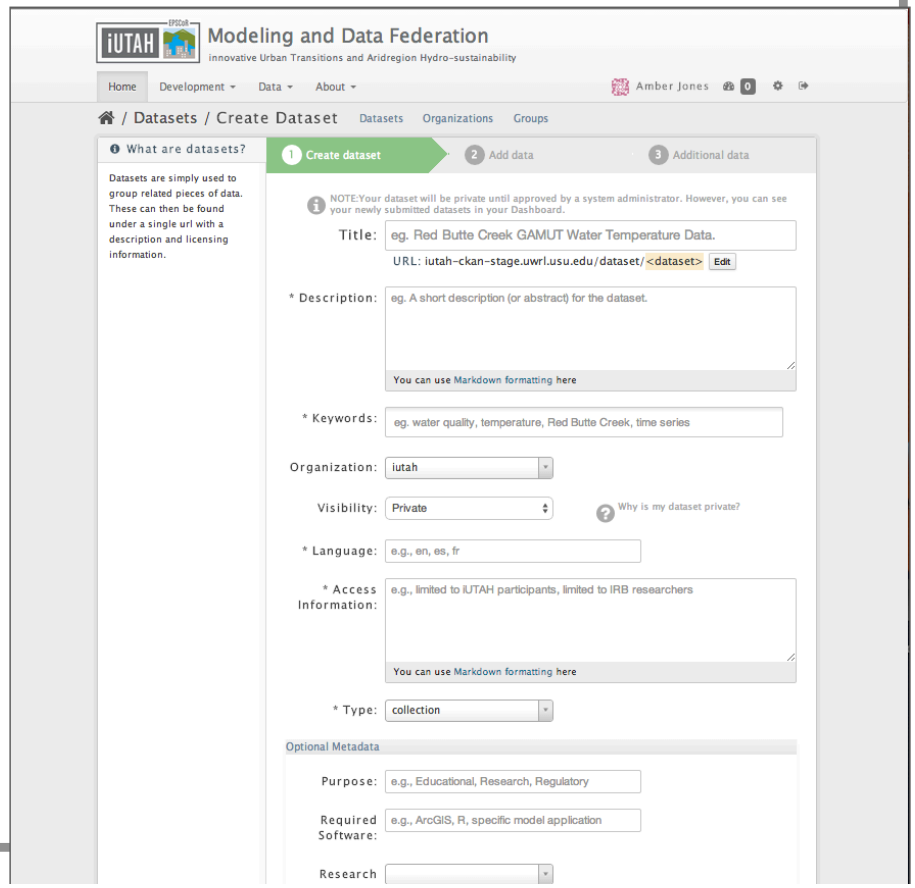
June 11, 2014

Edited by:

Jeffery S. Horsburgh and Amber S. Jones

- Defines Data Typology
- Defines expectations for data sharing, data and metadata quality, and timeframes
- Requires submission of Data Collection Plan for iUTAH-sponsored efforts
- Includes Data Use Agreement

- Web-based Data Publication System for iUTAH researchers to submit and publish data and models
- Integrated submission and presentation of data and metadata
- Supports discovery and access of datasets to a wide audience



Infrastructure with a purpose as Utah addresses urban transitions with a need for hydro-sustainability

Year-2 score card

A	*A*	*A*	*INC*	*INC*
GAMUT	Analytical capacity	CI	GIRF	Visualization
designed, purchased, installed, operational	designed, purchased, installed, operational	designed, purchased, installed, operational	pilot project approved facility design in development	TBD

Overall vision: Education, Outreach, and Diversity

- Integrate with research activities
- Increase diversity of participants
- Support state-wide programs and partnerships
- Expand beyond original proposal

Highlights: iUTAH innovation funds

Research Catalyst Grants

Designed to stimulate research at PUIs across Utah

- Over $100,000 distributed
- Low-cost, high-Impact
- Engages undergraduate students
- 4 new awards given in year 2

EOD Catalyst Grants

Designed to solicit new outreach partners across Utah

- Align with iUTAH milestones
- Integrates research and EOD
- Engaging diverse audiences statewide
- Funded 13 proposals in year 2

Highlights: Summer Institute & REU

iUTAH Summer Research Institute

- Engaging undergraduate students, high school students and teachers
- Targets undergrads from PUIs
- Year 2 is hosting 2 students and 1 teacher from a high school in southern Utah.
- Recently highlighted at an EPSCoR EOD All-Hands meeting, in an EPSCoR STEM Program Catalog.

iFellows Undergraduate Research Experience

- 10 week-research program
- Seeks students from PUI institutions
- Near-peer mentorship
- Year 2 of the program has more PUI students than Year 1
- Added a student track of the 2014 iUTAH Symposium to enhance iFellows' (and other iUTAH students') connection to UTAH STEM workforce

K-12 Engagement

- iUTAH Taking Learning Outdoors
  - Engages K-12 Teachers and Students in iUTAH studied watersheds
- Utah Watersheds Outreach Program
  - Developed for 4th graders in Utah County
- Expanding Your Horizons
  - Supporting K-12 females in STEM
- Natural Resource Field Days
  - Interacting with Logan-area 4th grade students
- Project Youth
  - Engaging K-12 students in a University setting
- National Center for Women in Technology Aspiration Awards, Southern Utah
  - Recognized 11 high school women from Southern Utah for their achievements in computing, one became a national runner-up

Year 3 Plans

- Diversity conference with Hispanic and urban focus
- Leveraging additional statewide partners and programs
- Continued integration of EOD and research
- Broadened inclusion of PUI students in iUTAH programs

Seeking your advice

- K-12 education: How to best leverage Project WET?
- Underserved populations: In addition to SACNAS, are there efforts geared toward urban Hispanics within programs similar to iUTAH?

Research Infrastructure Improvement

Year 2: Research Infrastructure

- Environmental Observatory
- Cyberinfrastructure
- Neighborhood Typology
- Household Survey
- Conceptual Framework

Research Infrastructure Improvement

Year 2: Workforce/Human Infrastructure

- 2 new faculty
- 3 postdocs
- 16 PhD students
- 13 iFellows
- 4 Interns

Research Infrastructure Improvement

Year 1-2: Capacity Building

- **55** joint proposals
- **8** Research Catalyst Grants
- **10** EOD Catalyst Grants
- **5** websites developed
- **55** presentations on iUTAH
- **64** engineering students trained
- **33** graduate assistantships
- **27** joint journal publications
- **1** Environmental Observatory

Actions to Address - Research

- Behind schedule on groundwater workshop
- Stakeholder engagement as a research focus
- Need to increase proposal submissions and success rates
- Need to submit publications from iUTAH data
  - ➢ Implement new seed funding and workshop funding stream

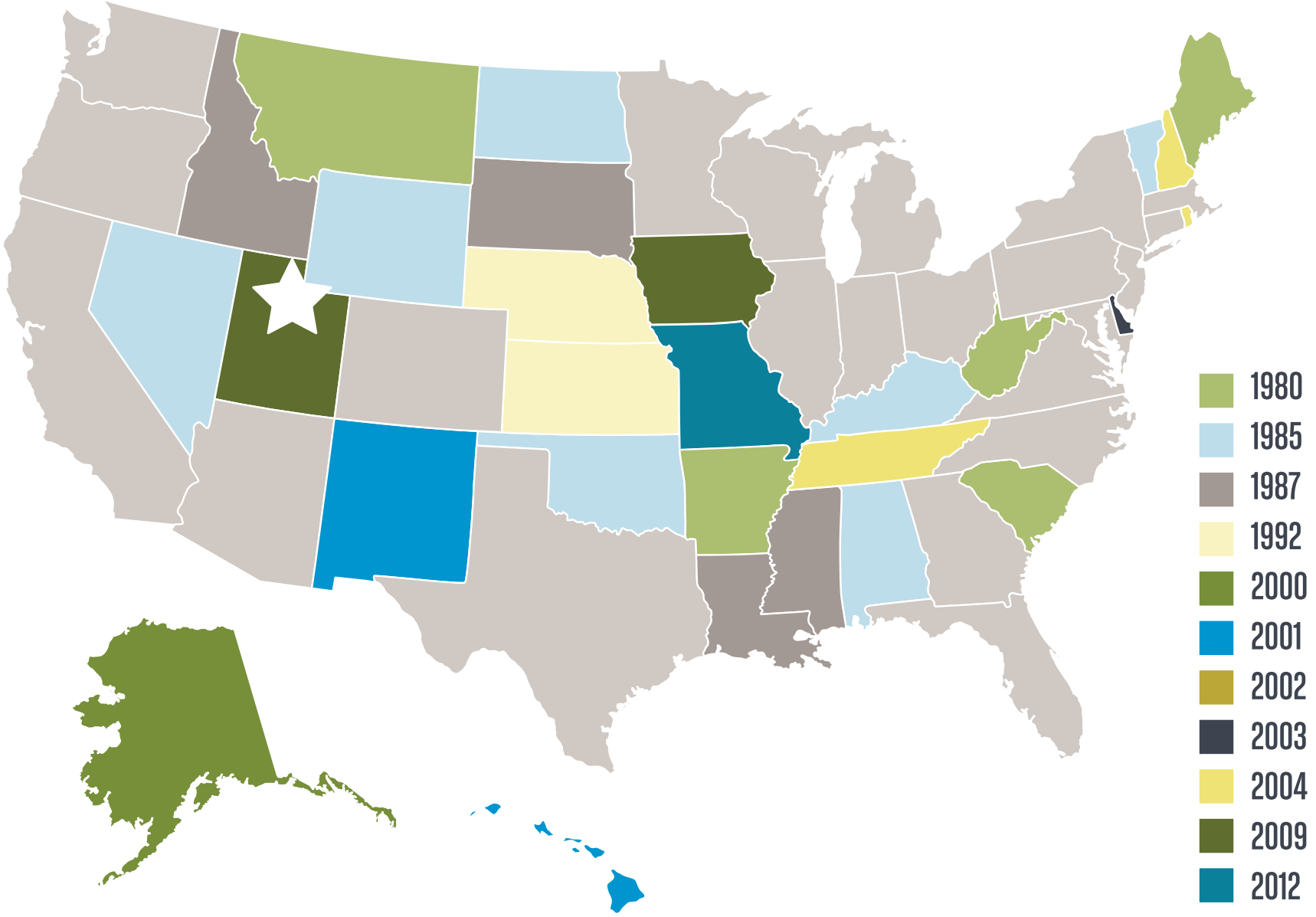
Actions to Address - Facilities

- Behind schedule on GIRF
- Visualization plans not finalized
  - Approved pilot project for GIRF
  - Will hire M. Buchart to guru visualization
  - Seed/workshop funding

Actions to Address - EOD

- Leveraging Project WET?
- Engaging urban Hispanics
- Long-term sustainability of EOD programs

Last-in-First Out!



Sustainability

(The view of the Salt Lake Valley from Little Cottonwood Canyon. Rick Egan, The Salt Lake Tribune)

With no funding, Utah clean-air panel dies as smog lives on

Pollution » Utah Legislature created but didn't secure funding for alternative-energy board.

By Lee Davidson | The Salt Lake Tribune
First Published Jun 13 2014 03:09 pm • Last Updated Jun 13 2014 09:29 pm

As smog smothered Salt Lake City during the 2013 Legislature, protests about air pollution were loud and frequent — and lawmakers responded by passing SB275 to create an interlocal panel to find ways to expand use of cleaner fuels, especially natural gas.

That group — dubbed the Alternative Energy Interlocal Entity Board — was then ballyhooed as a great hope to improve air quality. Some high-profile city officials and lawmakers were appointed, and the panel began to meet.

- Engage with various air quality groups. UU has a program in Air Quality, Health, and Society
- Engage with DEQ/DAQ/DWQ
- Tie research water to air quality (e.g. post doc Steven Hall's research); seed funds

Sustainability

- Develop partnership with the Utah Climate Center
- Institute for Climate and Water?
- Legislative visit in August
- Seed funds