MAPS ON THE HILL

Discover. Manage. Communicate.

Maps on the Hill

Map Book 2015

UGIC
Utah Geographic Information Council

Welcome to Maps on the Hill 2015!

I would like to welcome you to this year's ***Maps on the Hill*** on **Wednesday, January 28th** from **10:30am-1:00pm in the Capitol Rotunda.**

The Maps on the Hill event and this accompanying map book, showcase how mapping and GIS (Geographic Information Systems) are utilized for problem solving and analysis in the public and private sector. In the past, mapping was produced by hand but in today's technologically advanced world, mapping is more than just visual.

GIS provides digital powerful visualization and analysis using specialized data that contains the mapped features and associated identifying and descriptive details. GIS draws from the fields of computer science, mathematics, engineering, and geography. Today, GIS can be used in just about any profession to help visualize, analyze, and interpret data which helps with decision making and saves both time and money. A few examples follow below...

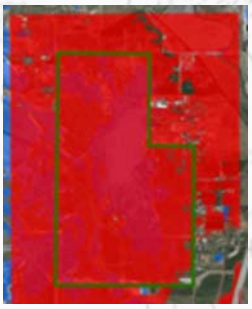
Utility Locations and History

GIS can be used to see all the utilities in a specific area. Remember it's not just a map any more. You can now ask the map questions: What size are the water lines? Have they ever been broken and how often?

This map shows the water mains near the State Capitol with the size, type, and age of the water utilities. This map can be used by citizens, developers, planners, etc…

Optimal Facility Locations

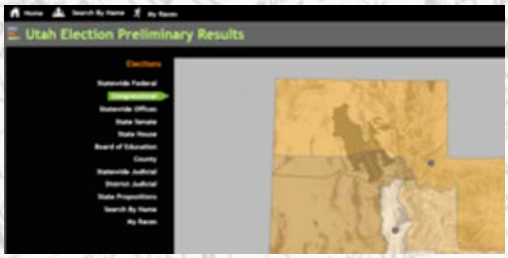
Is this a good location for a store, restaurant, or even a prison? Why or Why not?



Using GIS data, aerial photos, and LIDAR (elevation data) you can determine if a location is suitable for building based on flood levels. In this map, the red areas show potential flooding which may indicate it is not suitable for building.

Online Voting Maps

Using GIS, citizens can access online maps showing which voting precinct they are in and where to vote. They can also look up voting results and who are their elected officials. Just go to www.vote.utah.gov for examples of online GIS voting maps.



Please look through this book for many more examples of GIS mapping in Utah. And, please join us in the Capitol Rotunda to visit with a variety of professionals that are excited to show you how they use GIS to integrate and manage geographic data to best support the missions of their organizations.

Nick Kryger, Chair
Utah Geographic Information Council

Table of Contents

Information Sharing and Citizen Engagement

A locally made reference tool for citizens, policy makers and employees.

The 2015 Utah County Atlas

Where is Covered Bridge Canyon?

What township and range is that in?

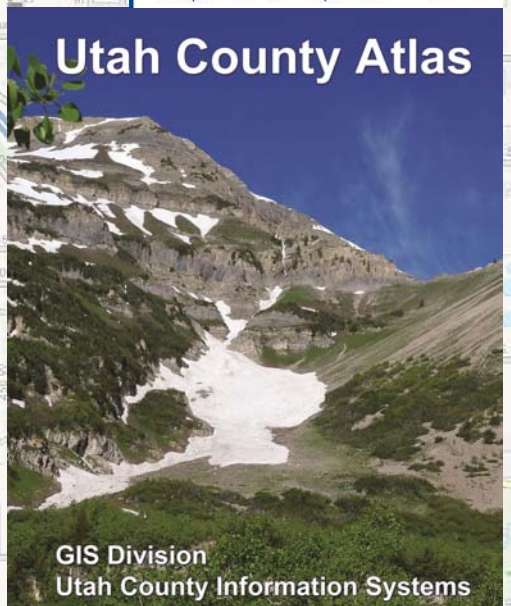
Is that a county maintained road?

Can I access public land?

What mile-marker do I turn at?

Utah County
HEART of UTAH
GIS Division

These are just a few of the questions the Utah County Atlas helps to answer. The 150-page atlas contains detailed street maps of the rural and urban portions of the county and specialized maps showing recreation, natural hazards and political boundaries. The Utah County GIS division has found that a general use paper atlas is an important tool for county decision makers, employees and citizens in addition to online and mobile mapping applications. County employees use it daily to navigate and plan their work assignments. Local businesses use the atlas as an additional source to look up hard to find addresses. Policy makers use it to give context to decisions. Also importantly the atlas serves as a backup for when electronic maps are not available. This general use atlas showcases the in-depth services available from the GIS Division.



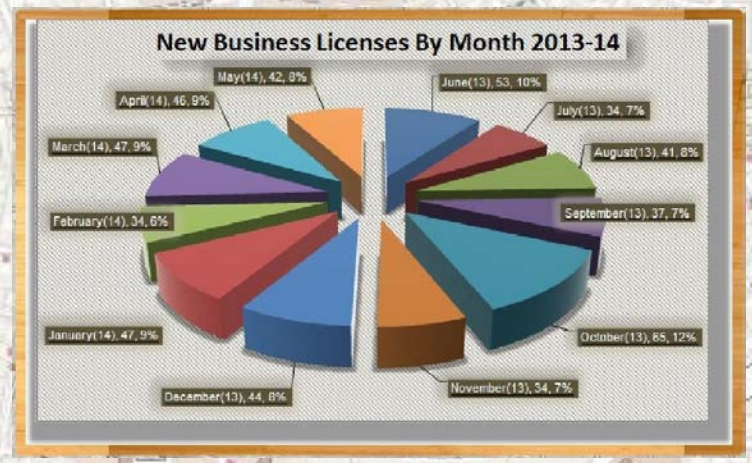
Encouraging Business Growth in Murray City

GIS helping to build a strong economy

Murray City's Community and Economic Development Professionals are using GIS tools to quickly analyze the best locations for existing and potential business needs

<u>Common interests for optimal location:</u>

*Office warehouse & retail space accommodations
*Public transportation & freeway access
*Proximity to similar businesses
*Zoning & ordinance restrictions
*Pedestrian & vehicle travel distances / times
*Traffic count data for volumes



Murray City GIS
Contact: Steve Kollman
skollman@murray.utah.gov

Providing balanced transportation options & optimizing mobility for all users.

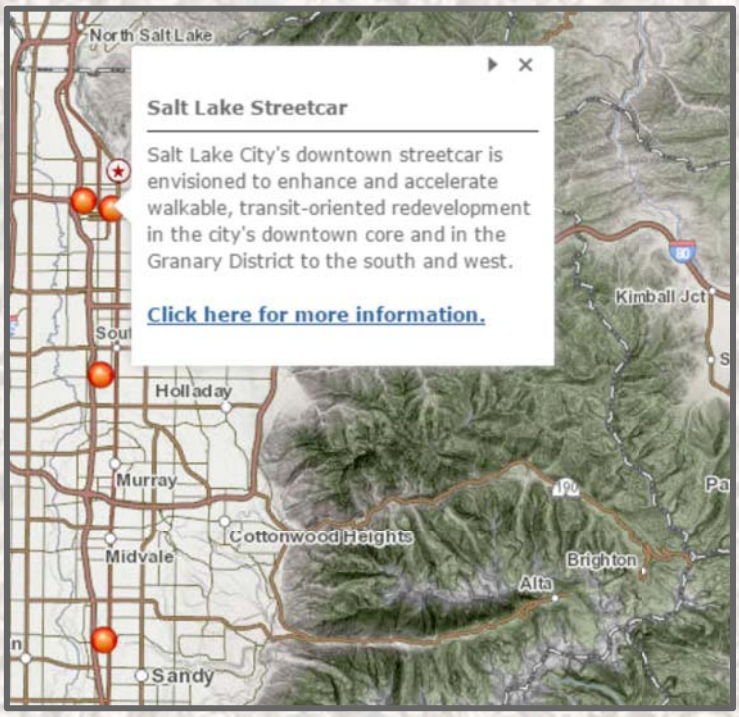
Integrated Transportation in Utah

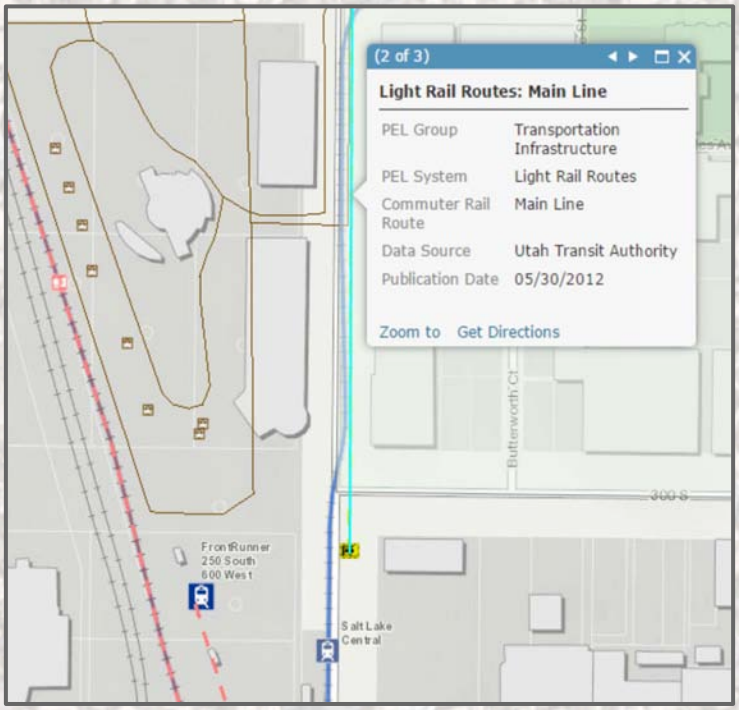
Integrated Transportation Story Map

Integrated transportation in Utah means optimizing mobility for every user, including vehicles, pedestrians, cyclists, freight, and transit. Transportation solutions should also consider how to best meet the needs of these user groups by leveraging existing and future infrastructure in the most efficient way possible. This project utilizes ESRI's Story Map Journal to create a dynamic, interactive product that can be used to inform stakeholders, elected officials, transportation organizations, and planning programs about the benefits of integrated transportation and showcase a handful of sites along the Wasatch Front.

Contact

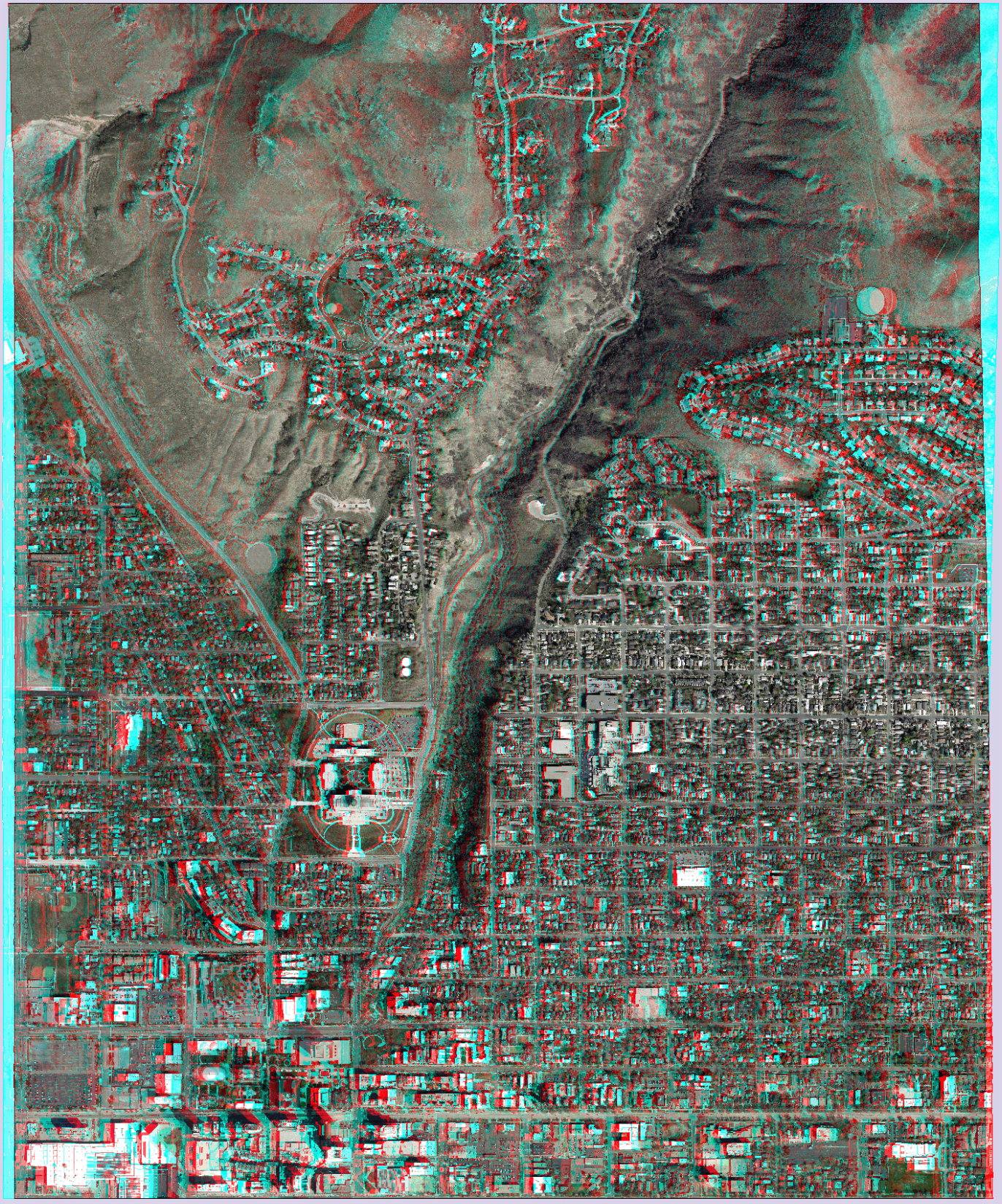
Utah Department of Transportation
Kaitlin Barklow & Becky Hjelm
http://uplan.maps.arcgis.com/home/
udotgis@utah.gov





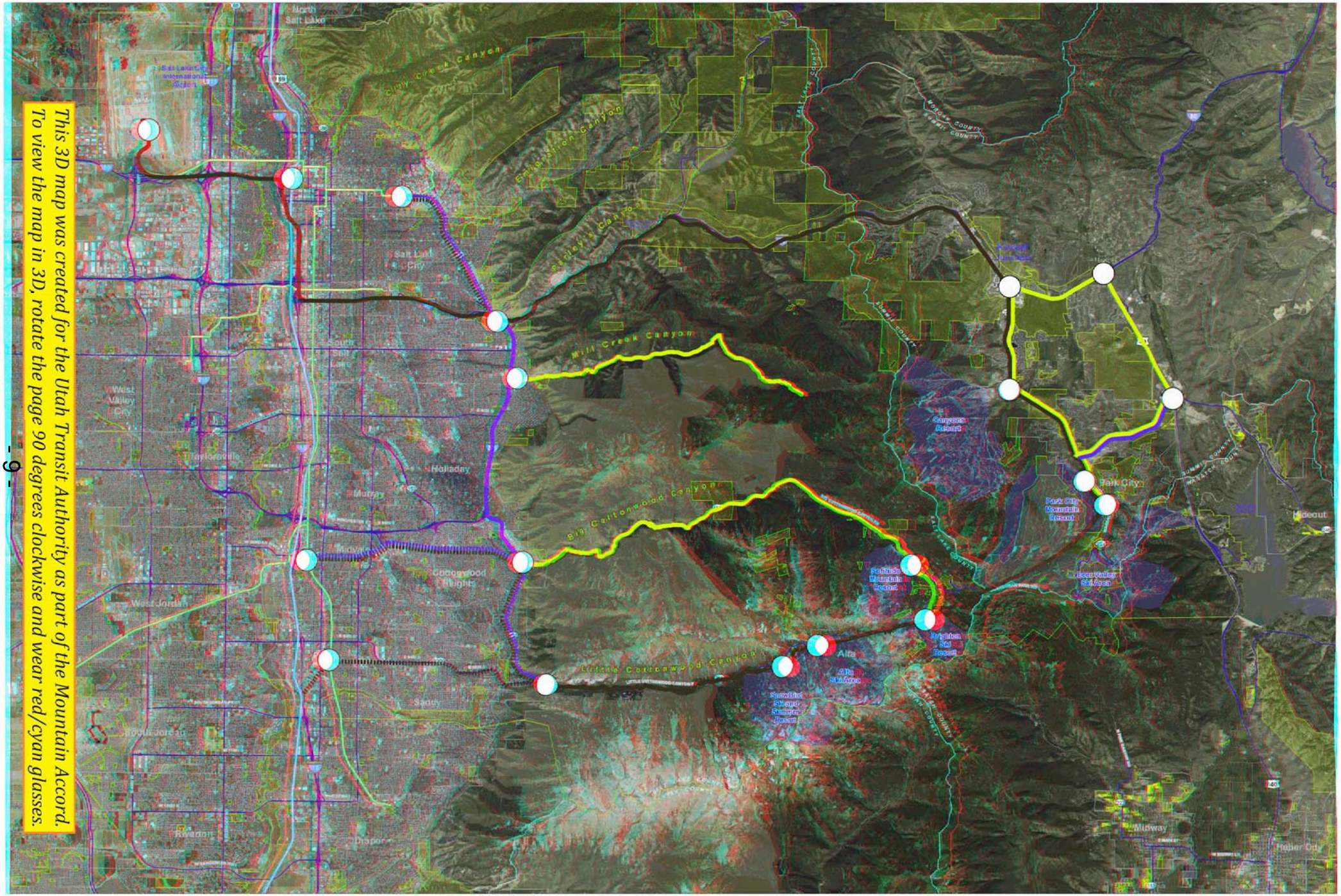
Maps in 3D

This is a kind of map whose image is not confined to the surface of the paper.
They help the public understand how topography influences transportation planning.
Please stop by our table for your pair of red/cyan glasses and see other examples.



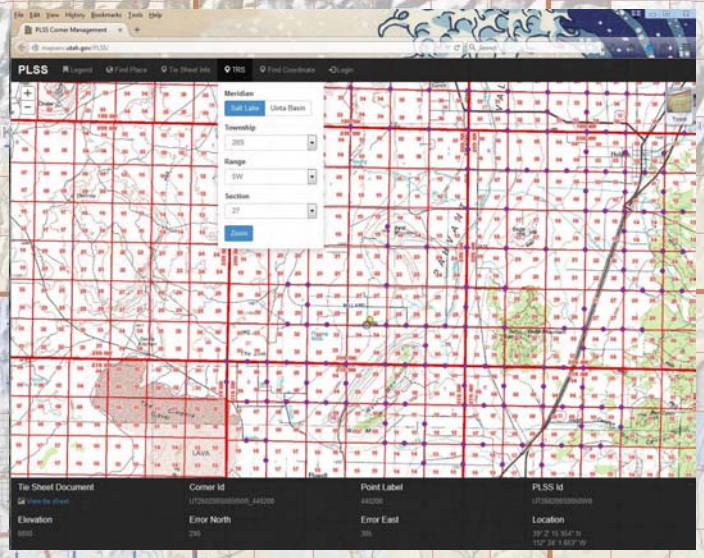
Utah State Capitol and Vicinity in 3D

Steve Richardson
2i3D Stereo Imaging
2i3D.steve@gmail.com


This 3D map was created for the Utah Transit Authority as part of the Mountain Accord.
To view the map in 3D, rotate the page 90 degrees clockwise and wear red/cyan glasses.
Transit Concept D
MOUNTAIN ACCORD
Transit Hubs
Transit Routes
Aerial
Bus
Bus Rapid Transit
Rail
City Boundary
Resort Area
Existing Federal Wilderness
Existing Protected City, County and Private Land
Light Rail
Commuter Rail
Major Arterials
Scale in Miles
0 1 2 3 4 5
2i3D

Public Lands Survey System (PLSS) is the basic foundation for other boundary layers

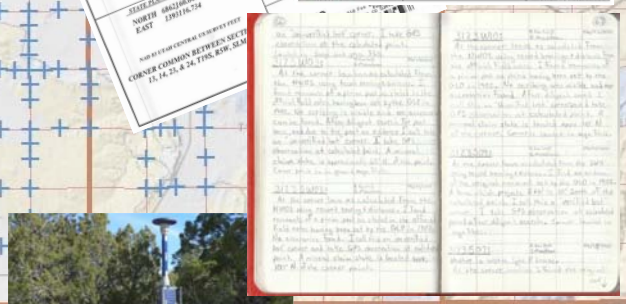
Collecting Corner Points for State PLSS



The Public Lands Survey System (PLSS) is used to survey and identify land parcels.

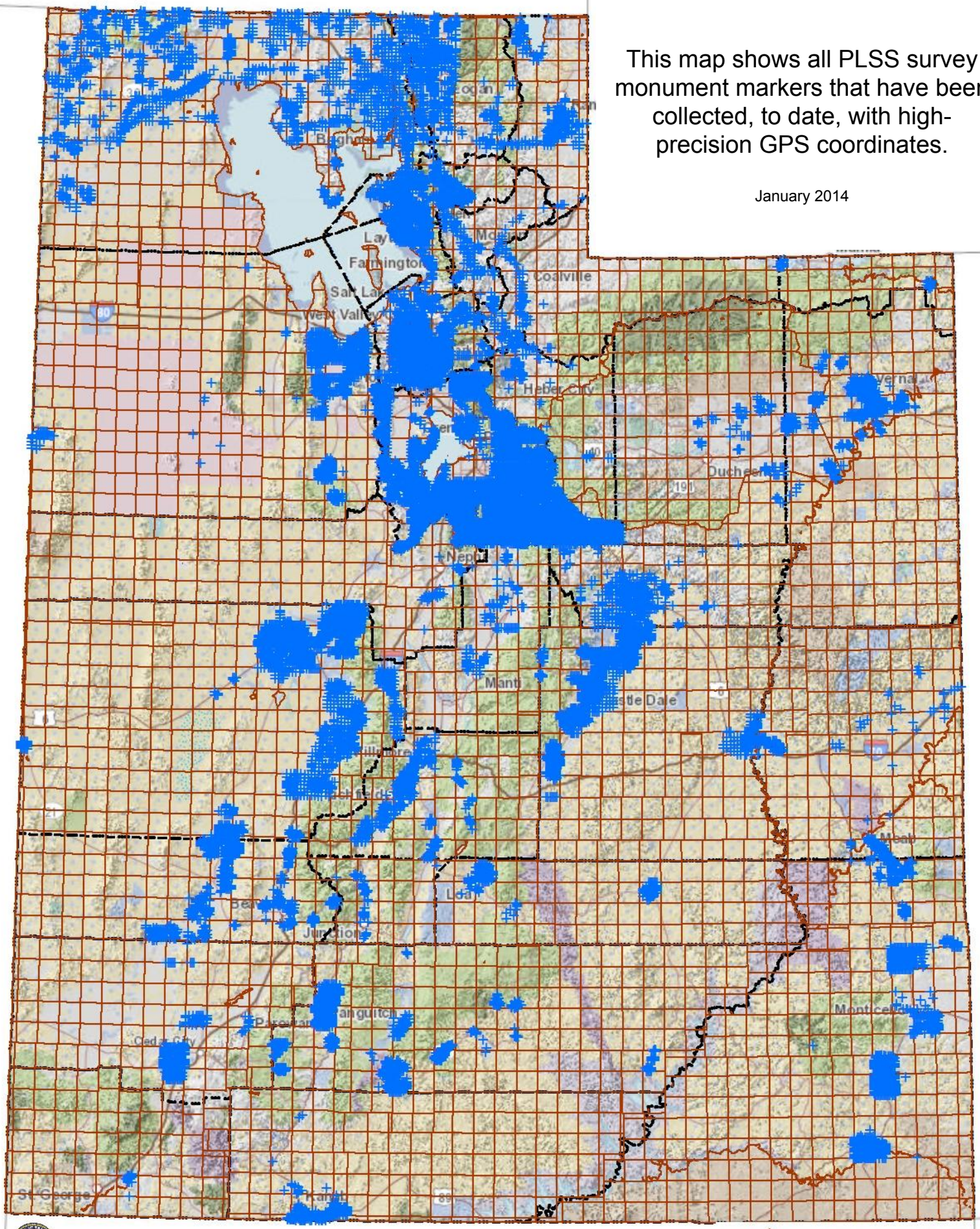
Over the years the accuracy of the surveying process to collect the Corner Points that the system is built on has become increasingly improved.

The Automated Geographic Reference Center (AGRC) has developed an online App to help Surveyors report and improve these positions.
http://mapserv.utah.gov/PLSS/



M Heagin ; Thanks to Carbon, Kane , Millard Counties and everyone for contributing

The Public Lands Survey System (PLSS)



This map shows all PLSS survey monument markers that have been collected, to date, with high-precision GPS coordinates.

January 2014

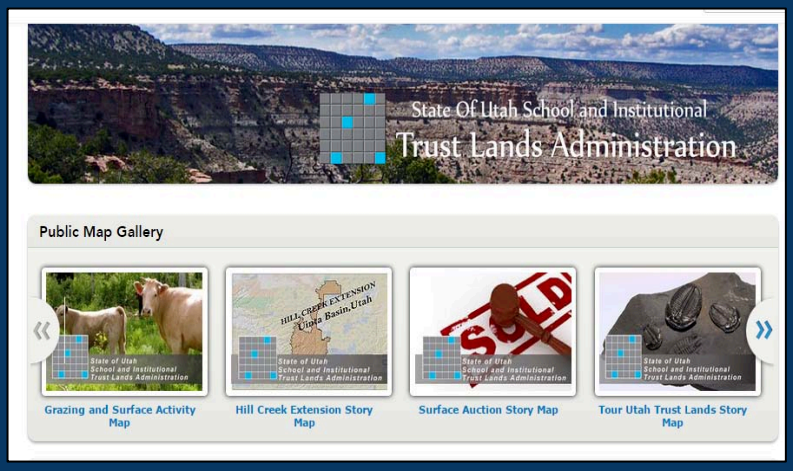
UTAH AGRC
Automated Geographic Reference Center

Online Apps and Maps

Welcome to the SITLA GIS Mapping & Data Portal

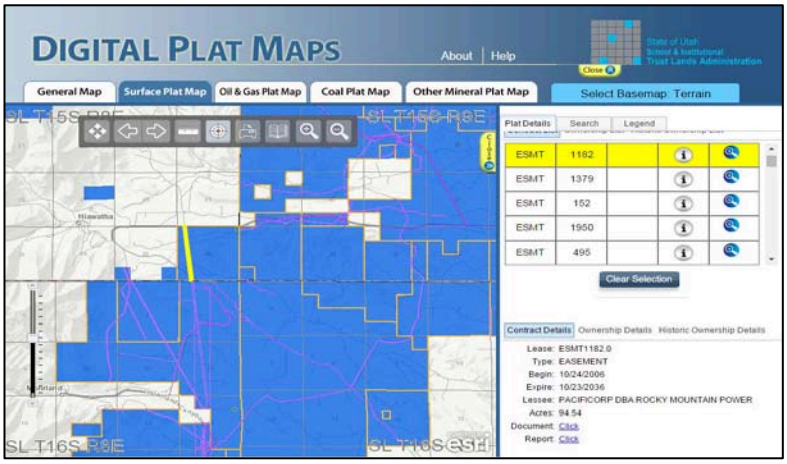
2014 years
$1.4 billion for public schools
State of Utah
School and Institutional
Trust Lands Administration

Mobile Maps and Apps



http://sitla.maps.arcgis.com/home/

The Digital Plat Map



http://platmap.trustlands.utah.gov/

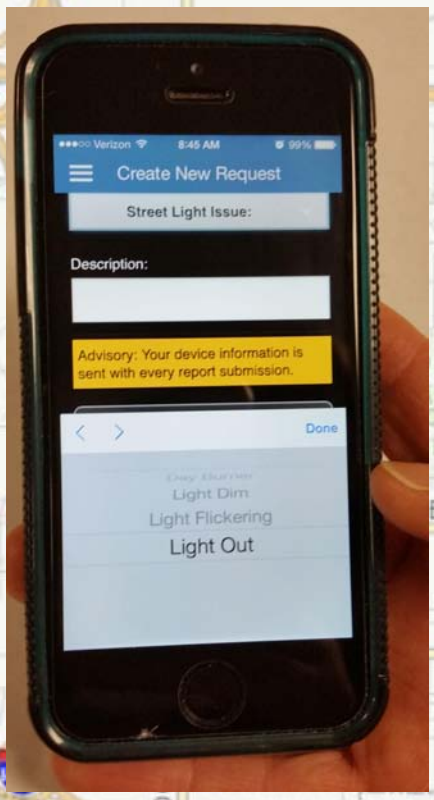
Online Mobile Map and Apps:
Access project specific maps, engaging story maps, Current projects, and data, data and more data. View our mobile solutions on your desktop, mobile device or table. Take trust lands with you into the field and into your home. Access contract, lease, permits and ownership anytime, anywhere. Search the online portal , overlay our authoritative data services with your data, all interactively and all online.

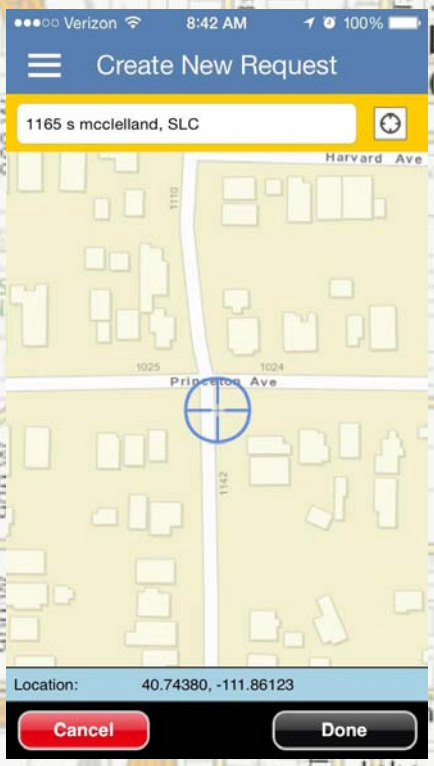
The Digital Plat Map:
This "one stop" information hub displays SITLA land ownership status for Surface, Oil and Gas, Coal and Other Mineral Estates owned by the State of Utah Trust Lands Administration along with active lease and permits on the estate property. Users can investigate contracts, sales and exchanges; view documents and reports, access historic plat and more... all with the click of a mouse.

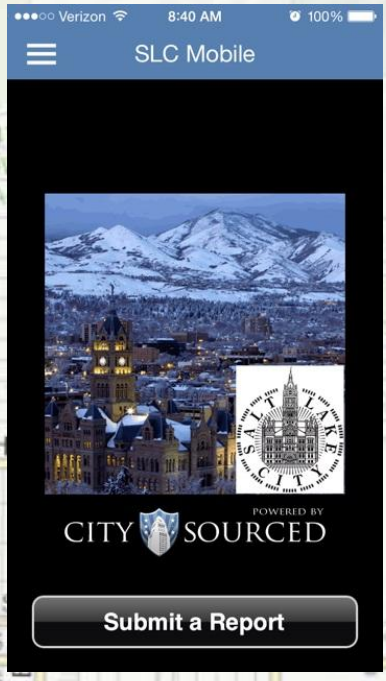
Jessica Kirby, GISP GIS Manager
State of Utah Trust Lands Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102
801-538-5141

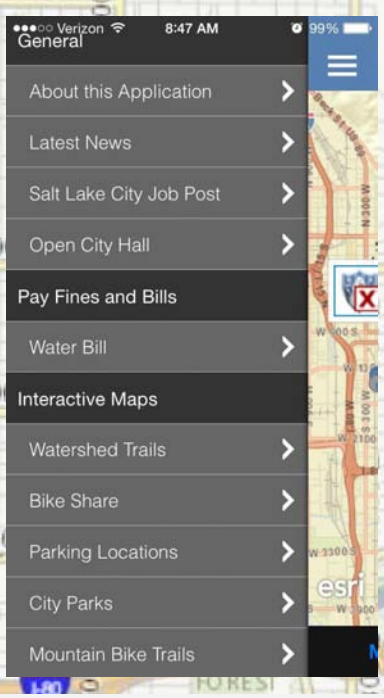
Salt Lake City Mobile Citizen Engagement

Using Mobile Devices to Connect Citizens with Local Government









Salt Lake has an app that works on all mobile devices and allows citizens to create reports on issues within the city. Examples of issues you can report are: Code enforcement violations, Water leaks, Trash Removal, Potholes, and Graffiti Removal. With this app you can take a picture of the issue and use the phone's GPS to get the location. You can also use the app to pay your water bill or see maps of parks or trails. From the website you can report an issue or download the app. Just go to http://www.slcgov.com/slcmobile/slc-mobile or in the app store search for SLC Mobile.

Salt Lake City Department of Public Utilities
GIS Division

Student Success in US Classrooms

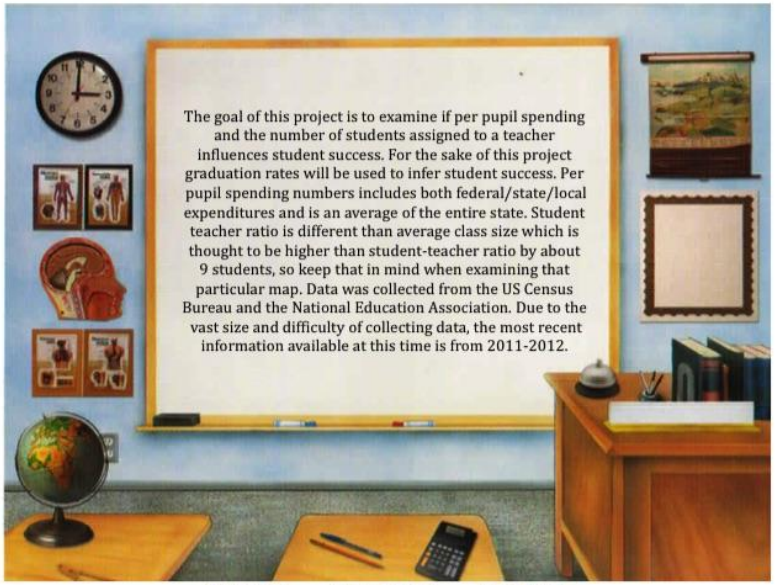
Abstract:
Utah has some of the lowest per pupil spending in the nation, as well as one of the highest student-teacher ratios in the nation. I wanted to compare maps with these variables to a map of nationwide graduation rates to see how Utah ranked (comparatively better), as well as noting what seemed to work and what did not.

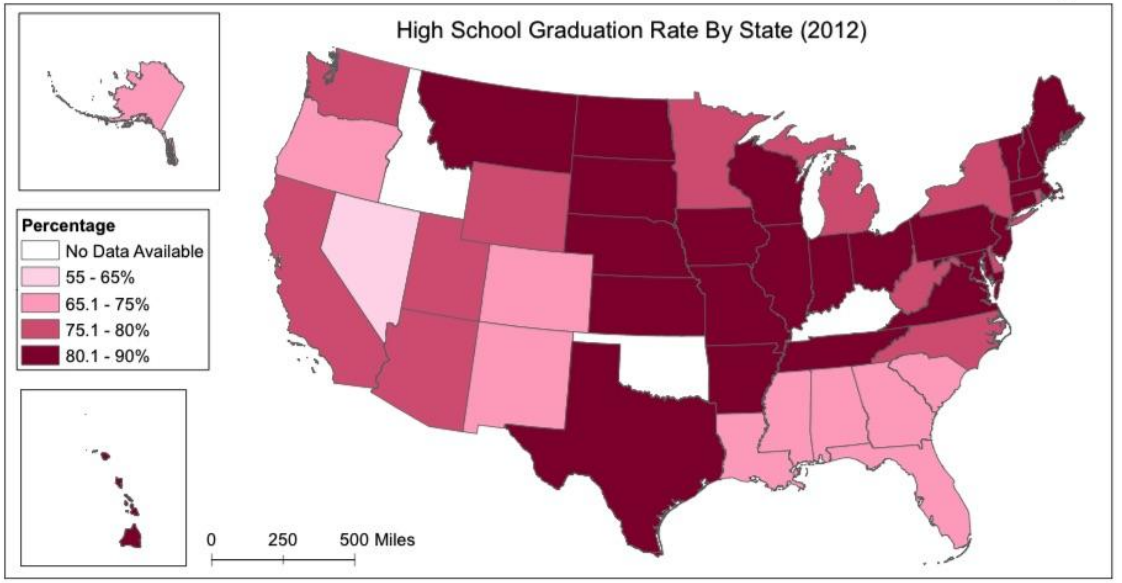
GIS was used in this effort to:

- **Identify** areas of high spending, student-teacher ratios, and graduation rates
- **Track** trends of success as well as failure
- **Assess** possible biases of one route vs another (spending vs. classroom sizes)
- **Determine** what is the best route for officials in determining how to focus their education spending.

Info about Author:
Katherine Toepke is a recent graduate from Univ. of Utah. These maps were created as part of her final project.

A Look at Success in US Classrooms



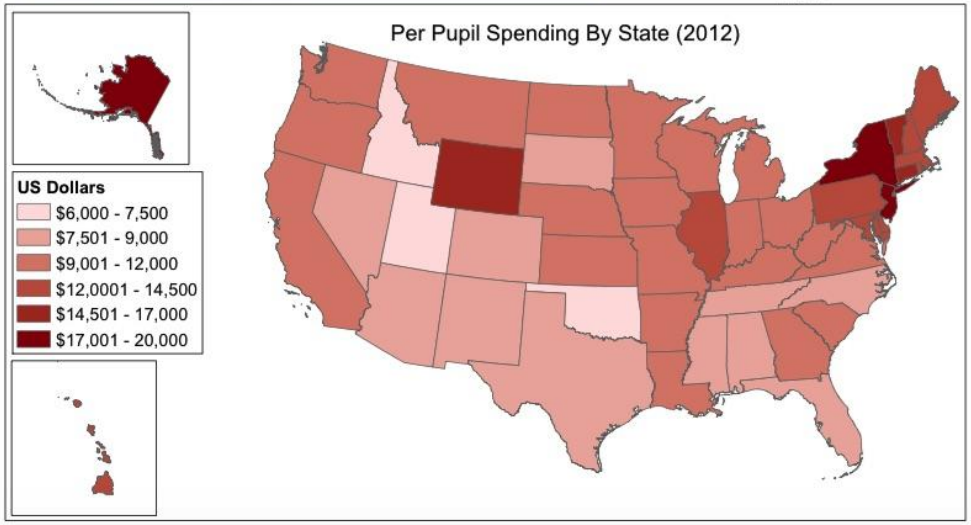


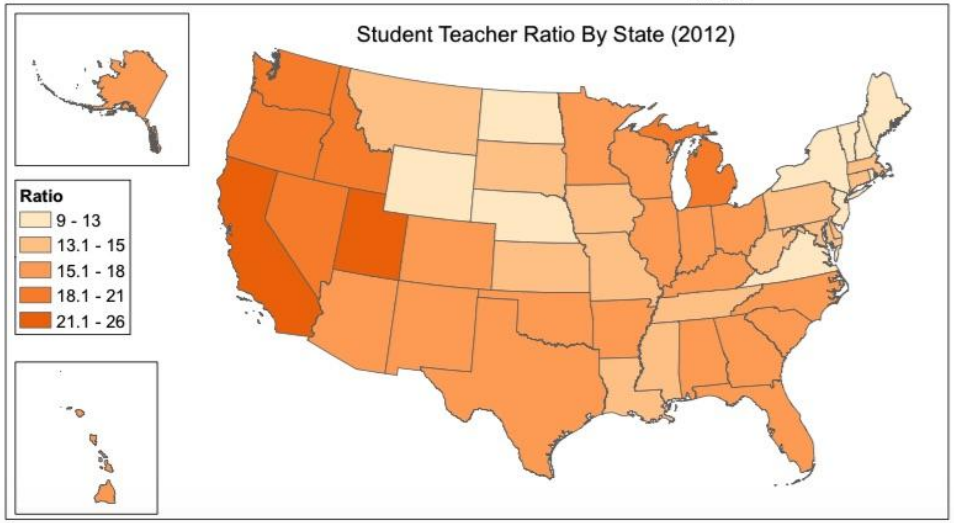
	First Place	Second Place	Third Place
Highest Graduation Rates	Iowa (89%)	*Vermont, Nebraska, Texas, Wisconsin (88%)	*North Dakota, Tennessee (87%)
Lowest Graduation Rates	District of Columbia (59%)	Nevada (63%)	Oregon (68%)
Largest Student Teacher Ratio	California (25.9)	Utah (21.9)	Oregon (20.2)
Smallest Student Teacher Ratio	Vermont (9.4)	Nebraska (10.7)	Maine (11.9)
Highest Per Pupil Spending	New York ($19,552)	District of Columbia ($17,468)	Alaska ($17,390)
Lowest Per Pupil Spending	Utah ($6,206)	Idaho ($6,659)	Oklahoma ($7,466)
*Denotes a Tie			


Huffington Post


Huffington Post


New America Media





Cartographer: Katherine Toepke

Projection: Lambert Conformal Conic

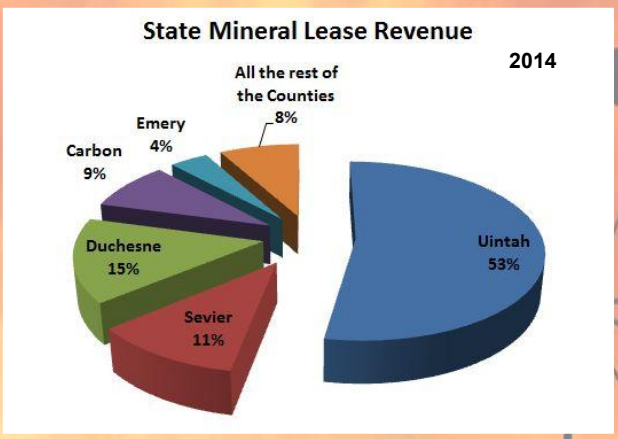
0 250 500 Miles

December 2014

Sources: National Education Association & Census Data

52.9% State Mineral Lease Revenue comes from Uintah County

Uintah County Oil & Gas Wells



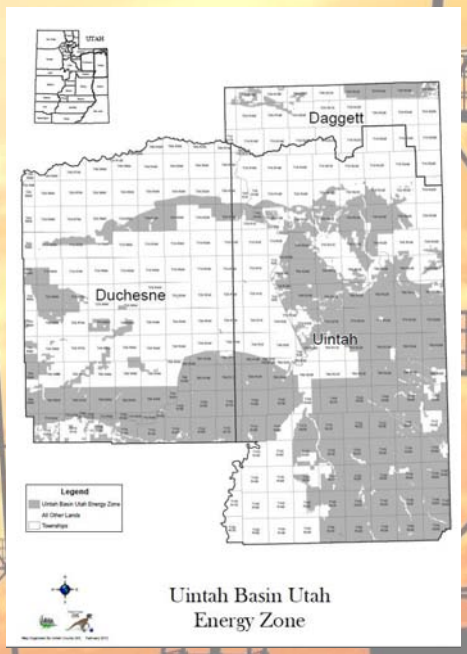
This simple GIS application has helped make many important decisions in managing the rich resources in Uintah County.

Decision makers such as Legislators, Commissioners and Economic Developers use this map for a wide range of resolution such as:

- Recruiting businesses
- Air quality
- Energy extraction
- Energy Zone
- Public lands uses just to name a few.

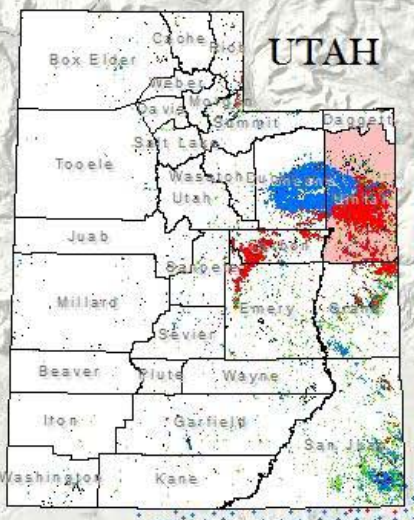
Example of decisions:

2012 State of Utah Legislative body established Uintah Basin Energy zone for maximizing efficient and responsible development of energy and mineral resources.



Jordan Merrell
Uintah County GIS

Uintah County - Oil & Gas Wells



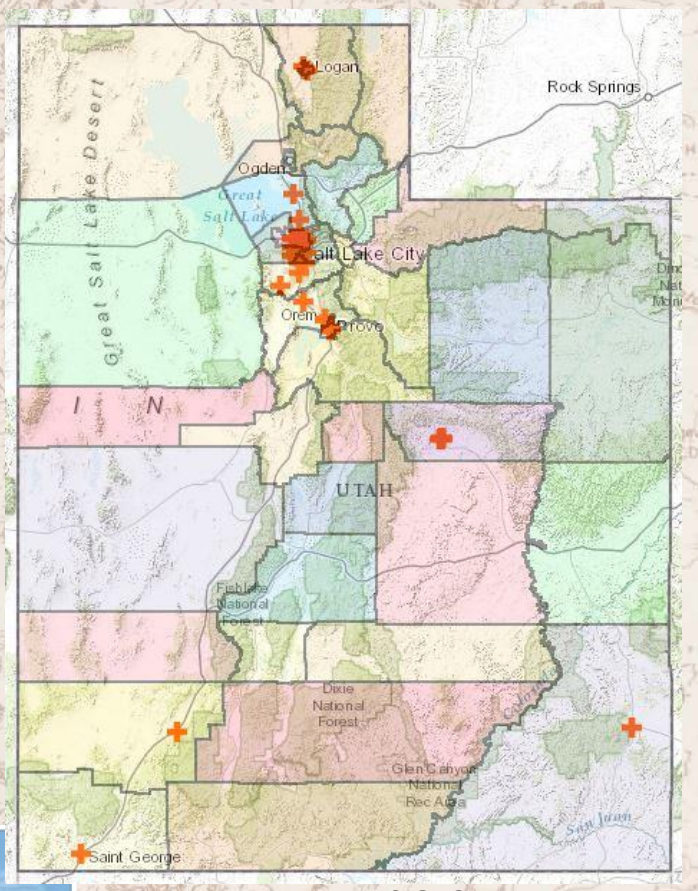
Oil & Gas Wells in the State of Utah

Created By Jordan Merrell Uintah County GIS
Updated: Friday, January 09, 2015

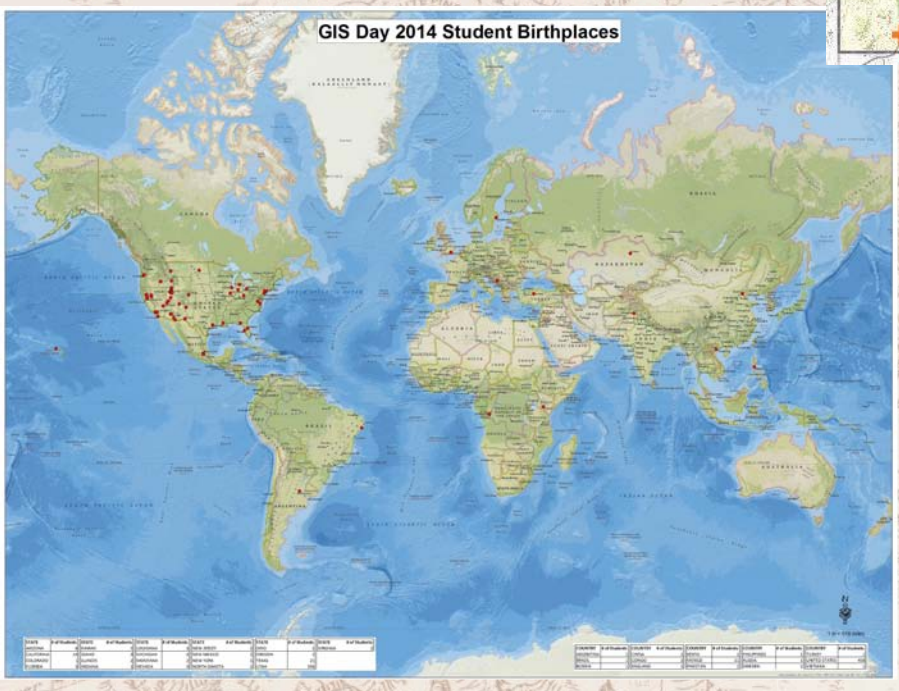
Sources: Oil and Gas Well Data from the State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining
Showing all Drill holes.
All other data updated and maintained by Uintah County GIS.

UGIC
Utah Geographic Information Council
Promoting Geographic Information Systems throughout Utah

UGIC was created to help promote development, access, application and cooperative use of geographic information in Utah. UGIC sponsors many activities for the GIS community throughout the state including Maps on the Hill, GIS Day, Mentoring Programs, UCET conference, teacher education, and yearly conferences. For more information on UGIC please visit our website - www.ugic.info.



Location of GIS mentors in Utah



Birthplace map of students attending Salt Lake County GIS Day, 2014

UGIC
Utah Geographic Information Council

Basemap courtesy of AGRC.

SB70, Transparency, and Open Data in Utah

Utah's New Open Data Portal

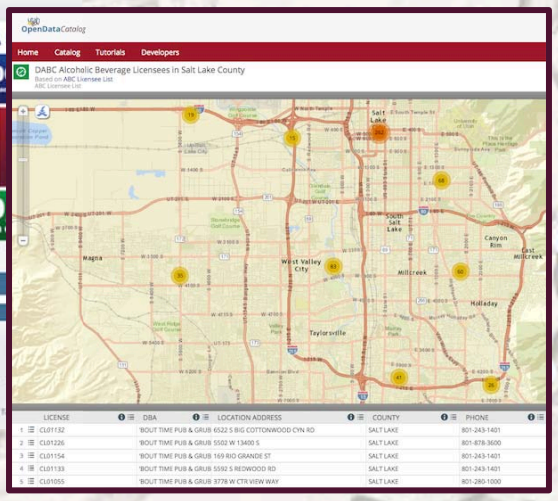
Features

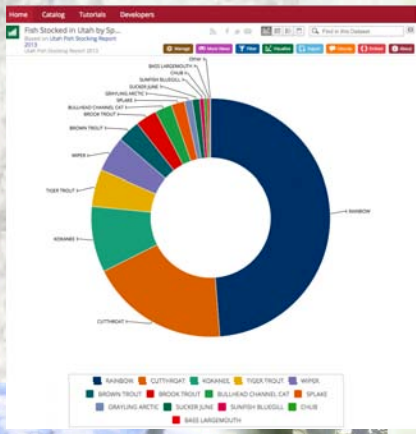
- *Geocoding*
- *Online point and heat map creation*
- *Dynamic charts and graphs*
- *Flexible Metadata Management*
- *Dynamic Embedding*
- *Federate your data with other organizations*
- *Multiple export formats*

Data.Utah.gov

With hundreds of open data sets, data.utah.gov is a new resource for the people of Utah.

Democratizing data is a global trend and the new portal enables users to chart, map, and download Utah data for a multitude of purposes.

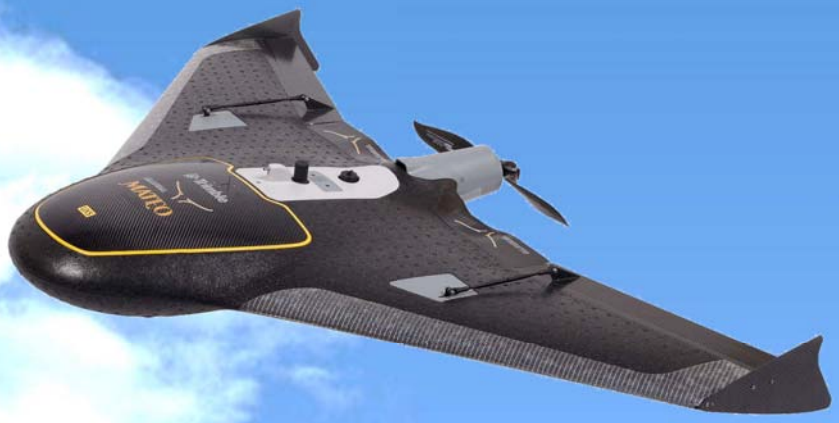




Drew Mingl is the State Open Data Coordinator.
dmingl@utah.gov

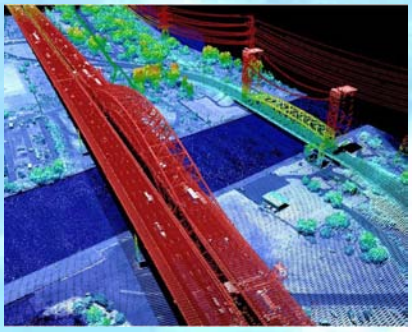
UAV Technology in Government Mapping

Faster Cheaper Better Imagery



Unmanned Aerial Vehicles (UAV) offers technology that provides for accurate mapping data for all sections of local government and public safety.

3-D surfaces & images: Helps access difficult terrain, increases data collection of important features, and offers easy custom data collection.



For More info contact: **Reid J. Demman P.L.S.**
Salt Lake County Surveyor 385-468-8240
www.surveyor@slco.org

Infrastructure Mapping

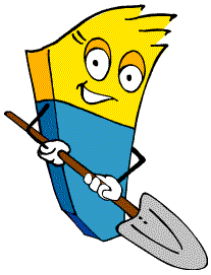
Where is excavation occurring? Does this indicate economic growth?

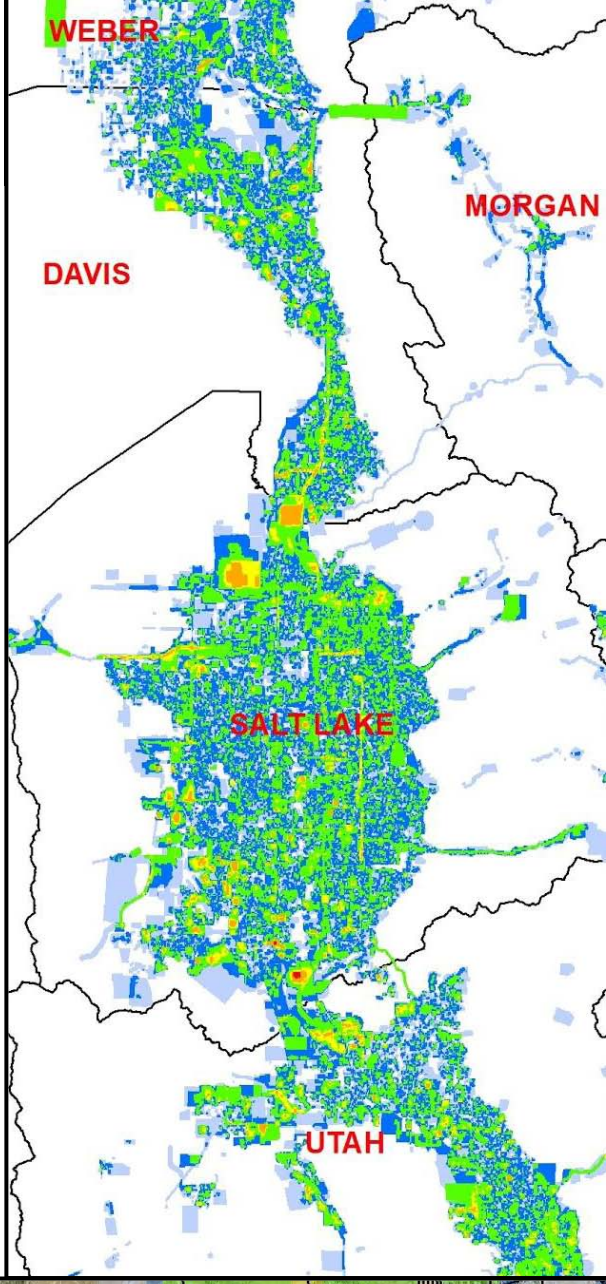
Blue Stakes of Utah is the utility notification center for Utah and the organization to "Call Before You Dig." In 2014, Blue Stakes received over 320,000 requests to have utility lines located and marked throughout the state.

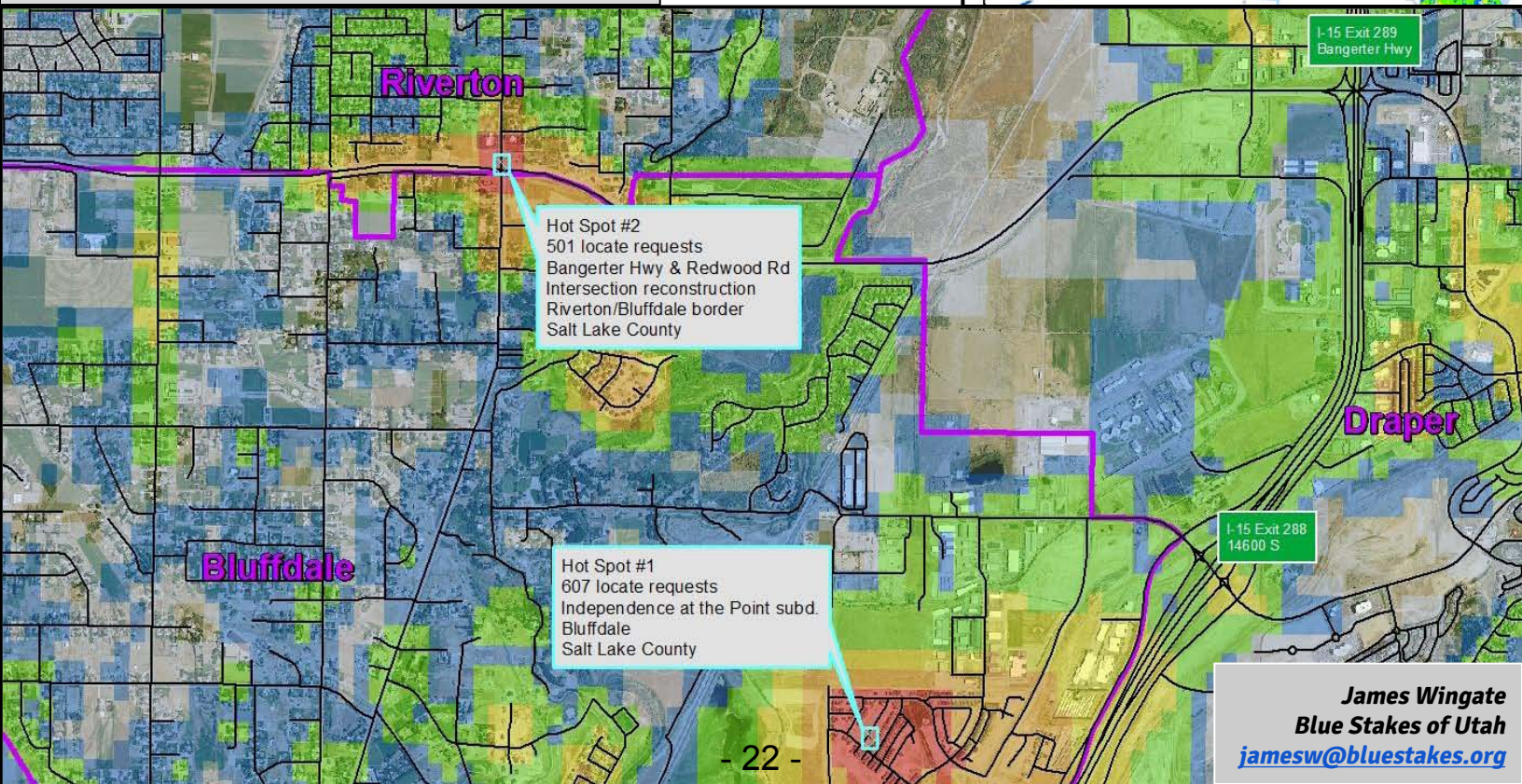
Excavation activity was reported on less than 4% of Utah's land area; the vast majority took place in populated urban areas, with the notable exceptions of the oil & gas fields in Uintah, Duchesne and San Juan Counties.

Please visit the Blue Stakes display table to view an interactive density map. See how much excavation took place in your area of interest!

811 Know what's **below.** **Call** before you dig.

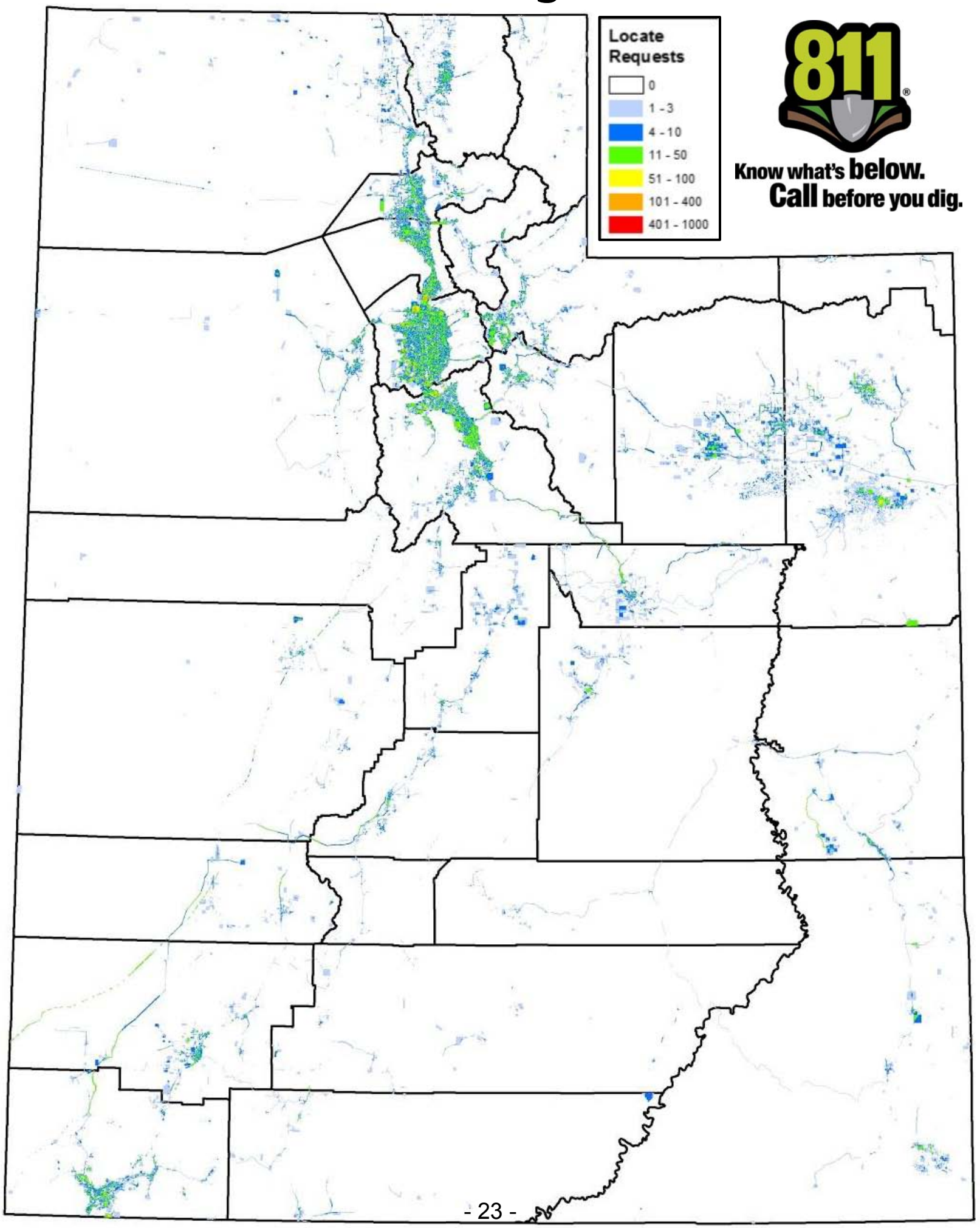






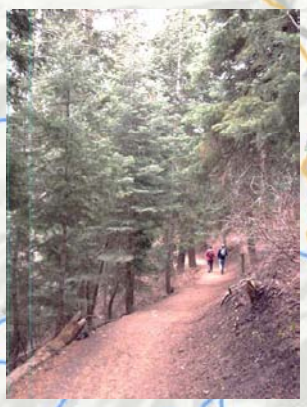
James Wingate
Blue Stakes of Utah
jamesw@bluestakes.org

Excavation Activity in Utah 2014



Davis County Active Transportation

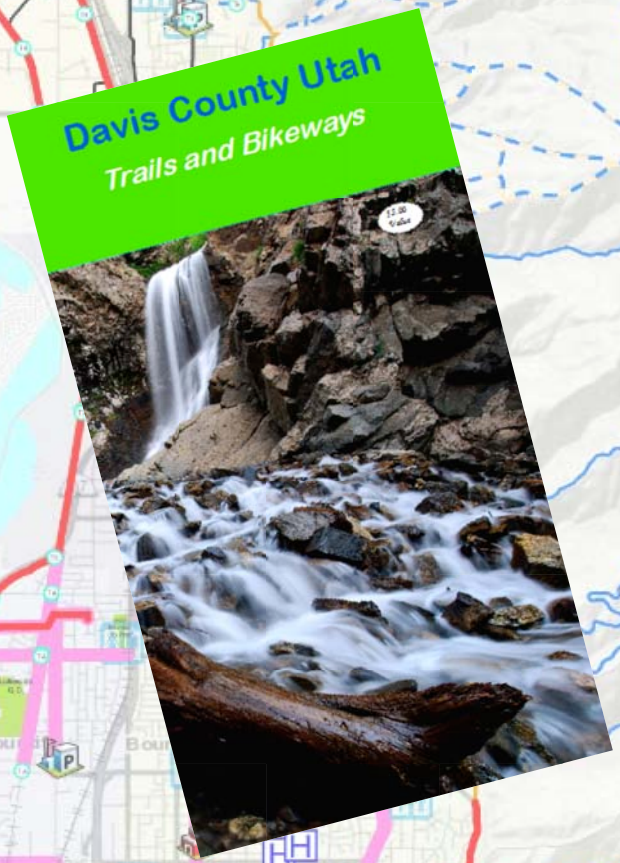
Trails and Bikeways Folding Map - 2015



GIS has played a crucial role in the creation of this 2015 first edition map. GIS made it possible to provide the Citizens of Davis County, as well as Visitors with a variety of trail and bike route information. It allows Planners and GIS Specialists a way to convey a safe and enjoyable way to travel within Davis County.

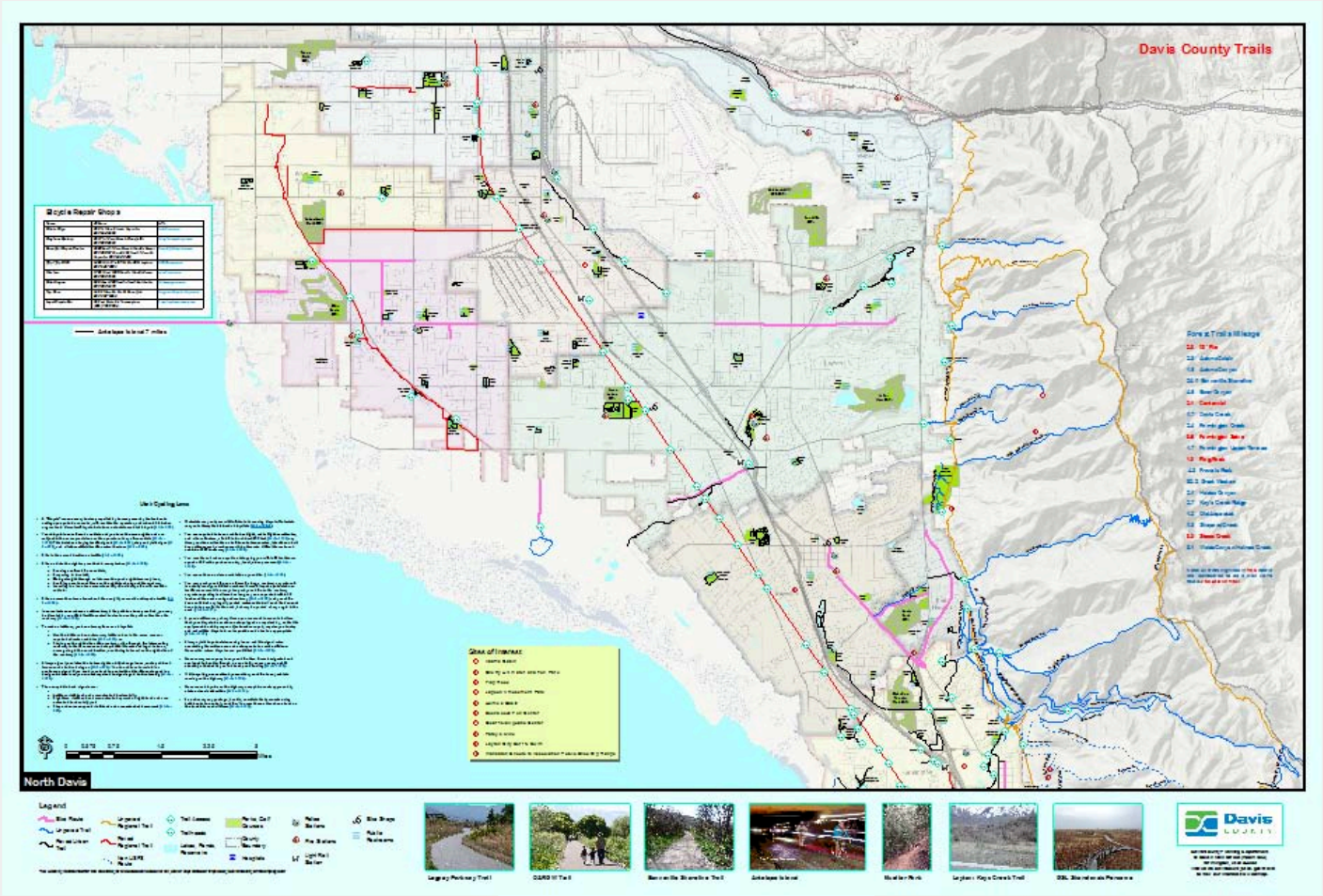
The use of GIS tools like Aerial Photography and GPS provides a means to collect the trails data. There are over 282 miles of hiking trails, 132 miles of bikeways, 78 miles of walking paths, 75 trailheads and 183 trail points of interest in Davis County. This abundance of GIS data allows for the creation this and other types of trail mapping. Trails information in the form of a Web Map can be found here: daviscountyutah.gov/trails .

Trails data is regularly updated and maintained by the Davis County GIS through input from various Hiking/Biking Groups, City/County Planning and the Davis County Active Transportation committee.

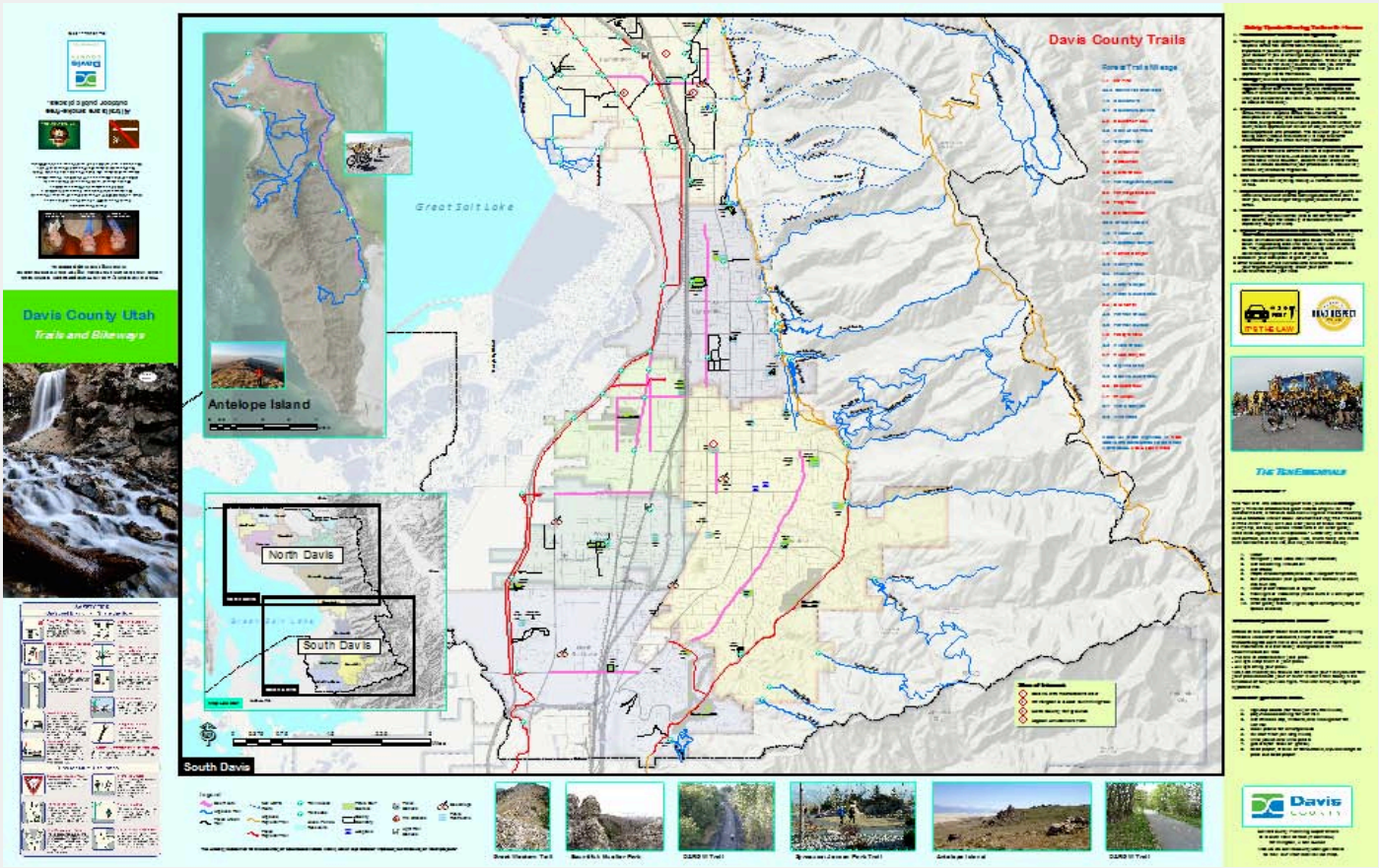


Davis County Planning Department
61 South Main Street (Room 304)
Farmington, Utah 84025

Visit us at: daviscountyutah.gov/trails
to view our interactive web map.



North Davis County



South Davis County

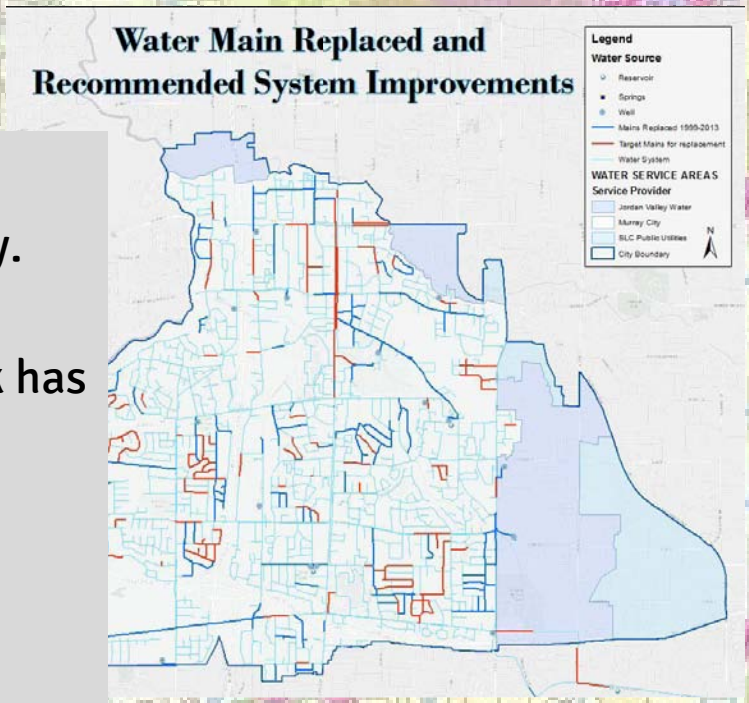
Managing Aging Pipelines in Murray City

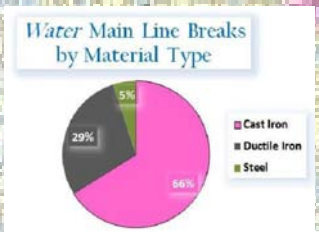
Water Main Replacement Analysis and Prioritization

Murray city is 12.3 square miles and is centrally located in the Salt Lake valley.

Murray City's pipe distribution network has 175 miles of water mains, with an estimated present day value of $130 million (2009 Dollars). Murray City currently spends approximately $1.3 million/year for pipe replacement.

Murray City Water Dept. personnel have been tracking main line breaks along with pipe size and material since 1999. This map shows hot spot areas for main line breakage as well as hot spot areas that have been remedied since 1999.





Murray City GIS
Contact: Matt McQuiston
mmcquiston@murray.utah.gov

Murray City
Transformer Capacity Analysis

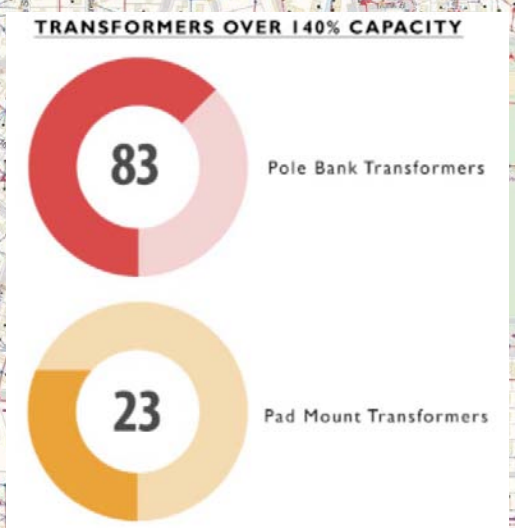
Murray City GIS was given the task to help identify all the power transformers that are 140% over capacity during peak consumption season (which is during the summer).

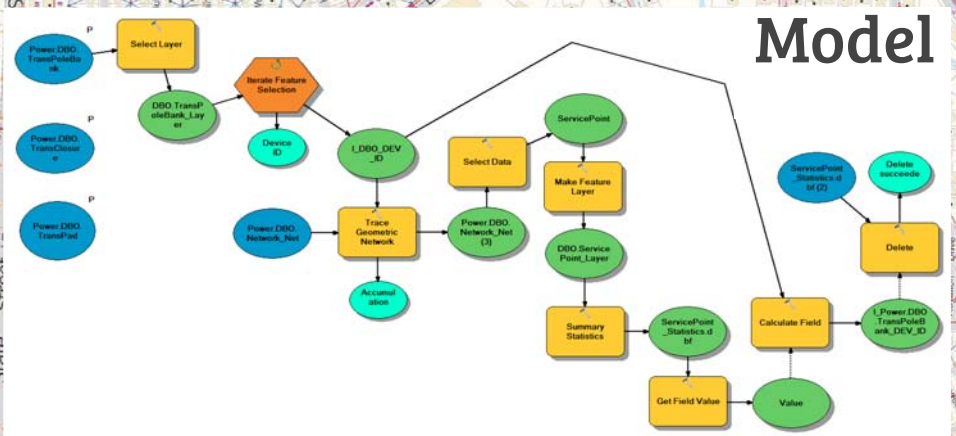
One of first things we had to do was filter the customer billing database (with over 3 million records) to select only the peak consumption of meters from August 2014. Then join that data by meter number to the individual power meters.

Then because we have built all the power utility data into a geometric network. We were able to determine the flow of electricity from the substations to the meters at each home. This will allow us to trace the flow downstream from the transformers to the meters.

Once the load for each transformer was calculated, the next step is to query out only those transformers that at are 140% over capacity. This is the expression that was used:
[Load] > ([Transformer KVA] * 1.4)

As a result we identified 106 transformers that are at risk of overload.





Murray City GIS
Ben Teran *bteran@murray.utah.gov*

Providing Destination Location and Route Determinaton through GIS

Utah Mapping GIS "Neighborhood maps" assist with the following tasks and objectives of county and city officials and citizens:

- incident management for law enforcement
- utility elements location for placement and repair
- action planning for emergency 1st responders
- clear destination path after nightfall and snowfall
- citizen trip planning to events ... and much, much more!

ArcView GIS Software used to create Utah Mapping square mile neighborhood maps.

FEATURED GIS DATA LAYERS

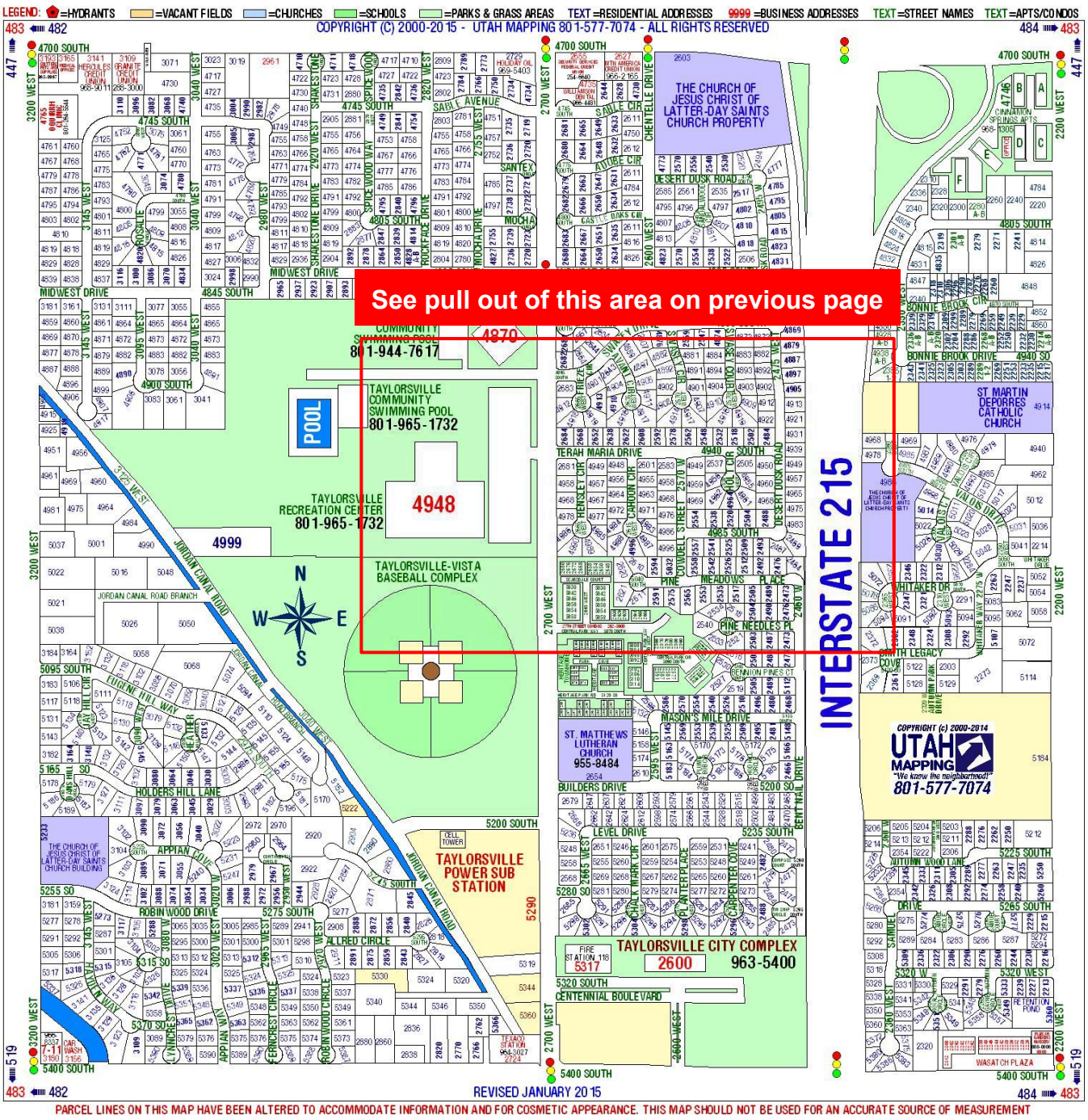
- UTM Area 483 Addresses
- UTM Area 483 Buildings
- UTM Area 483 Parcels
- UTM Area 483 Signals
- UTM Area 483 Streets

Utah Mapping has created easy to view 'neighborhood maps.' Each individual building address and street name has been physically verified. Now everyone who drives can "know the neighborhood!" No one ever needs to make a 'wrong turn" again or end up in a field!

Salt Lake County

'neighborized' map sample

"... we know the neighborhood!"



The Road To Nowhere, *or Your Secret Fishing Hole*

Centerville City Streets
–5 Year Master Plan –
Sustaining Funding with Analytical Record Keeping Using GIS

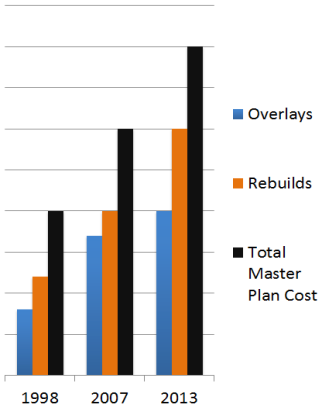
Every five years Centerville City prepares a Streets Master Plan to secure funding for road maintenance. The backbone of the master plan is based entirely on data in our GIS.

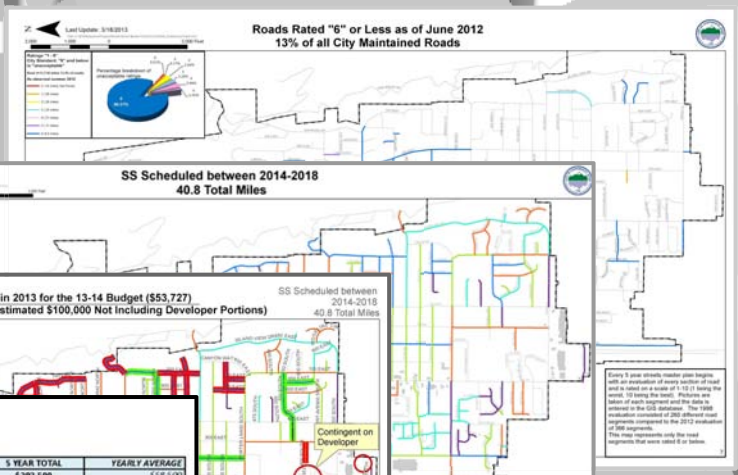
The process is simple yet effective:

1. Physically inspect all streets & attribute each road segment with a condition rating of 0-10.
2. Based on condition rating, assign a maintenance procedure: slurry seal, crack seal, overlay, or rebuild.
3. Prioritize over five years the streets to be treated
4. Submit master plan to city council

Since the 2006 conception of Centerville's GIS Dept, all street maintenance records have been stored in the GIS and directly linked to the centerline data. This historical data is best viewed as a map and is an instant picture of where consistent problem areas may be, or even where too much maintenance may occur. This has been invaluable for spending money where it is really needed and keeping our roads among the best in Utah.

- Since the 1998 master plan costs have doubled. Since the 2008-2012 master plan costs for overlays have gone up 8% and rebuilds up 25%-30%.
- If overlays aren't done when scheduled, rebuilds are inevitable, costing 3 times more than the scheduled overlay would have.
- <u>If roads are not repaired in a timely manner, the costs for the repairs will continue to rise substantially.</u>





	2014	2015	2016	2017	2018	5 YEAR TOTAL	YEARLY AVERAGE
CS	$75,000	$52,500	$60,000	$52,500	$52,500	$292,500	$58,500
SS	$143,816	$181,325	$219,692	$264,684	$227,011	$1,036,328	$207,266
OL	$874,926	$694,485	$941,613	$801,813	$809,068	$4,121,905	$824,381
RB	$212,296	$181,293	$0	$60,384	$244,965	$698,938	$139,788
REP CON					$101,787	$101,787	$101,787
Mobilization & Traffic Control	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000	$50,000
Contingency (10% of Construction Total)	$135,603	$133,940	$127,130	$122,938	$148,533	$668,144	$130,029
Engineering (7% of Construction Total)	$94,923	$81,158	$88,991	$86,057	$103,973	$455,102	$91,020
Inflation (3% of Treatment Construction Total (3% per year after 2014))	$40,681	$69,564	$114,417	$147,526	$222,800	$594,988	$118,998
TOTALS	$1,627,244	$1,426,065	$1,601,843	$1,585,902	$1,960,637	$8,201,691	$1,640,338

Treatment	Cost Per Mile
Crack Seal	$10,000.00 ($1,600 per ton)
Slurry Seal	$12,068.00
Overlay & Mill	$229,680.00
Rebuild	$612,480.00 12" deep $795,600.00 24" deep
Replace Concrete	$689,040.00 ($4.50 per sq ft)

Centerville City GIS
msmith@centervilleut.com

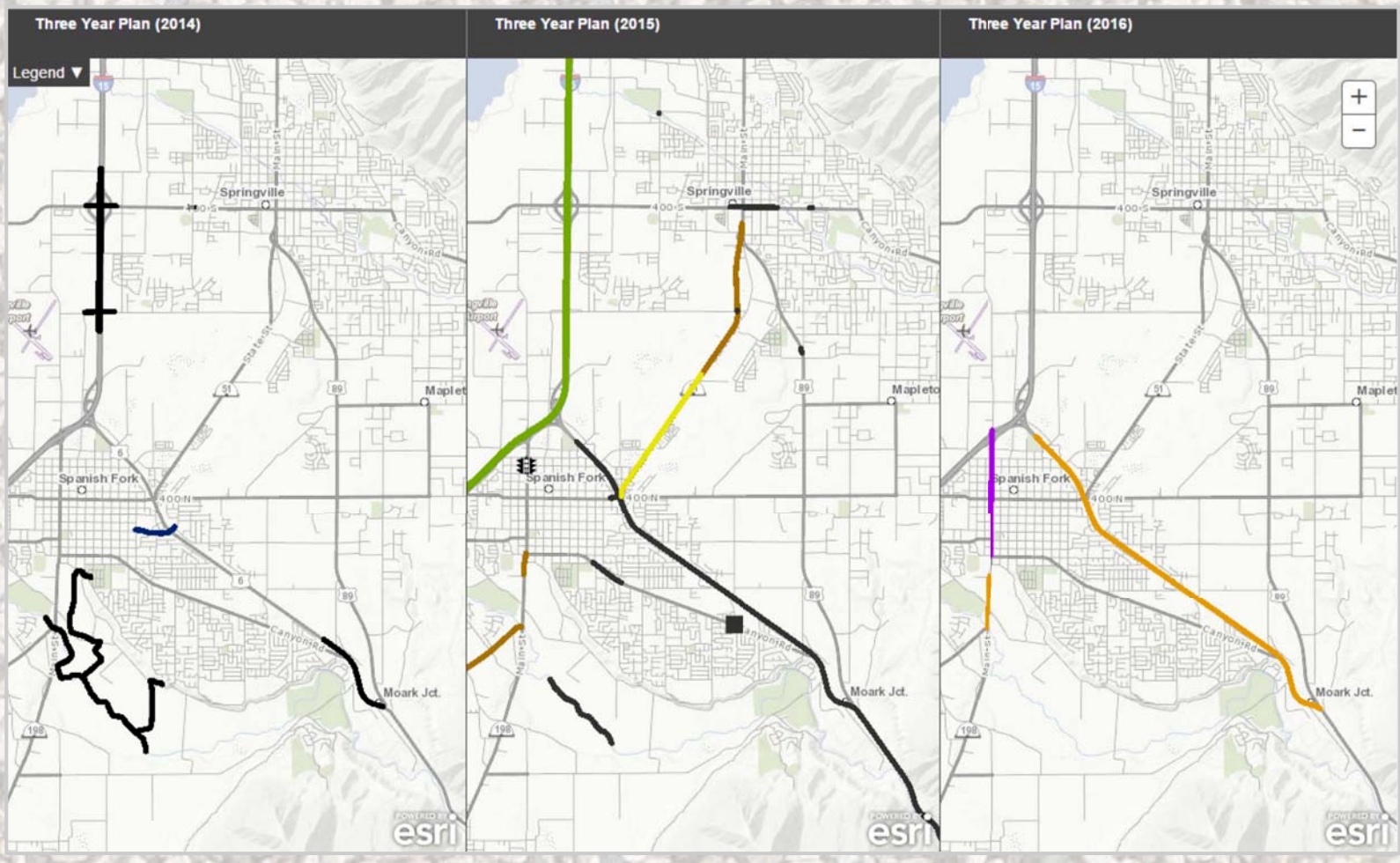
Synchronizing project planning and construction for efficiency!

UDOT THREE YEAR PLAN

What is it?:
UDOT was asked by senior leadership to develop a multi-year plan for projects in all programs. The goal of the Three Year Plan mapping effort is to look for synchronization opportunities to reduce the construction impact on the public and the economy. UDOT GIS developed a series of maps that dynamically link to project data. The maps are public and update nightly.

Value-added benefits of GIS to the Three Year Plan:

- **Dynamically** map project data
- **Communicate** project location to managers and the public
- **Facilitate** project synchronization discussions
- Increase **collaboration** across the department
- **Transparency** in Government activities



Utah Department of Transportation :
Becky Hjelm & Sarah Rigard
Contact: udotgis@utah.gov

UDOT Keeping Utah Moving

Understanding Utah's Broadband Landscape

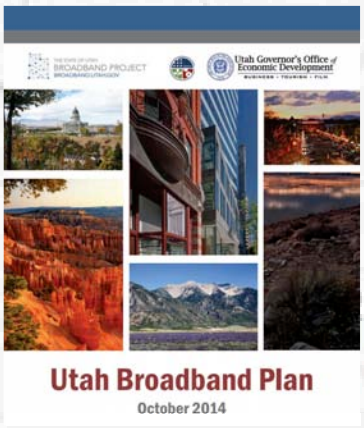
Utah Broadband Atlas

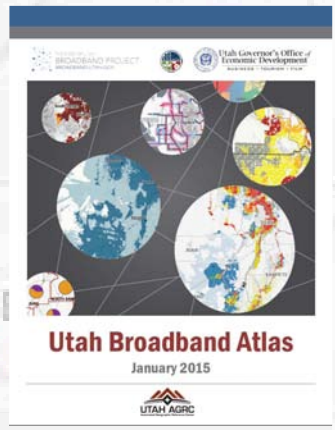
The Utah Broadband Project, a partnership between the Governor's Office of Economic Development and the Automated Geographic Reference Center, maintains a mapping database on broadband availability in Utah. The Project works with broadband providers in Utah to map service areas, transmission technologies, and advertised speeds statewide.

The broadband GIS data has been used to:

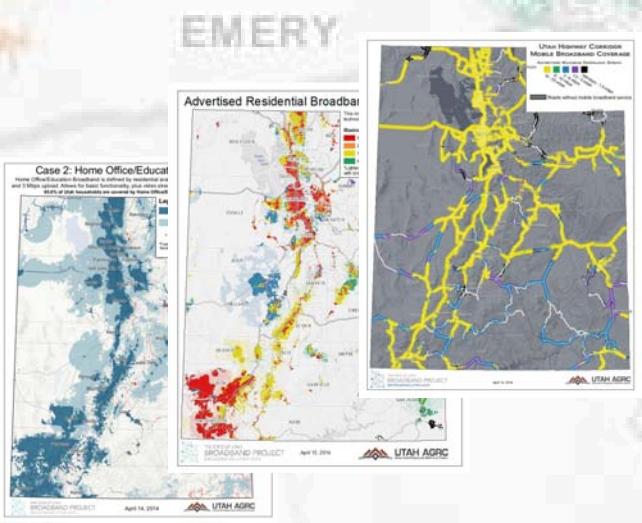
- Determine available broadband providers and available speeds in a given area.
- Identify areas that qualify for broadband funding opportunities.
- Understand the diversity in the broadband landscape, such as the relation between urban and rural broadband.
- Identify broadband availability trends relating to population density, and other demographic factors.

broadband.utah.gov





To learn about the Project's efforts and future plans, check out the ***Utah Broadband Plan***.
To view maps of broadband in Utah, check out the ***Utah Broadband Atlas***.

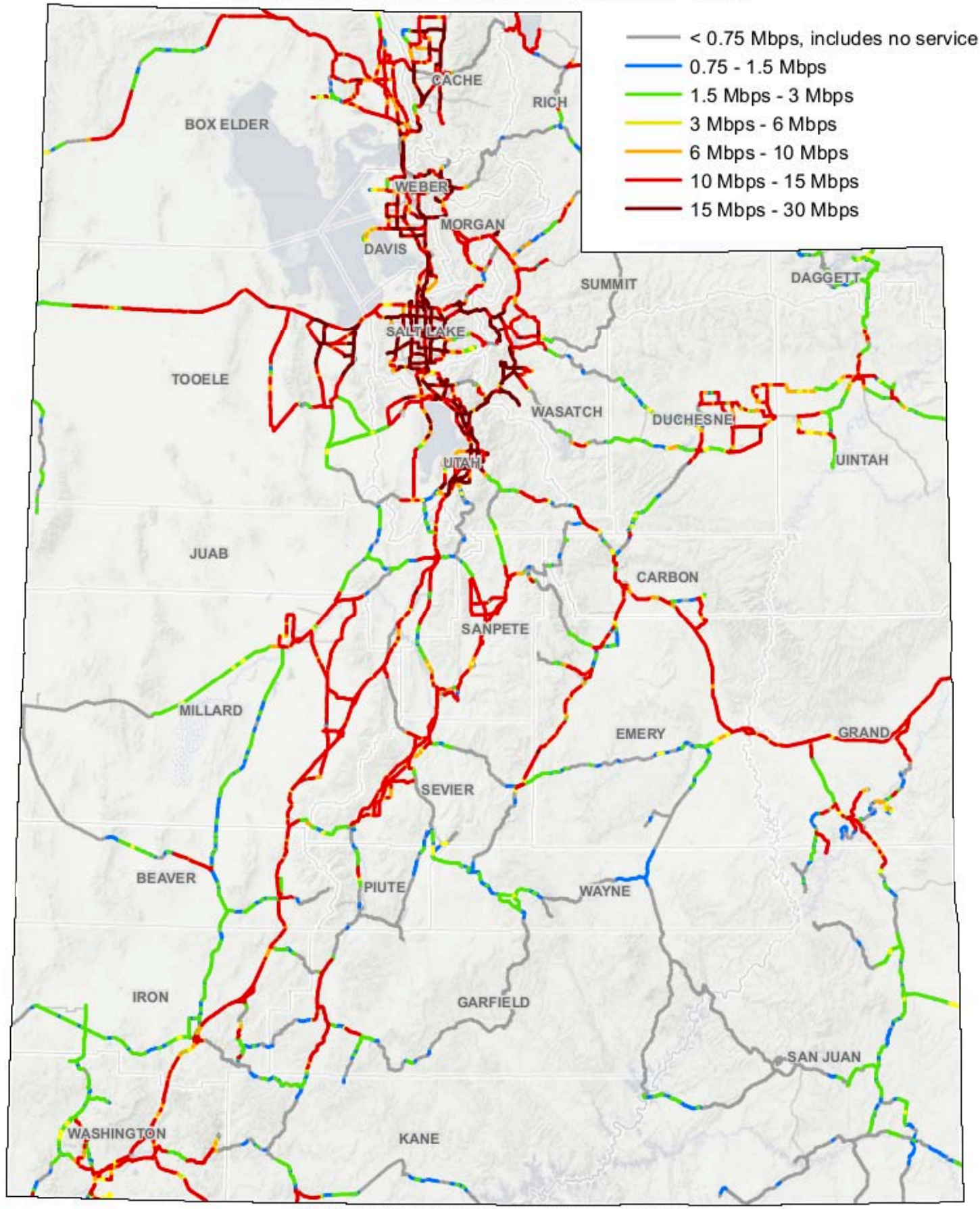


THE STATE OF UTAH
BROADBAND PROJECT
BROADBAND.UTAH.GOV

Utah Broadband Project
Kelleigh Cole, GOED
kcole@utah.gov
Jessie Pechmann, AGRC
jpechmann@utah.gov

Best Available Mobile Download Speed, Any Provider

Statewide Drive Tests: November 2013



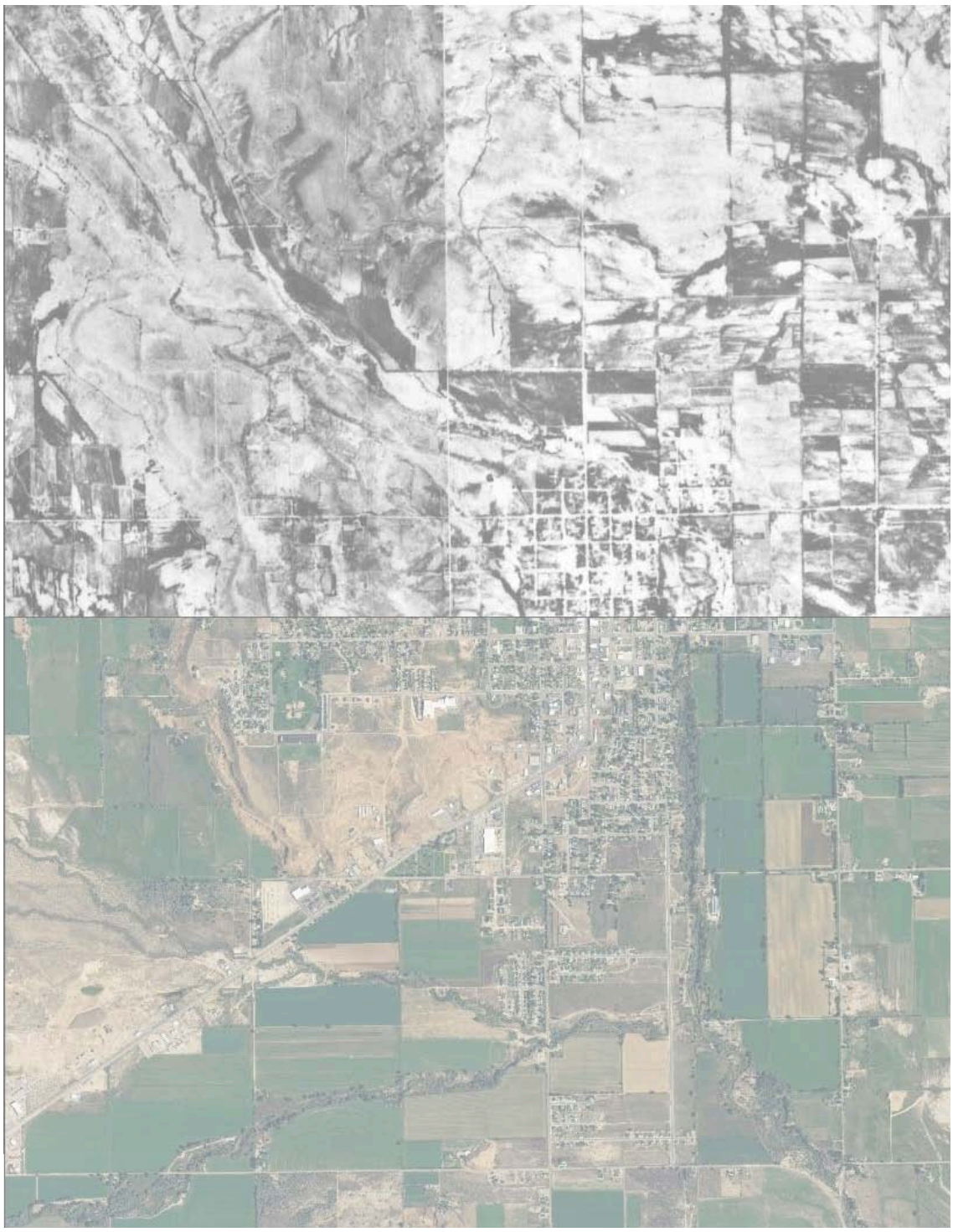
Drive testing was conducted by Isotrope, LLC using consumer grade smartphones.
The highest download rate is shown for each half mile road segment.

THE STATE OF UTAH
BROADBAND PROJECT
BROADBAND.UTAH.GOV

UTAH AGRC
Automated Geographic Reference Center

January 2015

Land Use, Patterns, and Change



Trust Lands Ownership

Mineral and Surface Estate by County

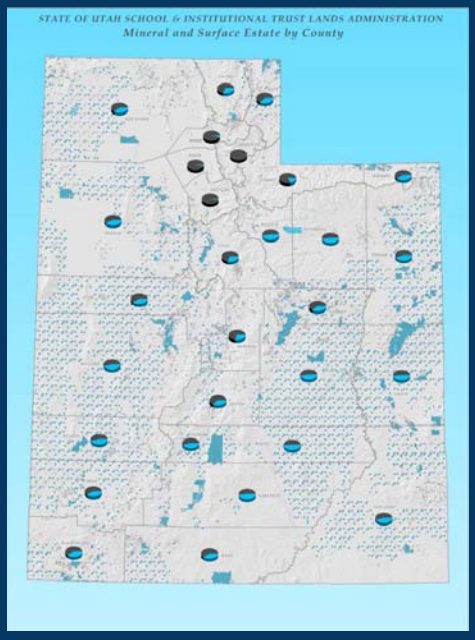
State of Utah
School and Institutional
Trust Lands Administration

The School and Institutional Trust Lands Administration (SITLA) is an independent state agency of Utah. The agency was created to manage parcels of land granted to the state by Congress in 1894. SITLA administers approximately 3.4 million acres of land and an additional 1.1 million acres of mineral lands. Management of the lands provides funding and support to the permanent trust funds of the state's public schools and 11 other beneficiaries. Funding and support of the institutions occurs through development, leasing, exchanges and the sale of SITLA parcels.

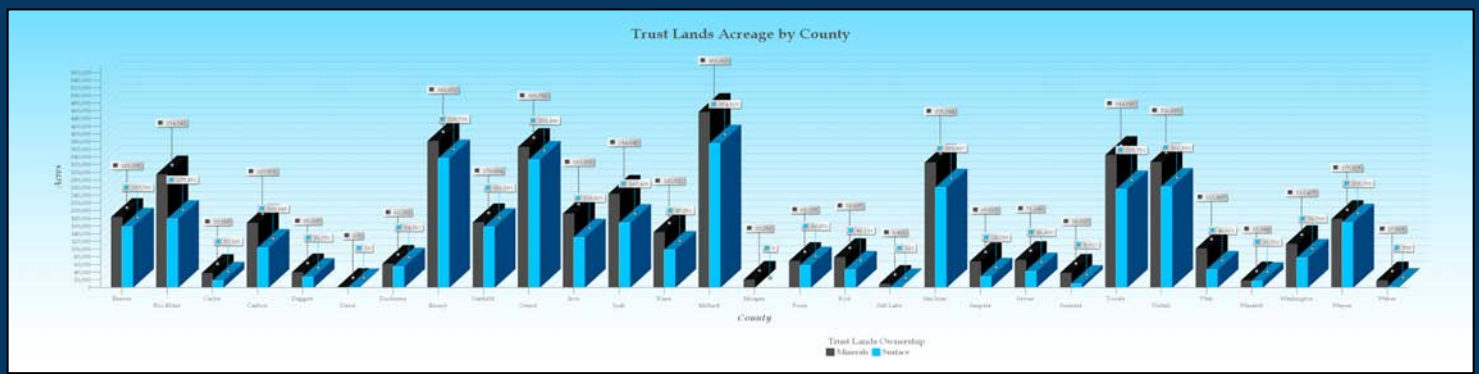
Through maintenance and tracking of SITLA mineral and surface estate, important decisions can easily be made by leaders that will benefit the state institutions.

During the January 2014 State of Utah General Session, H. C.R.4 (House Concurrent Resolution 4) was passed to recognize 20 years of SITLA.

http://le.utah.gov/~2014/htmdoc/hbillhtm/HCR004.htm



Acreages by county were derived using GIS calculations and are for reference use only. Statistics depict the number of calculated mineral estate acres and the number of surface estate acres separately.



Kate Staley, GISP GIS Analyst
State of Utah Trust Lands Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102
801-538-5147

Land Exchanges Work for Schools

Land exchanges provide SITLA with an opportunity to consolidate trust land holdings, trade out of sensitive lands and acquire lands more suitable for development.

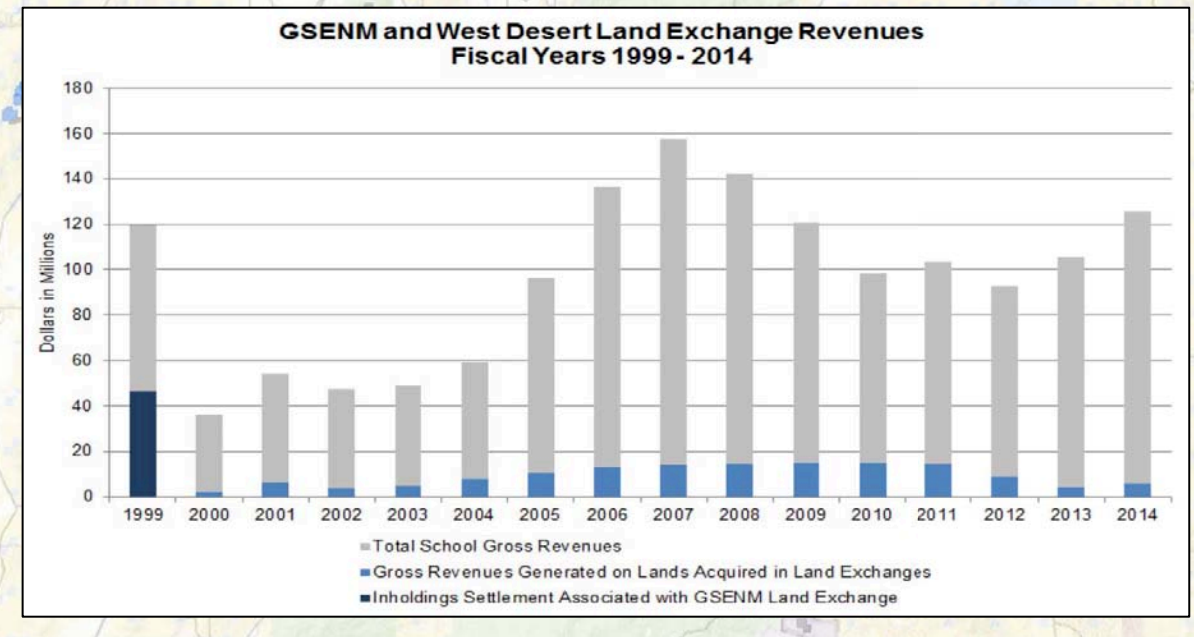
2014 years
$1.4 billion for public schools

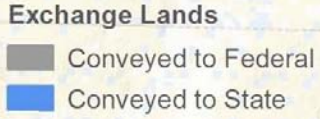
State of Utah
School and Institutional
Trust Lands Administration

Tracking the revenues generated on lands acquired in the West Desert and the Grand Staircase Escalante National Monument (GSENM) Land Exchanges shows that land exchanges increase revenues generated by agency activities.

Land exchanges also make managing Trust Lands easier by reducing small inholdings and creating larger consolidated blocks of land.

Based on the success of past land exchanges, SITLA anticipates that current land exchange proposals will play a key role in optimizing and maximizing trust land uses for the financial support of its beneficiaries over time.





Megan Southwick, GIS Analyst
State of Utah Trust Lands Administration
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801-538-5172

Utah Land Ownership

Statewide Land Ownership & Areas of Responsibility

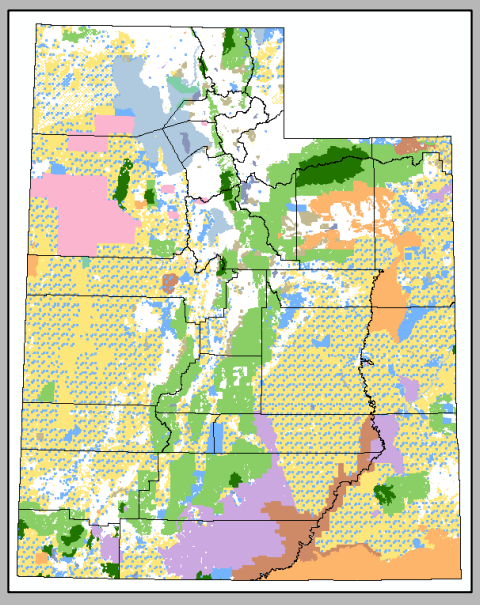
2014 years
$1.4 billion for public schools
State of Utah
School and Institutional
Trust Lands Administration

This contiguous statewide layer is a monumental success story of interagency partnership and cooperation!

Multiple State and Federal agencies contribute conveyance updates and provide cadastral verification to this centrally located geography database. Revisions are posted weekly and are available as a gis service, digital download and directly from the state geospatial information database (SGID) housed at Utah Automated Geographic Reference Center (AGRC). The result of this cooperative effort is a highly accurate and dependable statewide land ownership layer. Major contributions are attributed to the effort of the Utah School and Institutional Trust Lands Administration (SITLA) and the Bureau of Land Management (BLM). These agencies along with county government, city administrations, town municipality and private business and higher education institutions alike have come to rely and depend on this digital GIS resource.

STATE OF UTAH LEGEND
- Bureau of Land Management
- Bureau of Reclamation
- Bankhead-Jones Land Use Lands
- National Recreation Area
- National Parks, Monuments _Historic Sites
- National Forest
- National Wilderness Area
- National Wildlife Refuge
- Other Federal
- Military Reservations and Corps of Engineers
- Private
- State Trust Lands
- State Sovereign Land
- State Parks and Recreation
- State Wildlife Reserve/Management Area
- Other State
- Tribal Lands

Land Ownership is one of the top 5 most important GIS layers



What are Trust Lands?

Trust lands are parcels of land managed by the Trust Lands Administration for the exclusive benefit of state institutions or beneficiaries, as designated by Congress. Because these lands are held in trust, they differ greatly from public lands, and are more akin to private lands. Only about 6% of the state's acreage is set aside as trust lands to generate revenue for beneficiaries, primarily public schools.

http://trustlands.utah.gov/

Jessica Kirby, GISP GIS Manager
State of Utah Trust Lands Administration
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Salt Lake City, Utah 84102
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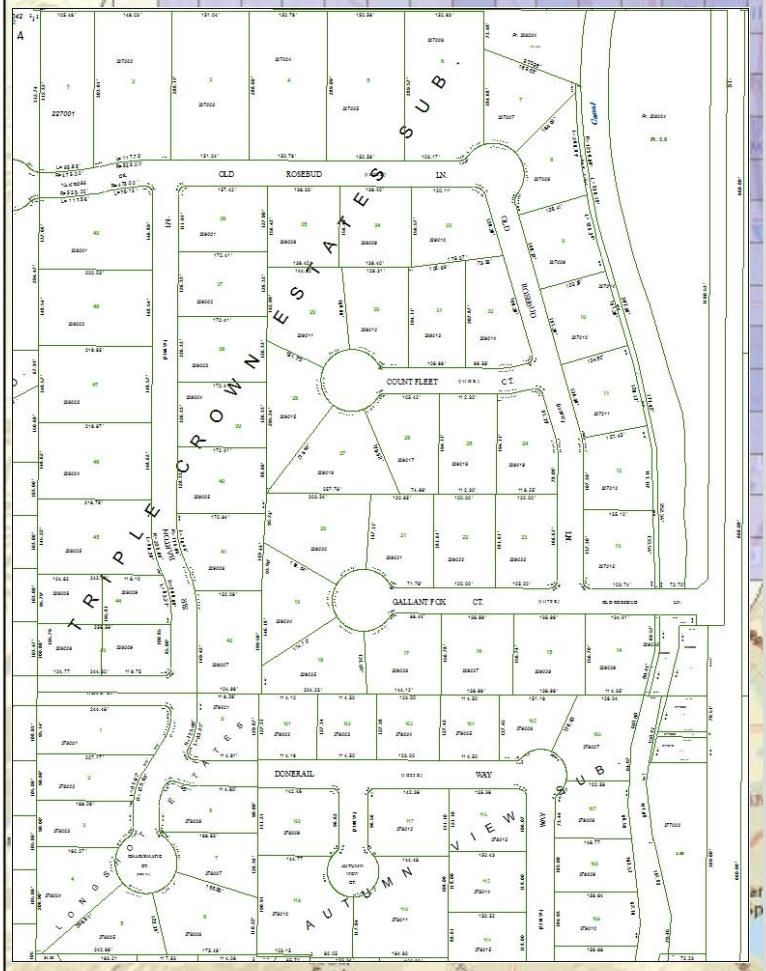
Where has Salt Lake County seen the most growth over the last 10 years?

Planning for Economic Development



Identifying the areas where growth is taking place is essential for counties, cities, and townships. Without understanding where growth and development is taking place, it is impossible for municipalities to plan for future services and development and keep their master plan up to date.

The Salt Lake County Recorder is responsible for the documents and GIS data that represent land ownership in the county. It is the maps and documentation of real property ownership including commercial and subdivision developments that allows municipalities to have a real time view of the growth and development taking place within their boundaries.

Generally, when real estate is divided and subdivided, it is for the purpose of building new homes, businesses, roads and utilities. This is a good measure of development and hence economic growth.

Your Salt Lake County Recorder, Gary Ott, has served for the past 13 years. In those 13 years Gary has pioneered the use of modern technology in the county. He was the first in the county and nation to introduce electronic recording and fully recognizes the integral part that modern technology plays in accurately recording and digitally viewing your land records, allowing municipalities and developers to analyze growth. Through the technology that Gary has introduced, including the use of GIS, real property recordings are completed faster and more accurately than ever before.

For the 2015 Maps on the Hill, we will have interactive and hard copy maps available. Our office analyzed the differences between the total number of parcels in each PLSS Section in 2004 and 2014. The change in the parcel count is represented on the map with the darkest areas containing the largest amount of growth.

The Recorder's Office currently manages over 350,000 parcels within Salt Lake County. That number increases annually by approximately 7,000 parcels.

Gary has put together a stellar recorder team to accomplish all of this.

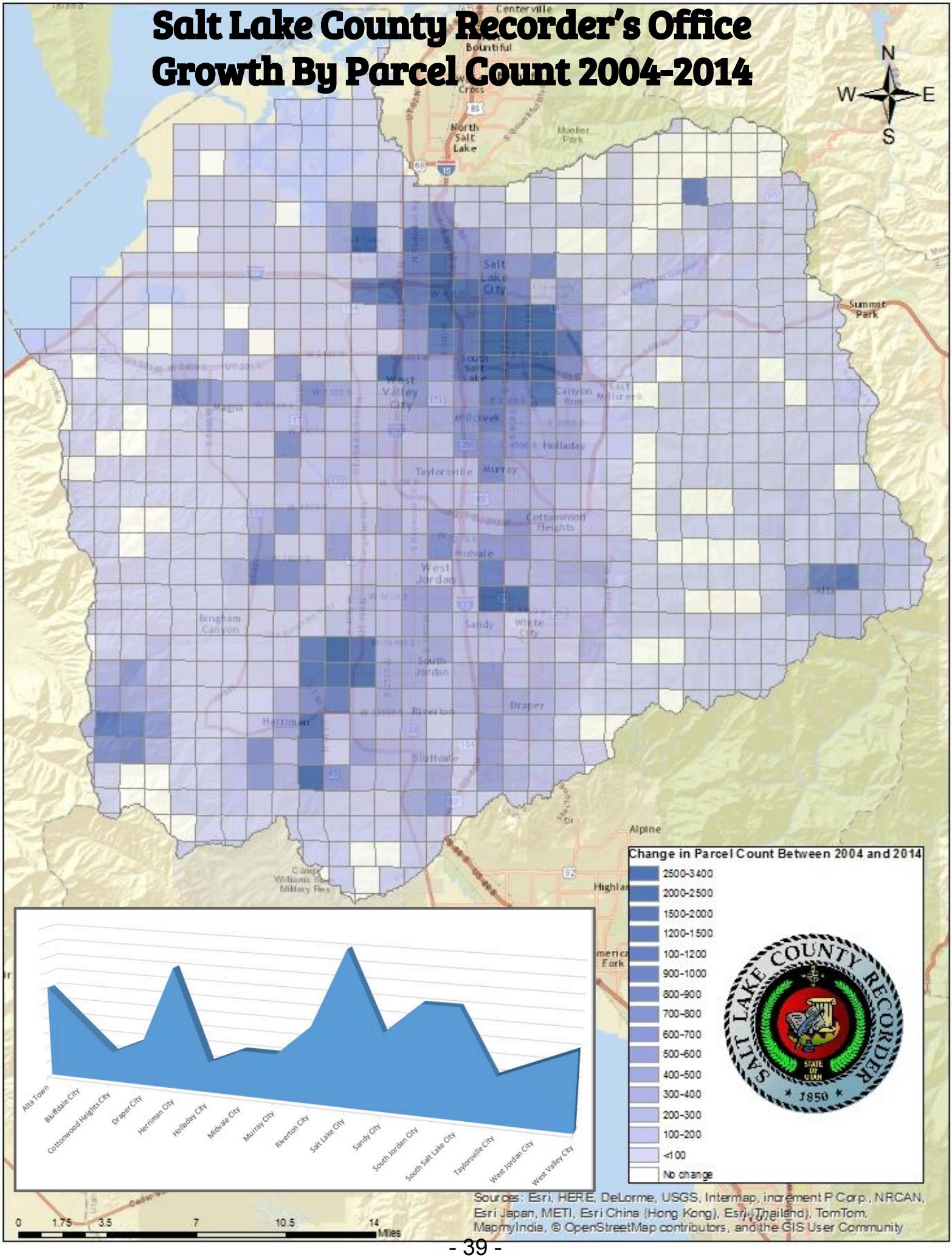
Created by the Salt Lake County Recorder's Office

Gary Ott, Recorder

Julie Dole, Chief Deputy Recorder

Salt Lake County Recorder's Office
2001 South State Street
Suite N1-600
Salt Lake City, UT 84190
385.468.8147
JDole@slco.org
www.slcorecorder.org

Salt Lake County Recorder's Office
Growth By Parcel Count 2004-2014



UTAH MAPPING & INFORMATION PARTNERSHIP

PURPOSE

The Utah Mapping & Information Partnership (UMIP) is a collaborative project between state agencies, local government, and other public-sector partners to provide:

1. High-resolution statewide mapping imagery
2. Information sharing where data from UMIP partners can be viewed as layers in a map-based system facilitating faster and better decision making

BENEFITS

Quality of mapping imagery

- Imagery will have 43 times greater resolution of what is currently available through State applications and will match quality of private sector applications (e.g. Google Earth)

Data sharing

- Program data currently held in proprietary systems in multiple agencies will be viewed as layers in a map-based application facilitating better and quicker decision-making processes for business, local government, and state government

UMIP will provide tools to:

- Business to help identify and minimize risks for natural resource development projects, increasing the speed and decreasing the cost of doing business in Utah
- Government to increase efficiency and responsiveness, and facilitate appropriate and productive regulation
- Public to improve quality of various public-sector functions like public safety, emergency response, surveying, assessing, etc.

CONTRIBUTING PARTNERS

Department Of Environmental Quality
Utah Department of Transportation
Utah Communications Authority / 911 Committee
Department Of Natural Resources
School and Institutional Trust Lands Administration
Department Of Workforce Services HCD Programs
Department Of Public Safety
Salt Lake County
Duchesne County
Governor's Office Of Economic Development
Uintah County
Utah Transit Authority
Department Of Heritage & Arts
Mountainland Association Of Government

STATEWIDE HIGH RESOLUTION MAP IMAGERY

39 INCH LOW RESOLUTION VS 6 INCH HIGH RESOLUTION

INFRASTRUCTURE

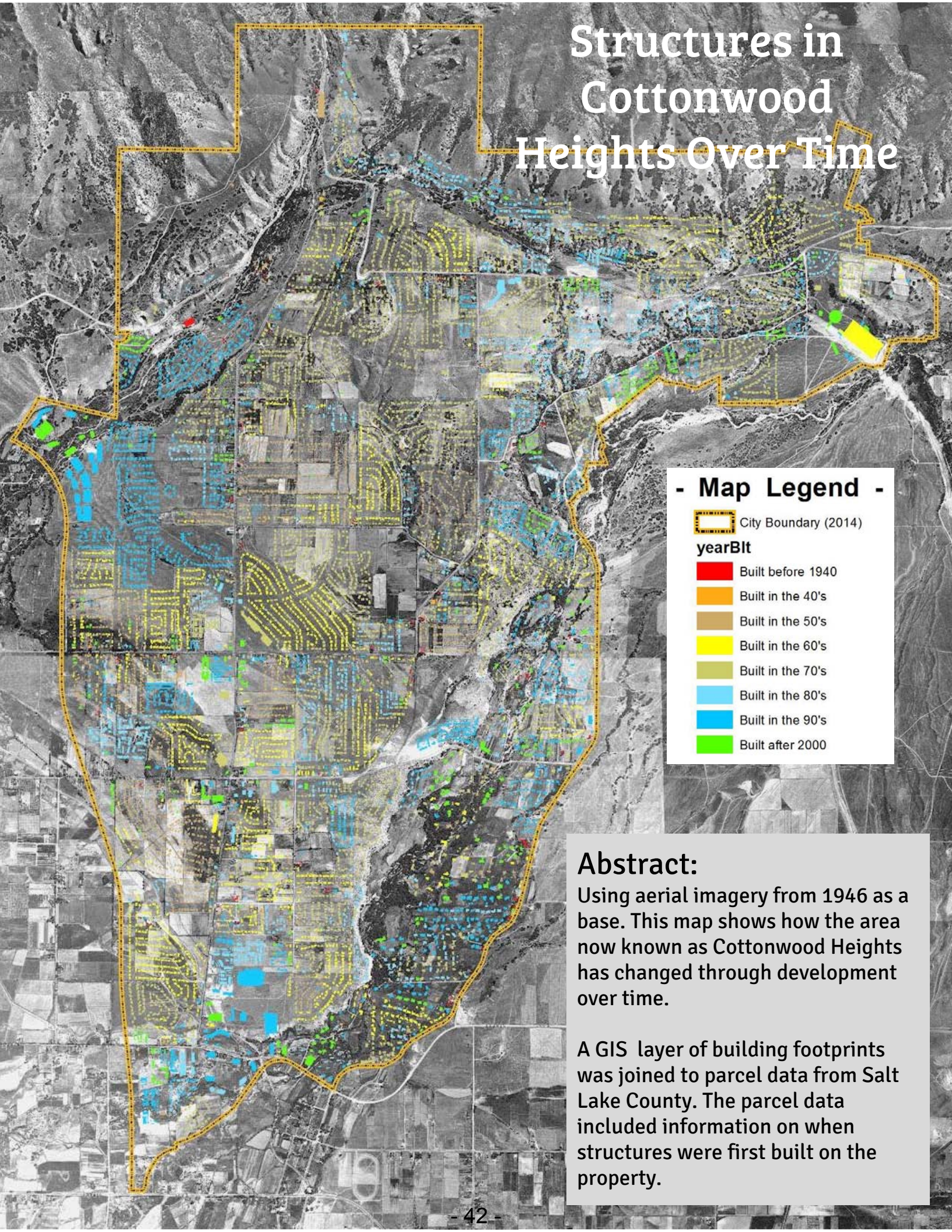
TRANSPORTATION

WATER DELIVERY SYSTEMS

BUILDINGS AND VEGETATION

Whiterocks
Tridell
Mountain Home
Altona
Boneta
Altamont
Talmage
Mt Emmons
Ballard
Roosevelt
Gusher
DUCHESNE
Starvation Reservoir
Duchesne

Structures in Cottonwood Heights Over Time



Abstract:

Using aerial imagery from 1946 as a base. This map shows how the area now known as Cottonwood Heights has changed through development over time.

A GIS layer of building footprints was joined to parcel data from Salt Lake County. The parcel data included information on when structures were first built on the property.

Where are farmlands declining in the Wasatch Front region?

Analyzing Agricultural Land Loss in the Wasatch Front Region, Northern Utah

Project Summary:

Urbanized development can come from three sources: farmland, urban infill, or natural open space. As populations increase, urbanization generally comes from the development of agricultural land since it is more cost effective to build homes on land that has already been cleared. Also, many farms lie on the outskirts of more densely populated areas which make them more susceptible to development. The downsides of replacing agricultural lands with urbanized uses are the loss of farming culture and the increased threat to local food security.

This study analyzed the Wasatch Front Region of Northern Utah in an effort to discover which of the four counties in the region had the highest rate of agricultural land loss between the years 2010 and 2013. Results show that each of the four counties have experienced a loss of farmlands, but Salt Lake County had the highest rate at nearly 25 percent during the three-year study period. The declining pattern of agricultural land in the region suggests that these lands, along with local food security, are being threatened by the continuing expansion of the urbanized areas.

Project sources: US Dept of Agriculture, Utah AGRC, and the Wasatch Front Regional Council.

Research was done as part of undergraduate studies at Weber State University

Travis W. Lund (801) 644 - 5002 - travis.w.lund@gmail.com

Natural Hazards

Identifying Hazardous Weather in a Visually Compelling Way

MesoWest VoroWeather Mashup

MesoWest, a group within the University of Utah Department of Atmospheric Sciences, has been aggregating surface weather observations from all over the United States and several countries since 1997. We currently have over 26,000 active stations and over 42,000 archived stations in our archive.

Recently, we reorganized our data archives and built a data API (Application Programming Interface) to allow for efficient web-based access of both our real-time and archival observations. This has enabled the development of a number of online "mashups" for visualizing 19 years of weather data in innovative and compelling ways.

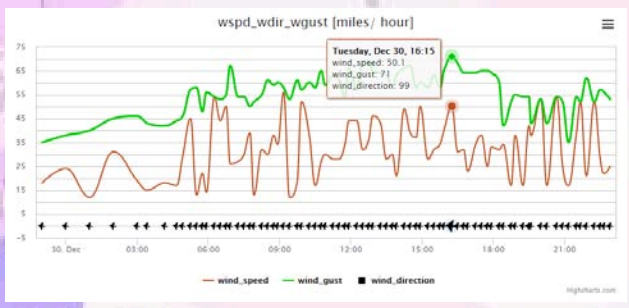
One of these websites is the MesoWest VoroWeather Mashup, which uses both the Leaflet JS and D3 JavaScript libraries to display station observations based on the distances between a given station and its neighbors, and the temperature, relative humidity, and wind speed values observed.

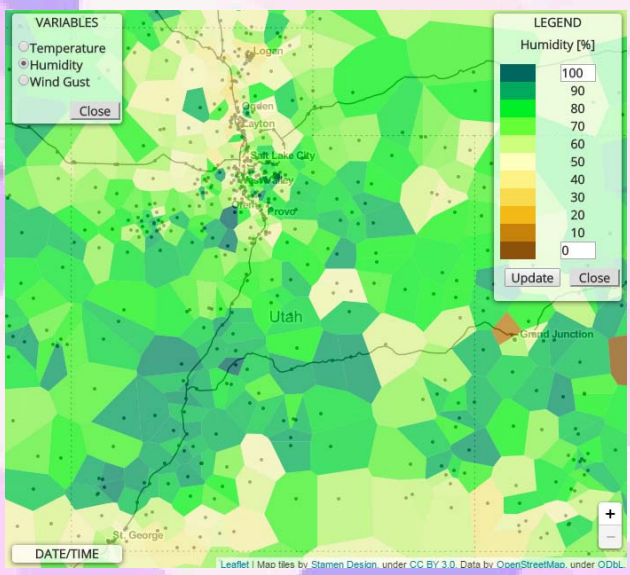
By color-coding observations, values are highlighted for the 836 active stations in Utah with high wind speeds, humidities, and both significantly cold or warm temperatures. This enables the user to identify both potential erroneous observations and locations of interest for extreme weather.

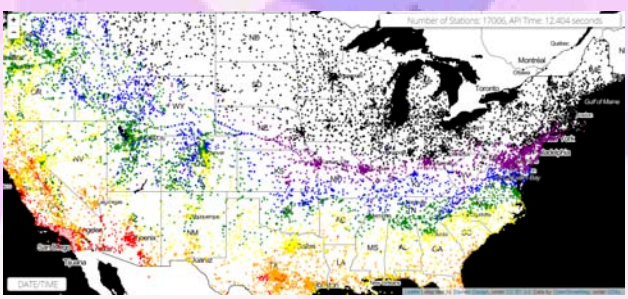
The background image, for example, was captured from the recent downslope wind event on December 30, 2014, with darker shades of blue represent higher wind gusts. Note the very dark shapes around and south of the Ogden/Layton area.

For more information, visit
www.mesowest.org

This map can be found at mashup.mesowest.net/voroState.html



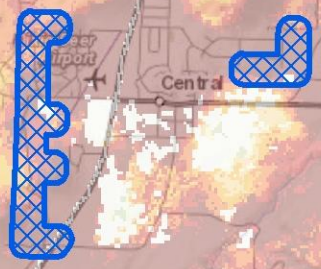




Matthew Lammers
Research Associate
University of Utah/MesoWest

Reducing Catastrophic Fire in Utah!

GIS use for the *Governor's Catastrophic Wildfire Reduction Strategy*



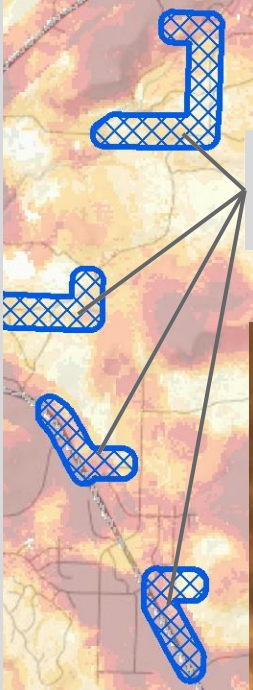
Following the devastating 2012 fire season, Governor Herbert asked state agencies to develop a cooperative strategy to reduce the size, intensity and frequency of catastrophic fires.

In 2014, the Utah Legislature appropriated $1.926 million for on-the-ground fuel and risk reduction projects.

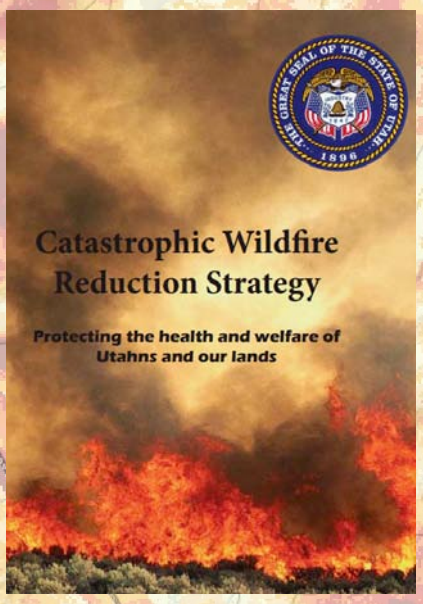
GIS was used in this effort to:

- **Identify** areas with the highest **risk** to wildfire.
- **Map** proposed **project areas**.
- **Rank** proposed project areas for **strategic funding**.

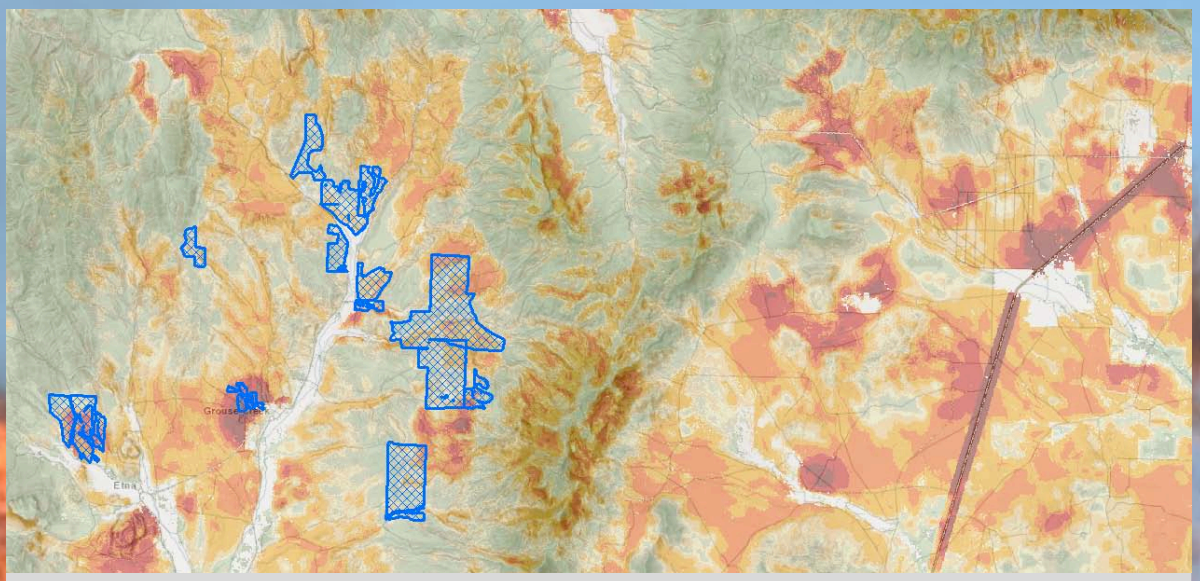
Follow this link for more information - http://bit.ly/UtahCatFire



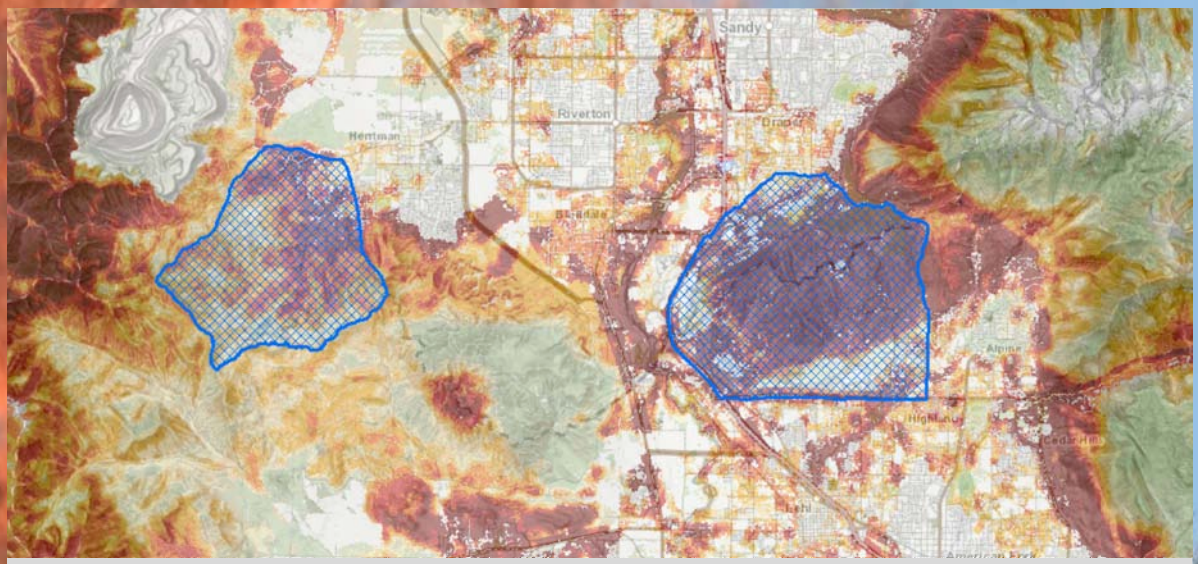
Projects in Southwestern Utah



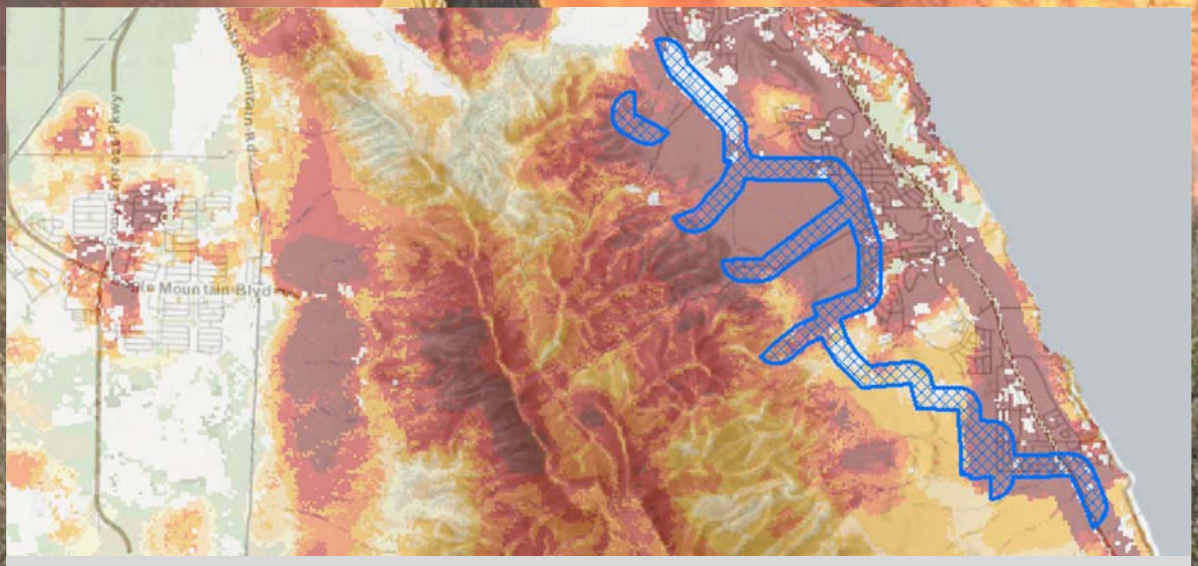
Utah Division of Forestry, Fire and State Lands
Buck Ehler, Sean Edwards & Tanna Fullenkamp
Contact: buckehler@utah.gov



Promoting Resilient Landscapes

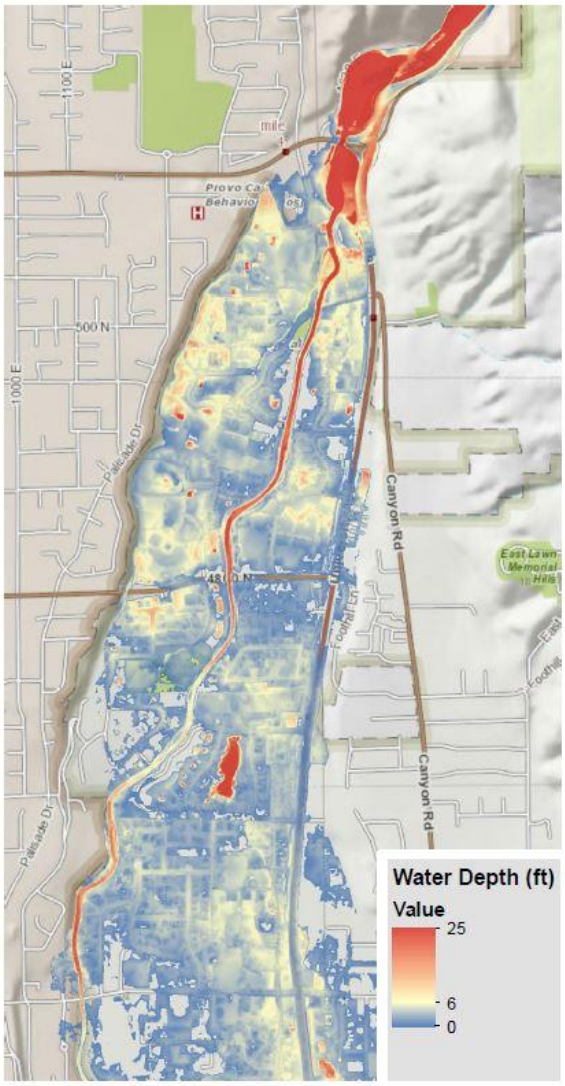


Protecting Values Through Fuel Modification Projects

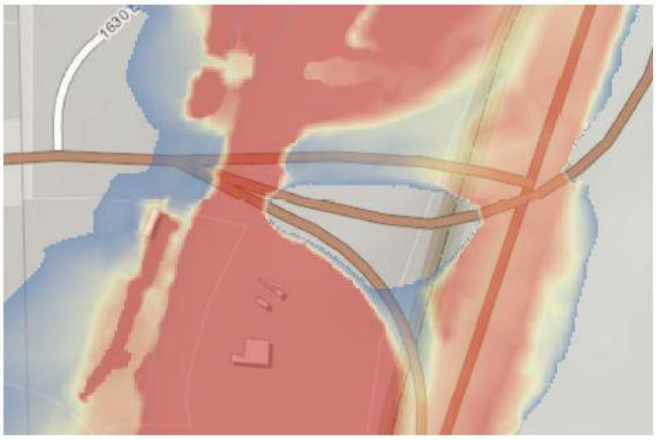


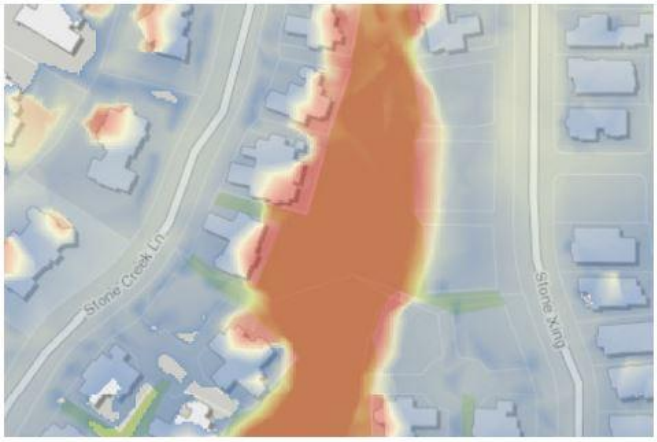
Reducing Wildfire Risk to Utah

Provo River Flood Model using HEC-RAS and GIS



This flood model represents a catastrophic flow (25,000 CFS) of water down the Provo River. This model was created using HEC-RAS and HEC-GeoRAS for pre and post-processing in ArcGIS.





Jonathan Garrard
UVU Earth Sciences GIS course
Fall 2014

Where is the Warm Springs fault in downtown Salt Lake City?

New geologic mapping of the Salt Lake City North quadrangle

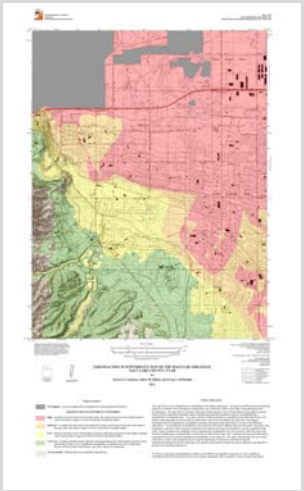
The Salt Lake City area is cut by several active faults, including the Warm Springs fault of the Wasatch fault zone. Our geologic maps locate and study this and other faults to help planners and developers make informed decisions regarding geologic hazards.

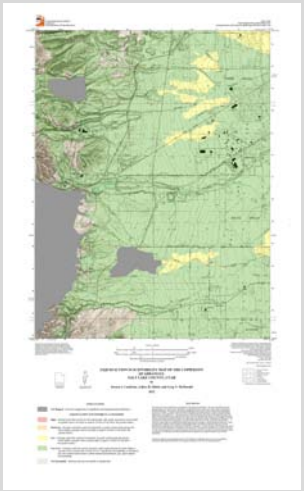
This geologic mapping is part of our legislative mandate to provide uniform geologic maps across the State of Utah for geologic hazard mitigation and resource development.

The geology was mapped using GIS software to view, analyze, and compile fieldwork observations, aerial photographic mapping, 3D mapping, and faults mapped using newly acquired 0.5 m LiDAR.

Adam McKean
Mapping Geologist
Geologic Hazards Programs
Utah Geological Survey
adammckean@utah.gov
801-537-3386

Mapping Utah's Geologic Hazards





Utah Geological Survey Hazard Mapping Initiative

Jessica J. Castleton & Ben A. Erickson

Utah's rapid growth along the Wasatch Front has resulted in increasing development in hazardous locations. This development incursion into areas with increased exposure to geologic hazards increases public vulnerability. In many areas, geologic hazards have not been mapped to meet the needs of new and evolving geologic-hazard ordinances. Geologic-hazard mapping is ongoing in areas of high projected growth where recent Quaternary geologic mapping has been completed, specifically the western part of Salt Lake Valley and Utah County. Additional mapping is planned to continue in urban areas of Salt Lake, Utah, Davis, Weber, Wasatch, Summit, Cache, and Uintah Counties.

The geologic-hazard maps will address hazards associated with earthquakes, landslides, flooding, debris flows, radon gas, shallow groundwater, rock fall, and problem soil and rock. Maps are being prepared by compiling a geographic information system (GIS) database incorporating available site-specific geotechnical investigation reports, previous geologic-hazard studies, new Quaternary and bedrock geologic mapping, Natural Resource Conservation Service (NRCS) soil data, field, and other data.
Our final product is a set of geologic-hazard maps and accompanying text documents that address critical geologic hazards. While site-specific geotechnical investigations should be performed for all development, the maps will identify areas where additional, specialized geologic-hazard investigations are necessary prior to development as well as provide information that may be used for emergency planning and community risk assessment for existing home and business owners. The Utah Geological Survey will provide copies of the published maps to local governments within the study areas, and will work with communities as requested to help prepare geologic-hazard ordinances, as requested.

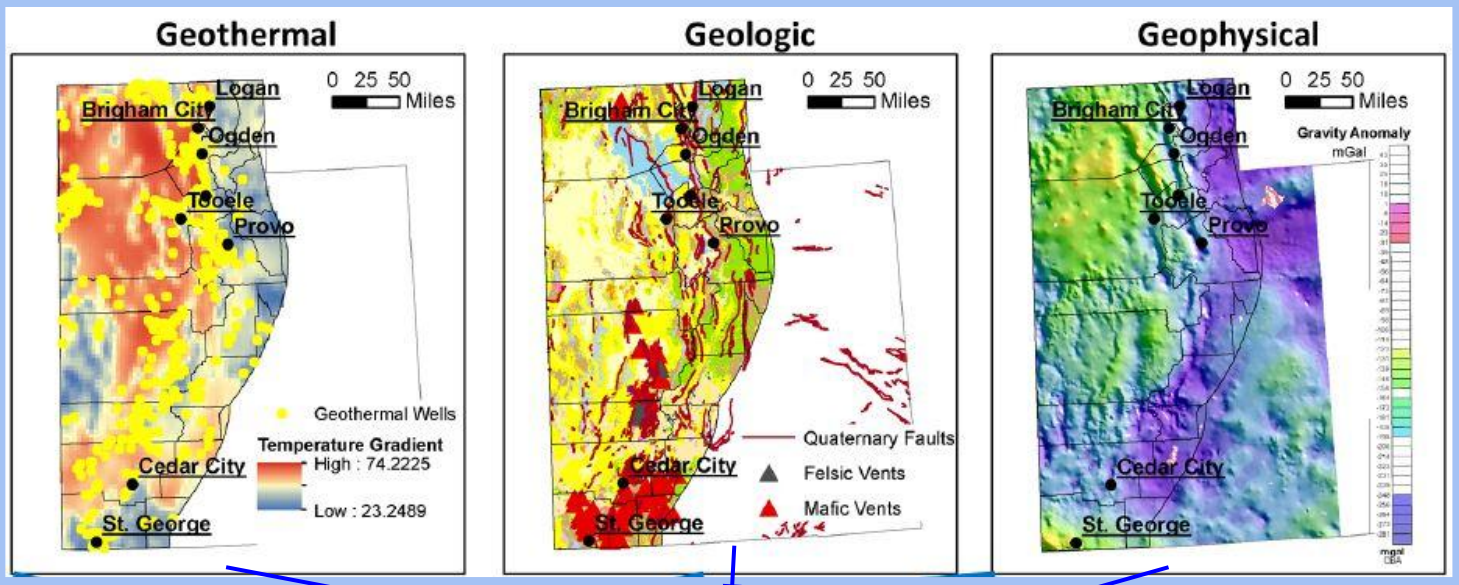
UTAH DNR GEOLOGICAL SURVEY

UTAH DNR NATURAL RESOURCES

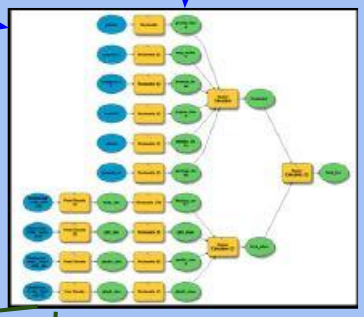
Natural Resource Management

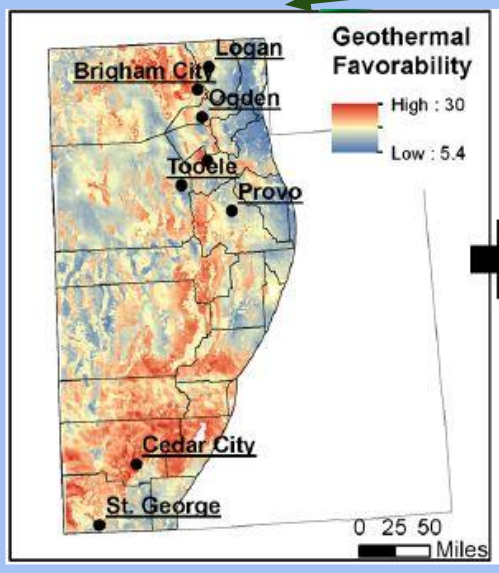
Assessment of Geothermal Favorability in Utah Using a Multi-Proxy approach

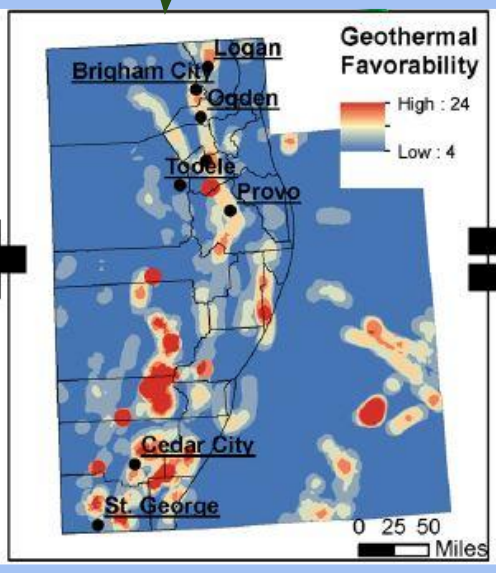
The western half of Utah contains a portion of the Basin and Range province of the U.S. Thin crust and shear strain caused by extensional tectonics, high regional heat flow, and young quaternary faulting and volcanism make this province uniquely favorable for economic geothermal exploration. The purpose of this study is to use spatial analysis of unique Basin and Range parameters to locate areas of high geothermal favorability which coincide with high priority exploration targets.

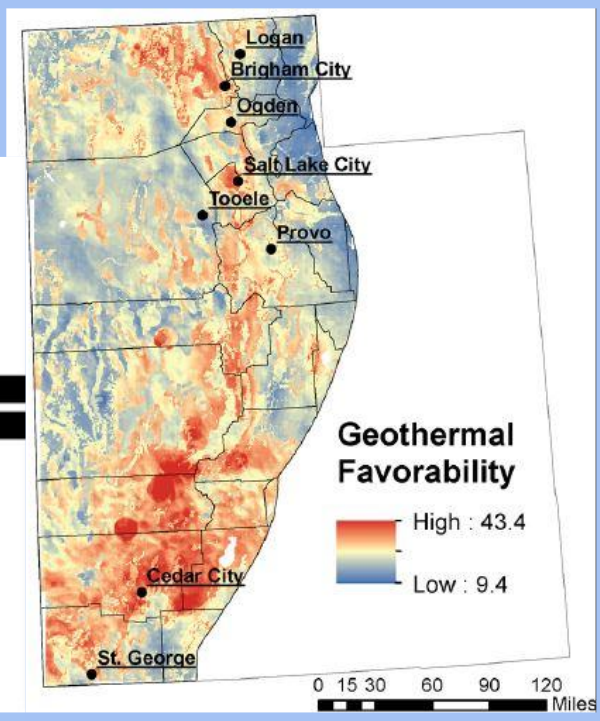


Favorable Parameters		
Geologic	**Geophysical**	**Geothermal**
Quaternary Volcanic Units	Bouger Gravity Anomaly	Hot Springs and Wells
Quaternary Volcanic Vents	Seismic Moment	Temperature Gradient
Quaternary Faults	Shallow Crustal Gravity	
	Magnetic Anomaly	









All data acquired from the Nevada Bureau of Mines and Geology (NBMG) geothermal database http://ww.nbmg.unr.edu/Geothermal/Data.html

UTAH VALLEY UNIVERSITY

Buchanan Kerswell
UVU Earth Sciences GIS course Fall 2014

Carp Removal on Utah Lake

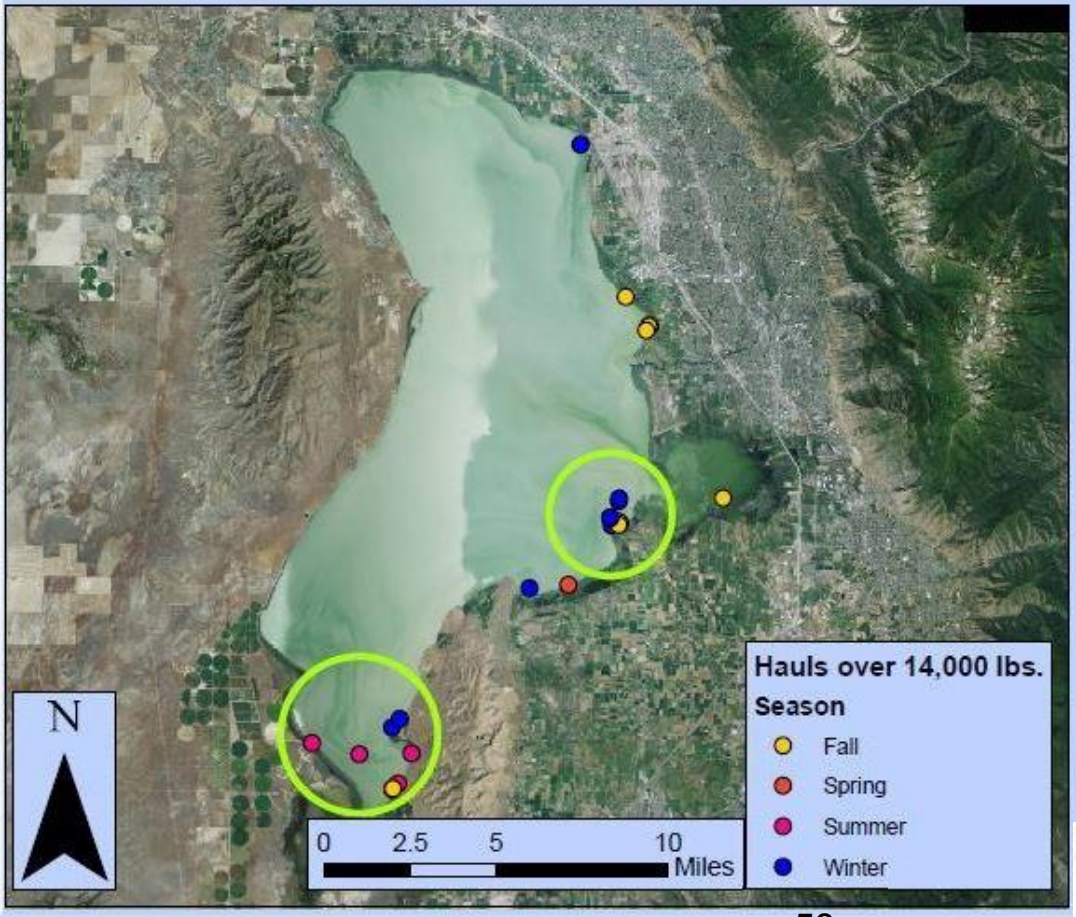
Common carp in Utah Lake have been identified as a nuisance species which directly inhibits the recovery of the endemic and endangered June sucker. To date, 15.5 million pounds of Common carp have been removed from Utah Lake.

In this study, the weight of carp per net measured in pounds, was separated by season and proportionately symbolized to show "hotspots" of fishing based on season. Additionally, seine hauls ≥ 14,000 lbs were graphed to show overlap of "successful" fishing year round. From this analysis, Lincoln beach and south Goshen Bay seem to provide the most effective commercial fishing year round.

Fall

Summer

Winter



Graduated representation of total (n=215) commercial seine hauls on Utah Lake observed by UDWR. Symbols are graduated by weight in tons of carp/net.

UTAH VALLEY UNIVERSITY

David Tinsley
UVU Earth Sciences GIS course
Fall 2014

Finding Major Gold Deposits in Utah

The need to remedy the abundance of unnecessary "trial and error" in locating viable ore deposits in the endeavor of mineral exploration has recently become apparent. The dot density of the compilation of major gold occurrences with the geologic settings hosting known gold deposits in Utah enables a prospector to understand what factors are controlling these anomalies by selecting any given location. In attempt to increase effectiveness and time management in mineral exploration it is critical to know the deposit type and their given depth of formation. Even with recent technological advances extreme difficulties in discovering viable ore deposits remains. Locating deposits in a timely and efficiently manor a specific map is mandatory for discovering mineral occurrences. Adding this data/map engineered to attend to this need with the arsenal of current technology will increased the ability to extract the "hard to reach" deposits. When used correctly, there will be a measurable increase in productivity and efficiency in the field.

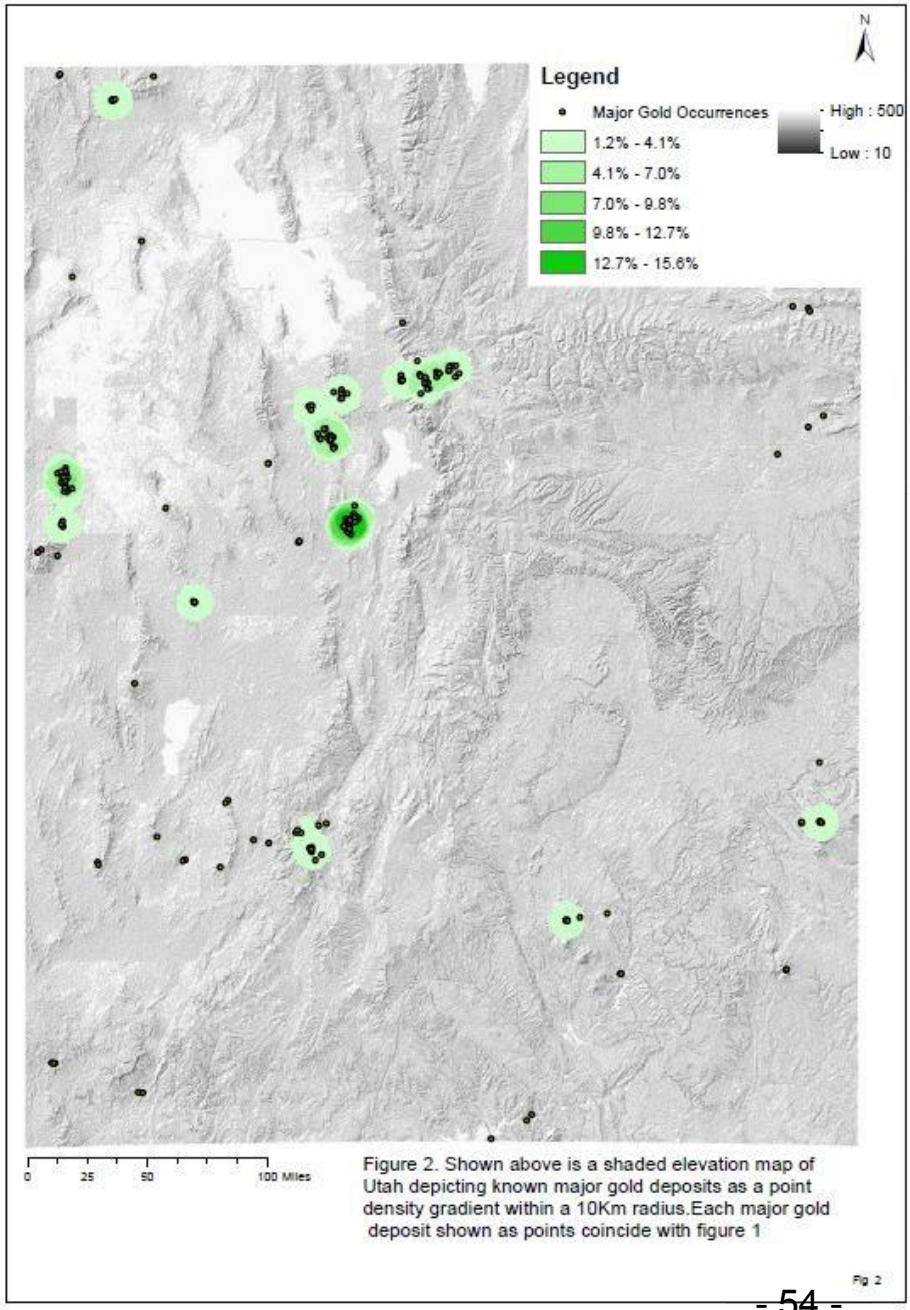


Figure 2. Shown above is a shaded elevation map of Utah depicting known major gold deposits as a point density gradient within a 10Km radius.Each major gold deposit shown as points coincide with figure 1

Fig 2

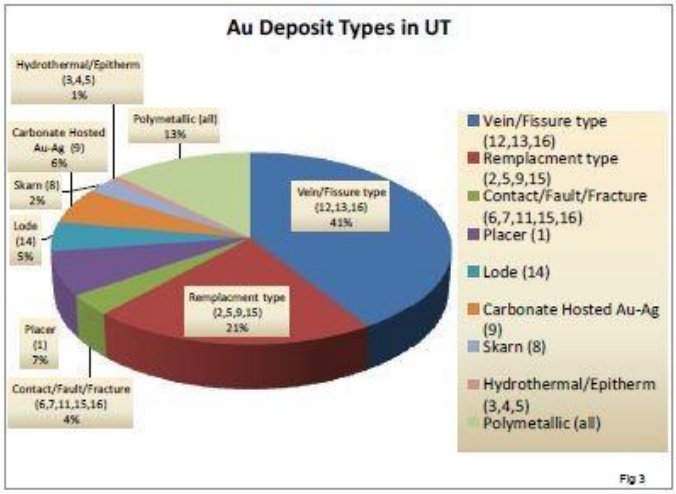


Fig 3

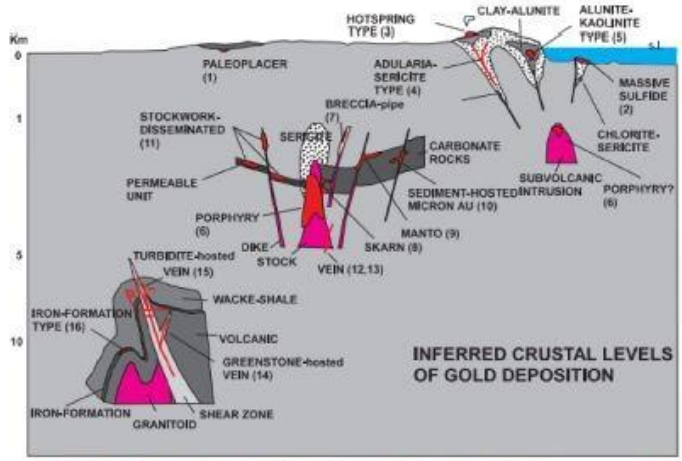


Figure 4. Schematic representation of the crustal levels inferred for gold deposition for commonly recognized deposit types. The depth scale is approximate andlogarithmic and numbers beside named deposit types coincide with those used in figure 3

Fig 4

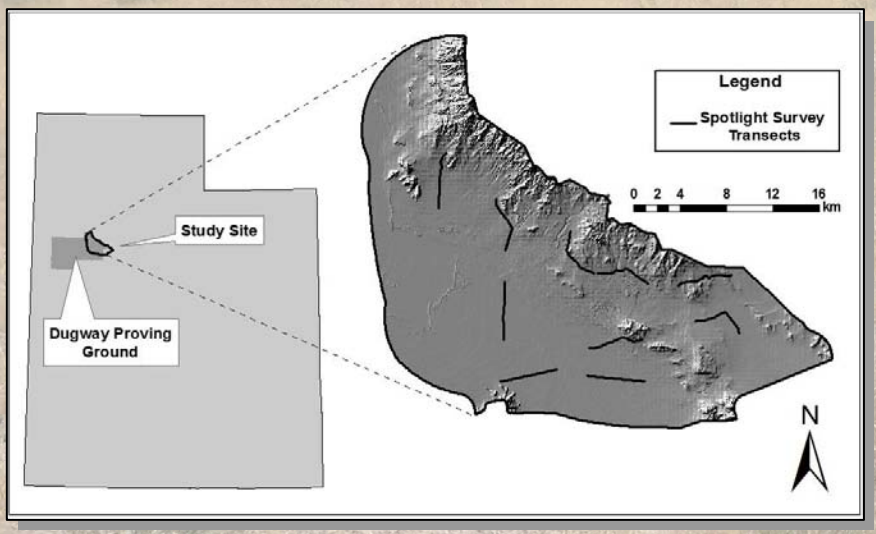
Brock Howell
UVU Earth Sciences GIS course
Fall 2014

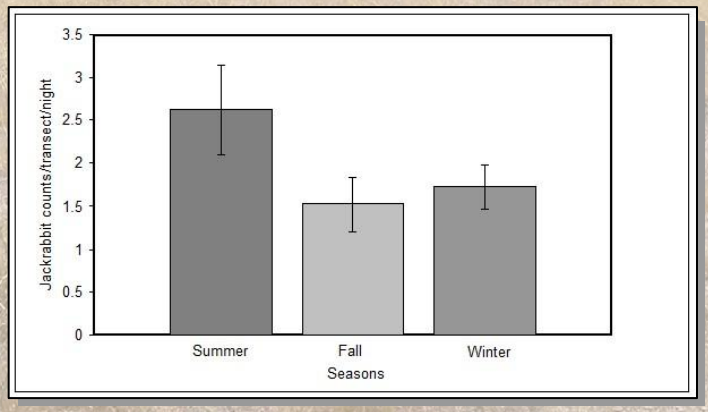
Invasive Species and Wildlife

The effects of cheatgrass on black-tailed jackrabbits relative abundance at Dugway Proving Ground, UT.

Cheatgrass (*Bromus tectorum*) is an invasive species known to compete with and displace native species in lower-elevation, dry western ecosystems. This project evaluated the effects of cheatgrass on black-tailed jackrabbits, a habitat generalist that prefers succulent vegetation as forage. It was hypothesized that the increase in the occurrence of cheatgrass would negatively influence black-tailed jackrabbit abundance.

Using cheatgrass occurrence and GIS data developed through remotely sensed methods, ground surveys of existing vegetation and jackrabbit populations were conducted. Using generalized linear mixed models, data were analyzed. The findings did not support the initial hypothesis that increased cheatgrass cover would negatively impacted black-tailed jackrabbit populations.





This project is being conducted by **Ms. Victoria Holman** in the Utah State University Quinney College of Natural Resources and directed by Mr. Bryan Kluever and Dr. Doug Ramsey with the Utah State University Remote Sensing/GIS Laboratory .

S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES UtahStateUniversity

UTAH VIEW

Low-cost aerial mapping for natural resources

A case study for the use of small unmanned aerial systems (sUAS) for collection of natural resource data.

Unmanned aerial systems (UAS), drones, unmanned aerial vehicles (UAV) – names aside, autonomous and semi-autonomous aircraft are rapidly gaining popularity as a method for collecting data such as aerial photography. Costs and technical requirements have continued to diminish at an accelerating rate and platforms that are capable of autonomous flight may now be acquired for less than $1,000.

Despite the current debate surrounding privacy and public safety with respect to sUAS, research institutions, local and state government, federal agencies, and consultants are finding these systems to be excellent low-cost, effective, and efficient data collection tools. The Remote Sensing/GIS Laboratory at Utah State University has been experimenting with the use of sUAS for the purpose of collecting low-level land cover and habitat information to support and inform management decisions at a local and state levels. Using a DJI s1000 multicopter with a Canon 5D Mark III DSLR camera, researchers have been able to collect and process high resolution (<2cm pixel resolution) data and digital terrain models (DTMs). This proof-of-concept demonstrates the effectiveness of rapidly collecting range and habitat data that may be used to help local landowners improve grazing forage, promote wildlife habitat, and reduce overall time needed to assess range condition.

Mr. Christopher McGinty
Dr. Doug Ramsey

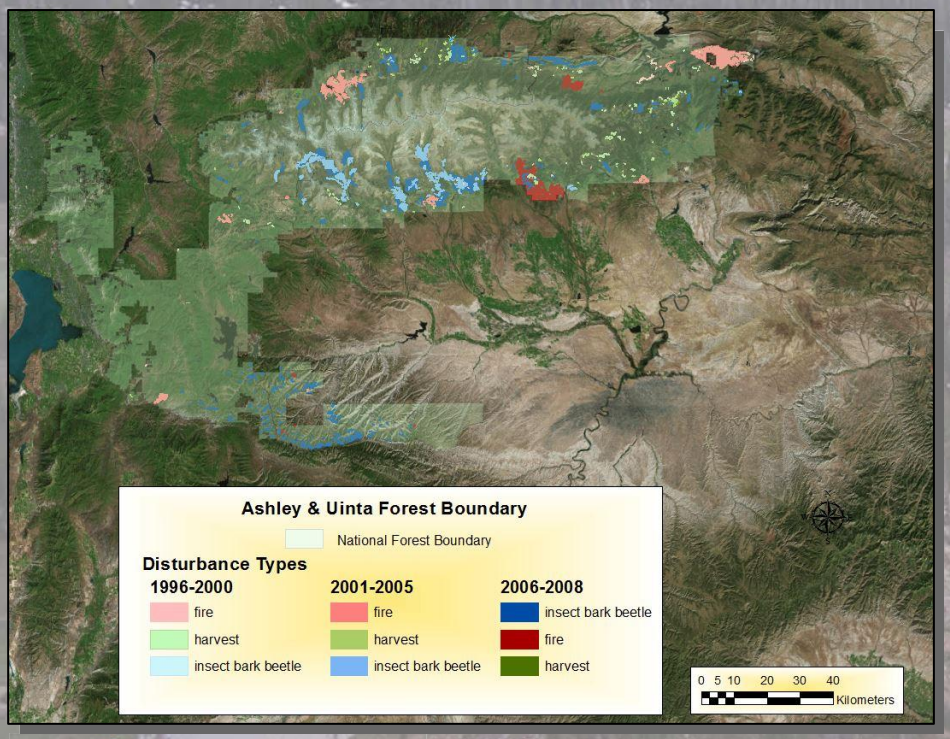
S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES
UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

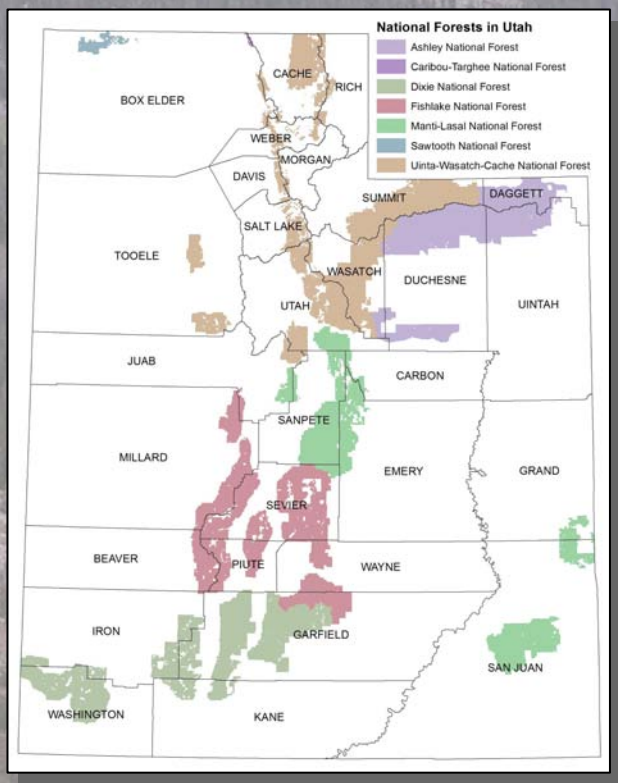
Mapping Forest Resources in Utah

Mapping of forest disturbances across National Forests in Utah.

The United States National Forest System (NFS) comprehensive plan for carbon monitoring requires accurate maps of disturbances, such as fires, harvests, and insect activity. The Remote Sensing / GIS Laboratory, in partnership with the United States Forest Service (USFS) is generating a long-term time series of maps that show the timing, extent, and type of disturbances going back to 1990 and concluding in 2011. Our mapping approach starts with an automated initial detection of annual disturbances using imagery captured within the growing season from the Landsat archive. The initial detections are then visually inspected, manually corrected and labeled using various USFS ancillary datasets and Google Earth high-resolution historic imagery. This is an unprecedented effort that provides comprehensive disturbance history for the past 22 years for all the National Forests in the United States.

Valuable information about trends in disturbed area, and how disturbance fluctuates in space may be extracted for any National Forest in the State of Utah. An initial assessment of the Ashley-Uinta NF clearly shows that there was a dramatic increase in the areas disturbed by insects (bark beetles and defoliators) in the late years of the past decade. Studies to determine the relative effects of past disturbance and climate anomalies on the occurrence of additional disturbance are underway. These data and information can be useful for a variety of management applications such as wildlife habitat assessments, carbon sequestration dynamics, performance of field activities, among others.





S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES
UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

Primary Project Researchers: Dr. Alexander Hernandez, Dr. Sean Healy, Dr. Doug Ramsey, and Mr. Thomas Thompson

Sage Grouse Habitat

Mapping sage-grouse habitat corridors and movement potential in Utah.

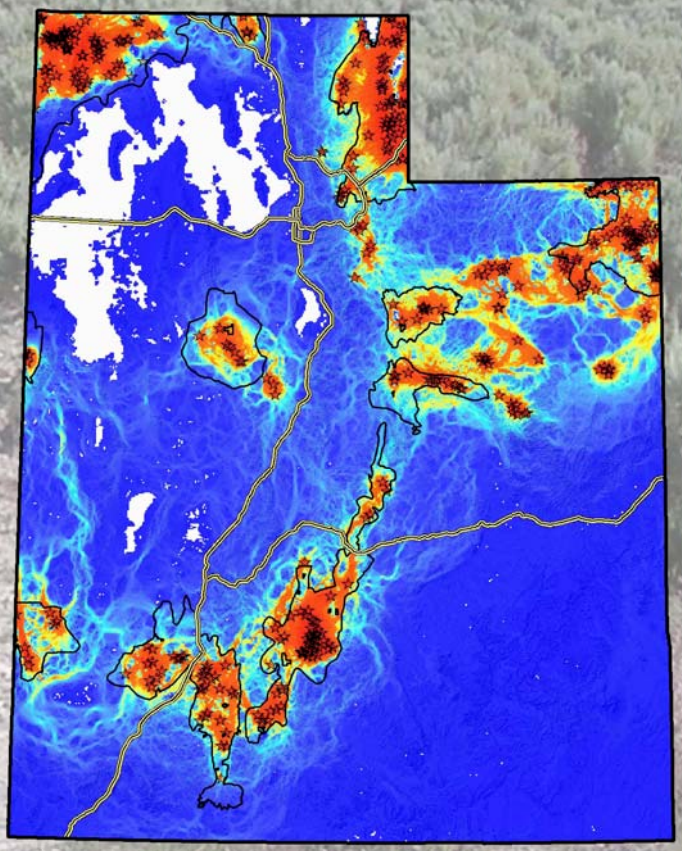
Conservation of wide-ranging sage-grouse populations requires an understanding of how and where birds move within and between seasonal habitats to complete their life cycle. Sage grouse require vast tracts of intact sagebrush and exhibit varied movement strategies across their range in response to the composition of available habitats and human activities. In places where particular habitat pathways facilitate movement, managers may need to extend conservation actions to maintain these habitats as linkages between seasonal ranges.

We mapped connectivity corridors between active sage-grouse leks in Utah using an approach based on circuit theory. The mapped landscape is treated as a circuit board, where each pixel on the map provides a certain level of resistance to the flow or movement. Sage-grouse can pass more easily through areas with high quality habitat. These areas are assigned a lower resistance level, while areas of poor habitat are assigned higher resistance values.

To highlight areas with the best movement potential (**shown in red**), "voltage" is introduced to the landscape at sage-grouse lek locations. These critical areas are where sage-grouse congregate in the spring to mate. Leks are shown on the map as **stars**. More voltage is applied to the leks with higher number of bird counts, while leks with lower usage rates receive less voltage.

The final map displays an estimate of the cumulative sage-grouse 'current' that would flow between all of the leks. It could be used by managers to prioritize conservation actions in areas with high movement potential, as these are likely the areas that are of critical importance to Utah's sage-grouse populations.

Pacific Southwest Region U.S. Fish and Wildlife Service



S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES
UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

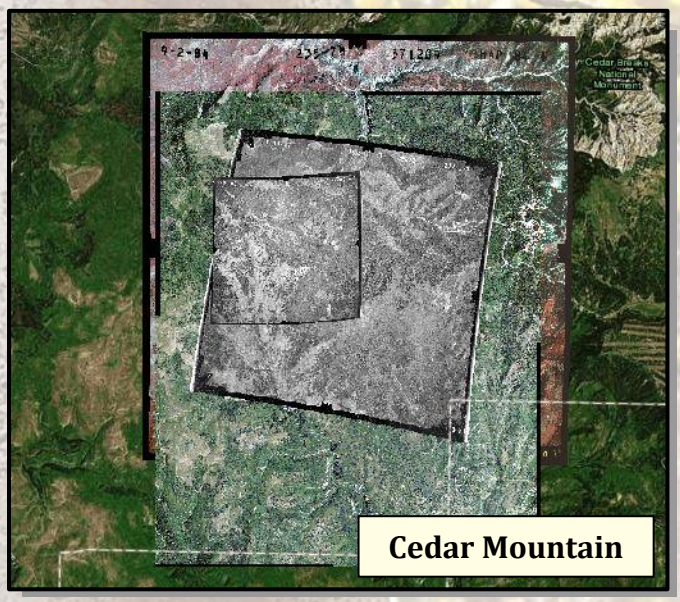
This project is being conducted by **Mr. Benjamin Crabb** at the Utah State University Quinney College of Natural Resources Remote Sensing/GIS Laboratory and is directed by Dr. Terry Messmer, Dr. David Dahlgren, and Dr. Doug Ramsey

Saving Utah's Forest Resources

Decadal analysis of aspen-conifer succession using remote sensing and GIS.

Quaking aspen (*Populus tremuloides*) is a key species in many western North American ecosystems. Aspen support a wide range of flora and fauna and has the potential to serve as natural fire breaks in large, otherwise coniferous-dominated forest ecosystems. Research has shown that declines in aspen over recent decades may be driven by changes in regional climate, fire suppression, increased pressure from wildlife and domestic browsing, and conifer encroachment.

The study uses remote sensing and geographic information systems (GIS) analysis to determine successional pathways in aspen and conifer stands in 10 year increments ranging from the 1940s to present. The goal is to evaluate overall changes in aspen coverage over large spatial and temporal scales in Utah by conducting geospatial analysis of historic aerial photographs.



Cedar Mountain

Fish Lake

This project is being conducted by **Mr. Thomas Thompson** with the Utah State University Quinney College of Natural Resources Remote Sensing/GIS Laboratory, under the direction of Dr. Karen Mock and Dr. Doug Ramsey.
Data has been provided by Mr. David Davis of the U.S. Department of Agriculture Aerial Photography Field Office in Salt Lake City, Utah.

USDA

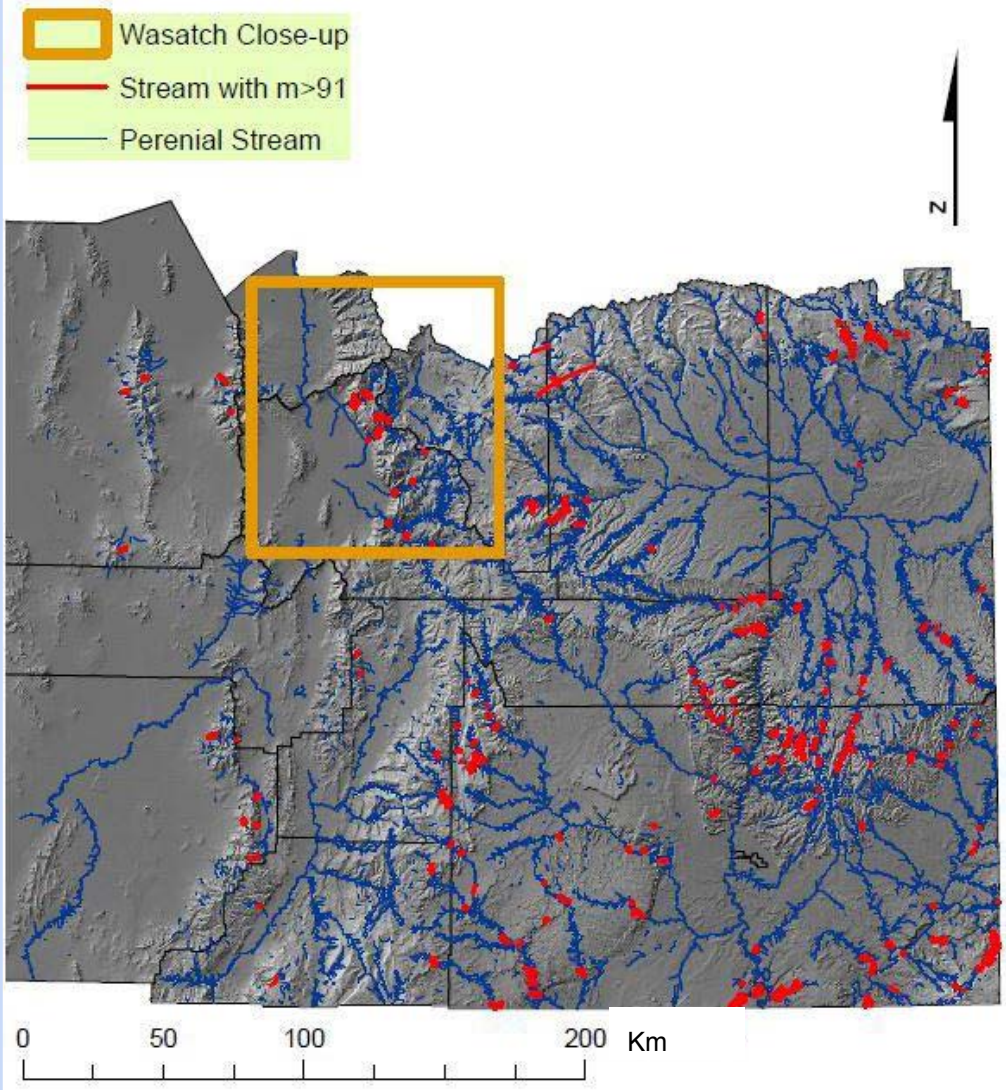
S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES UtahStateUniversity
REMOTE SENSING/GIS LABORATORY

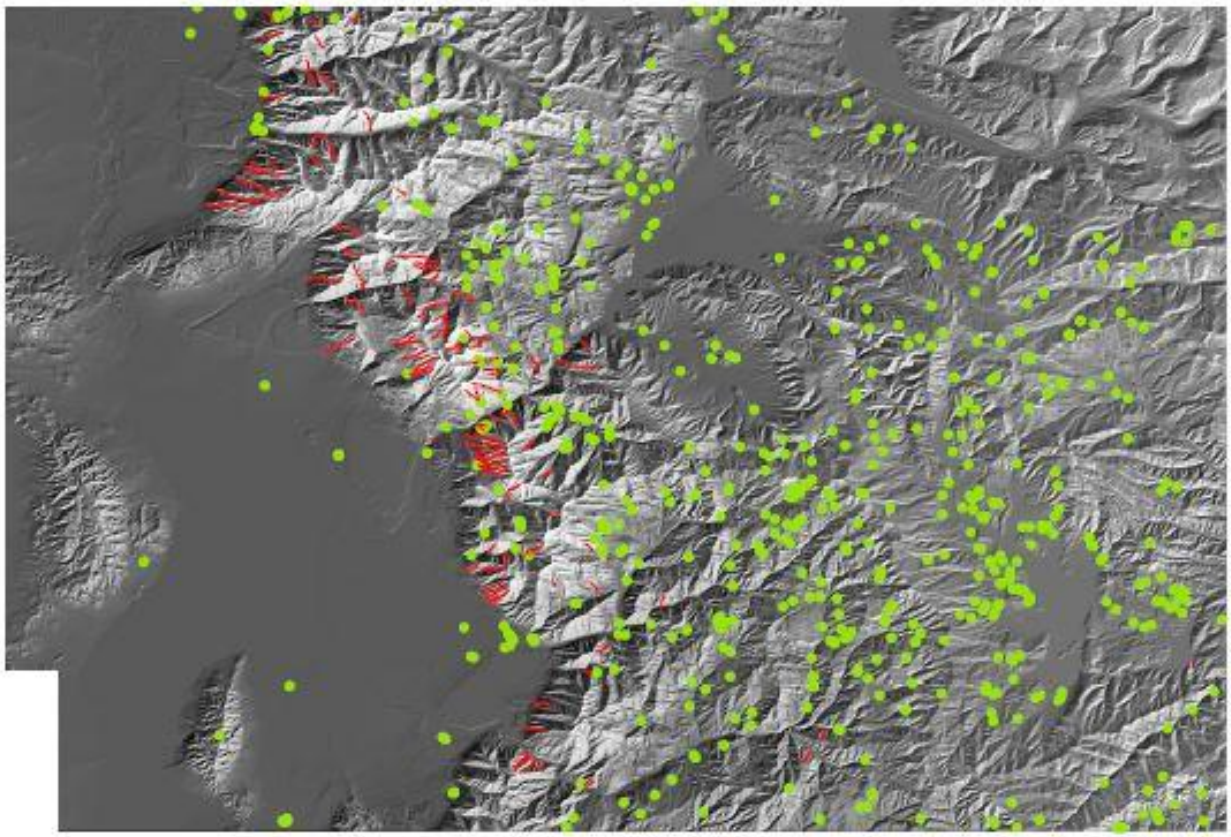
S.J. & JESSIE E. QUINNEY COLLEGE of NATURAL RESOURCES UtahStateUniversity

UTAH VIEW

Potential Vertical Ice Buildup (for Ice Climbing) in Central Utah Drainages

Locations where both steep perennial streams and bedrock seeping springs occur are mapped below to identify potential ice climbing sites.





Steep perennial streams infiltrate less, often due, to thin soil horizons giving way to bedrock outcrops.

Also, springs are more likely to flow year-round and those seeping from bedrock commonly form vertical ice during winter months.

UTAH VALLEY UVU UNIVERSITY

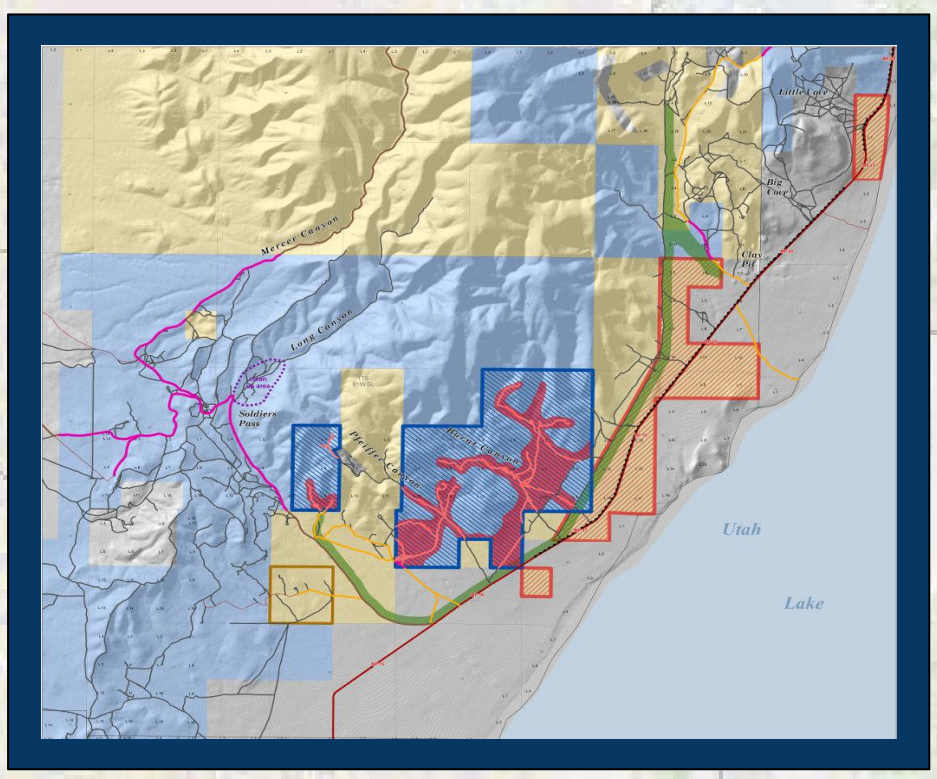
Paul Robertson
UVU Earth Sciences GIS
Fall 2014

Lake Mountain Cleanup

Protecting School Trust Lands at Lake Mountain, Utah County

2014 years
$1.4 billion for public schools

State of Utah
School and Institutional
Trust Lands Administration



The Trust Lands Administration, in partnership with Utah County, conducted three cleanup projects at Lake Mountain. The Utah County Commission and SITLA coordinated the cleanup effort after the commission received complaints from residents about illegal dumping and undisciplined shooting in the area.

Local high school students, employees from Utah County and SITLA and other volunteers collected nearly 11 tons of illegally-dumped construction materials, spent ammunition shells, and other debris, including appliances and many tires.

In addition to fencing efforts by Utah County and land closures by BLM in the area, SITLA closed approximately 1,500 acres to public access to help curb increased fire danger from undisciplined shooting as well as destruction of public lands, including archaeological artifacts.

Barry Biediger, GISP GIS analyst
State of Utah Trust Lands Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102
801-538-5146

Remote Sensing Analysis of a Flood Season's Impact on Pleasant Creek, Capitol Reef National Park, Utah

Bret Huffaker, Suzanne Walther, & Nathan Toké

Utah Valley University, Department of Earth Science, 800 West University Pkwy, Orem, UT 84058

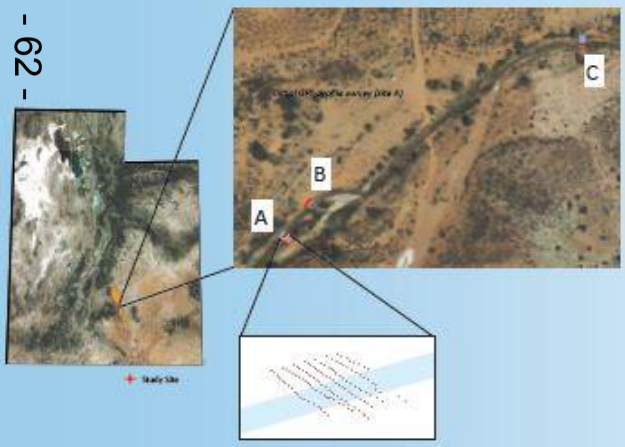
huffakerbret@gmail.com

Objectives

- Establishing base data for future flow and sediment transport analysis on Pleasant Creek in Capitol Reef National Park (CRNP)
- Using high-resolution RTK GPS and imagery with Structure from Motion (SfM) to create digital elevation surfaces for use in geomorphic change detection analysis.

Study Site

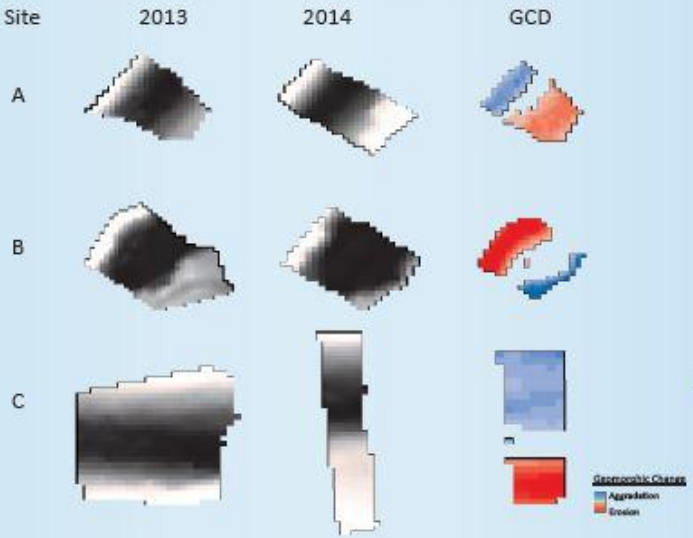
Capitol Reef National Park lies in south-central Utah. Little research has been done in this area, particularly with respect to the river morphology as well as sediment distribution and transport on the perennial rivers flowing in the National Park. Pleasant Creek flows through the Park adjacent to Utah Valley University's Capitol Reef Field Station. We surveyed channel morphology at three locations along a reach of Pleasant Creek where the substrate o composed of mixed gravel to sand overlying the Triassic Moenkopi Formation.



Methods

In 2013, before the summer flood season, we collected baseline rtkGPS data at three ~15m x 15m sites. At each site we surveyed cross sections, spaced every one meter and collected points at 0.5m intervals along each section. We grab-sampled substrate and took a flow measurement on the center cross-section of each site for future modeling. The next spring we repeated the surveys at each site. We created digital elevation models for both survey years, then we used the Geomorphic Change Detection software add-on to ArcGIS (Wheaton et al. 2010a) to identify sites of aggradation and erosion. Accounting for error in our data collection method, we used a detection threshold of 0.06m for identifying these areas. Our initial surveys indicate that larger analysis areas and break lines are needed for improved error calculation. We are applying these methods with new data collected before and after a massive flash flood in August 2014.

Geomorphic Change Detection

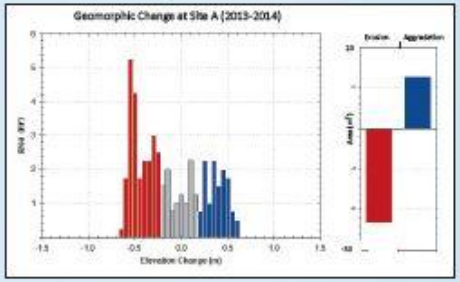


Results (2013-2014)

Using a standard rtkGPS error threshold of 0.06m at 95% confidence (most conservative), eliminates ~27% of the analysis area. The total net volumetric difference is $-22 \pm 15 m^3$ (erosion) and the average net vertical difference is -0.23 ± 0.15m. Over the reach there was 16% more volumetric change due to erosion than deposition. Data from all three sites highlight the geomorphic change between summer of 2013 and spring 2014.

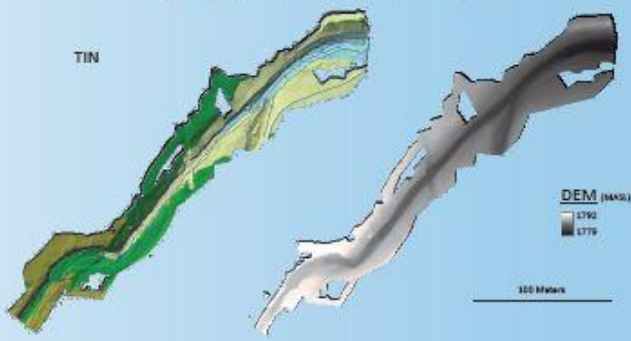
GCD Output Table for Site A (2013-2014)

Attributes	Raw	Thresholded (with Uncertainty)
AREAS		
Total Area of Erosion (m^2)	29	20
Total Area of Deposition (m^2)	29	15
Total Area of Detectable Change (m^2)	n/a	35
Total Area of Interest (m^2)	47	n/a
Percent of Area of Interest with Detectable Change	n/a	73%
VOLUMETRICS		Minus Volume / Plus Volume
Total Volume of Erosion (m^3)	20	19 ± 5 / 0	95%
Total Volume of Deposition (m^3)	6	5 ± 3 / 0	92%
Total Volume of Difference (m^3)	26	15 ± 2 / 0	58%
Total Net Volume Difference (m^3)	-4	-4 ± 3 / 0	-100%
SURFACE DISTRIBUTIONS		Minus Variance / Plus Variance
Average Depth of Erosion (m)	0.34	0.33 ± 0.28	98%
Average Depth of Deposition (m)	0.21	0.19 ± 0.28	90%
Average Total Thickness of Difference (m) for Area of Interest	0.34	0.31 ± 0.23	90%
Average Net Thickness Difference (m) for Area of Interest	-0.16	-0.09 ± 0.11	-100%
Average Total Thickness of Difference (m) for Area with Detectable Change	n/a	0.41 ± 0.28	69%
Average Net Thickness Difference (m) for Area with Detectable Change	n/a	-0.22 ± 0.15	-100%
PERIMETERS (BY VOLUME)		
Percent Erosion	66%	83%	
Percent Deposition	34%	33%	
Percent Unbalanced (Imprecision Equilibrium)	-34%	-33%	
Net -to-Total Volumes Ratio	-20%	-30%	



Future Work

New 2014 RTK GPS data (pre-flood)



New 2014 point cloud SfM data (post-flood)

In June 2014, we collected over 3000 RTK GPS data points of the entire study area. When we returned in September to collect high resolution imagery using a Dji quacopter, the creek had experienced a massive flash flood, completely altering it. We are now creating elevation surfaces from both data sets to perform GCD and point cloud comparisons of the channel to calculate a sediment budget for the flash flood. This is an ongoing project. Each season we will conduct repeat surveys of the area to provide long-term change data on the creek and to investigate impacts of seasonal flash flooding. An important additional component will be to use gaging stations along the nearby Fremont River as a proxy for the hydrologic record of Pleasant Creek which is currently ungaged.

Acknowledgements

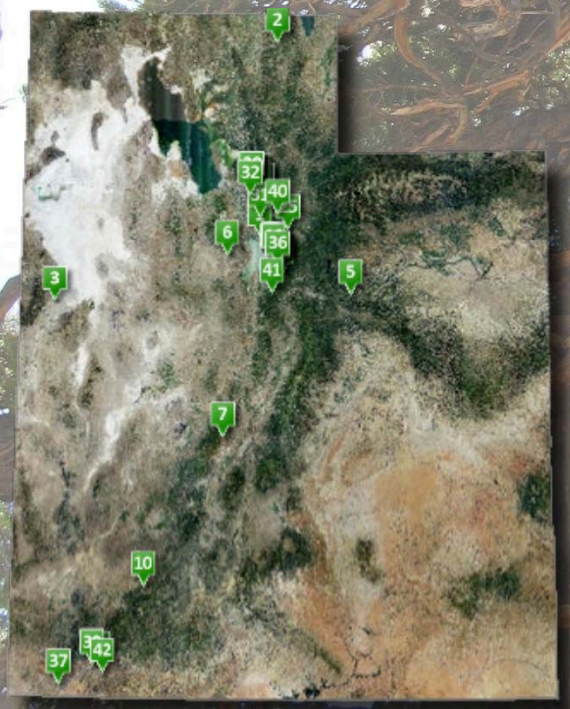
We thank Alison Stallings and Russell Harrel for field assistance, Jason Kudulis at the Capitol Reef Field Station for housing, and Sandy Borthwick at the National Park Service for research permission. This work was funded by a UVU Summer Undergraduate Research Fellowship (SURF) in 2013 and a Grant for Engaged Learning in 2014. Future work is funded by a 2014 SURF.

Utah Heritage Trees Story Map

How our roots have grown with the trees to tell Utah's rich history.

Utah's Heritage Tree Program aims to celebrate the State's rich history through trees. Trees played a critical role in the establishment of most Utah communities and continue to stand witness to important historic events. People need trees and, often in Utah, trees need people. The Heritage Tree Program tells this story.

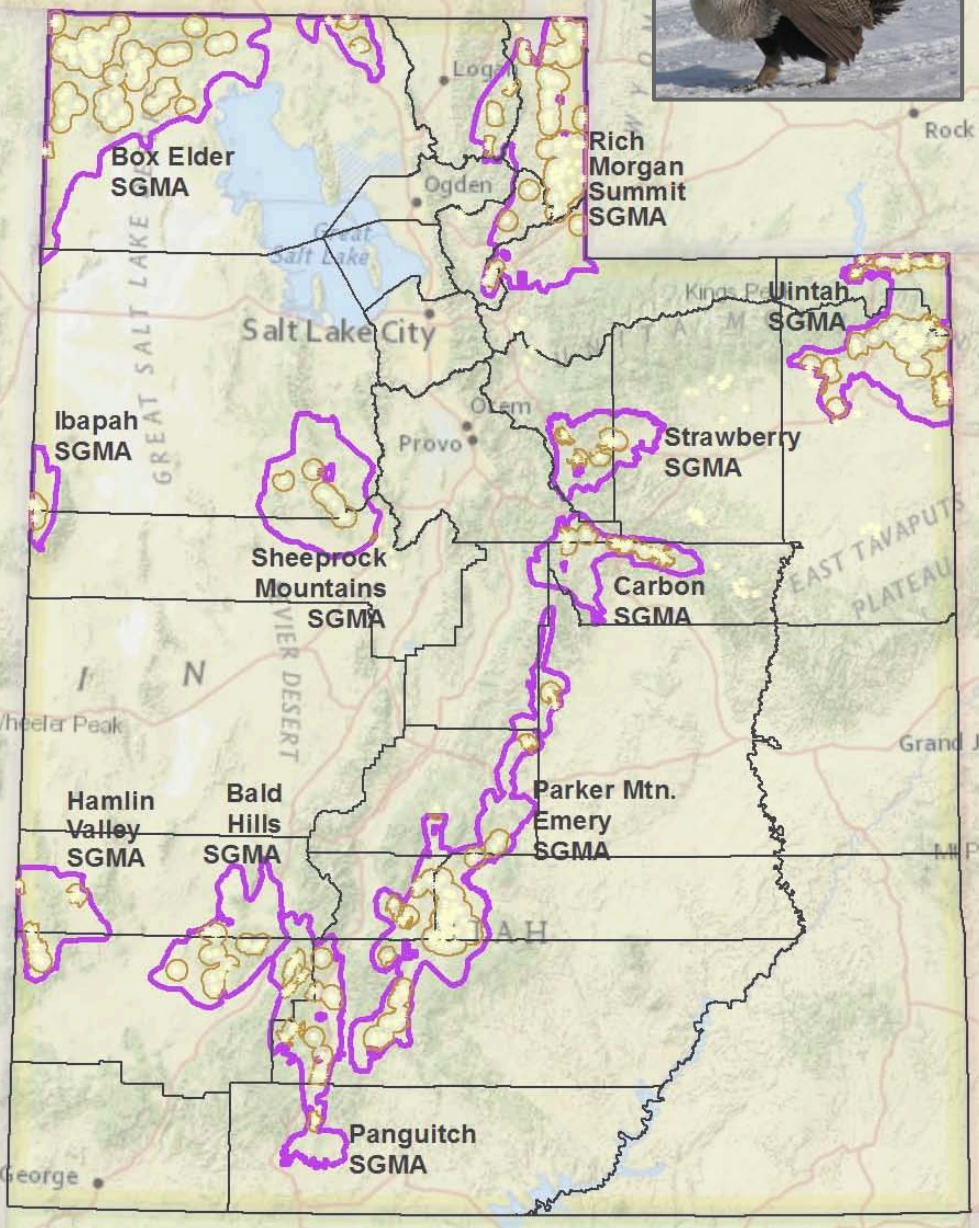
Explore Utah's Heritage Trees at
bit.ly/UtahHeritageTreesStoryMap



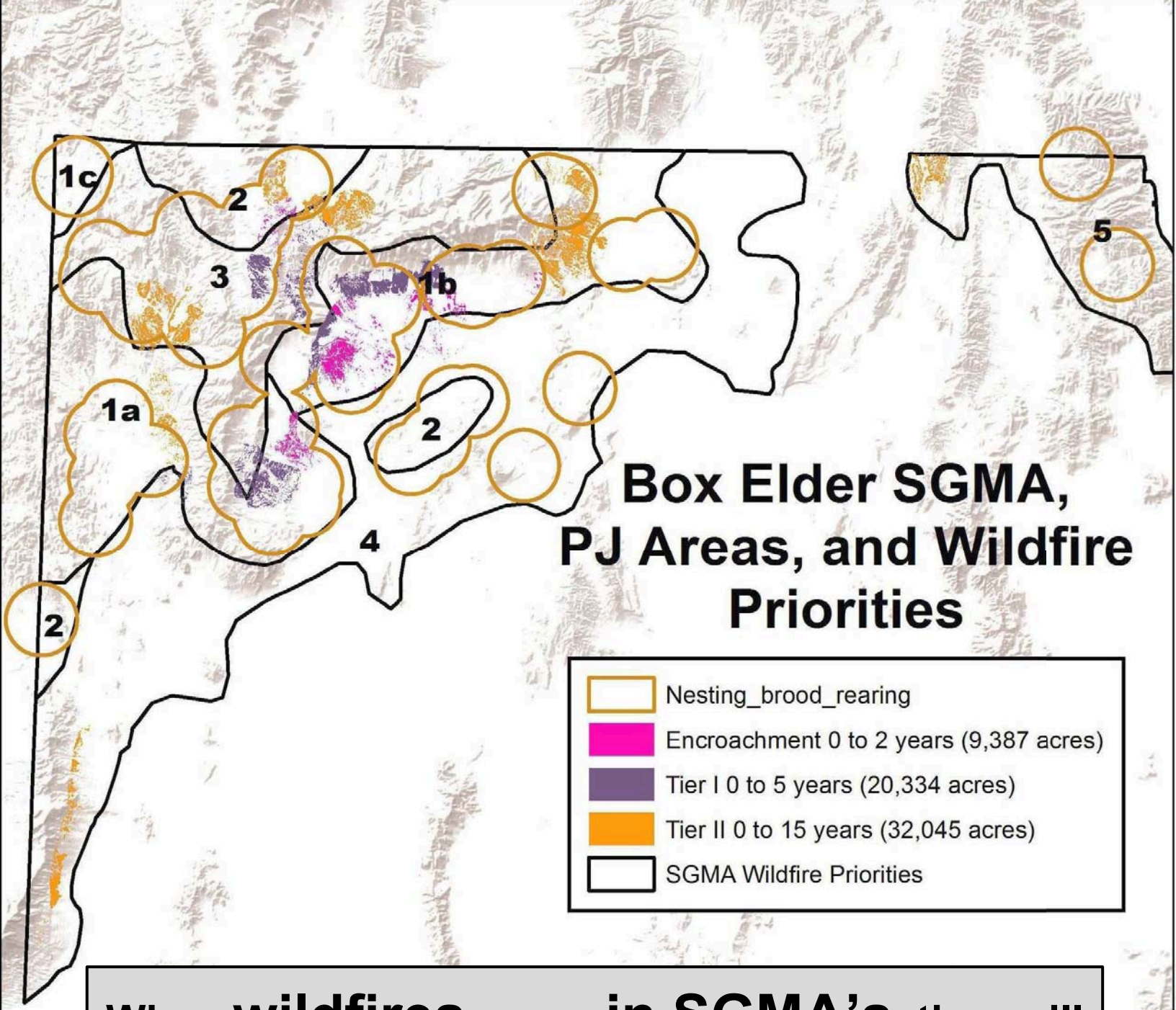
Utah Division of Forestry, Fire and State Lands
Buck Ehler, Jennifer Biggs, Meridith Perkins & Heather Church
Contact: meridithperkins@utah.gov

Utah's Sage Grouse Management Areas (SGMA's)

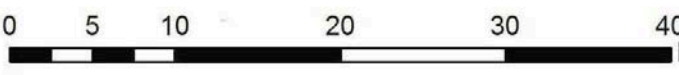
Protecting and Improving High Quality Habitat



The State of Utah is working to eliminate threats facing sage-grouse populations while balancing the economic and social needs of the residents of Utah. These actions are necessary to help negate the need for the listing of the species under the provisions of the federal Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (FWS) is bound by a court decree to make a final decision by the end of 2015.



When wildfires occur in SGMA's, they will be fought more aggressively according to the established "Wildfire Priority" areas.

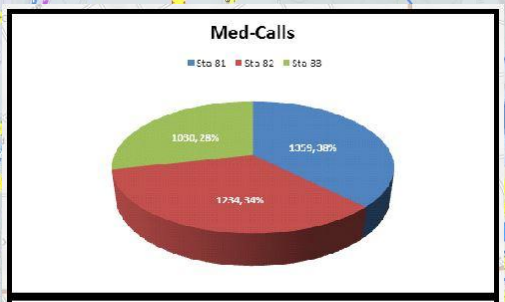


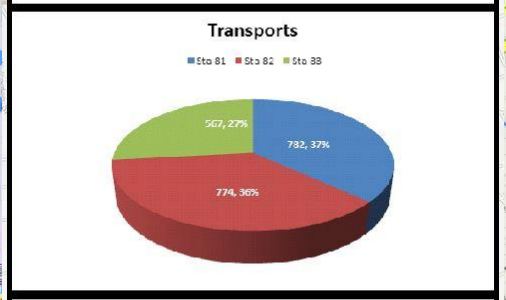
Sources: Esri, USGS, NOAA

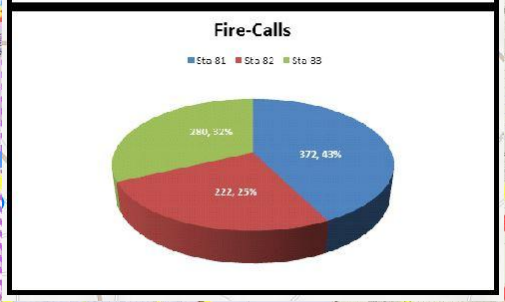
Public Safety, Health, and Emergency Response

Consolidating Ambulance Service for Murray City

Ambulance Service Relocation







Murray City provides Fire, Emergency Medical and Ambulance service to its residents. The City is served by three fire stations, each serving a zone of approximately one third of the City. In an effort to consolidate services, the Fire Department made a decision to dispatch ambulance service from only two of the stations. In an effort to determine which two stations to best house the ambulance service, data was obtained from VECC (Valley Emergency Communications Center), the emergency dispatching agency which handles calls for the City. Monthly call logs were combined and categorized between medical calls, fire calls, and transport calls. These calls were geocoded and quantified per Fire Zone. From this analysis it has been determined that ambulances should continue to be dispatched from Stations 81 and 82.

MURRAY FIRE & EMS

Murray City GIS
Contact: Janie Richardson
jrichardson@murray.utah.gov

Supporting NextGen 9-1-1: Statewide GIS Map Layers

Coordinated state and local government GIS efforts are helping to position Utah as a lead state in implementing Next Generation (NG) 9-1-1 service.

The NG platform replaces legacy telephone-address tables with modern GIS-based location resources.

In NG 9-1-1, GIS data will verify and determine the location of calls, route calls to the correct Center (PSAP), and provide call-takers and dispatchers with robust map views. GIS data quality, completeness, and updates (ideally daily), will become even more critical to public safety.

Location Finding

- ☑ **Road Centerlines** with Street Address Ranges & Aliases
- ☑ **Highway System**: Mileposting and Exits
- ☑ **Aerial Photography**
- ☑ **Address Points & Assignment Areas**
- ☐ **Cell Tower Antenna Sectors**
- ☑ **Railroad Centerlines** & Mileposts
- ☑ **Lakes and Streams**
- ☑ **Common place points** (official & other)
- ☑ **Municipal and County Boundaries**
- ☑ **Unincorporated Areas**
- ☐ **Neighborhoods/Subdivisions**
- ☑ **Parks and Campuses**
- ☑ **Composite Base Maps**
- ☑ **Other:** Schools, shopping complexes, government offices, trails and trailheads, other recreation facilities/sites, etc

Jurisdictional

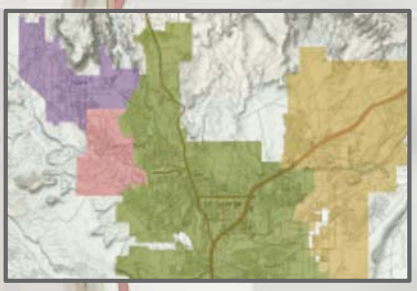
- ☑ **911 PSAP Boundaries**
- ☑ **Emergency Response Service Boundaries**
- ☑ **Non-Emergency Service Boundaries**
- ☑ **GIS Data Maintenance Responsibilities**

Current Status (& Update Goal*)

- ☑ = *Updated As Changes Occur***
- ☑ = *Update Published Monthly*
- ☑ = *Updated Bi-Annually*
- ☑ = *Updated Periodically*
- ☑ = *Good, But Incomplete*
- ☑ = *Incomplete*
- ☐ = *Not Begun*

** boundary of check box indicates suggested goal*
*** or, as updates received from data steward*

UTAH 911 COMMITTEE

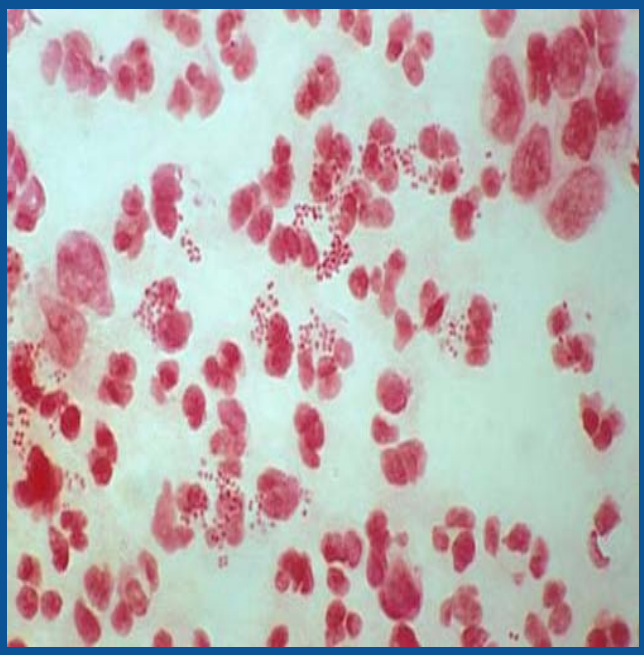


UTAH AGRC
LOCATION MATTERS
gis.utah.gov

Gonorrhea Cases in Utah

UTAH DEPARTMENT OF HEALTH

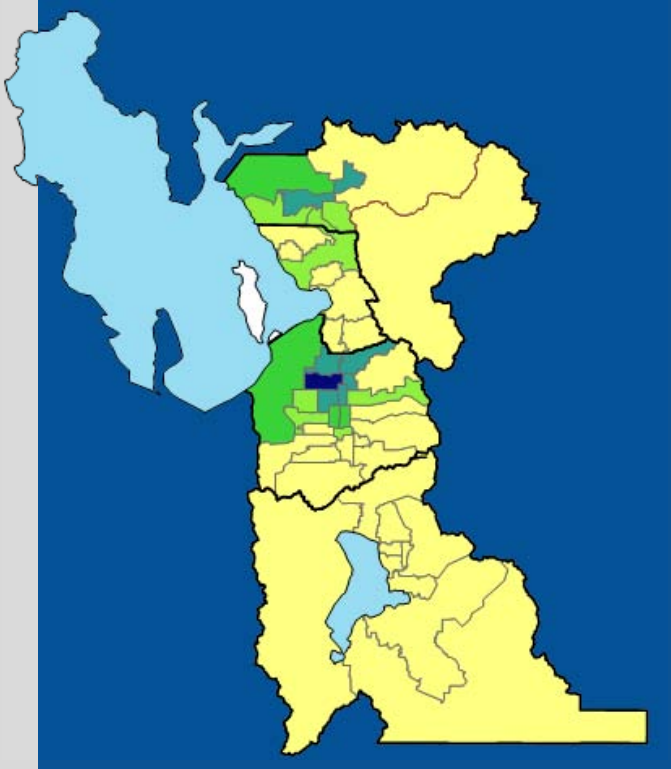
Abstract:
Utah's gonorrhea (GC) statewide rate increased from 9.8 cases per 100,000 population in 2011 to 32.8 cases per 100,000 population in 2013. Analysis of the reported case data suggests a shift in the affected population from primarily men who have sex with men (MSM) to a heterosexual population. Infections among males increased 166% from 2011 to 2013, while infections among females increased 447%. Mapping of the local epidemiology allowed for a visual of the changing trends in the various health districts.



GIS was used in this effort to:

- **Identify** areas of high morbidity
- **Track** trends of GC cases
- **Assess** possible gaps in testing services
- **Determine** effective interventions for each health district

This map uses the Health Department's Small Health Statistical Areas have been sized to provide an overview of spatial health trends without compromising individual anonymity.



Joel Hartsell, MPH
STD Epidemiologist
joelhartsell@utah.gov

Targeting Radon Education to Prevent Lung Cancer

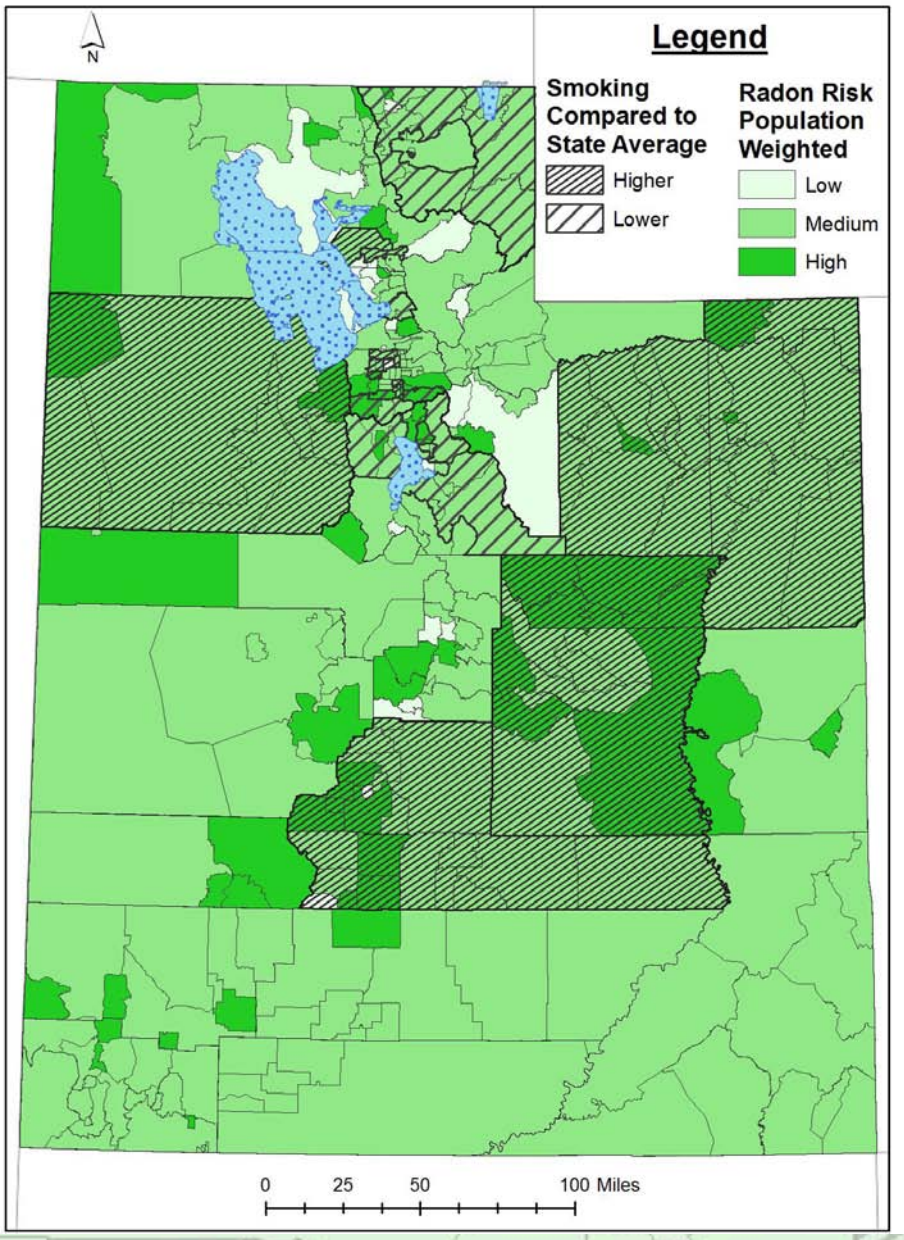
Population Weighted Radon Exposure Risk with Smoking Prevalence, by ZIP code

Radon is a leading cause of lung cancer, second only to smoking. It is a colorless and odorless gas that is naturally released and gets trapped inside of homes. Only through proper testing can radon levels be detected. People who smoke and are exposed to high levels of radon have a very high risk of lung cancer.

This map combines radon geology data and population data to estimate areas where indoor radon levels could be high. Also, smoking prevalence data is overlaid on the map to highlight areas of particular concern regarding lung cancer.

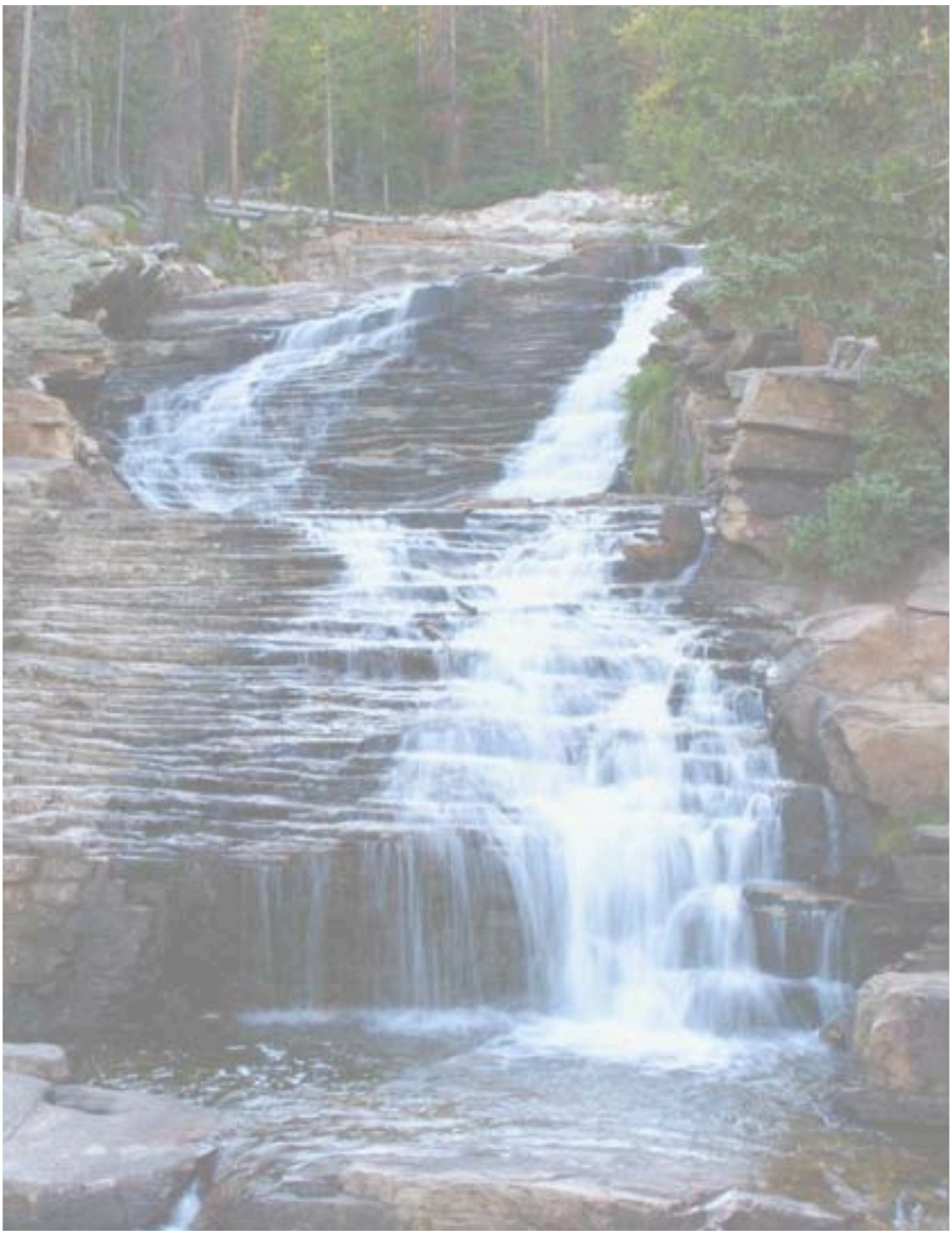
This information can be useful to target radon and lung cancer prevention outreach programs.

Radon Risk by Population and Smoking Prevalence by ZIP Code, Utah



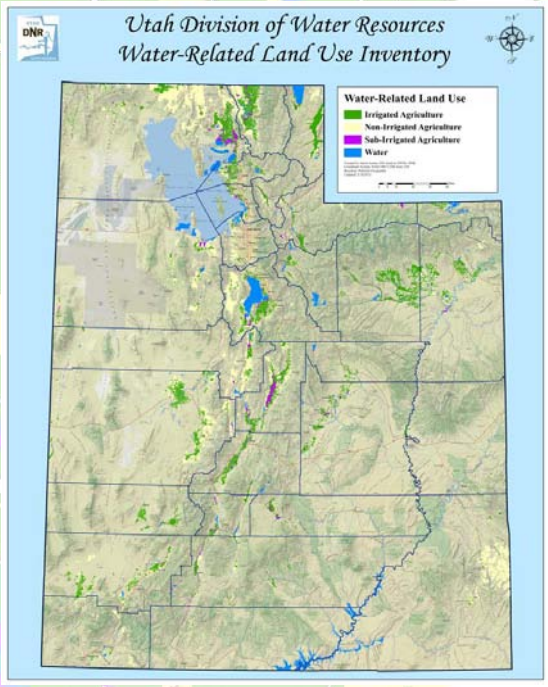
Map created by Sasha Zaharoff, MPH
Utah Environmental Public Health Tracking Network
Utah Department of Health
Website: epht.health.utah.gov
Email: eep@utah.gov

Water Resources



How Is Water Used and Where Is Water Use Changing In Utah?

Water-Related Land Use



The Division of Water Resources collects spatial land use data in its yearly inventory. This data provides decision makers with vital information regarding the location, extent, irrigation methods and types of agriculture as well as a basis for calculating the evapotranspiration (ET) of crops and the water budget (inflows, outflows, consumptive uses and supply) of a given basin or watershed.

The Water-Related Land Use layer is used to aid analysis regarding:

- Ag to Urban Change
- Population Projections
- Sage Grouse Habitat
- and more...

UTAH DNR NATURAL RESOURCES

UTAH DNR WATER RESOURCES

Aaron Austin, Utah Division of Water Resources

Utah's Water Quality Assessment and Beneficial Uses Map

Utah Department of Environmental Quality
Division of Water Quality

in cooperation with

Automated Geographic Reference Center (AGRC)

UTAH AGRC
Automated Geographic Reference Center

http://mapserv.utah.gov/surfacewaterquality/

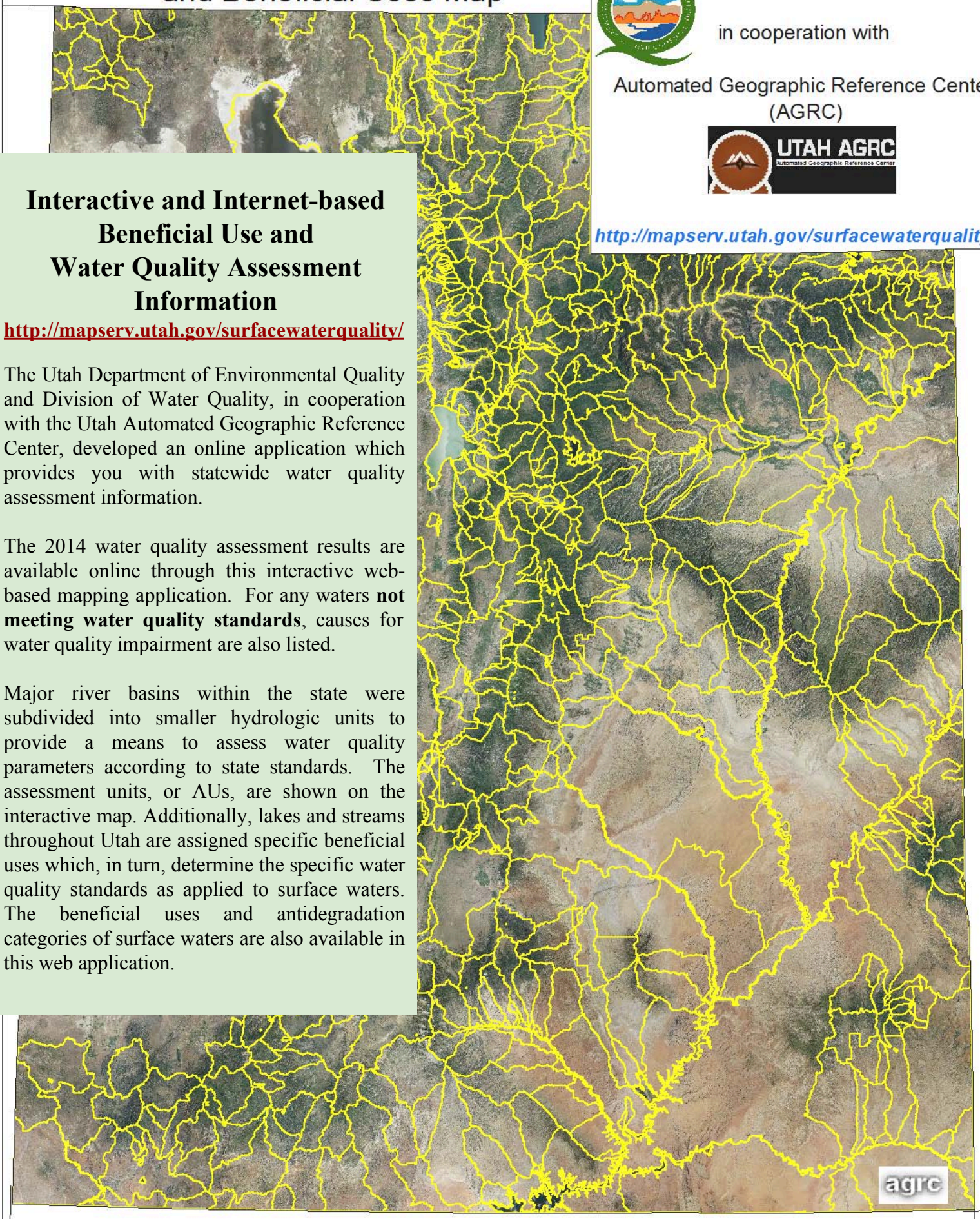
Interactive and Internet-based Beneficial Use and Water Quality Assessment Information

http://mapserv.utah.gov/surfacewaterquality/

The Utah Department of Environmental Quality and Division of Water Quality, in cooperation with the Utah Automated Geographic Reference Center, developed an online application which provides you with statewide water quality assessment information.

The 2014 water quality assessment results are available online through this interactive web-based mapping application. For any waters **not meeting water quality standards**, causes for water quality impairment are also listed.

Major river basins within the state were subdivided into smaller hydrologic units to provide a means to assess water quality parameters according to state standards. The assessment units, or AUs, are shown on the interactive map. Additionally, lakes and streams throughout Utah are assigned specific beneficial uses which, in turn, determine the specific water quality standards as applied to surface waters. The beneficial uses and antidegradation categories of surface waters are also available in this web application.



Protecting and Improving the Quality of Utah's Waters

Utah's Surface Water: Beneficial Uses and Water Quality

Water samples were collected throughout the State of Utah to assess the quality of Utah's waters. Results of water chemistry analyses were compared to existing water quality standards based on water's assigned beneficial uses. Biological components of Utah's lakes and streams were also included.

Assessment results show the locations of waters where management practices are needed to protect existing waters and where Total Maximum Daily Load (TMDL) studies are required to improve impaired waters.

GIS mapping by Mark Stanger from data compiled by Utah Division of Water Quality staff, Utah DEQ.

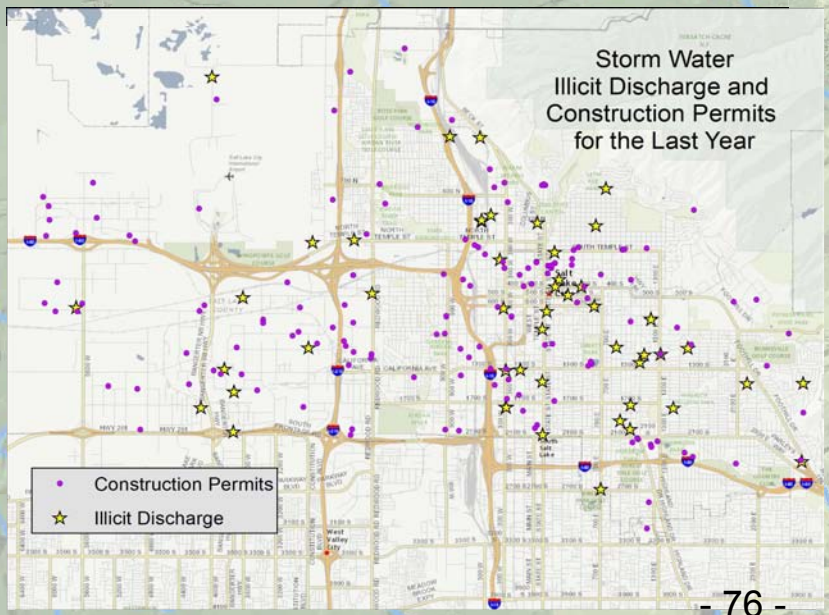
Salt Lake City Public Utilities

Protecting Salt Lake City's Water Resources

With more and more use within our protected watershed (e.g. tanker trucks carrying hazardous materials down Parleys Canyon, major oil and gas pipelines), the need for better communication between emergency responders and SLC Public Utilities has increased. Improved mapping has allowed for our crews and emergency responders to identify exactly where an incident occurred and better assess what the potential effect could be on our water resources. Better mapping has resulted in faster response times and protection of our drinking water resources.

Our storm water quality group has a goal to minimize contamination from entering our storm drain system. To aid in this endeavor, mobile maps have been developed to track and document unlawful discharges within the city boundaries. In addition, the map is used to better inventory and track construction sites and activities across the City.

Collaborating with Emergency Management to Protect our Water Resources in Parleys Canyon.

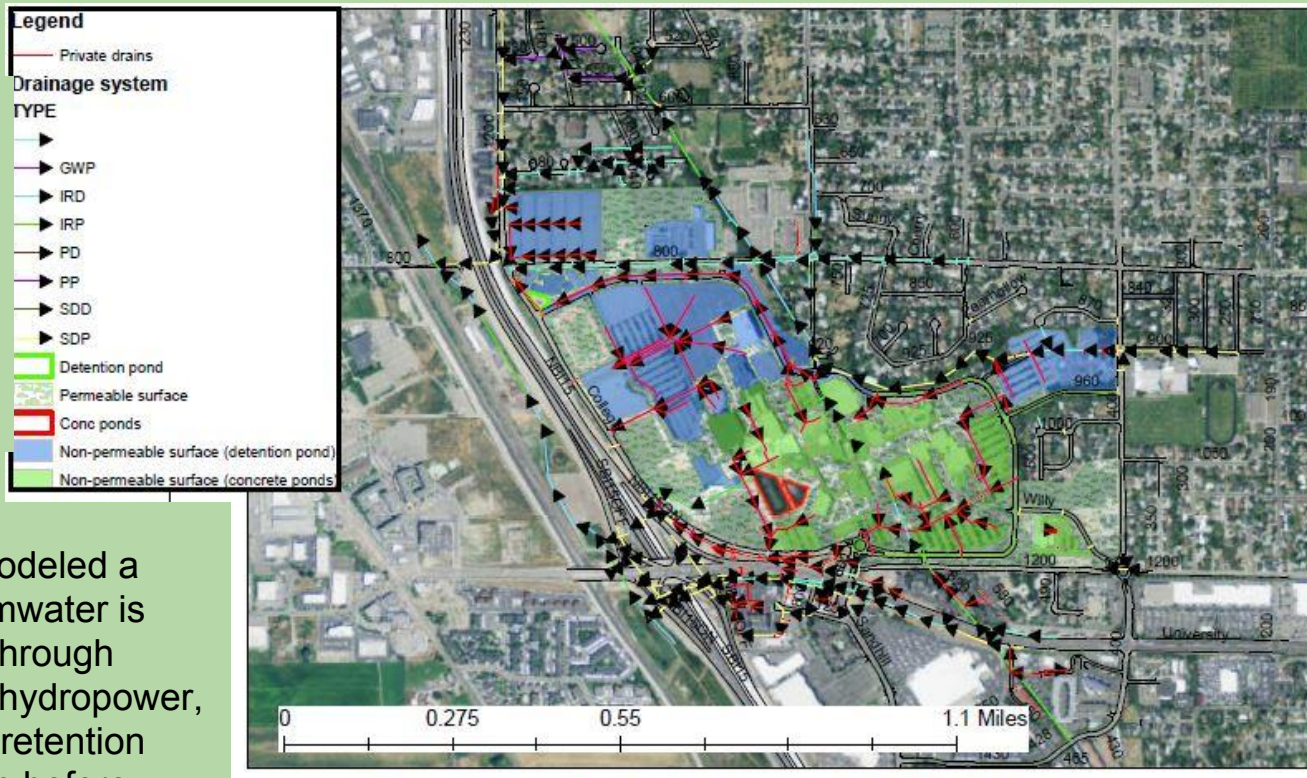


Keep It Pure
Mountains to your Tap
SALT LAKE CITY PUBLIC UTILITIES - WATERSHED MANAGEMENT

Salt Lake City
Department of Public Utilities
GIS Department

UVU Stormwater Containment and Filtration Plan

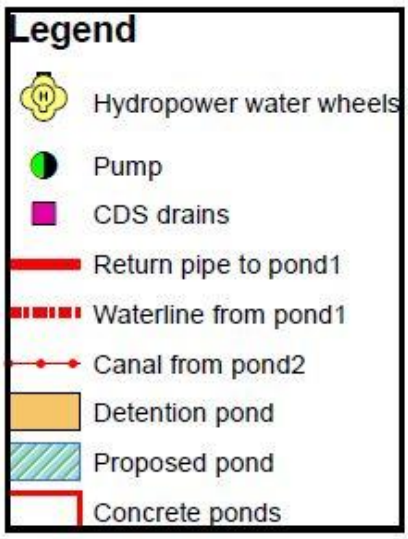
Stormwater from UVU's main campus, with all its road toxins, currently flows to Utah Lake.



Direction of water flow in current drainage system

Using GIS, we modeled a route where stormwater is redirected--first, through water wheels for hydropower, and second, into retention ponds for filtration before being routed to Utah Lake.

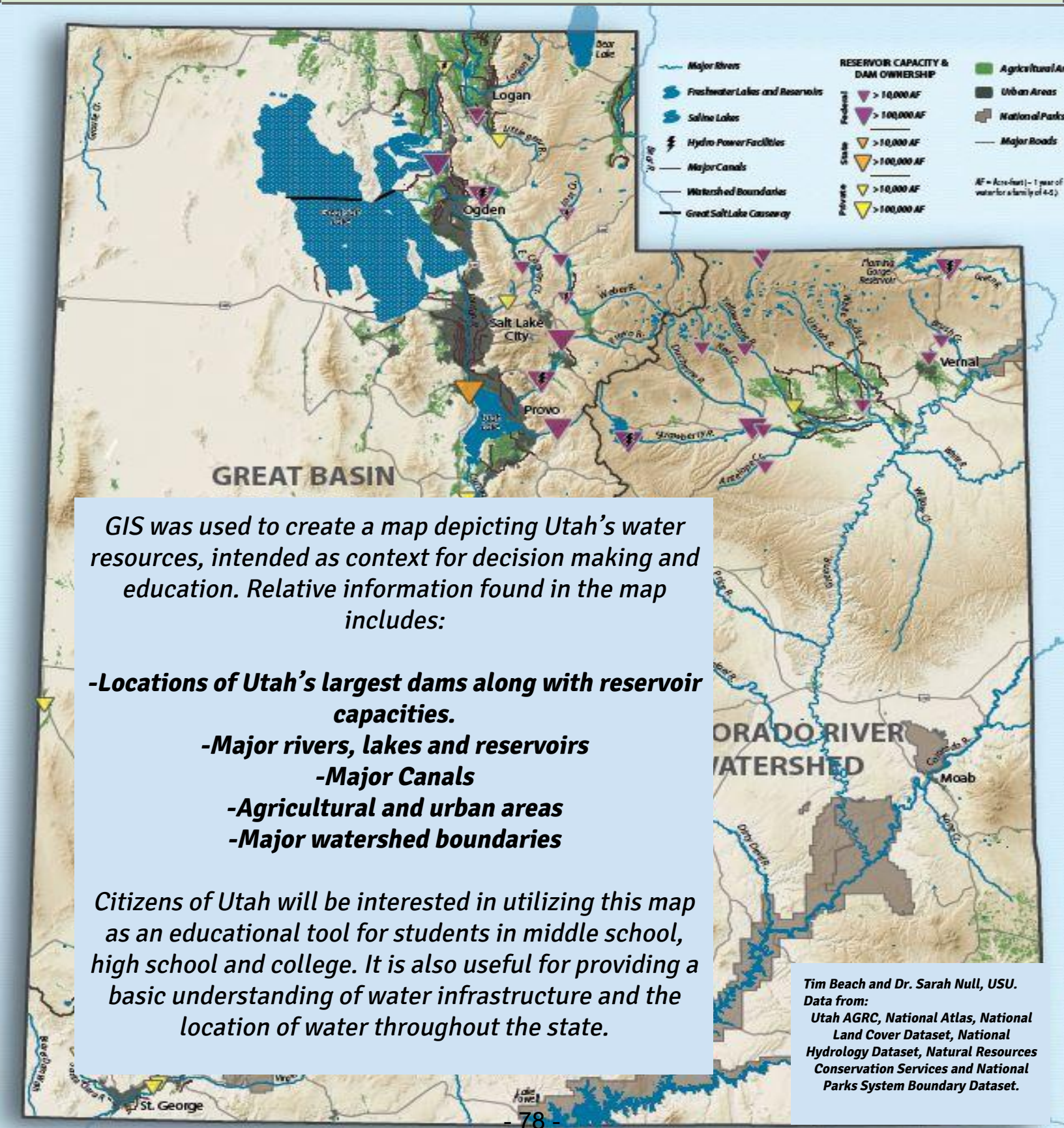
This prevents toxins from entering Utah Lake's important fish habitat and recreation areas.



Proposed containment and filtration system for UVU campus

Kevin Greenwell
UVU Earth Sciences GIS Fall 14

Spatial Relationships that Provide Context for Decisions



GIS was used to create a map depicting Utah's water resources, intended as context for decision making and education. Relative information found in the map includes:

-Locations of Utah's largest dams along with reservoir capacities.
-Major rivers, lakes and reservoirs
-Major Canals
-Agricultural and urban areas
-Major watershed boundaries

Citizens of Utah will be interested in utilizing this map as an educational tool for students in middle school, high school and college. It is also useful for providing a basic understanding of water infrastructure and the location of water throughout the state.

Tim Beach and Dr. Sarah Null, USU.
Data from:
Utah AGRC, National Atlas, National Land Cover Dataset, National Hydrology Dataset, Natural Resources Conservation Services and National Parks System Boundary Dataset.

Understanding Water Use in Utah and the Nation

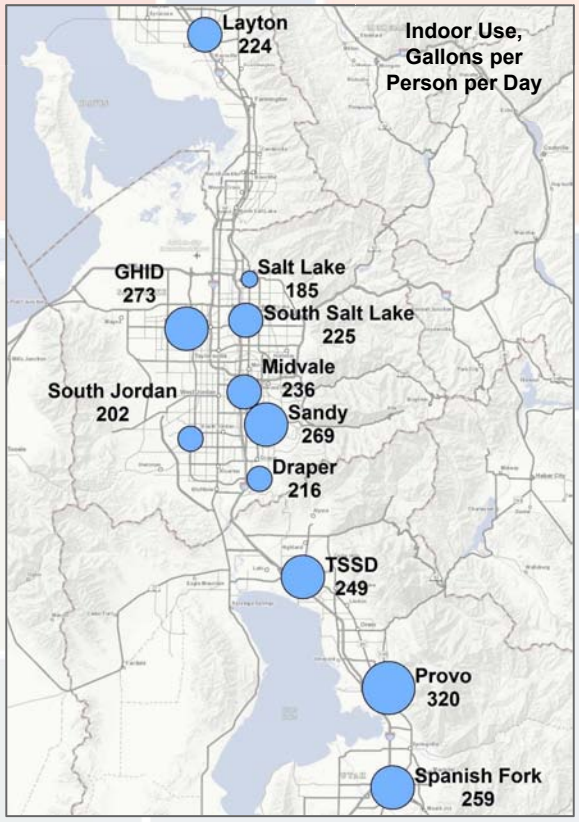
Geographic water data help us understand who, what, where, when, why, and how

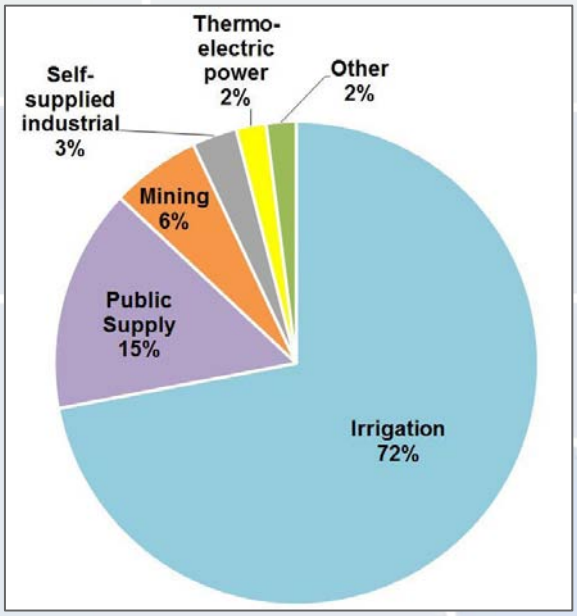
Public datasets help us recognize trends, patterns, and behaviors in water use, especially when coupled with geography.

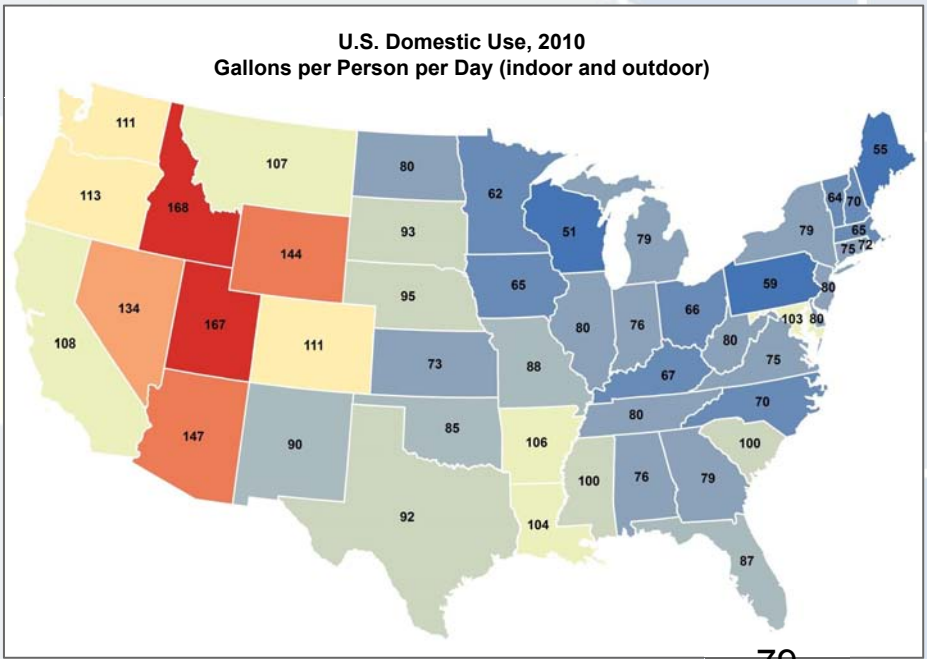
This information is used for education, outreach, management, engineering, research, conservation, policy, and planning.

Quick facts:

- ❏ U.S. use lowest since 1965
- ❏ Utah withdraws 5 billion gallons per day
- ❏ Utah ranks 2nd in highest domestic use (indoor and outdoor)
- ❏ Utah's largest use: agricultural irrigation (70–80%)
- ❏ Next largest: public supply (15%)







Robert B. Sowby
Hansen, Allen & Luce, Inc.
rsowby@hansenallenluce.com

HANSEN ALLEN & LUCE inc ENGINEERS

Maps on the Hill

Thanks to all Maps on the Hill 2015 participants!

The 2015 map book was created using the Google Slides' distributed editing platform. Each map, description, and layout was submitted directly by the map authors.

Publication of the map book was made possible through the combined effort of the Utah Geographic Information Council, the Automated Geographic Reference Center, and the Utah Department of Natural Resources.

UGIC Utah Geographic Information Council

UTAH AGRC LOCATION MATTERS gis.utah.gov

UTAH DNR NATURAL RESOURCES

About the Cover: The cover shows aerial photography of the Utah State Capitol building and grounds from June 5th, 2013. It is sourced from Utah's license to Google's statewide high resolution aerial photography (6 inch pixels).

The Google imagery license was purchased at the beginning of 2015 and will allows streaming and on-premise uses of the aerial photography across state, local, and tribal government, as well as their project collaborators and contractors.

Look for more details on accessing this resource in the coming weeks at:
http://gis.utah.gov