EPSCoR iUTAH

GAMUT

gradients along mountain to urban transitions

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GAMUT

gradients along mountain to urban transitions

What?
Where?
Why?

A trip down memory lane

A trip down memory lane

1969 – Red Butte RNA
2000s – Red Butte and NEON
2006 – Little Bear River Test Bed
2007 – Great Salt Lake Basin CZO
2009 – ULTRA for the WRMA
2009 – EPSCoR 1; CAD network (dust, snow, water)
2010 – iUTAH 1; EMN (urbanization gradient)
2010 – WSC Planning Grant @ USU
2011 – iUTAH 2; GAMUT

What is it?

Infrastructure (facility) built and maintained to provide ongoing data acquisition, support research and teaching missions, and provide opportunities for outreach

INCREASE UTAH'S COMPETITIVENESS FOR $

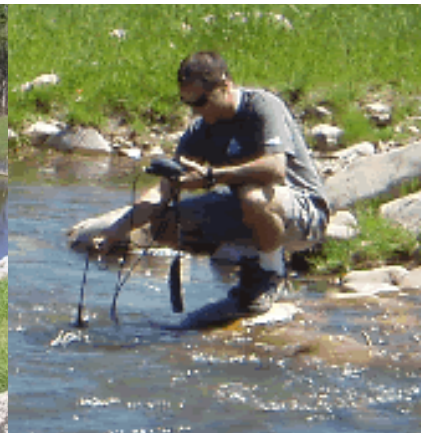
Relation to RFA 1

- Improve capacity to monitor and understand biophysical processes that influence our water resources

What is it?

- Networked instrumentation to measure aspects of water quality and quantity.





What is it?

Table 1. Parameters to be measured by the iUTAH GAMUT.

	Fundamental Suite	Enhanced/Urban Suite
Terrestrial Sensors	Barometric pressure Wind speed and direction Air temperature Relative humidity Precipitation Snow depth Soil temperature, moisture, conductivity Solar radiation (net radiation and PAR)	Barometric pressure Wind speed and direction Air temperature Relative humidity Precipitation Soil temperature, moisture, conductivity Solar radiation (net radiation and PAR) CO_2 and H_2O
Aquatic Sensors	Stream stage Temperature Electrical Conductivity pH Dissolved oxygen Turbidity	Stream stage Temperature Electrical Conductivity pH Dissolved oxygen Turbidity Total algae (chlorophyll a + phycocyanin) fDOM Nitrate

What is it?

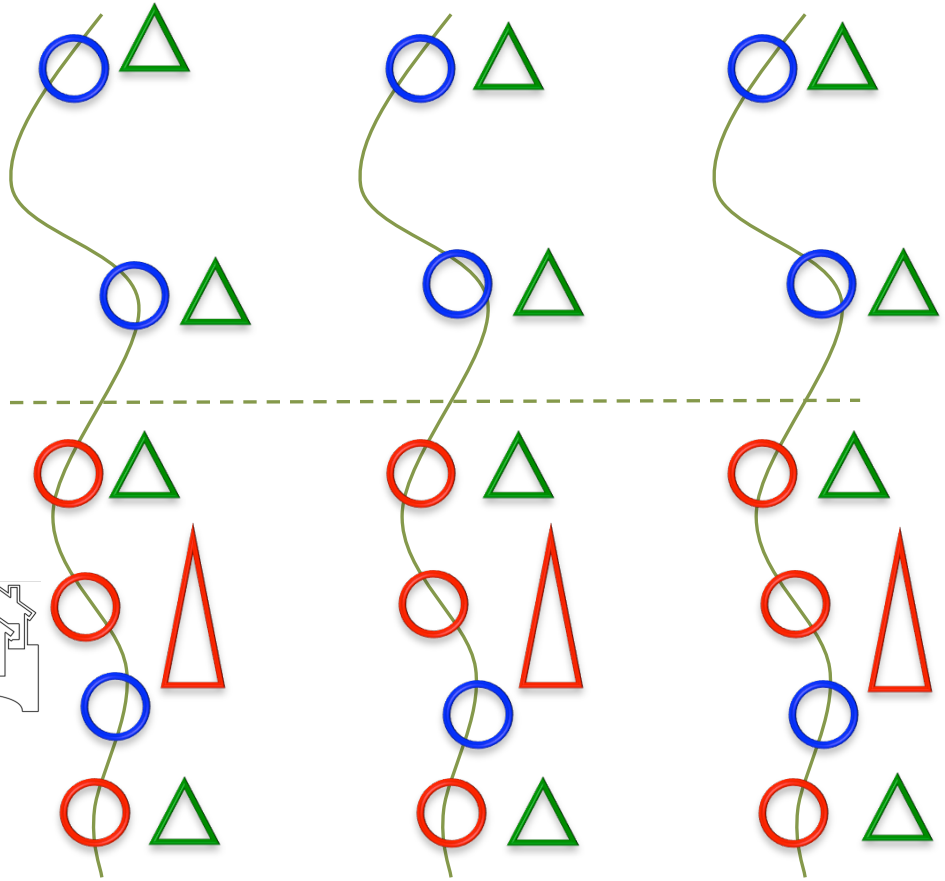
Sensor units are EXPANDABLE

What is it?

- Iterative Process
  - Campus conversations
  - Compatibility with existing infrastructure
  - Input from RFA Team Leads and Researchers, PI Team

GAMUT (gradients along mountain to urban transitions)

2500+ m



Mountain-to-Valley transition

Fundamental aquatic sensors, *in situ*

Fundamental aquatic sensors, relocatable

Enhanced aquatic sensors, *in situ*

Fundamental terrestrial sensors

Urban tower and sensors

Conceptual Design of Social/Engineering Observatory in GAMUT

River

Mountain-to-Valley Transition

NEIGHBORHOOD TYPE A

NEIGHBORHOOD TYPE C

NEIGHBORHOOD TYPE D

NEIGHBORHOOD TYPE B

Irrigation canal

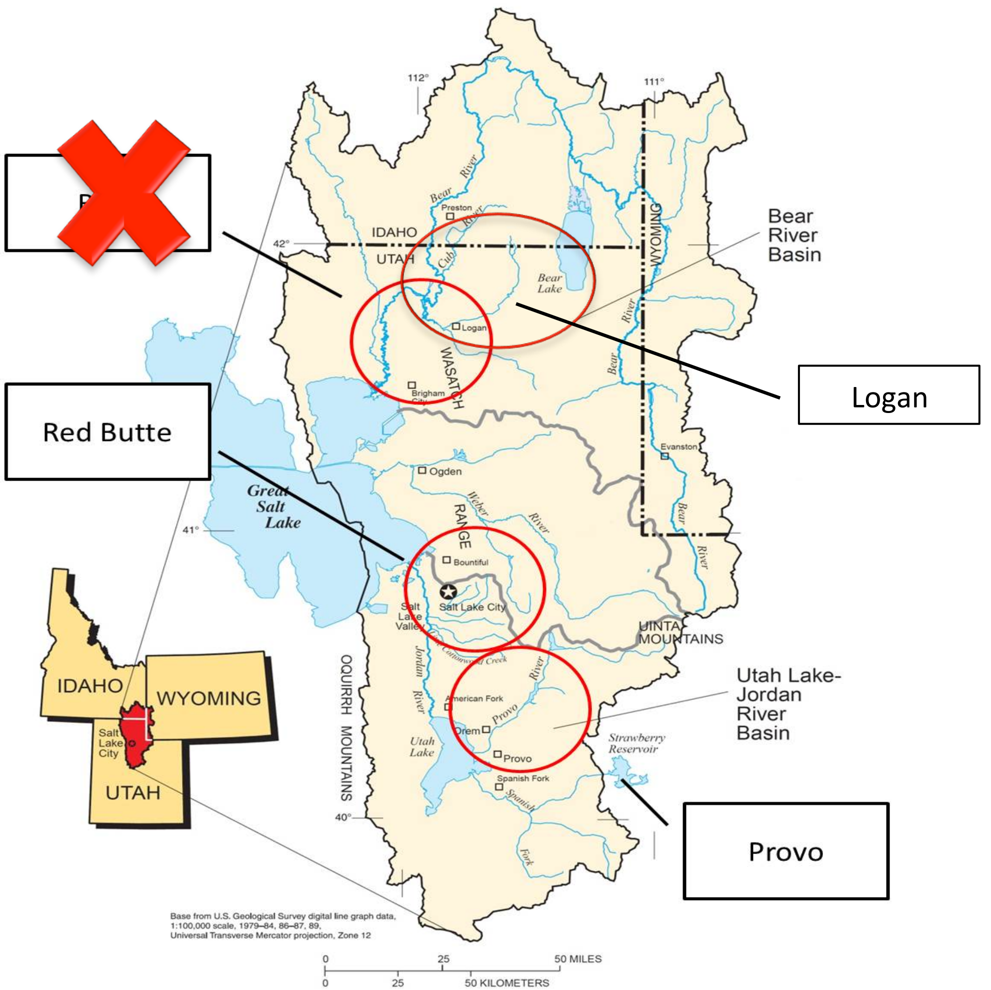
Social/Engineering Observatory Infrastructure

- Green Infrastructure Research Facility
- Small Lot Development
- Formerly Rural Development
- Large Lot Development
- Green-Infrastructure Development
- Private Water Wells
- Public Water Supply
- Neighborhood Boundary
- Water Supply Conveyance Systems
- Stormwater/Drainage Systems

Ecohydrology Observatory Infrastructure

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

Where is it?



Red Butte
Logan
Provo
Bear
River
Basin
Utah Lake-
Jordan
River
Basin
IDAHO
UTAH
WYOMING
Great
Salt
Lake
Bear Lake
Logan
Brigham City
Ogden
Evanston
Bountiful
Salt Lake City
American Fork
Orem
Provo
Spanish Fork
Utah Lake
Strawberry Reservoir
WASATCH
RANGE
UINTA MOUNTAINS
OQUIRRH MOUNTAINS
IDAHO
WYOMING
UTAH
Salt Lake City
Base from U.S. Geological Survey digital line graph data,
1:100,000 scale, 1979–84, 86–87, 89,
Universal Transverse Mercator projection, Zone 12
0 25 50 MILES
0 25 50 KILOMETERS

Where is it?

- Iterative Process
  - Campus Conversations
  - Input from PI Team
  - Input from RFA Team Leads and Researchers
  - Scouting

Where is it?

- Mountain-to-urban transitions
  - Low urban – fast transition (Provo)
  - Moderate urban – moderate transition (Logan)
  - Highly Urban

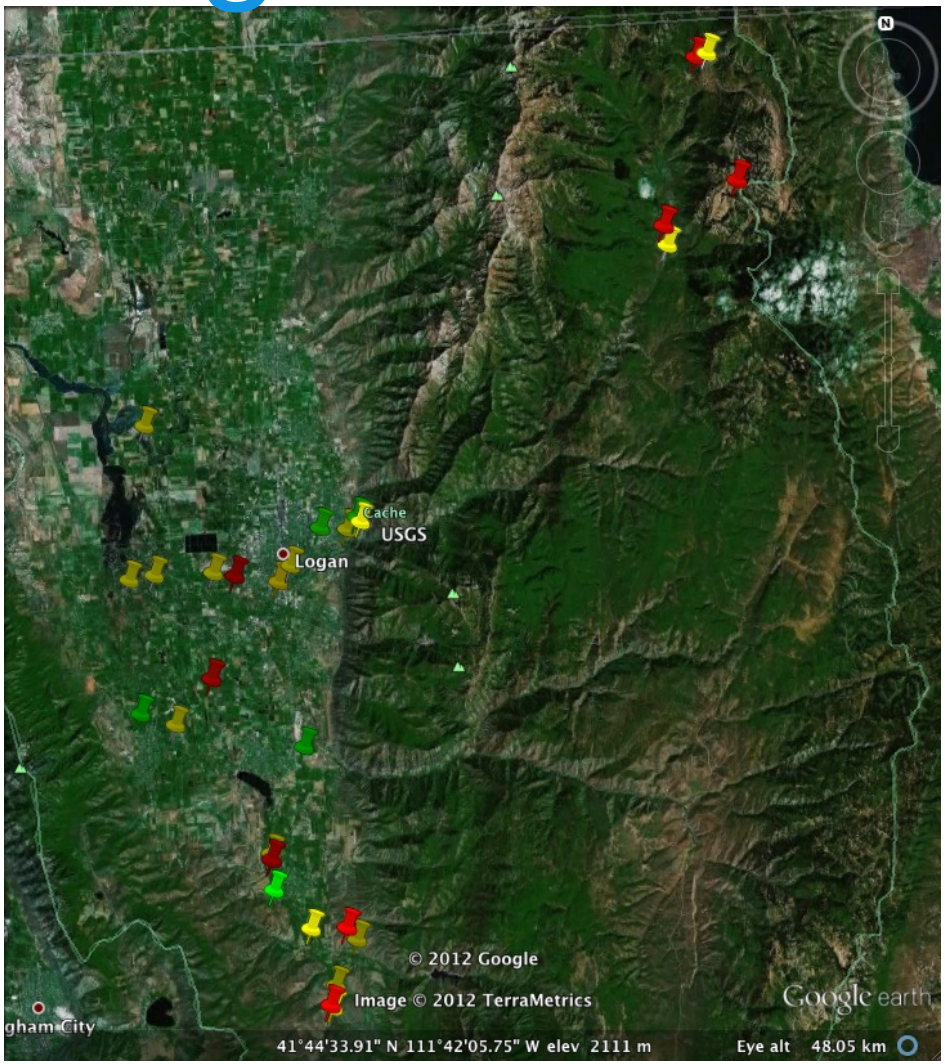
Provo River

Provo River


Park City
climate
aquatic
40
climate
aquatic
Heber
aquatic
aquatic
climate
aquatic
climate
aquatic
Wasatch

Logan River

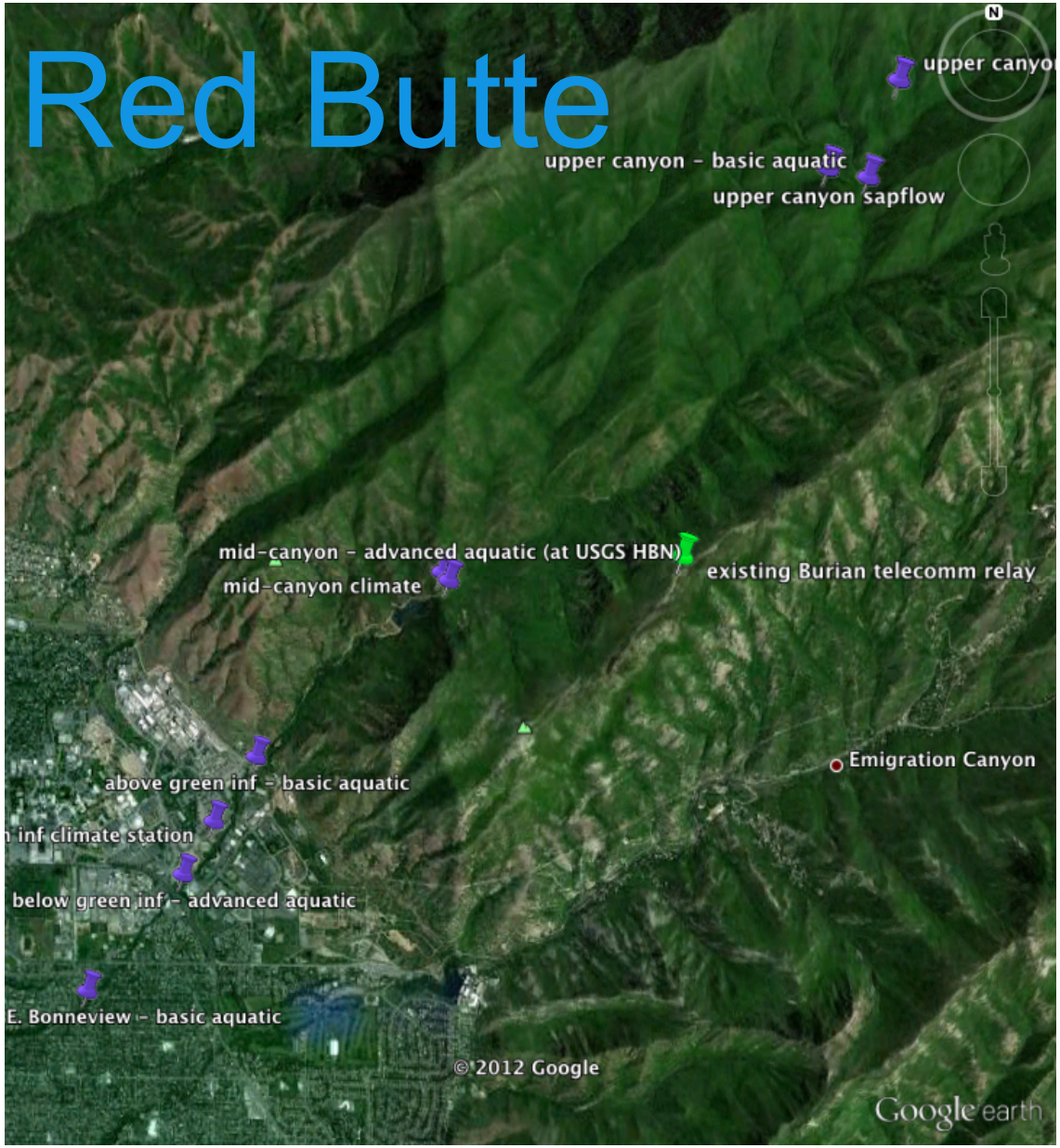
Logan River


N
Cache
USGS
Logan
© 2012 Google
Image © 2012 TerraMetrics
Google earth
41°44'33.91" N 111°42'05.75" W elev 2111 m
Eye alt 48.05 km

Logan River

Red Butte

Red Butte


upper canyon
upper canyon - basic aquatic
upper canyon sapflow
mid-canyon - advanced aquatic (at USGS HBN)
mid-canyon climate
existing Burian telecomm relay
Emigration Canyon
above green inf - basic aquatic
inf climate station
below green inf - advanced aquatic
E. Bonneview - basic aquatic
© 2012 Google
Google earth

Red Butte

General Schema

- Upgrades to existing units where possible
- Have not cited “urban tower”
- Plan to use existing urban wx stations where possible
- Capture additional data streams via iUTAH-Data Federation (e.g. Meso-West, USGS, etc.)

Gradients

- Mountain
  - Elevations
  - Lake-effect snow
  - Vegetation
    - Tree cover, age
    - Mixed conifer, aspen, sage
    - Mixed conifer (including Lodgepole)

Gradients

- Urban
  - Park (Red Butte Garden)
  - Residential/Commercial (SLC, Logan)
  - Residential (SLC, Logan, Heber/Midway, Wallsburg)
  - Transitioning agriculture (Logan, Heber/Midway)
  - Non-transitioning (Wallsburg)

Why?

- What ecohydrological processes affect the water balance of forested, urban, exurban, and agricultural land covers?
- How does water quality change on mountain-to-urban gradients?
- How will availability of water resources change as a result of climate and land use change?
- How do urban form and water availability interact?
- Inputs of data for various iUTAH modeling efforts

Why?

- Place-based science platform for education and outreach
- Data streams for the science and practitioner communities now and in the future

Possible Challenges

- Accessibility of potential sites (property ownership)
  - Strong potential delay in negotiating access in urban areas
- Telemetry/power
- Personnel to maintain sites in years 2-5
- Timing of research faculty – lose interest if not engaged till year 3, hinders collaborations
- No funds for groundwater monitoring
- Eddy covariance – no personnel