Maps on the Hill

Map Book 2013

Maps on the Hill

UGIC
Utah Geographic Information Council

Table of Contents

Table of Contents

Table of Contents

STATE GOVERNMENT (continued)

Table of Contents

STATE GOVERNMENT (continued)

FEDERAL GOVERNMENT

Private Sector and Non-profits

3D Anaglyphic Maps

At 2i3D Stereo Imaging we create interesting and useful three-dimensional maps by using computers to combine various kinds of map data.

For the most part, the joys of exploring the world using 3D aerial photographs have been restricted to geologists, the military, and the class of map maker known as photogrammetrists.

When compared to a topographic map of the same area, you can easily see how the symbolic features of the map relate to the actual details that can be seen on the 3D color aerial photograph.

Anyone with the ability to view stereo images can now see and appreciate the map's mountains and canyons, especially since they are no longer flat images confined to the surface of the paper.

Utah State Capitol and Vicinity in 3D

The map at right was created from data obtained from the Utah Automated Geographic Reference Center (AGRC). It combines a 2006 LiDAR First Return Digital Elevation Model (with buildings updated) and 2012 High Resolution Orthophotography (HRO) images.

To view the map in 3D you will need a pair of red/cyan glasses, available at our table with other map examples.

2i3D.steve@gmail.com
www.2i3D.com

Steve and Ben Richardson
2i3D Stereo Imaging

Hubway Bikeshare System

Site Suitability and Station Placement Analysis

Alta Bicycle Share, Inc. operates the Boston bike share system, dubbed "Hubway", which launched in July 2011 with 610 bikes and 61 stations. Alta is responsible for all operational aspects of the system. For Hubway, Alta also manages all marketing and membership sales elements.

Live and Work

Demographic data was scored according to the range of density per census block group. Age ranges having the highest distribution of usage throughout North American bike sharing systems were scored higher. Census block groups with higher College Enrollment and Employment Density were also scored higher.

Play and Transit

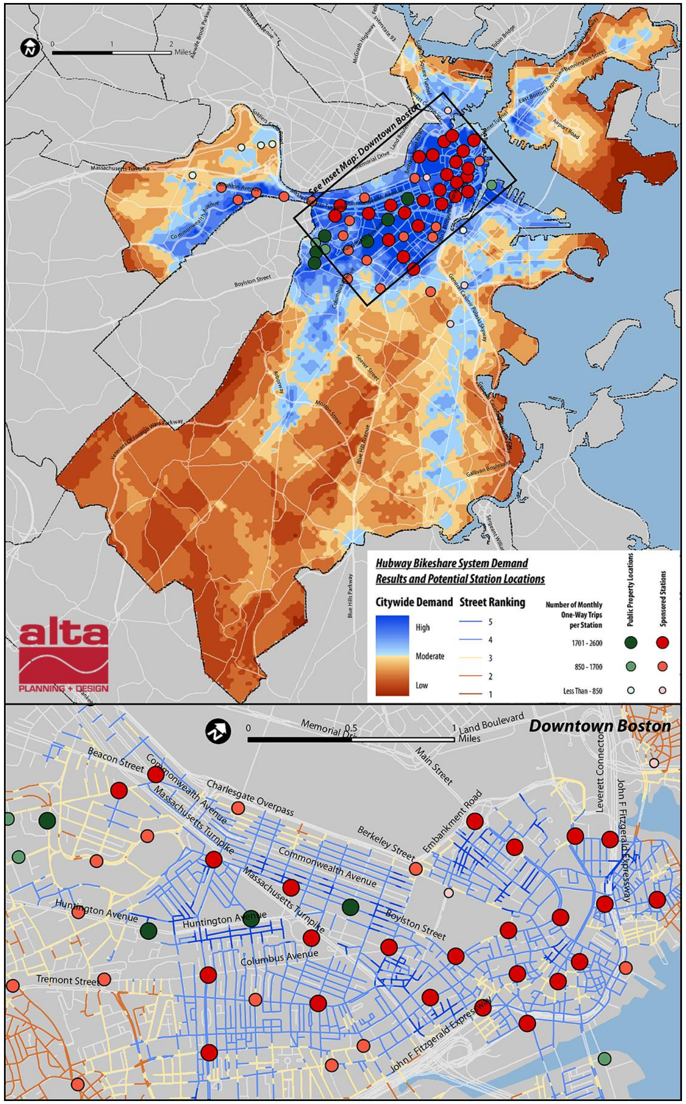
Attractor Location Scoring was given to point features according to a feature's perceived appeal as well as the distance to landmarks, tourist attractions, and libraries. Other Area Attractors were scored according to the feature's total acreage, these sites of interest include destinations such as Parks, Commercial Corridors, and Historic Districts. Transit Scoring gave locations with Commuter Train and Massachusetts Bay Transit Authority Stations, Water Taxi or Bus Stops a higher score than places without.

Station Placement

Stations were placed at street intersections that resulted in the highest scores based on a street score considering; Presence of Bicycle Facilities, Presence of Bus Routes, Through Streets, and Sidewalk Width.

Estimated Exposure

Exposure to bicyclists was also determined through street classifications such as Interstate, Local, Principal Arterial, Urban Principal Arterial, Urban Collector, Urban Minor Arterial (taken from MASSGIS).

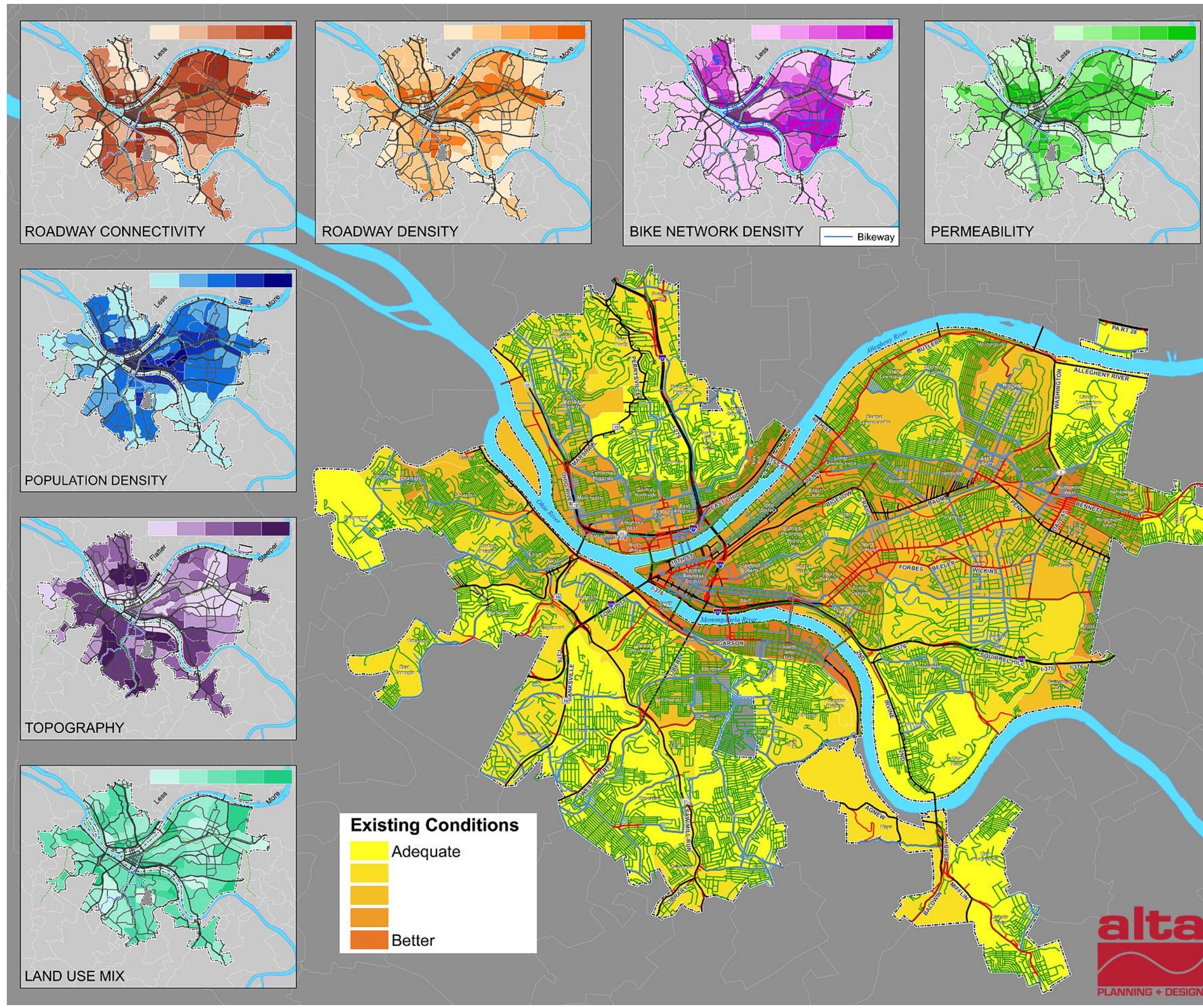


Boston, MA

Tony Salomone
Alta Planning + Design

Cycle Zone Analysis

Cycle Zone Analysis (CZA) is a GIS-based network development tool developed by Alta Planning + Design to identify the corridors and areas within a city that have a combination of (a) a higher demand for bicycle facilities and (b) the lowest amount of bicycle facilities. These zones are areas within the city where cycling conditions are similar and are often defined by barriers like highways or natural features like topography. The CZA map of Pittsburgh describes the existing conditions and future potential of bicycle friendliness in specific neighborhoods. Different factors known to affect the quality of a person's bicycling experience are combined to understand the environment. Some factors, like quality of the bikeway network can change in the short or long term while others,like topography, are fixed. Examination of these factors can help understand what makes a place great to bike.The cycling level of service is based on analyzing the level of stress the average adult cyclist is likely to feel when riding on a roadway or trail.Factors considered in this analysis include number of lanes, motor vehicle speeds and volumes, presence of bike lanes, and crossing opportunities at intersections.



Pittsburgh,
PA

Kim Voros
Alta Planning + Design

Citizen Graphical Information

Mapping for Everyone

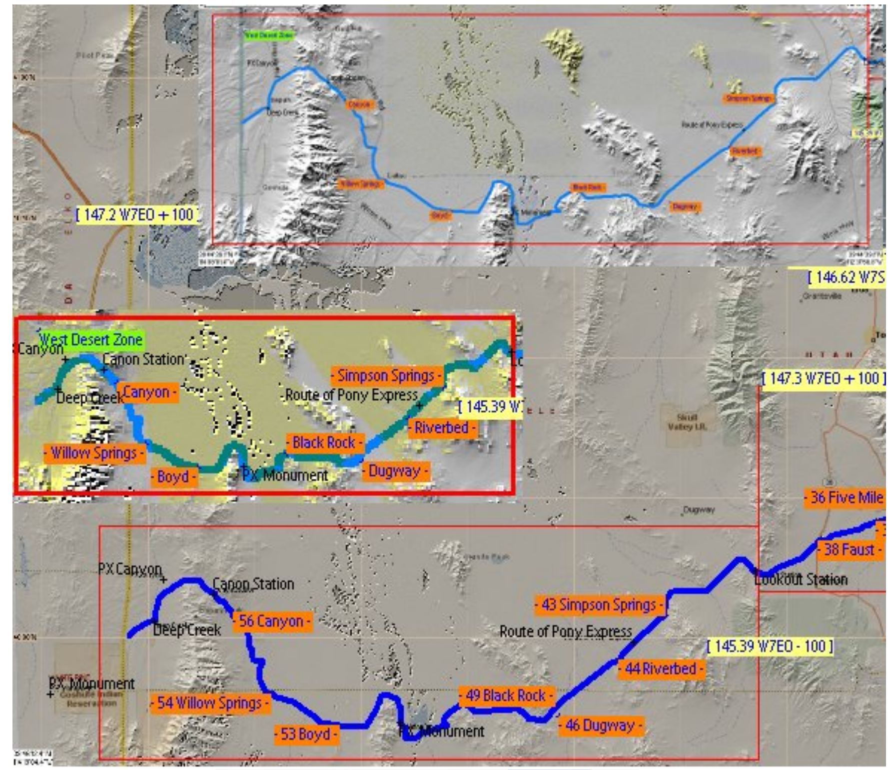
Geographic Information Systems (GIS) are *for all people* who work with map images. While it is said that a picture is worth a thousand words, what is the value of a map? How many pages of a book would it take to describe the information a GIS product can contain on a single page? Three solution will be highlighted.

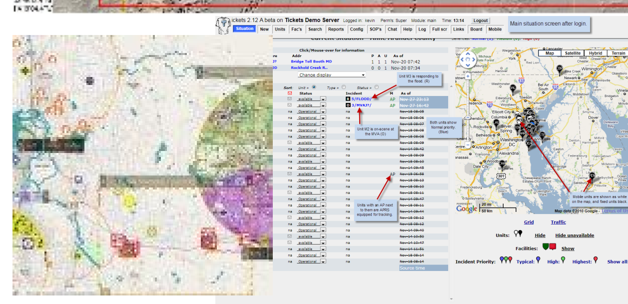
Depiction, TicketsCAD and webSplat! empowers the citizen, whether they be a hobbyist or community volunteer, to use the tools of GIS to present information in unexpected ways that is understandable and aids in the management of resources.

The displayed top image demonstrates the use of map information to study and identify repeater coverage in the West Desert area of Utah. The use of traditional cell phones or telephone land lines is severely limited in this sparse region of the state. With this information the Pony Express re-Riders each year can be assured by the amatuar radio operators that their communication needs are achieved. The left middle map insert shows in a yellow tint the expected coverage of a single repeater. As can be seen, some areas along the trail are out of range. At those time other repeaters are used which do cover those gaps.

The two bottom images illustrate two other solutions available for emergency management issues. Each depending on publicly available data.

The use of these solutions would not be possible without the availability and access of the public data that drives these and many other GIS application.. The public at large benefits from it's use; and builds community solutions.



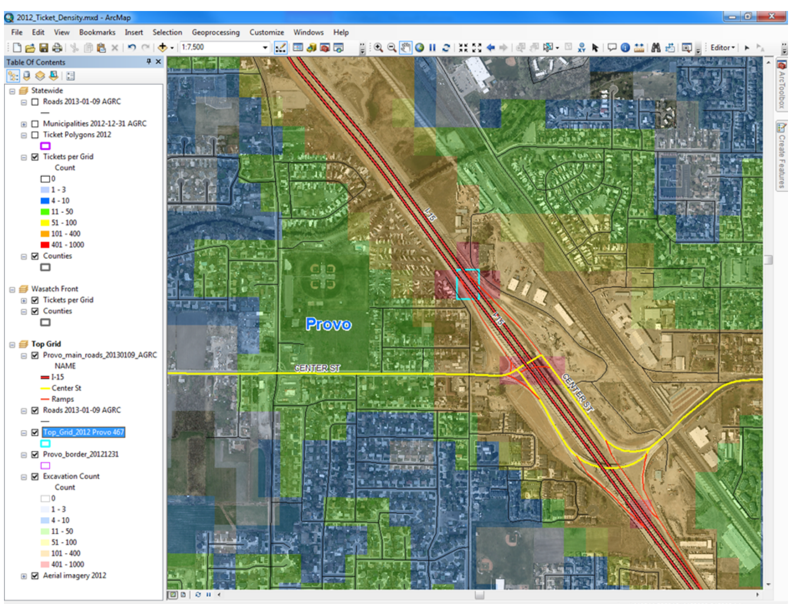


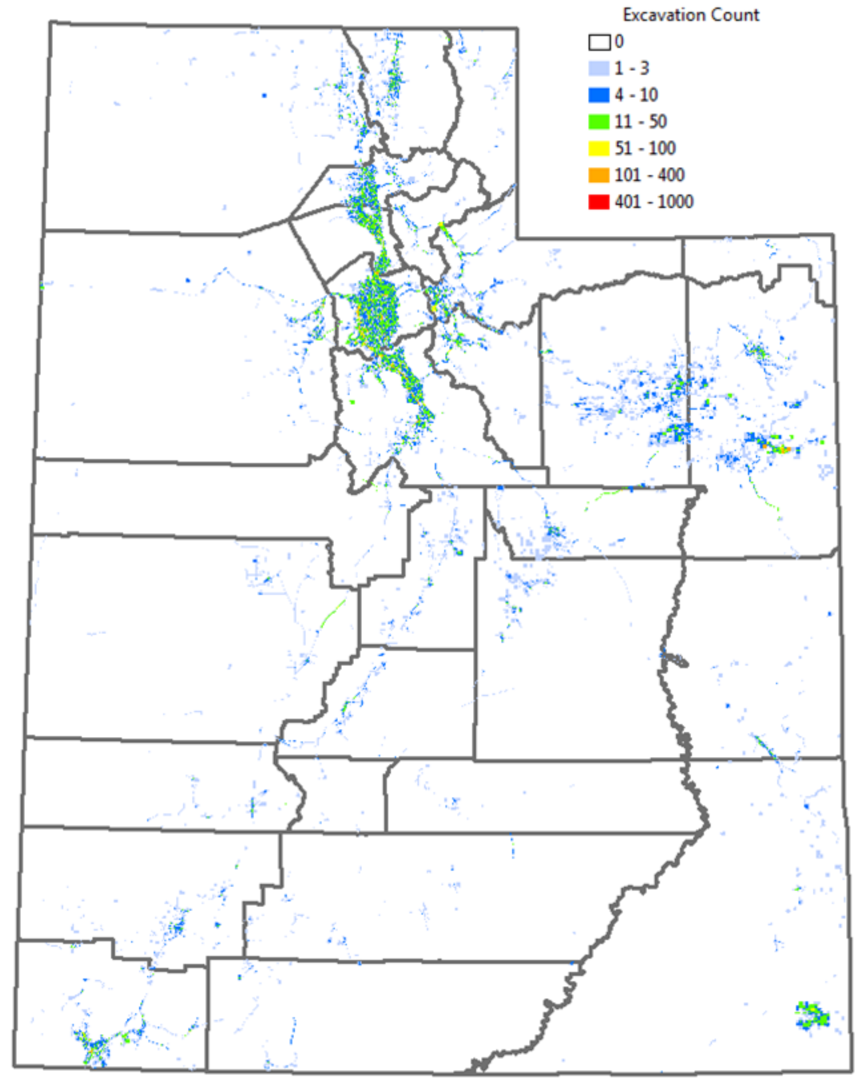
Gerald Hasty
ARES/RACES

Excavation Activity in Utah 2012

Blue Stakes of Utah is the "Call 811 Before You Dig" utility notification center for Utah. In 2012, Blue Stakes received over 273,000 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 exception of the oil and gas fields.

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





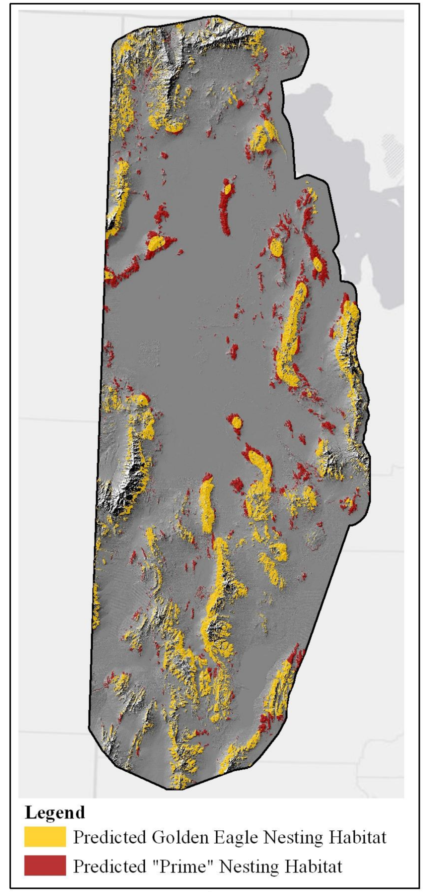
James Wingate
Blue Stakes of Utah

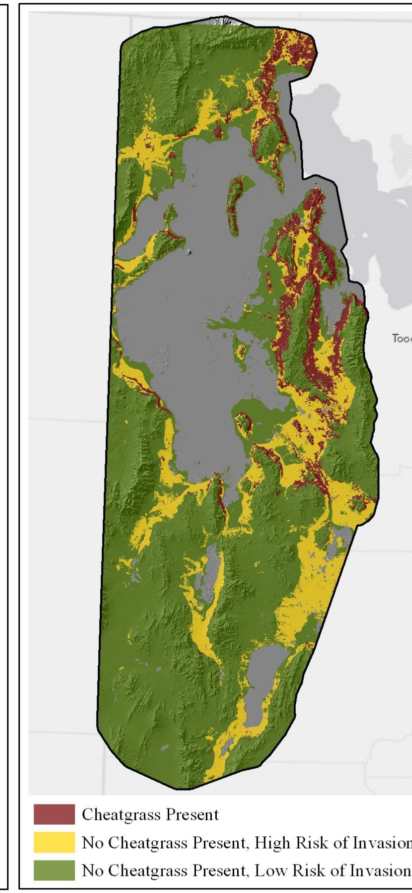
GIS AND RAPTOR CONSERVATION

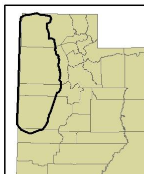
HABITAT MODELING FOR SPECIES OF CONCERN AND CHEATGRASS INVASION IN WESTERN UTAH.

Abstract: Modeling predicted habitat is a powerful tool for conservation planning. Effective models can be especially useful when coupled with predictive threat maps. With funding from the DoD Legacy Resource Program and with cooperation from the Utah Legacy Raptor Partnership, we used GIS and Maxent to explore the relationship between cheatgrass (*Bromus tectorum*) coverage, invasion risk and potential raptor habitat. Cheatgrass is widespread in the Great Basin, and has possible negative implications for wildlife. Golden Eagles (*Aquila chrysaetos*) are potentially affected by invasive cheatgrass, and is additionally a species of conservation concern. We used nesting location data, collected between 1998 and 2011, to create predictive habitat models, inputting general landscape characteristics (e.g. elevation), land cover and climatic data as variables. We further ranked nesting sites by determining areas that are surrounded by prime foraging habitat through comparison with known active Golden Eagle territories. A current cheatgrass coverage map was created from MODIS images for the same period. We created an invasion risk map based on the relative probabilities of cheatgrass presence associated with elevation, aspect, soil capacity, and distance to linear and human features. The intersection of high invasion potential with under-surveyed raptor areas provides targets for monitoring and conservation for land managers in the region.

Acknowledgments: We wish to acknowledge the assistance of the following Utah Legacy Raptor Partnership (ULRP) project partners and contributors for their involvement in this project: DoD (US Army Dugway Proving Ground, Hill Force Base), RINS, Mr. Kent Keller, UDWR, BLM, USFWS, General Dynamics and USU Remote Sensing and GIS Lab.







Study area extent: Closely follows the MIlitary Operating Area in Western Utah. Funding for this project was provided by DoD Legacy Resources, Dugway Proving Ground.

Kylan Frye
HawkWatch International

Higher Education

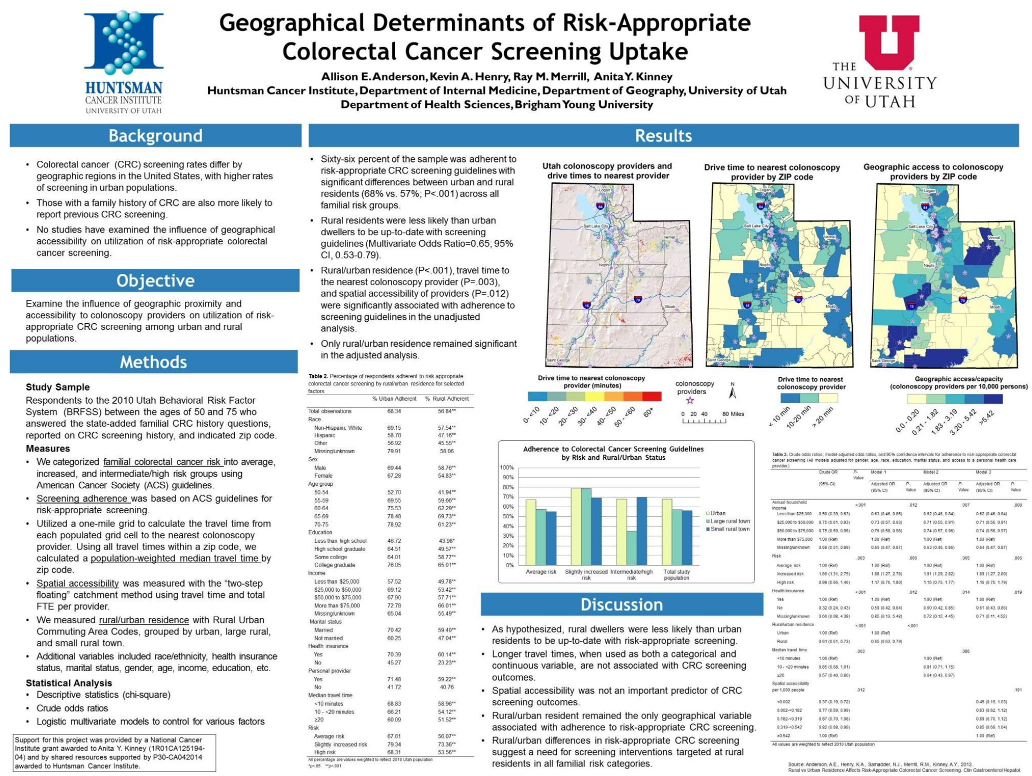
Geographical Determinants of Risk-Appropriate Colorectal Cancer Screening Uptake

OBJECTIVE:
We evaluated the effects of geographic factors on adherence to CRC screening and differences in screening use among familial risk groups.

METHODS:
We analyzed data from the 2010 Utah Behavior Risk Factor Surveillance System, which included questions on familial CRC (n=4260, 50-75 years old). Using logistic regression, we assessed the effects of rural vs urban residence, travel time to the nearest colonoscopy provider, and spatial accessibility to providers on adherence to risk-appropriate screening guidelines.

RESULTS:
Sixty-six percent of participants followed risk-appropriate CRC screening guidelines, with significant differences between urban and rural residents (68% vs 57%, respectively; P<.001) across all familial risk groups. Rural residents were less likely than urban dwellers to be up-to-date with screening guidelines (odds ratio=0.65; 95% confidence interval, 0.53-0.79). Rural vs urban residence was the only geographic variable independently associated with screening adherence in the adjusted analyses.

CONCLUSION:
There are marked disparities in use of risk-appropriate CRC screening between rural and urban residents in Utah.

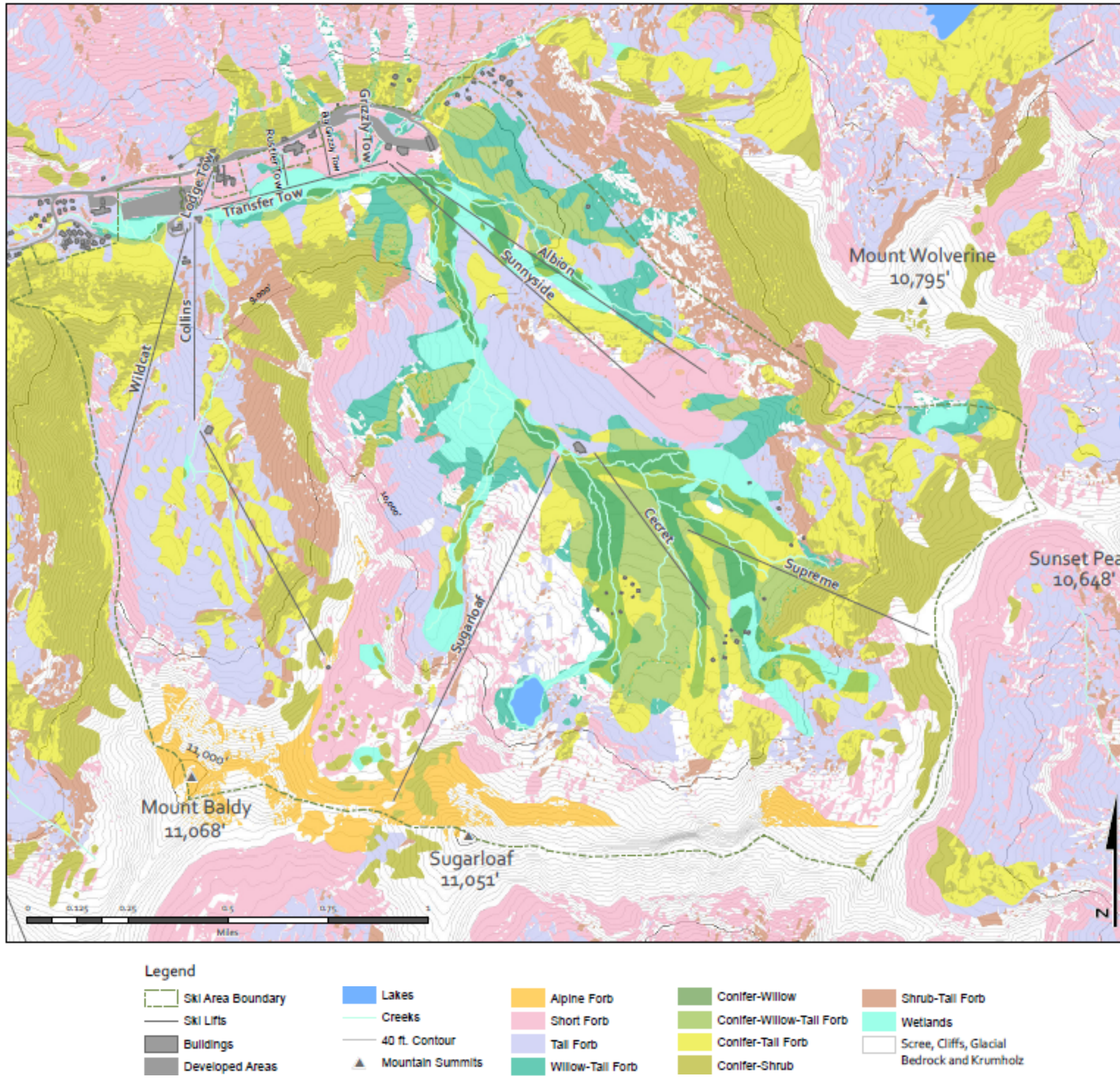


Anderson AE[1], Henry KA[2], Samadder NJ[1], Merrill RM[3], Kinney AY[1]
[1]Huntsman Cancer Institute, University of Utah; [2] Geography, University of Utah; [3] Health Science, Brigham Young University

Alta Ski Area Vegetation Community Types

A Predictive Analysis Map

This map is a representation of Alta Ski Area's predictive spatial references for native plant communities based off an aspect, elevation and slope analysis. The map is the first process in updating Alta's original hand-drawn Vegetation Communities Map from the 1997 Final Environmental Impact Statement – Master Development Plan by the Forest Service. The purpose of the maps is to help guide the ski area in restoration practices operating within their Special Use Permit. The map shows much of Alta's current vegetation it does not display the all current land status for recently and historically disturbed sites.

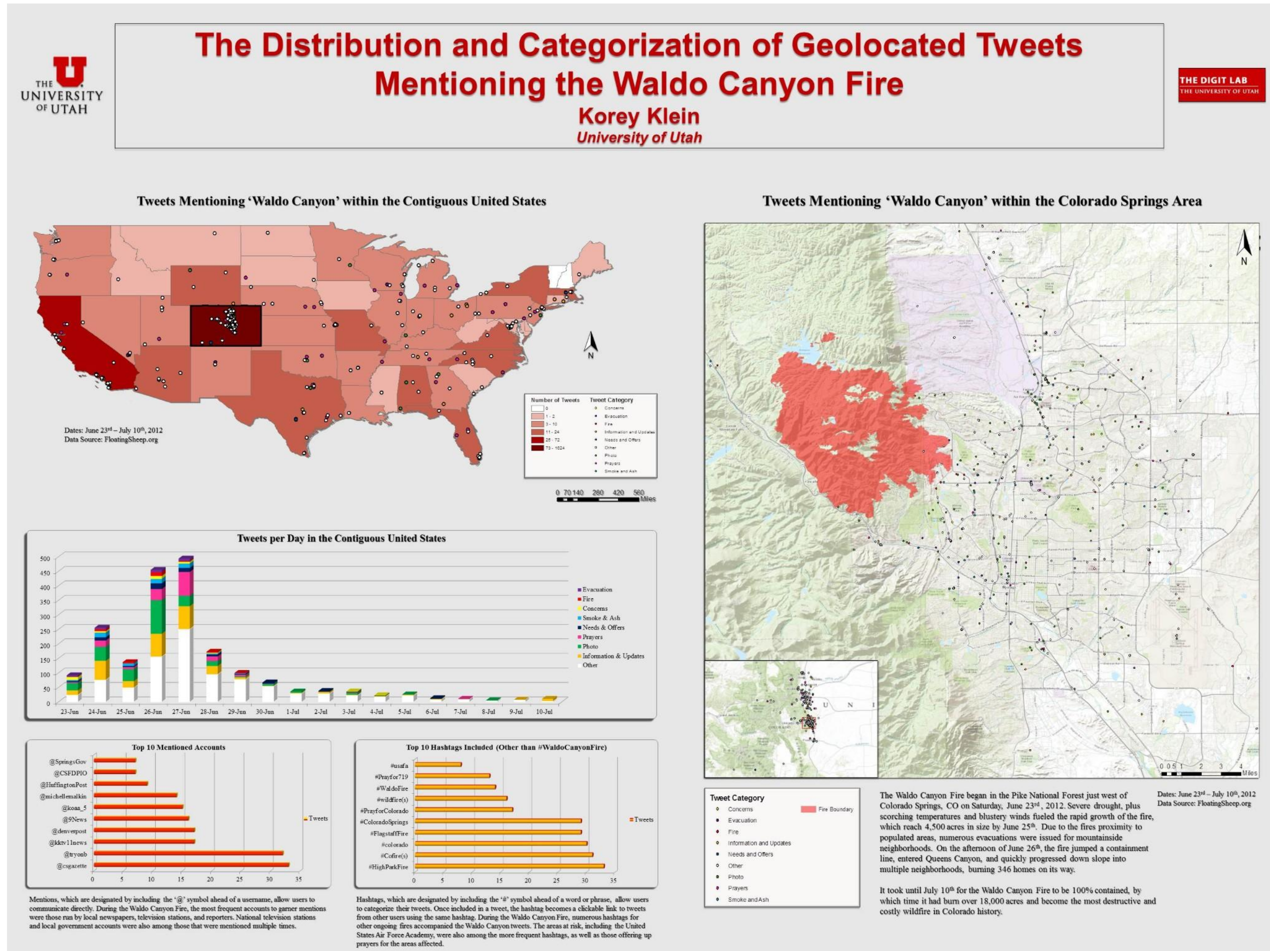


Maura Olivos
Alta Ski Area/Salt Lake Community College

The Distribution and Categorization of Geolocated Tweets Mentioning the Waldo Canyon Fire

As seen throughout the 2012 fire season, wildfires often threaten the population and infrastructure built in the wildland-urban interface. During fast-moving events, timely dissemination of information to the public is pivotal in saving lives, but unfortunately, information through official channels is often delivered at an insufficient rate. Recently, volunteered geographic information (VGI) through social media websites, such as Twitter, has shown promise in filling the time-sensitive void of information during disasters.

This poster highlights geolocated tweets sent out during the Waldo Canyon Fire outside of Colorado Springs, CO this past summer. The tweets have been categorized based on their content, as well as examined to determine which users and hashtags garnered the most attention. The purpose of this map is to demonstration the rapid use of social media, as well as its range of applications, as disasters unfold.



Korey Klein
University of Utah

Contact among Utah's School-age Population

Contact among Utah's School-age Population (CUSP) is an ongoing research study at the University of Utah, Division of Epidemiology funded by the Centers for Disease Control and Prevention to collect data on contact and mixing rates and patterns among school-age children. The data on contact rates are integral inputs to mathematical models of transmission for influenza. These transmission models are used world-wide to understand disease dynamics and assess public health interventions for annual epidemics as well as pandemic situations.

Models often stratify for school-age children because they are known to be more infectious and also may be infectious longer than adults. Assumptions about contact can lead to biased results. Using observed data on contact and mixing will improve our understanding of disease transmission and also help reduce illness through more informed public health decision-making.
CUSP is collecting data from urban, suburban, rural, mountain, and desert areas (Figure 1) in Utah to capture the variety inherent in these diverse demographic and climatic regions. This design will also ensure that the publicly-available data can be generalized across the US and the world.

The data are collected using self-report surveys and logs and objective measures of proximity using radio signal strength indication sensors. Data from sensors are most readily visualized with network graphics where nodes (dots) represent students and edges (lines between them) represent a contact between them. Figure 2 is a network graphic showing student contact for one day within and among classrooms in one wing of an elementary school.

Preliminary results suggest that there is variability in contact and mixing rates and patterns within and among schools. This information will be linked to absenteeism, symptom information, and laboratory testing results (see Figure 3). Together, these data will improve our understanding of disease dynamics and allow us to explore effective and efficient interventions to reduce influenza transmission. Data collection and development of transmission models are ongoing through August, 2013.

Figure 1. Utah Counties. Yellow counties have schools participating in CUSP: Salt Lake, Summit, Utah, Beaver, and Washington.

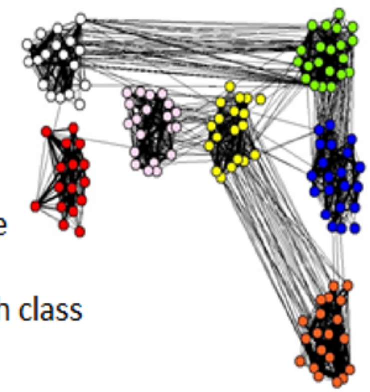


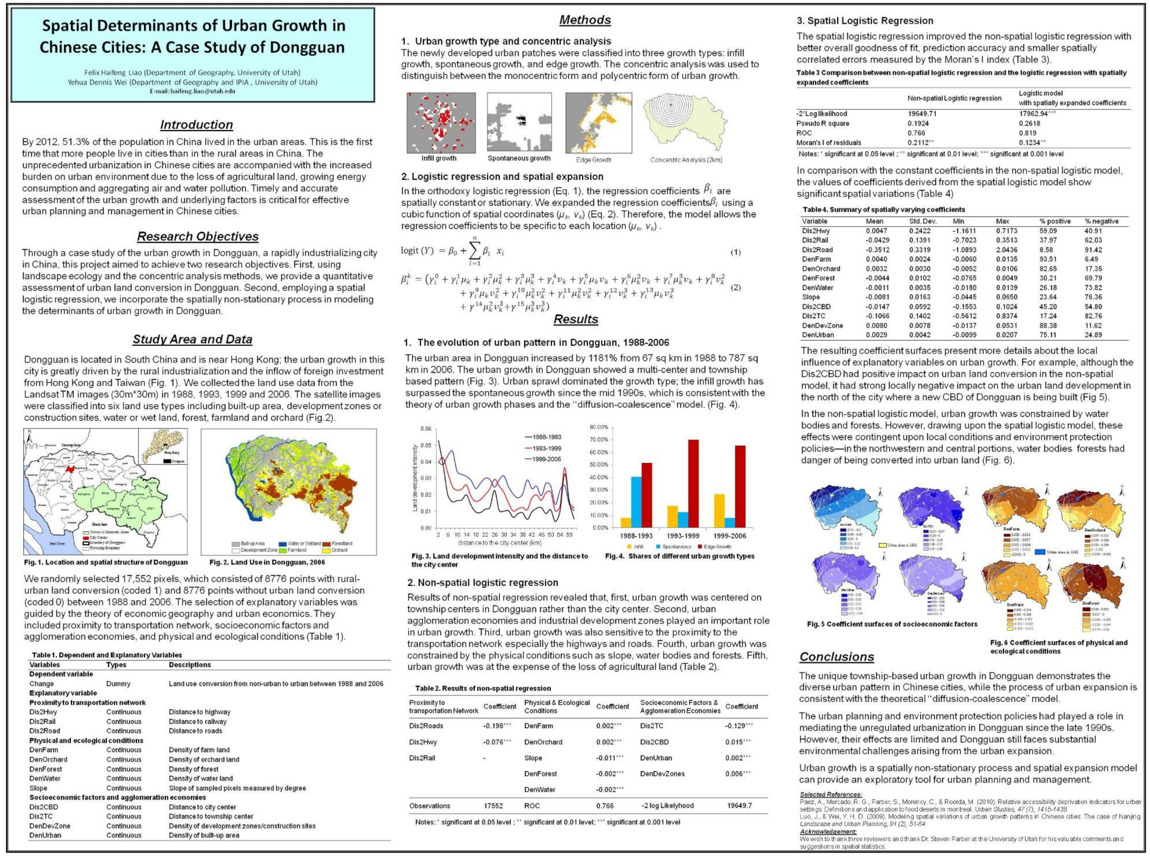
Figure 2. Contact network graphic for one day on one wing of an elementary school. Each class has a different color.

Figure 3. Utah counties and current influenza season positive tests from Intermountain Healthcare.

Molly Leecaster
University of Utah School of Medicine
Division of Epidemiology

Spatial Determinants of Urban Growth in Chinese Cities: A Case Study of Dongguan

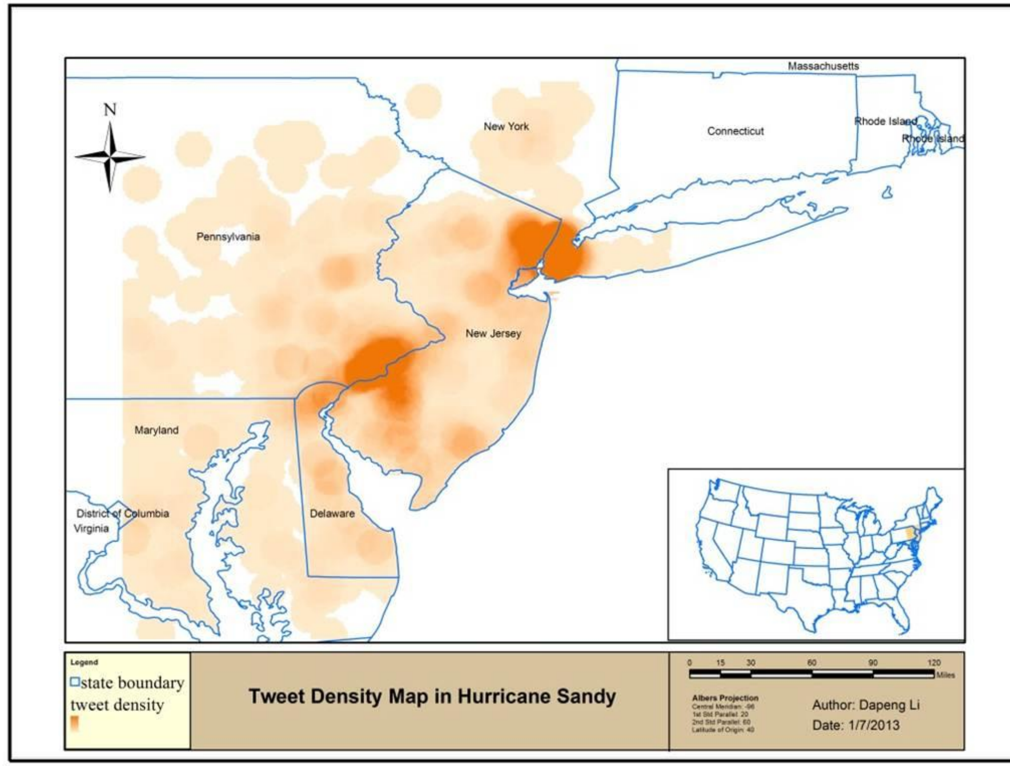
This poster examines spatial variations of urban growth patterns in Chinese cities through a case study of Dongguan, a rapidly industrializing city characterized by a bottom-up pattern of development based on townships. We have applied landscape analysis techniques and employed both non-spatial and spatial logistic regression models to analyze urban land conversion. The non-spatial logistic regression has found the significance of accessibility, neighborhood conditions and socioeconomic factors for urban development. The logistic regression with spatially expanded coefficients significantly improves the orthodoxy logistic regression with lower levels of spatial autocorrelation of residuals and better goodness-of-fit. More importantly, the spatial logistic model reveals the spatially varying relationship between urban growth and its underlying factors, particularly the local influence of environment protection and urban development policies. The results of the spatial logistic model also provide clear clues for assessing environmental risks to take the local contexts into account.



Felix Haifeng Liao
University of Utah

Social Media in Natural Disasters: Mapping Tweet Density in Hurricane Sandy

Social media has enjoyed great popularity in many domains in the past few years. In natural disasters social media could be utilized by the government agencies to disseminate information to the public or to collect information from the public. The public could also use social media to ask for help or to communicate with each other. Hurricane Sandy in eastern US in 2012 witnessed a social media explosion. We utilized Twitter API and collected over 20,000 geotagged tweets in the New Jersey area where Hurricane Sandy first went ashore. The research area covers a 4 degree by 4 degree geographic area (longitude: 73°W~77°W, latitude: 38° N~42°N). The time window is from 7:52 PM to 10:09 PM on October 29th in 2012. A point density analysis was conducted on the collected tweet data and the results are shown in the map. Generally the areas with high tweet density correspond with the areas with high population density. Further analysis needs to be conducted to explore the abnormal areas.



Dapeng Li
University of Utah

Protecting Vulnerable Populations from Hazardous Air Pollutants

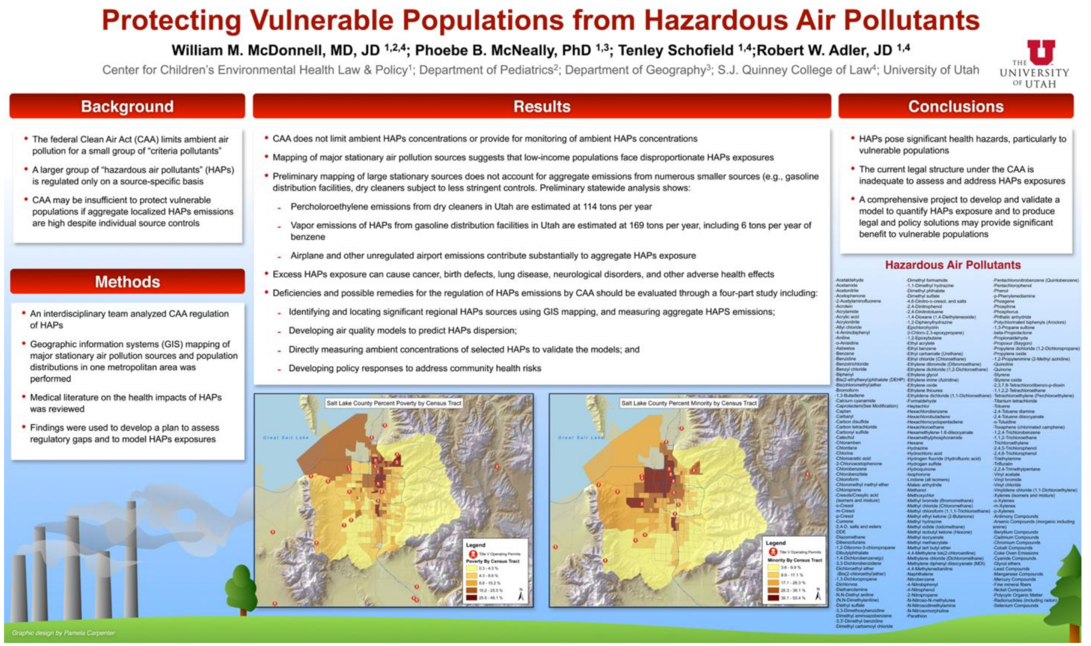
Background: The federal Clean Air Act (CAA) limits ambient air pollution for a small group of "criteria pollutants." A larger group of "hazardous air pollutants" (HAPs) is regulated largely on a source-specific basis, without measurement or control of total emissions. Therefore, the CAA may be insufficient to protect vulnerable populations such as children, who are disproportionately affected by environmental toxicants.

Objective: To determine whether the CAA adequately addresses risks from HAPs and to design an approach to address any such regulatory deficiencies.

Methods: CAA regulation of HAPs were analyzed and EPA and Census Bureau data was used to estimate HAPs emissions in Salt Lake County. GIS mapping of stationary air pollution sources and population distributions were performed and the medical literature on the health impacts of representative HAPS was reviewed. Based on these findings, the team developed a plan to assess regulatory gaps and to model HAPs exposures.

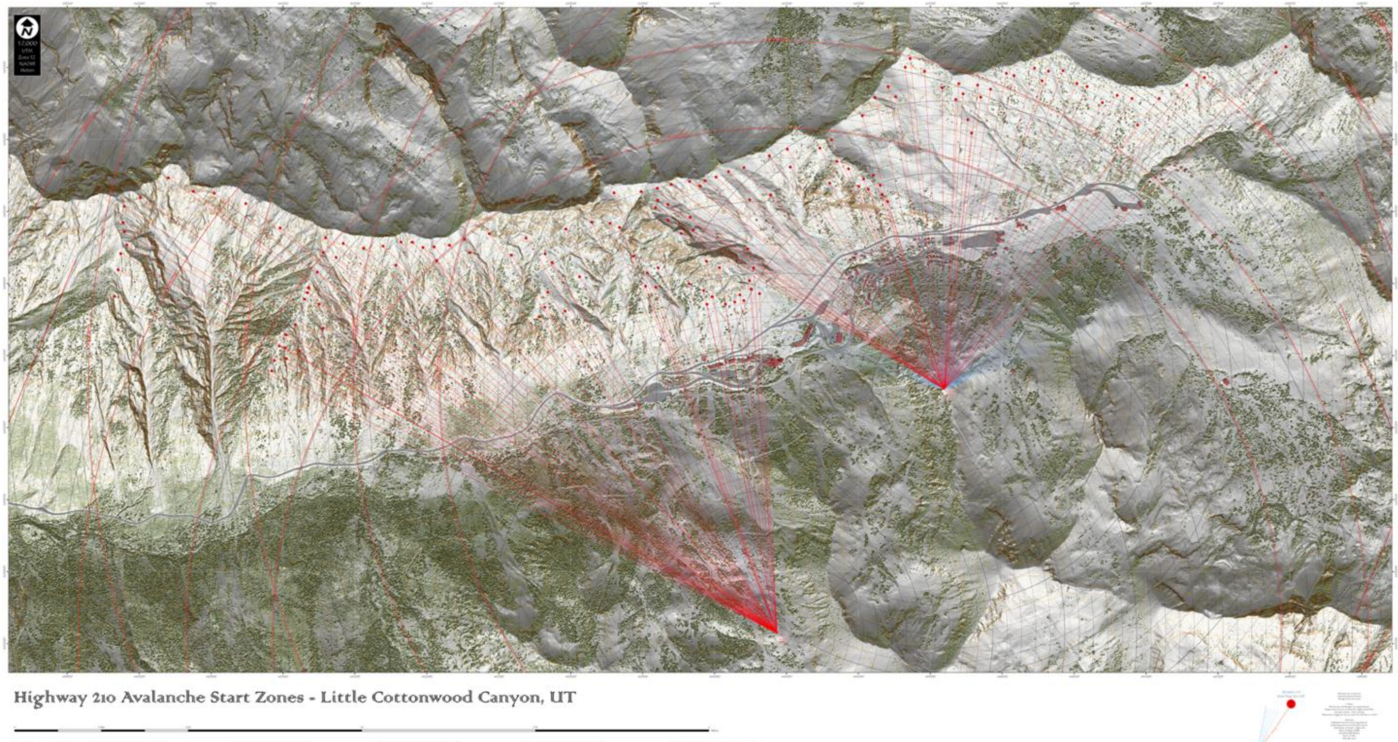
Results: The CAA does not limit, or provide for monitoring of, ambient HAPs concentrations. Mapping of major stationary air pollution sources suggests that vulnerable populations in the study area face disproportionate HAPs exposures. Moreover, large stationary source controls do not account for aggregate emissions from numerous smaller sources. HAPs exposure increases risks of numerous adverse health effects.

Conclusions: HAPs pose significant health hazards to children and other vulnerable populations, but the current legal structure appears inadequate to assess and address exposures. A comprehensive project to develop and validate a model to quantify HAPs exposures and to produce legal and policy solutions may provide significant health benefits to vulnerable populations.



McDonnell WM, McNeally PB, Schofield T, Adler RW
University of Utah

Mapping for Fixed Position Howitzer Mounts: An On-sight Reference for Target and Data Acquisition



Little Cottonwood Canyon is by far the most avalanche prone highway in the State of Utah and has the highest Avalanche Hazard Index of any roadway in North America primarily due to terrain and traffic volume. With the help of local and federal agencies, as well as the local ski areas, the Utah Department of Transportation maintains avalanche safety in the canyon through both avalanche forecasting and active control measures with the use of military artillery. While artillery has proven to be the most effective method of active avalanche mitigation, the methods for obtaining target data have relied on coarse measurements from topographic maps. A solution to this has been found through the use of GIS and cartographic products which have been a proven aid for calculating data for new targets prior to avalanche control work, as well as for making fine adjustments during firing missions.

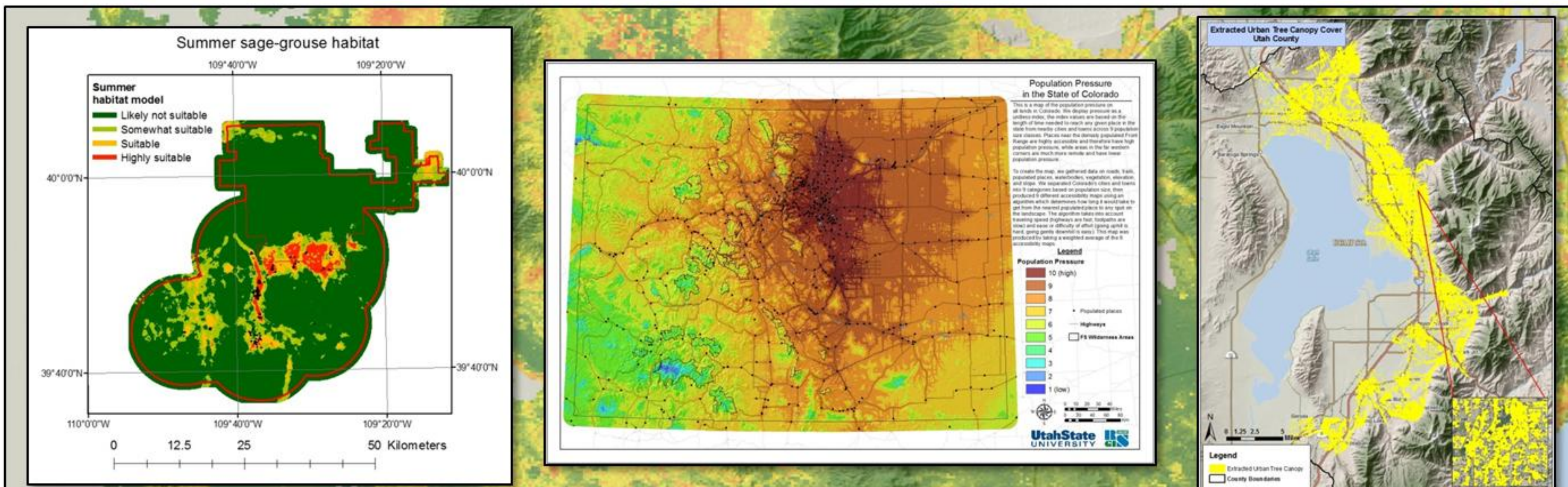
W. Adam Naisbitt
Utah Department of Transportation, University of Utah

Maps and Analyses Presented by the Remote Sensing/GIS Laboratory at Utah State University

The Remote Sensing/GIS Laboratory in the Quinney College of Natural Resources at Utah State University has been a leader in the field of remote sensing and geospatial analysis in Utah and the Intermountain West for the past 20 years.

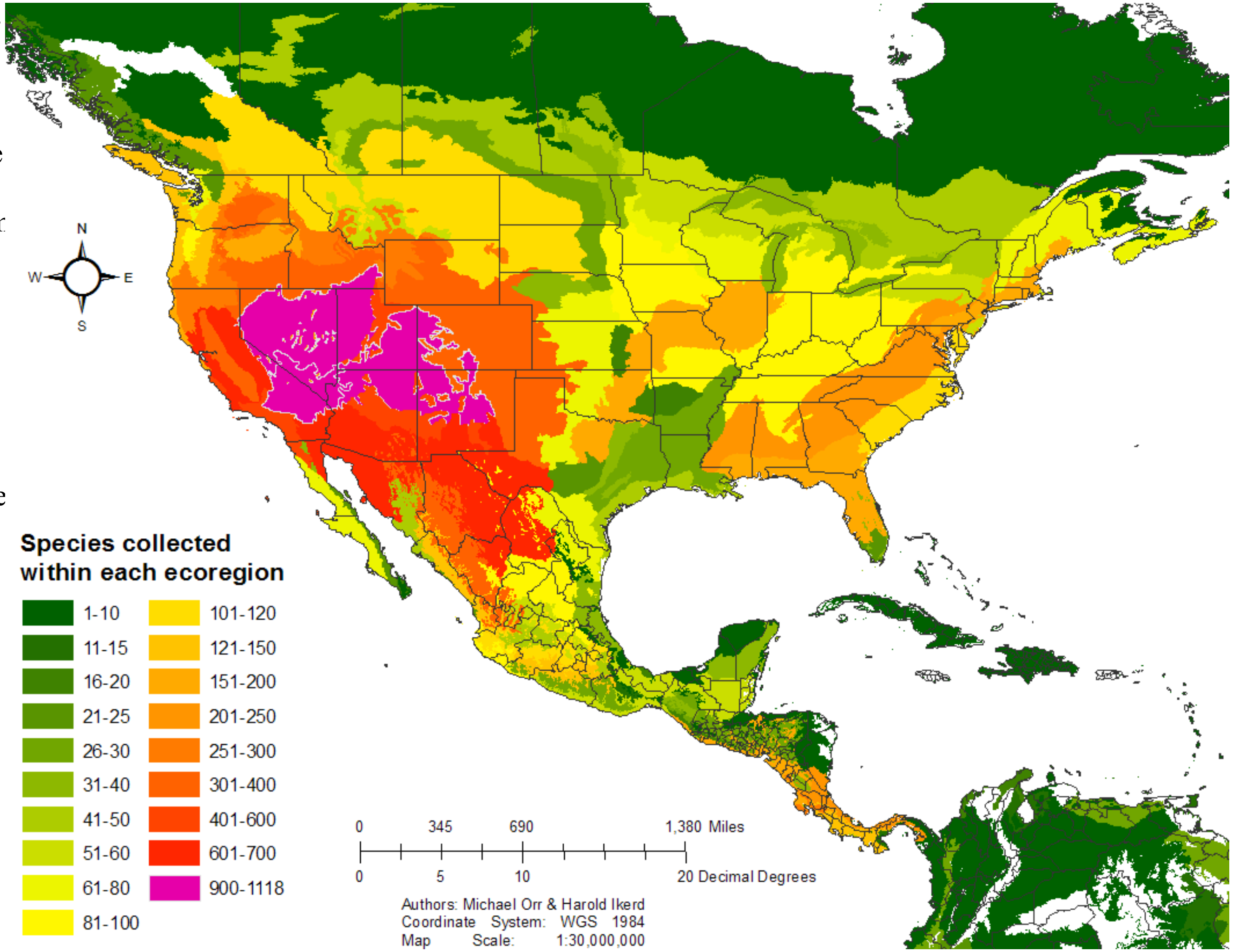
Research staff and students working with remotely sensed imagery and geospatial data:

- **model current land cover for state and federal agencies**
- **map and predict invasive species that threaten rangelands and increase fire risk**
- **develop wildlife habitat models to support management decisions**
- **conduct urban tree canopy and impervious cover analyses to assist planners**
- **support state and federal agencies by developing land cover monitoring systems**
- **work with neighboring states to better understand and manage natural resources**



Bee Species Richness by Ecoregion

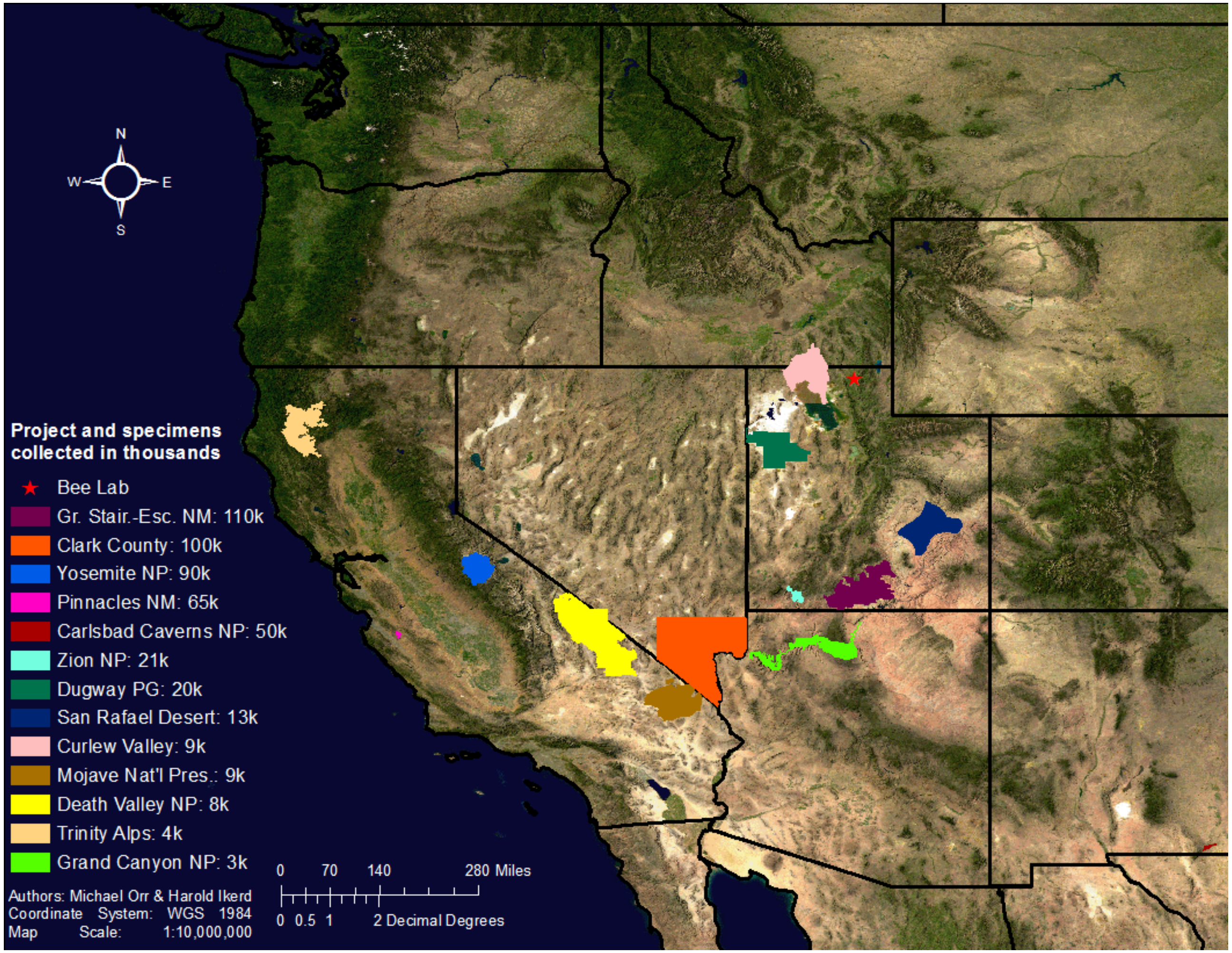
Species richness is the number of species found within a chosen area. In this interactive map, the study area is the entire world. The richness is plotted to the WWF Ecoregions. In this way we see the species richness for each individual ecoregion. The data used were taken from the USDA-ARS Bee Biology and Systematics Collection located in Logan, UT. This map clearly shows that xeric areas have greater species richness than elsewhere in the US. This is a general trend that is seen throughout much of the world; bees seem to do best in xeric or Mediterranean climates. In the interactive version of the map, an additional layer quantifying the density of collection events will show the impact of collector effort on species richness.



Michael Orr
Utah State University
Department of Biology

Bee Inventory Projects of the Bee Biology and Systematics Lab

Founded in 1947 by Dr. G.E. Bohart, the Bee Biology and Systematics Lab is the largest repository of bee specimens in the United States. There are an estimated 1.5 million bee specimens stored in the collection. A significant number of these records come from targeted collecting projects in protected areas of high bee species richness, often national parks or national monuments such as Death Valley, the Grand Canyon, and our own Zion National Park. In this map, you can see both the location of the collection and the locations of these projects, each accompanied by a total number of specimens in the legend.



Michael Orr
Utah State University
Department of Biology

Corinne, UT Corn Stand Counts
from AggieAir Imagery

The AggieAir Flying Circus is a service center at the Utah Water Research Laboratory, which provides high resolution, multi-spectral aerial imagery using a small, unmanned aerial system called AggieAir.

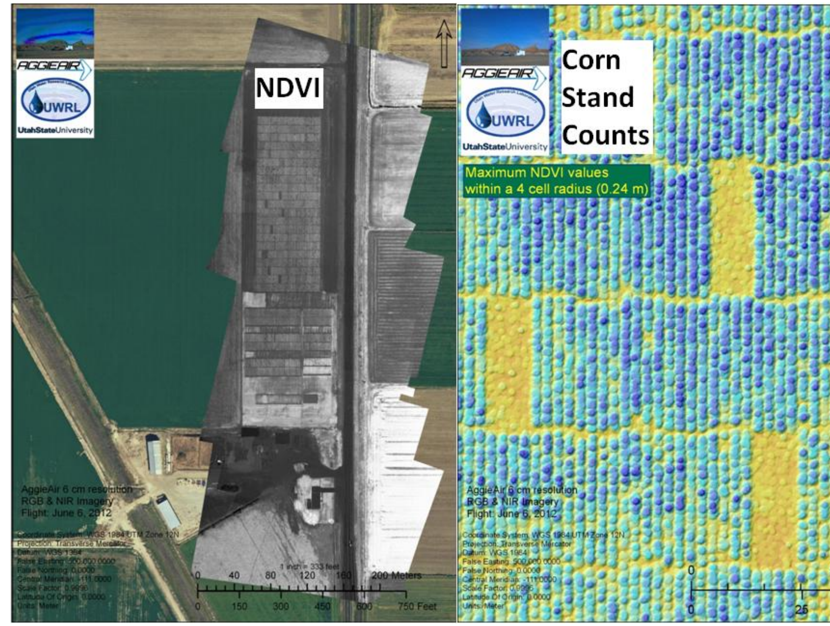
AggieAir is a low-cost, easy-to-use platform. It is able to map small areas quicker, more frequently, at finer resolution, and at a smaller cost than conventional remote sensing platforms (satellite and manned aircraft)
AggieAir is independent of a runway, which gives the user the ability to launch the aircraft from virtually anywhere
Applications:

Riparian: mapping vegetation, substrate classification, fish habitat, hydraulic modeling, restoration

Wetland: monitor/classify invasive/native plant species, delineation

Civil: monitor/survey/document construction of infrastructure (roads, bridges, dams, canals, levies,
pipelines, power lines) and inspect
infrastructure

Agricultural: soil moisture, irrigation management, canal, ammonia concentrations, vegetation classification



AggieAir captured RGB and Near Infrared Imagery to produce a high resolution Normalized Difference Vegetation Index (NDVI) Map at a research farm in Corinne, UT. This map has been used to make estimates of Maximum NDVI and Corn Stand Counts. Researchers have gained insights into which rows are performing. Eventually, algorithms developed at the Utah Water Research Lab could be used to determine yield from this type of high resolution map.

Mark Winkelaar
USU Utah Water Research Lab Aggie Air

Number of UVU Students by House and Senate Districts

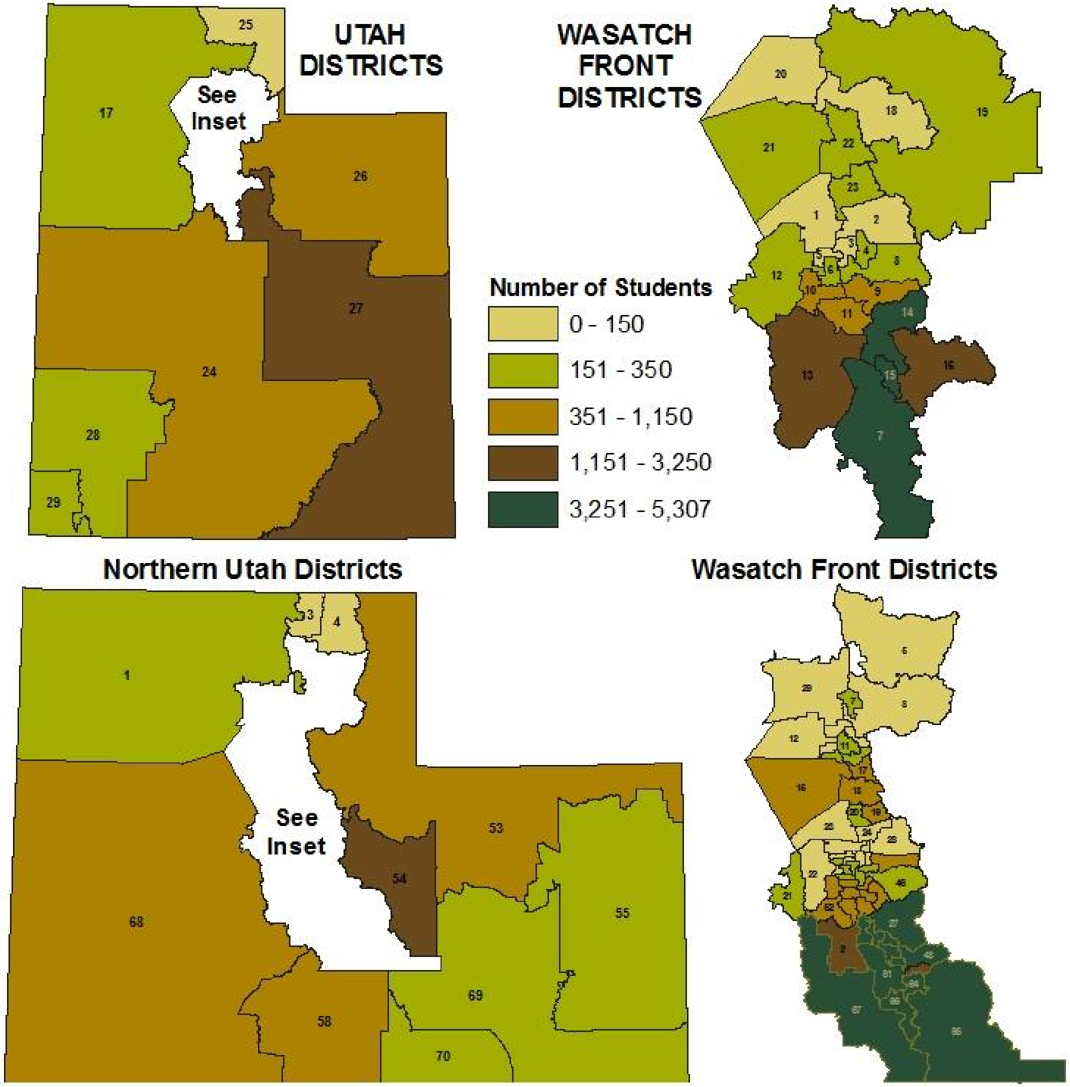
With more than 30,000 students actively attending Utah Valley University (UVU) their housing locations may be very influential in voting outcomes. For this, and other reasons, UVU tracts and maps each students location to publish in their yearly Fact Book.

To accomplish this task we use the ArcMap Program from ESRI. Using student registration records we Geocode each address which returns a Latitude and Longitude giving us XY coordinates, which in turn, we combine with census, senate, and house district base maps found on the AGRC website. This allows us to account for students based on their spatial location.

The first map demonstrates the State Senate Districts, the 2nd are the House Districts and the map on the next slide shows student locations according to their census block.

We use this information for various reasons, one of which is to compare with other universities throughout the state and country. We also use the information for surveys, institutional indicators, and enrollment studies, and budgets.

Our maps are not limited to the state of Utah but are extended to the United States and Students from around the Earth.



Trevor Jensen
Utah Valley University

Local Government

Cottonwood Heights Emergency Response

The Salt Lake Valley is due for a 7.0 magnitude earthquake. This quake will produce extensive damage around the valley, altering the city,county, and state Emergency Operation Centers (EOC).

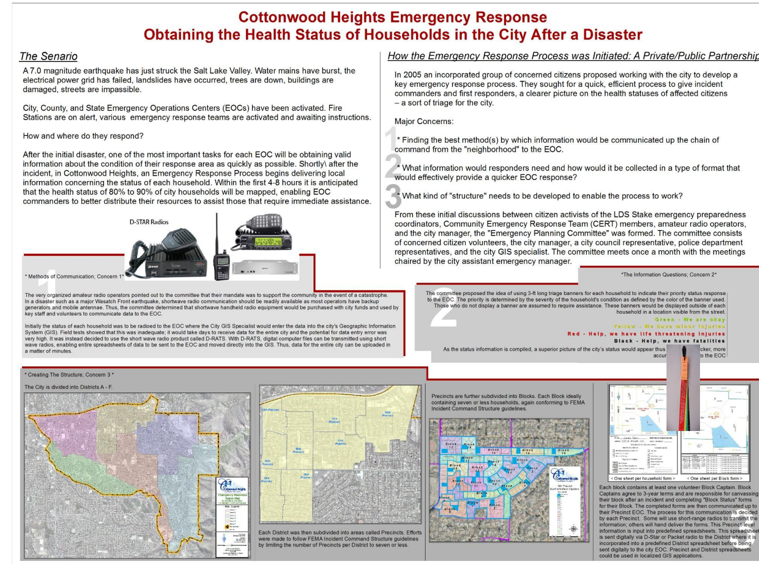
Cottonwood Heights has developed a citywide Emergency Response program to enable a quicker, more accurate response from the EOC. Each household uses 3-foot triage banners that define the severity of the household's condition.

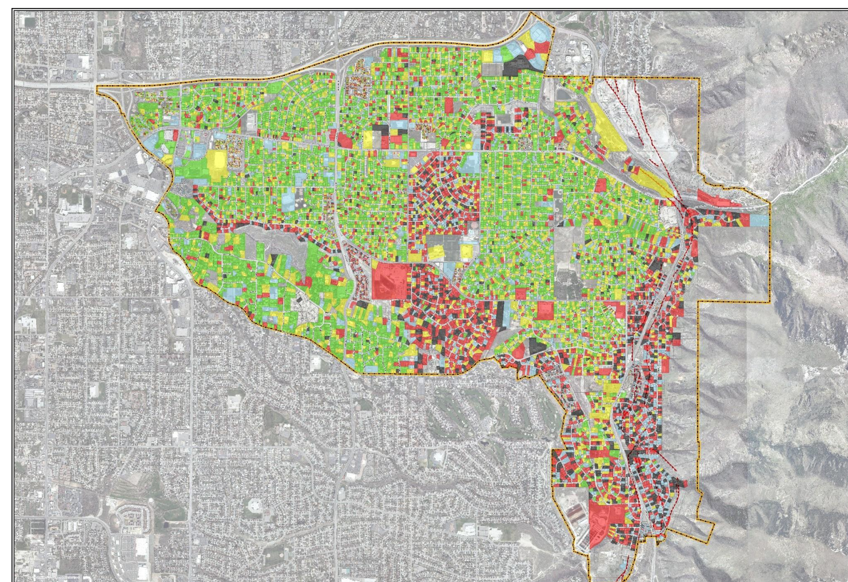
Green - We are ok *Yellow - Minor injuries*
Red - Major injuries *Black - Fatalities*

The banners are displayed outside the home in a visible location. Homes not displaying a banner are assumed to require assistance.

For gathering this information, Cottonwood Heights has been divided into smaller entities. A volunteer gathers the banner information on a block level, which is then reported to the precinct level, then to their district, and finally to the Cottonwood Heights EOC.

Shortwave radio was determined as the most reliable source for communication. Using a product called D-RATS, digital computer files are transmitted via shortwave radios, enabling entire spreadsheets of data to be sent to the EOC and directly into the GIS in a matter of minutes!





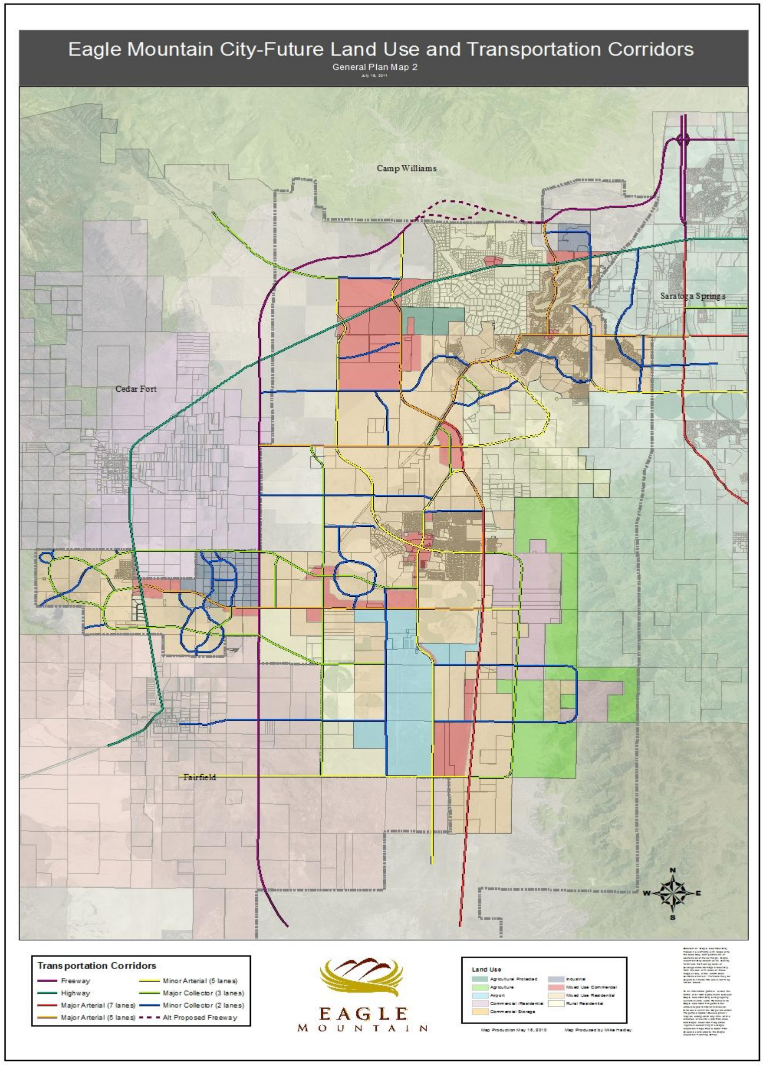
Kevin Sato & Lynzie Tilley
Cottonwood Heights

Eagle Mountain City General Plan

This map represents the General Plan of Eagle Mountain City which includes Future Land Use and Transportation Corridors. A General Plan is the primary policy document dedicated to directing the City's future development. It articulates the City's general plan and policies. The General Plan is used as a guide for the physical,economic and community development of the City. The General Plan establishes goals and policies for the City to use in evaluating and making future decisions. The Plan's policies communicate the anticipated trends and demands that will be placed on the city as it naturally grows and matures.

The General Plan is adopted by the Planning Commission and City Council once it is adopted the City's decisions can be guided by it. Used in this way the General Plan minimizes conflict in decision making, promotes coordination among programs and regulations and brings predictability to the development process. Individual landowners and private interest groups are able to use the plan to evaluate their decisions in connection with community goals.

The success of the General Plan relies on the ability to convey its intent. The General Plan can be effectively administered when its content is clear and concise. It is imperative that the information contained in the plan is comprehensible. The best way to do this is using GIS maps. Maps provide a visible picture to relay information to the intended clientele.



Mike Hadley
Eagle Mountain City

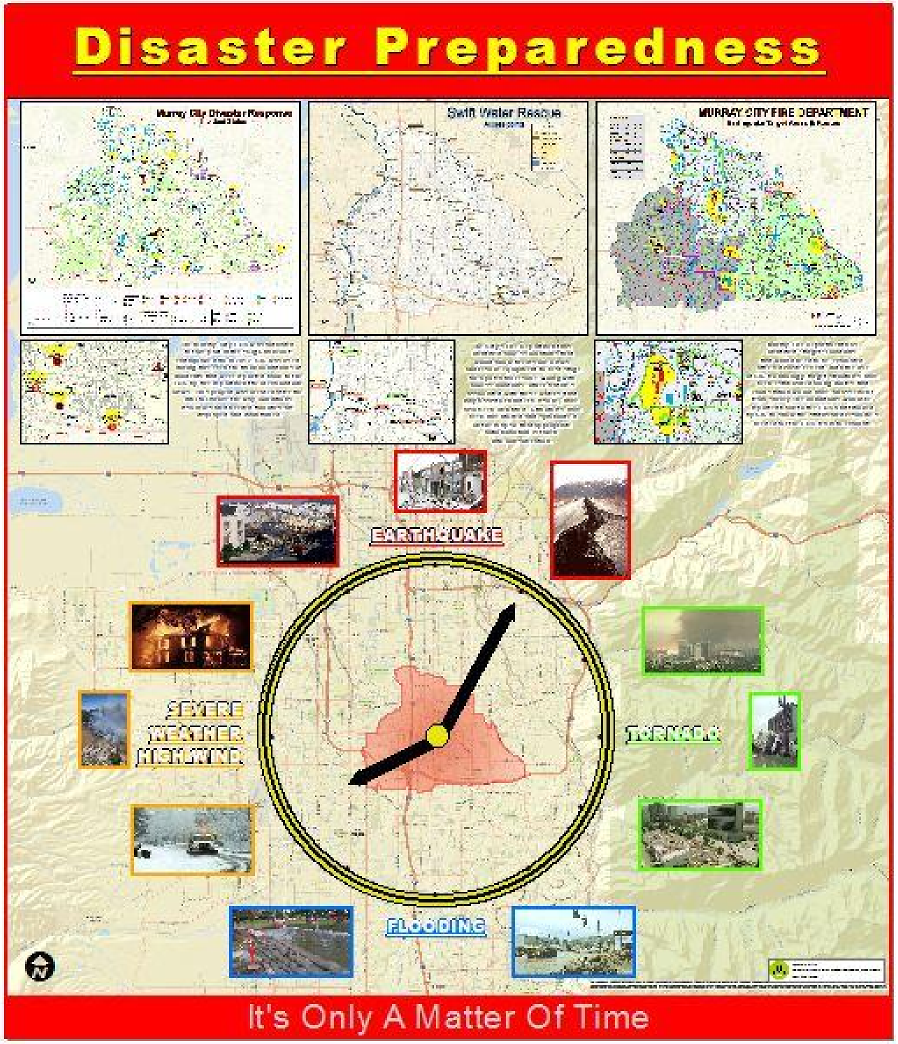
Not if, but when........

The city of Murray has used GIS for several years to plan, train and improve the way disaster events will be executed. Murray has used it's GIS data and GIS tools to analyze several scenarios for different types of disasters.

Most recently, Murray City activated it's EOC (emergency operations center) and took part in the "BIG SHAKEOUT" earthquake drill to evaluate how the city will prioritize incidents and effectively put our resources to use. GIS was used to put together an emergency preplan for each Murray fire station/district. Evaluation routes have been defined to inventory the condition of predefined target locations within each district's response area. Each location is surveyed to determine the level of action needed, or if the location is a possible resource for a triage/first aid station or temporary shelter.

As part of the drill, each fire district evaluation team ran their route and reported back to the EOC the status of each target location. The target location information was relayed to the GIS team in the EOC and displayed in an interactive GIS project to the show the entire EOC team the "BIG PICTURE" condition of the city.

GIS features/resources such as city transportation conditions, utility conditions, available equipment/manpower, shelter locations, mobile first aid stations, drinking water and food distribution areas, etc… can also be displayed to assist with the needs of affected areas.

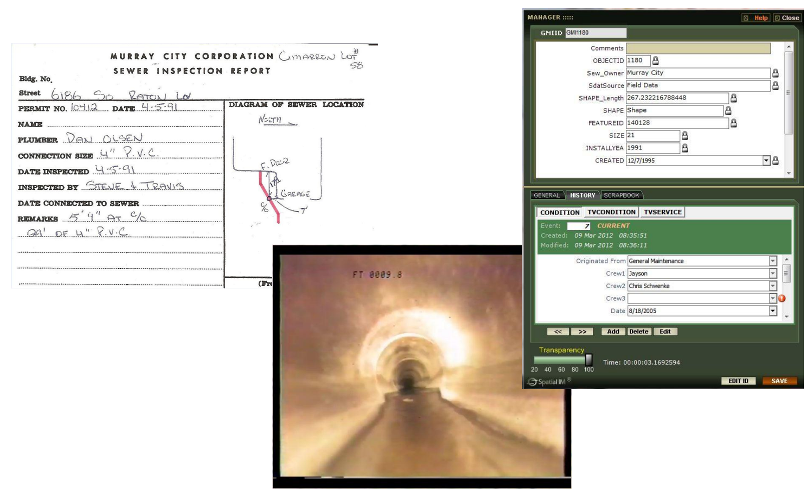


Steve Kollman
Murray City GIS

Waste Water Management Document Retrieval System

Since the beginning, the Murray City waste water division has kept vital records of the cleanout locations and video inspections of its collection system. In years past these records had been cataloged on index cards and stored in file drawers and racks of VHS tapes. On frequent occasions these records needed to be reviewed to see their whereabouts or conditions for maintenance or capital improvement planning. Retrieving these numerous documents was a time intensive process, with questionable results.

With efforts from the GIS division and the use of GIS and GIS tools, the waste water division can now access these scanned and hyperlinked documents with the click of a mouse. Each unique file has been imported and/or scanned into a database and is tied to its associated feature in GIS. These files can then be quickly selected, viewed and printed by simply picking the appropriate feature of interest from the GIS map.



The waste water division has also incorporated tools to track work history events and imagery for each GIS feature as well. This assigns details such as type of work done, still photos, work crew information, date work was performed and conditions found at that specific time and date.

These new technologies allow not only the waste water office staff access to these documents and reports, but any GIS user in the city can view print and query as well. This has greatly improved the efficiency and quality of data requests.

Matt McQuiston
Murray City GIS

Improving Services for Municipal Utilities

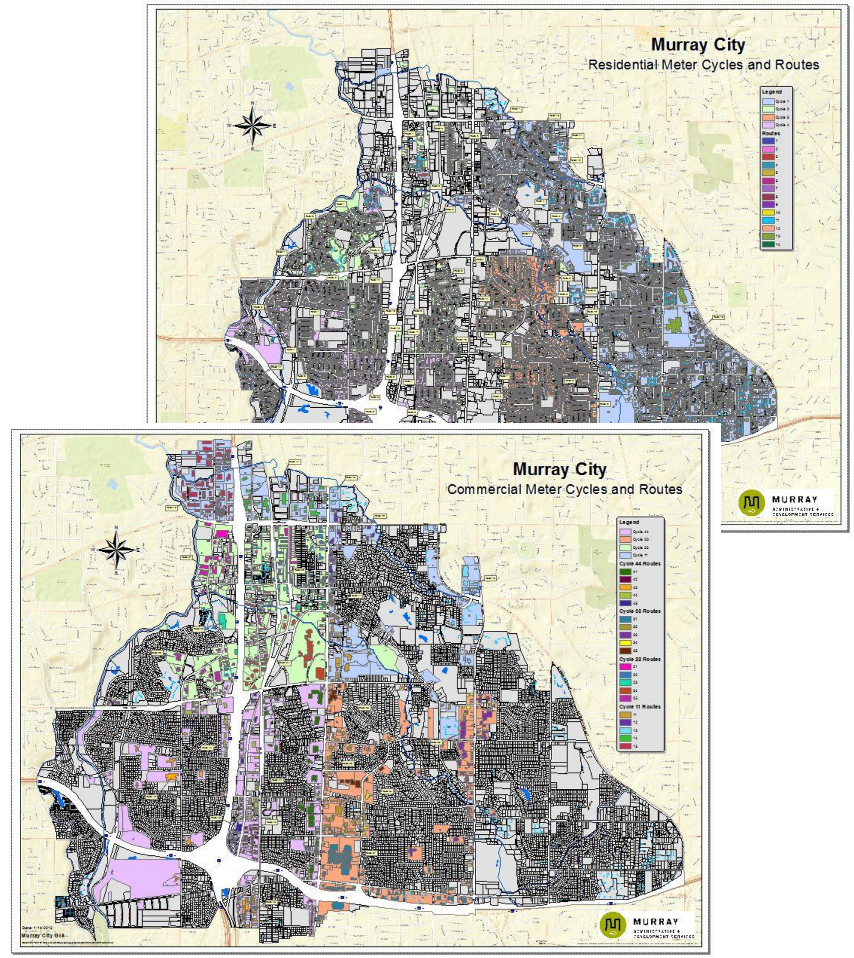
Murray City is one of the few municipalities which provides all utility services to its citizens. Water, Wastewater, Stormwater, Solid Waste and Power Utilities are all provided and maintained by the City.

In order to keep these utilities running, the Cities Customer Service Department maintains a series of meter cycles and routes for collecting usage data. Originally, meter readers would follow these cycles and routes monthly, following a list of addresses along the route which were tied to the meters.

Meters, which were originally read manually each month, have been replaced by radio read units. The locations of these meters have been recorded in the GIS database, and coordinates identifying their spatial locations are downloaded to the meter data collection software.

The cycles and routes are separated into residential and commercial customers, with four billing cycles for each, and multiple routes within each billing cycle. Separate routes identify customers who were annexed more recently to Murray, and receive Stormwater Utility services only.

Installation of radio read meters, and incorporating spatial locations into the mobile data collection systems has greatly enhanced the efficiency of billing for utility usage for the City.



Janie Richardson
Murray City GIS

Empowering Municipal Electrical Utilities through the use of Digital Map Books

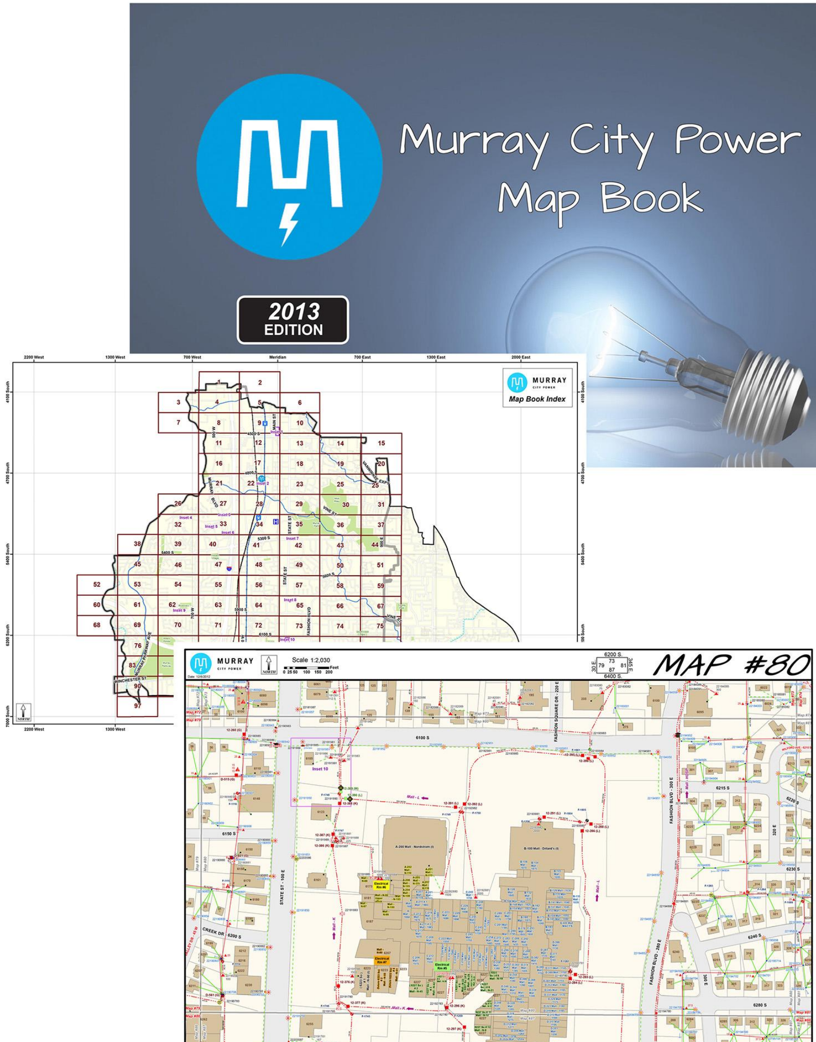
Traditionally Geographic Information Systems (GIS) has been a back office technology, and many of the maps created by GIS professionals only reach the hands of few people. However, because of the advancements in computing and mobile geospatial technologies, we have much wider variety of options for extending the reach of our maps.

Murray City GIS Division has developed a digital Map Book for our municipal electrical utility “Murray City Power”. This Map Book serves as a GIS/Mapping tool to help utility line crews and dispatchers view and understand the complex power grid with in Murray City.

The Map Book breaks down the city into 98 pages at a scale of 1: 2,000; labeling every road, building, canals, rivers, parks and symbolizing the complex electrical network including both overhead and underground transmission and distribution systems.

To help with navigation we have created a “smart” grid/index page where the user can click on the corresponding maps and the map book will jump to the selected pages. On the top of each map page there is a “page guide” that lists the north, east, south, and west boundaries on each map. The user is also given the ability to navigate via the page guide by clicking on the corresponding number.

This new system of digital map books will allow the City to save hundred’s on the cost of printed map books and allow for a more enhanced user experience, with much more flexibility and for more frequent updates as the network grows over time.



Ben Teran
Murray City GIS

Provo City Redistricting

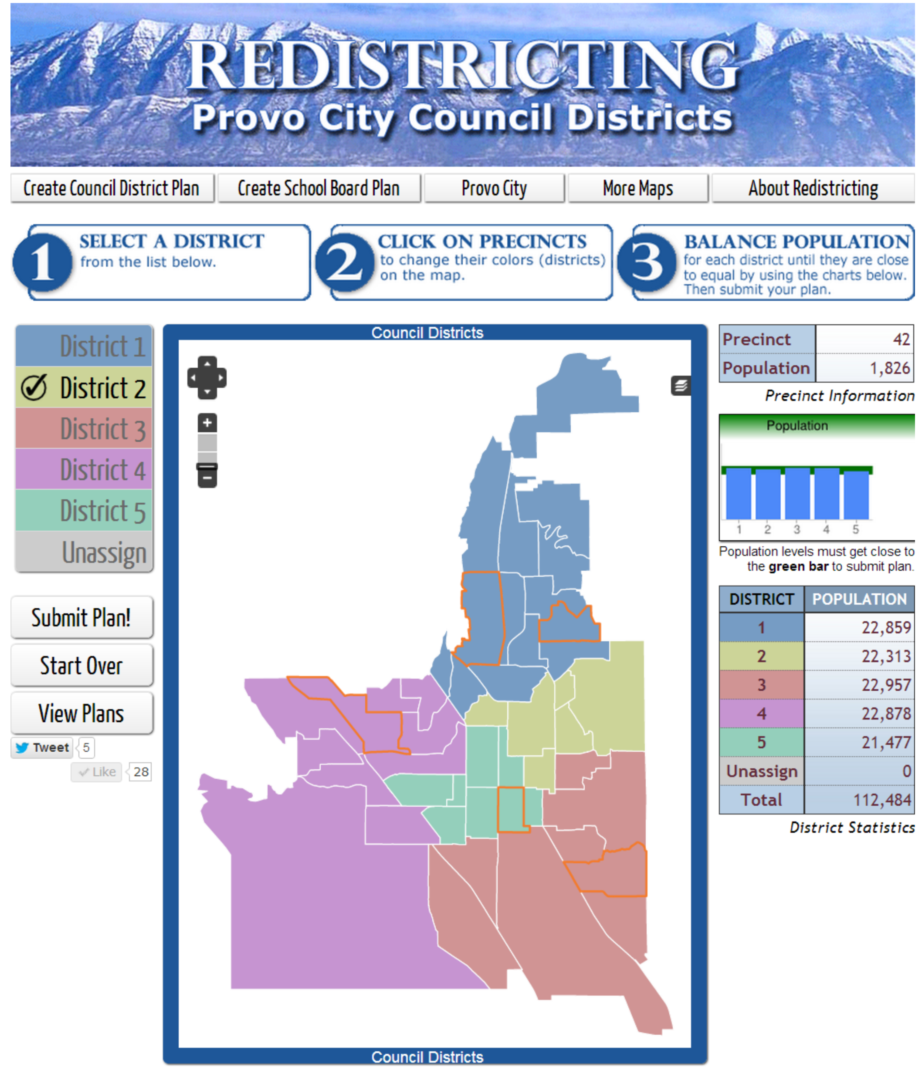
Why redistricting?
A census is taken every 10 years to determine where the population is located. District boundaries need to be adjusted to balance population in order to receive proper representation.

What needs to be balanced?
The county uses census data to organize census blocks into precincts and balance them based on registered voters. The city then uses the precincts that fall within the city boundaries and groups them into larger council districts (5) and school board districts (7) based on population.

What was needed to achieve a balanced plan?
Submitted plans were validated on districts being substantially equal in population size. The districts also needed to be reasonably compact and consist of contiguous (touching) precincts.

How did this tool increase public participation?
In the last redistricting process there were only about a dozen plans up for consideration. With this new online tool there were nearly 100 plans submitted. Plans came not only from Provo city and school district employees, but many were submitted by the public as well. This process made redistricting transparent and allowed the public to take part in deciding the right solution for the city.

How much time was saved by creating this tool?
This online tool created the opportunity for close to 100 plans to be properly considered and automatically filtered for meeting the specified criteria. This allowed those involved in making the decision to quickly decide the best plan for the city. The redistricting process as a whole was completed in a little over a month, including public meetings and public comment sessions.

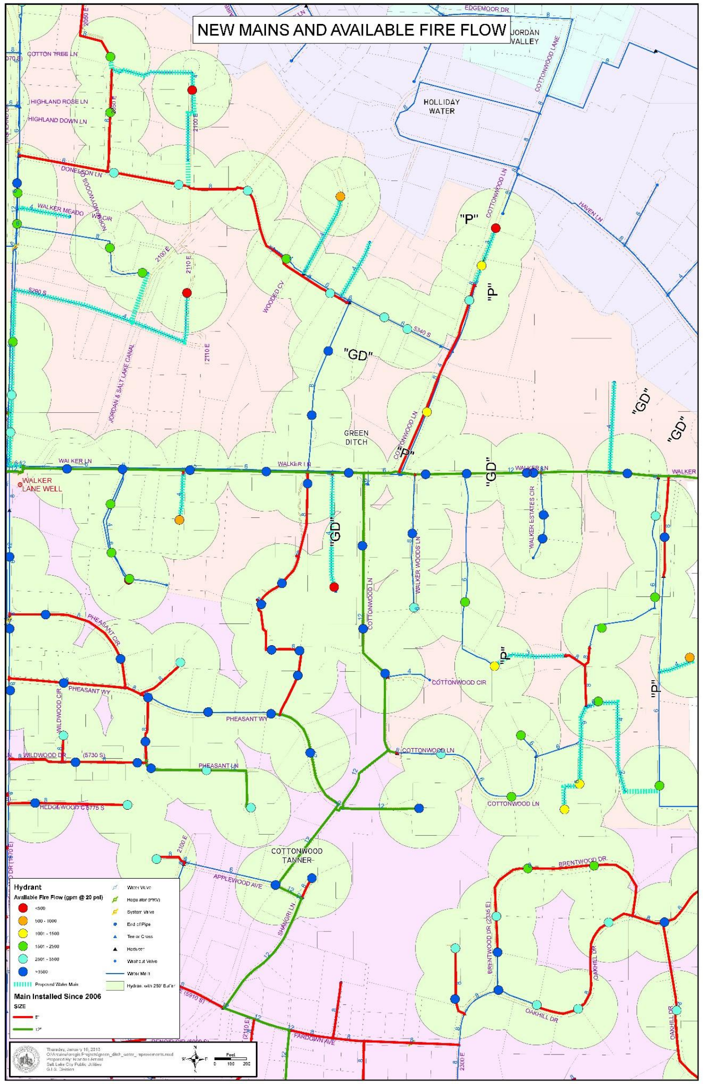


Stan McShinsky
Provo City
http://redistricting.provo.org/

Water and Wastewater GIS Modeling

GIS modeling tools are critical components in day-to-day functions, emergency response, and long-term planning for the Salt Lake City Department of Public Utilities (Public Utilities) water and wastewater systems. GIS modeling is used to identify and plan for the impacts of changes to each system that result from planned system improvements and system growth-needs as an outcome of economic development. These computer-generated representations illustrate real-world processes, providing a tool to assist us in anticipating and planning for a wide variety of scenarios and providing measures of physical processes, facilitating our ability to optimize system function. Models are continuously updated as the systems are upgraded, and model outcomes are field-verified by the Maintenance Division. Models are used to provide a deeper understanding of how current infrastructure functions, and how potential changes and upgrades to the system will affect functionality, or "what ifs." Models can also be utilized to graph contaminate movement, by either anticipating potential characteristics of designed scenarios, or by tracing back contaminants upstream to determine the location or flow direction and speed of contaminants, thus enhancing our ability to plan for potential events or to respond more effectively in the field. Another major use of the models is master planning; modeling assists us in determining how future, potential development will affect either system, and what capital improvements might be necessary to support proposed growth in a sustainable manner. As Salt Lake City grows, the models can project the need for larger infrastructure and determine which areas will need more attention in the coming years.

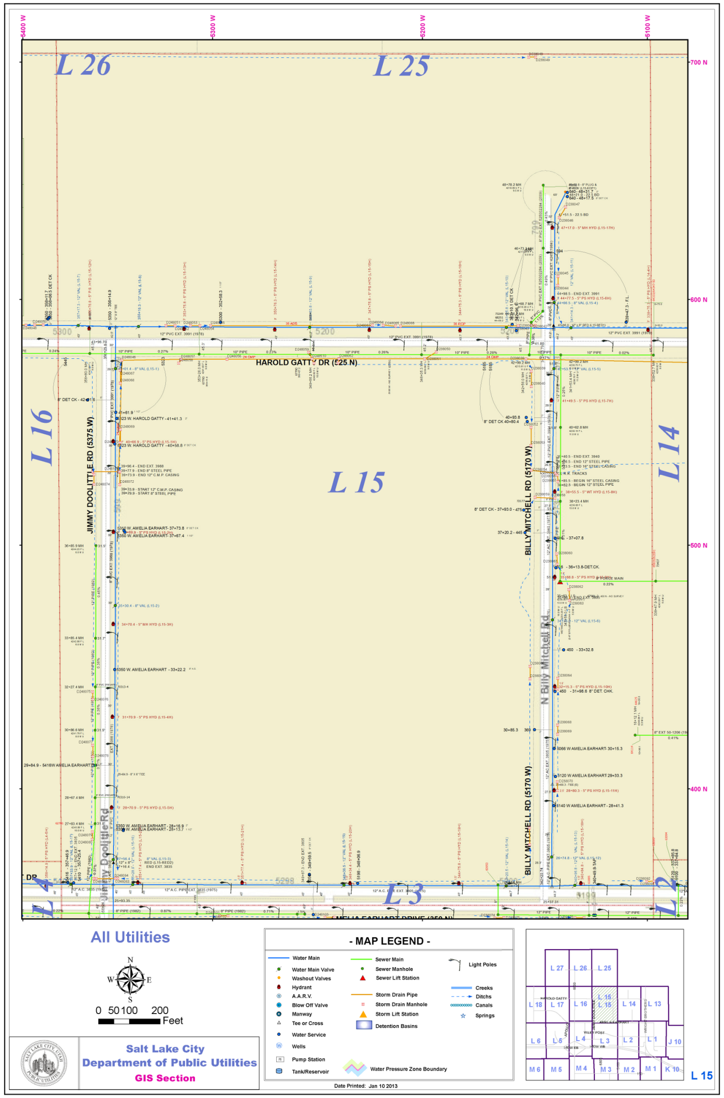
As an example, modeling helps to anticipate fire protection needs in both residential and commercial developments. The model is used to evaluate fire protection needs, and if additional support is needed in the form of more hydrant coverage or automatic in-door sprinklers.



Brandon Arnold
Salt Lake City Department of Public Utilities

Water, Wastewater, Stormwater, and Street Light Utility Map

Salt Lake City Department of Public Utilities (Public Utilities) uses GIS to link all aspects of data, capital improvements, and operations and maintenance functions in each of the four enterprise utilities to enhance efficiency, performance, and service to our community. One of the benefits of this linked network is Public Utilities' ability to provide paper maps or static PDF maps based on up-to-date GIS data to Utility crews that do not have access to iPads, and to developers, contractors, or residents to show utility infrastructure locations. Crews use these maps to make repairs and perform scheduled maintenance, and to respond to emergency repair needs. Developers and contractors use these maps to identify connection locations and to determine if the existing connections are adequate for their proposed construction. Homeowners use the maps when planning a home expansion or to help in effecting repairs to their water or wastewater lines. Developers, contractors, and homeowners can either use current pre-existing maps or request custom maps for specific needs.



Tricia Cannon
Salt Lake City Department of Public Utilities

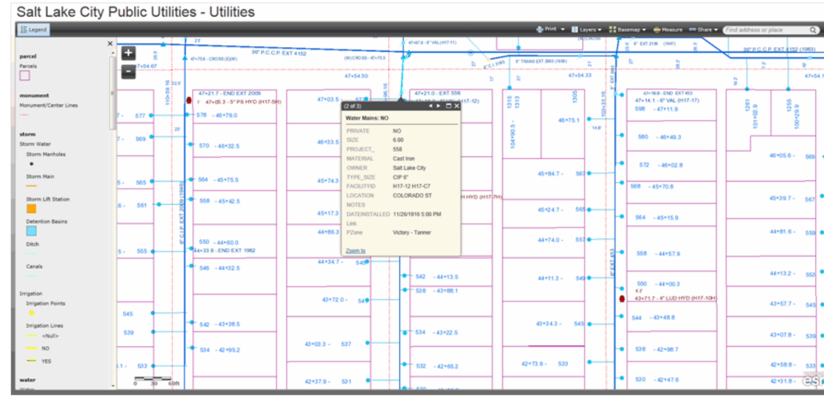
iPad Apps For Salt Lake City Department of Public Utilities

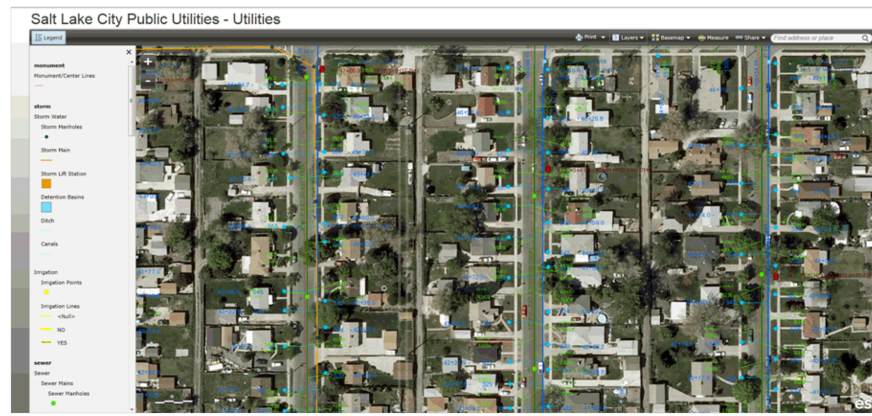
There are many jobs within Salt Lake City Department of Public Utilities (Public Utilities) that require access to maps and infrastructure system details in the field every day. But we don't use just any map. These maps are "live," and include location and information details about underground utilities, work areas, billing investigations, and Blue Stakes requests, which average over 3,000 each month. The following are just a few examples of how we use GIS-linked maps to work more efficiently and accurately in the field:

Locators: With expanded mapping technology and Apple iPads, locators can access up-to-date information in the field, ensuring that utility locations are quickly and accurately marked before anyone digs, avoiding costly, unnecessary damage and service interruptions. Using a mobile application that maps Blue Stakes requests, the locators can now route their tickets and complete the "paperwork" online, allowing for less paper and a more productive workflow.

Meter Investigators: With over 500 billing collections and investigation requests per month, efficient routing and scheduling of tasks is critical in allowing our investigators to act on these requests in a timely manner. Using multiple, combined applications, investigators view all action requests live on their iPads, as they are posted by Customer Service. A GPS locator tool on the iPad also helps investigators find buried or hard–to-find meters.

Water, Sewer, and Storm Maintenance: Using a variety of mapping applications, the Maintenance Division can access large scale and small scale maps for both a detailed and overall look at the system. This flexibility allows crews to identify not only currently assigned work, but other future scheduled repairs that could be completed at the same time, saving both time and money by avoiding multiple road-cuts in the same locations, and sending out crews to the same area repeatedly. Having access to live maps in small scale also helps crews to identify the best locations to shut down water valves to effect both planned and unexpected repairs, minimizing the number of connections affected and the duration of the shut-down, reducing the inconvenience for everyone.





Screen Shots from iPad

Nick Kryger
Salt Lake City Department of Public Utilities

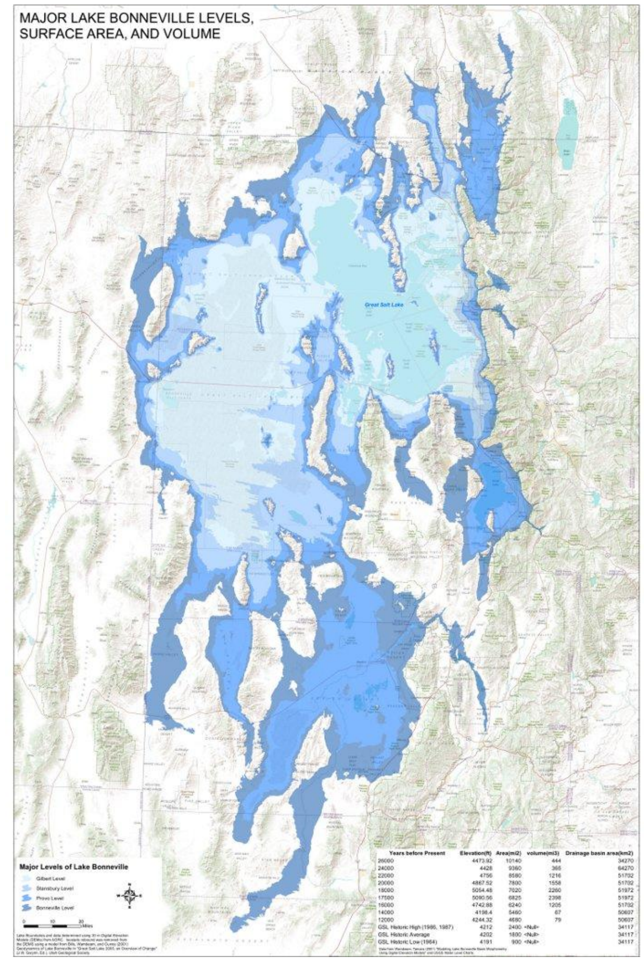
Major Lake Bonneville Levels, Surface Area, and Volume

The shorelines of Lake Bonneville are one of the most noticeable and known geologic features in the Salt Lake region. Teachers and students can explore geology easily just by walking out the door of the classroom.

This map was created to help teachers know where the different shorelines of Lake Bonneville can be found and help students explore the geologic history of their home state.

The surface areas, volumes, and drainage basin areas were determined using a Geographical Information System (GIS) with Digital Elevation Models from the state's Automated Geographic Reference Center (AGRC).

Comparing areas and volumes throughout time can be used to look at climate change and determine how much wetter and colder it was during the last glacial maximum.

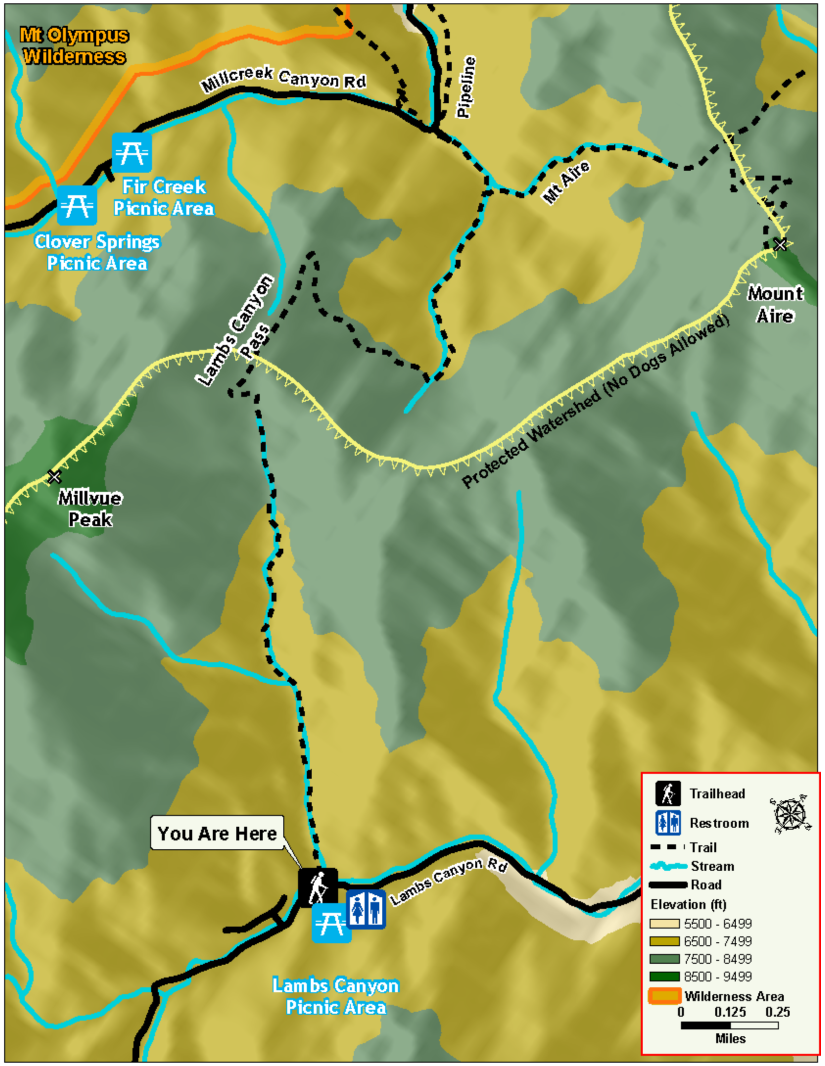


Tamara Wambeam
Salt Lake City Department of Public Utilities

Trail Maps of the Wasatch Front

The Wasatch Mountains are renowned for their recreational opportunities, especially the spectacular hiking. Salt Lake City Department of Public Utilities (Public Utilities) is charged with protecting our critical watershed areas and keeping our water supplies safe, while helping the community and its visitors to discover the beauty that is so close to the city. To facilitate both an appreciation for and responsible access to our Wasatch Front Watershed Area, Public Utilities hosts a website that provides maps of the main trails in our protected watershed area canyons. Besides static maps of all the main trails, some trails also have interactive maps that allow you to zoom in and out in order to help find trail details and to see other trails nearby. If you are using a mobile device you can also use the GPS locator on that device to help place your location on the interactive map. To enhance the user experience, the interactive maps also include different backgrounds such as air photos or topographic details.

The map shown here is a trailhead map of Lambs Canyon. If you are interested in the interactive maps please visit http://www.slcgov.com/utilities/public-utilities-gis-mapping and choose *Trail Maps*.



Tamara Wambeam
Salt Lake City Department of Public Utilities

2009 - 2012 Re-addressing Projects

Salt Lake County Addressing Office is dedicated in working towards enhanced public safety, increased efficiency, and more effective government service by ensuring accurate addressing in Salt Lake County.

The Addressing Office is responsible to assign addresses for the Unincorporated Salt Lake County and street name approval for new developments or street name changes within Salt Lake Valley.

Since the creation of the Addressing Office in January of 2009, the office has readdressed seven different communities within Unincorporated Salt Lake County assigning addresses based on the Salt Lake Base and Meridian Grid System:

In 2009:

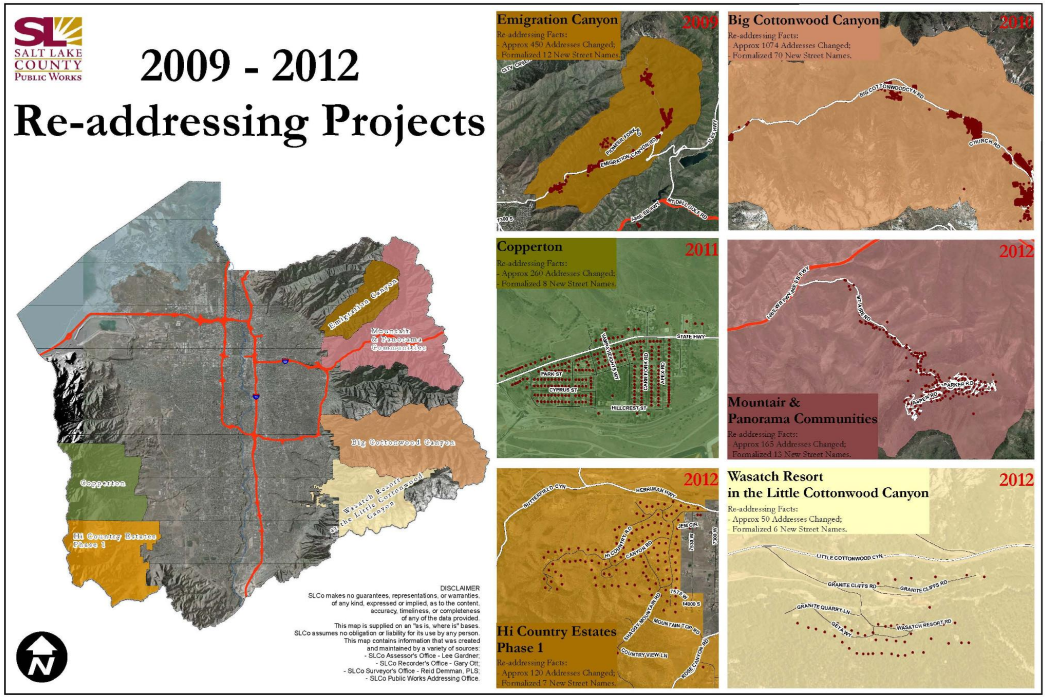
- **Emigration Canyon**: re-addressed approximately 450 properties and formalized 12 street names.

In 2010:

- **Big Cottonwood Canyon**: re-addressed 1074 properties and formalized 70 street names.

In 2011:

- **Copperton**: re-addressed 260 properties and renamed eight streets.



In 2012:

- **Wasatch Resort in Little Cottonwood Canyon**: re-addressed 50 properties and renamed six streets;
- **Hi Country Estates I**: Re-addressed 120 properties and renamed seven streets;
- **Mountair/Panorama Communities**: re-addressed 165 properties and renamed 13 streets.

Izabela Miller
Salt Lake County Addressing Office

Collection of Addressing Data

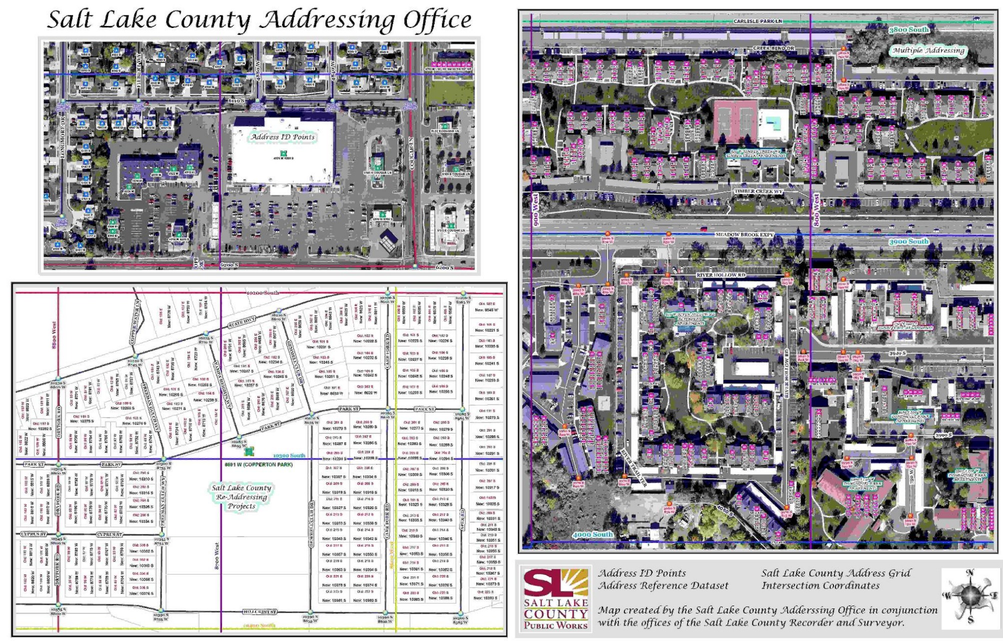
Using the correct address allows emergency service responders to locate the caller in optimum response time, the USPS to deliver the mail appropriately, and the public to easily find a location in the Salt Lake Valley.

Some of the Addressing Office responsibilities are maintenance of property location for Salt Lake County and maintenance of addressing data in Geographical Information System, such as:

- **Address Grid**: The Address Grid represents the Salt Lake County Grid in which each section line has an assigned coordinate value. The Address Grid is measured from section lines and follows actual addressing and street coordinates throughout Salt Lake County in increments of 100 units.

- **Address ID Points**: This is a spatial representation of an address. The point feature creates a symbolized reference of addressing data which allows for an organized view of the addressing data associated for each parcel.

- **Intersection Points**: Created a spatial representation of intersection points for the entire Salt Lake County. This project is now being maintained and used by internal and external agencies.

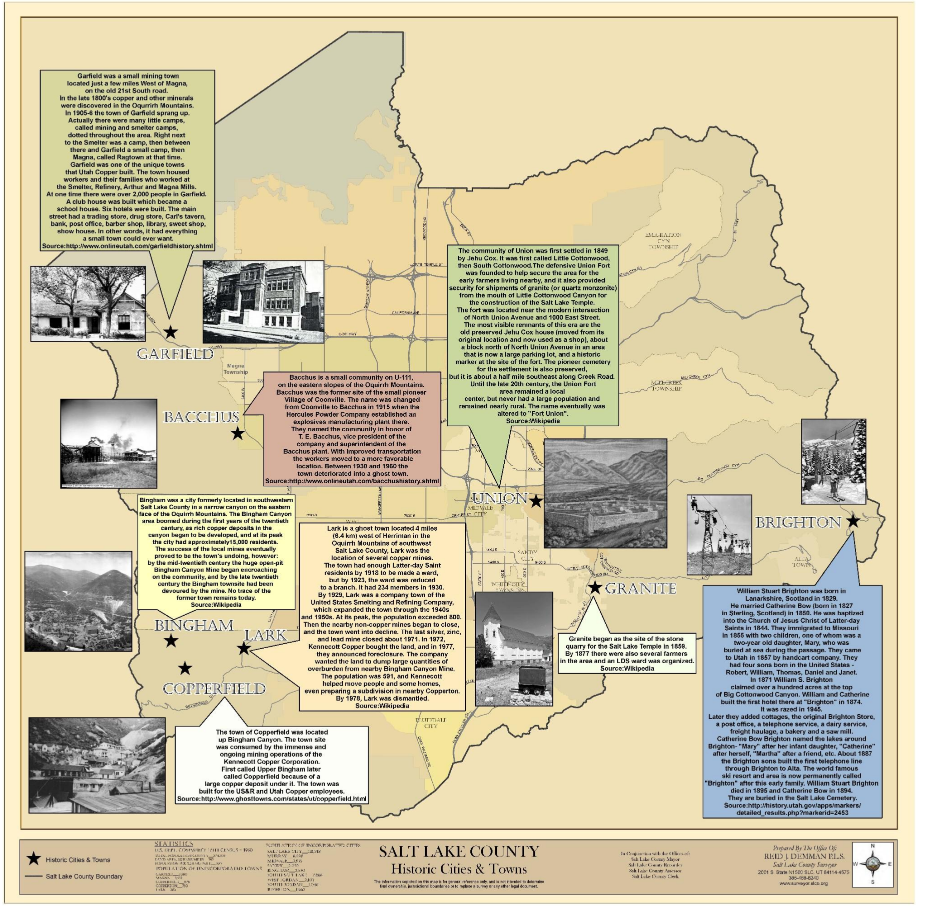


- **Relational Addressing Reference Data**: Addressing data sets used for research, validation and maintenance of addresses. Relational Functionality: creating point feature, look-up tool, and address locators.

Izabela Miller
Salt Lake County Addressing Office

Ghost Towns in Salt Lake County?

Since the 1850's the Office of the Salt Lake County Surveyor has maintained the Public Land Survey System and provided numerous mapping services for the citizens of Salt Lake County. This map is just one example of the historic information we maintain.
Many don't realize the number of ghost towns that exist in Salt Lake County.



Mark Miller
Salt Lake County Surveyor's Office

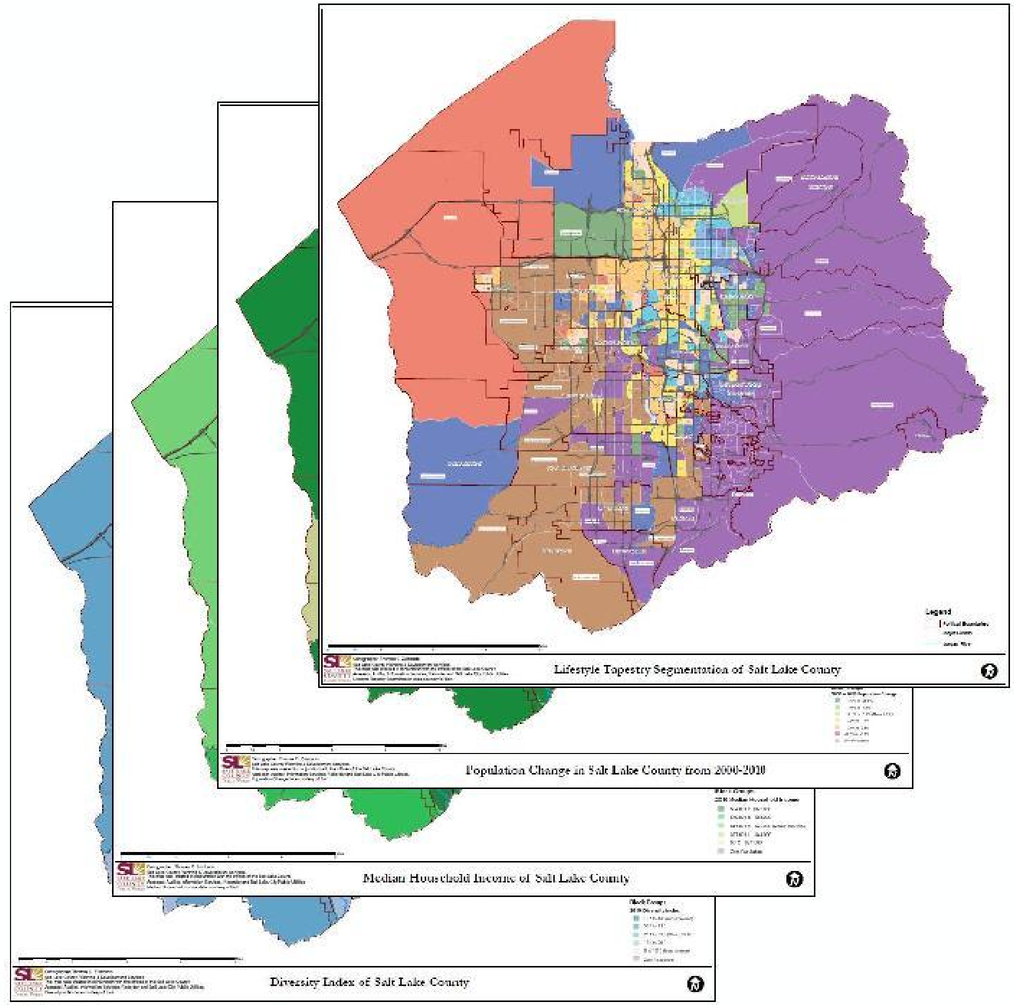
The Changing Face of the Capital County

A Matter of Perspective

The recent 2010 US Census has brought to light many demographic changes undergone by the Union in the last decade.

For the State of Utah, Salt Lake County continues to serve as a mirror for many of these changes, reflecting similar trends in socioeconomic, financial, cultural and migratory patterns.

Salt Lake County Planning & Development Services proudly offers a series of maps that visualizes the current social fabric of the capital county and, through a display of the rich diversity of its people, demonstrates to our elected leaders what a difference ten years can make.



Tom C. Zumbado
Salt Lake County Planning & Development Services

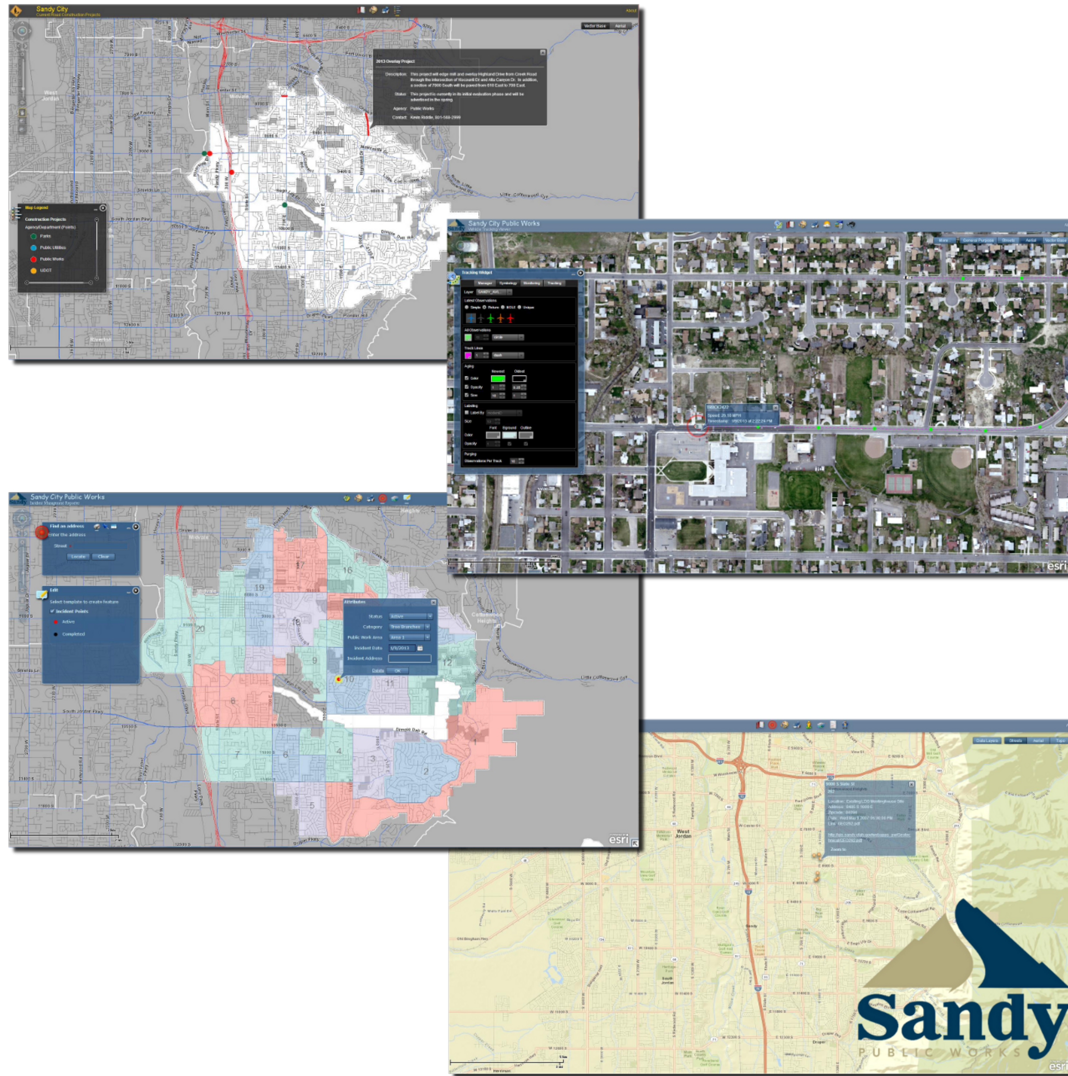
Using Flex-based web maps to display data

Sandy City uses web maps for many functions. As the use of GIS data has grown within the city, so has the need to easily view and analyze the data. By using custom designed web map applications, employees and citizens alike can easily obtain the information they need.

Sandy City Public Works Department has several web map applications that use the data stored in our GIS. From these web maps, information can be quickly found by it's geographic location, or by searching other attributes. Information can be made readily available to the public such as current construction projects throughout the city. Documents which are linked to the GIS are easily retrieved and viewed. Managers are able to view city vehicle locations during a snowstorm, and analyze existing driving routes for improvement. Incidents throughout the city can be recorded, organized by work area and labeled as active or complete.

Sandy City continues to find new uses for utilizing this technology, getting information quickly to those who need it. To view some of the current web map applications used in the Public Works Department, please visit:

http://gis.sandy.utah.gov/webapps_pw/projects.html



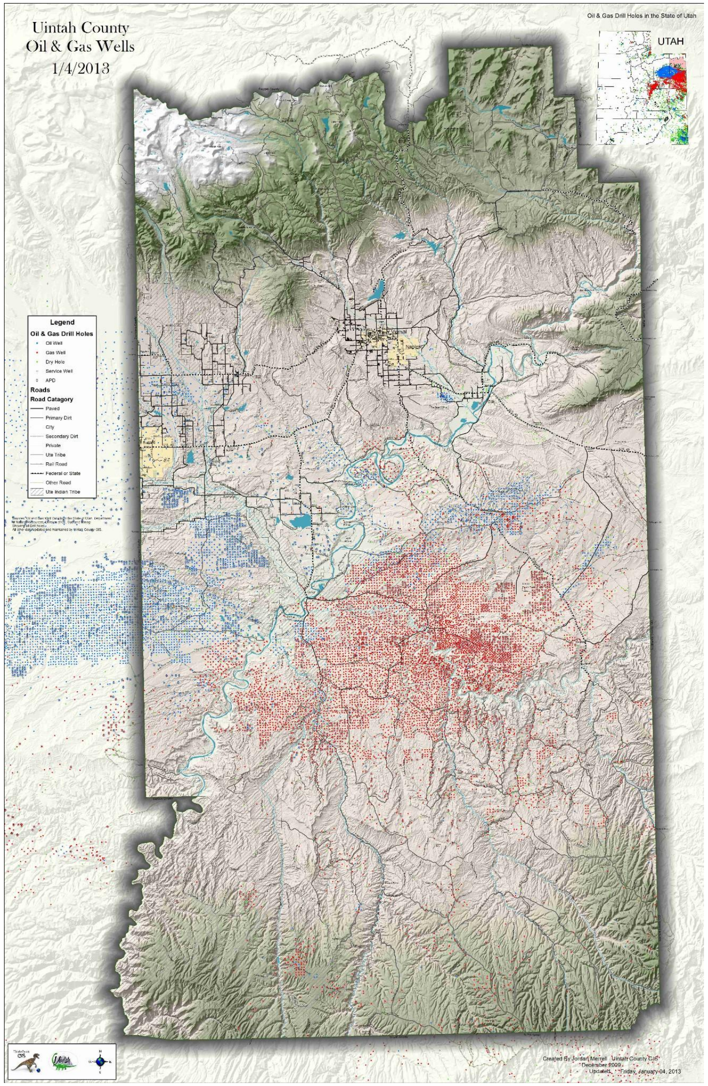
Ryan Kammerer
Sandy City Public Works

Uintah County Oil & Gas Wells

This "Oil and Gas Wells" map illustrates how extensive natural resource production is in Uintah County. Maps such as this one, are used by the Commissioners and Economic Development department to recruit business to the area, to explore air quality issues, and to demonstrate the need to bring electrification to the area, just to name a few.

The existing wells illustrated by this map exceed 6,000 wells in Uintah County alone. It is expected that this number will increase to over 25,000 wells in the next 10 years.

Mineral lease revenues generated by these wells provide funds distributed throughout the state though the permanent Community Impact fund Board (CIB). Uintah County is a major player in the extraction industry.



Jordan Merrell
Uintah County

State Government

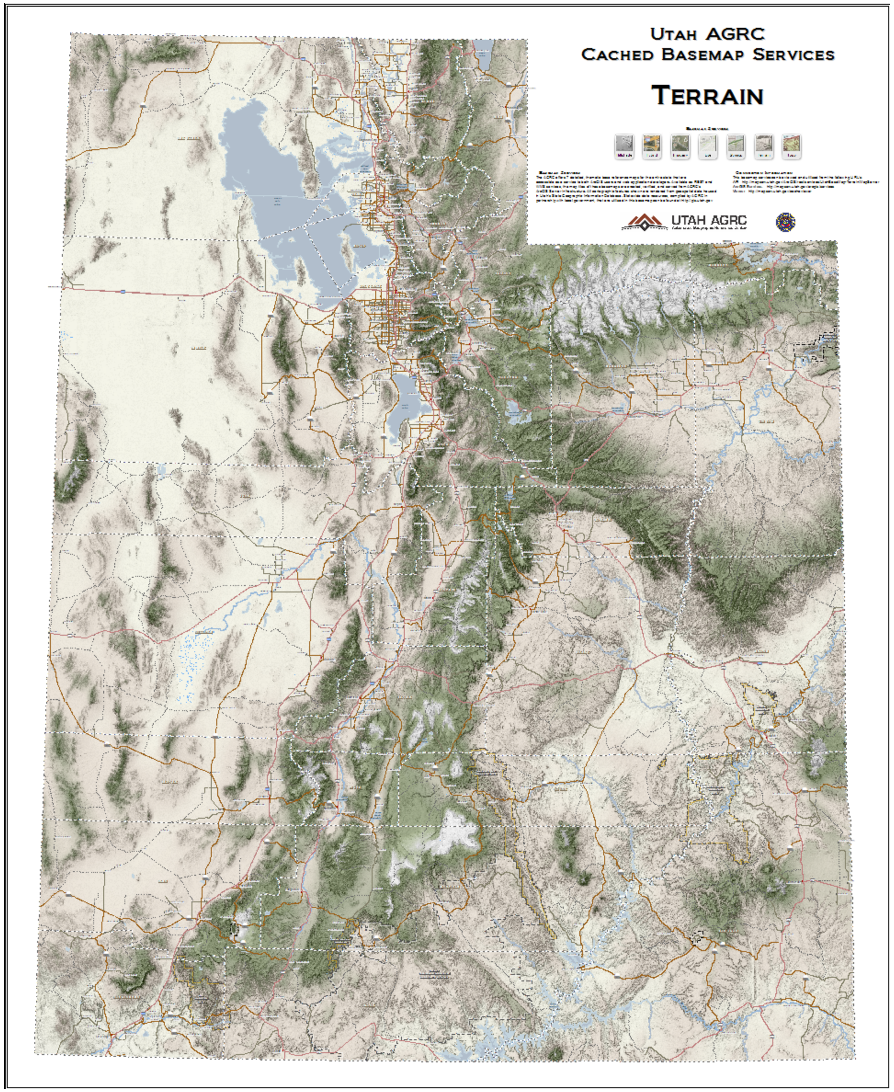
Utah AGRC Basemap Services

The AGRC offers seven detailed, thematic base reference maps for the entire state that are accessible as a web service to both ArcGIS users and web application developers. Available as REST and WMS services, the map tiles of these basemaps are created, verified, and served from AGRC's ArcGIS Server infrastructure.

All cartographic features shown are rendered from geospatial data housed in Utah's State Geographic Information Database. Statewide data resources, compiled by AGRC in partnership with local government, that are utilized in this basemap can be found at http://gis.utah.gov

This basemap service and others can be found at:

Web API: http://mapserv.utah.gov/ArcGIS/rest/services
ArcGIS Service: http://mapserv.utah.gov/arcgis/services
Viewer: http://mapserv.utah.gov/cacheviewer



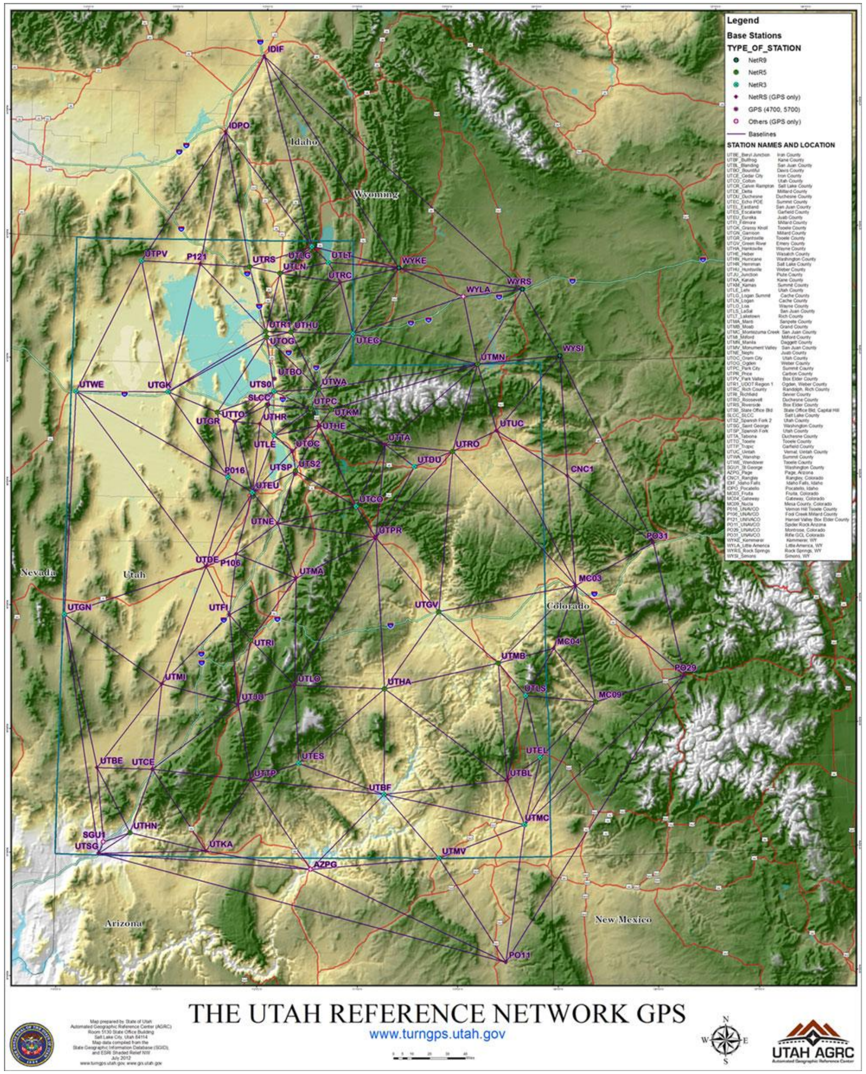
Zach Beck
Utah Automated Geographic Reference Center

Utah Reference Network GPS

In 2005, the Utah Legislature, recognizing the need to support highly accurate GPS applications for surveying, engineering, construction, and GIS data collection, signed into law UCA 63F-1-509. It created the Statewide Gobal Positioning Reference Network; required the Automated Geographic Reference Center (AGRC), within DTS to administer the network; and provided two years of funding for the initial buildout of the network.

From the initial 15 stations The Utah Reference Network GPS has grown to 70 survey grade GPS receivers, located across Utah, with supporting stations in three neighboring states. The network is used by 350 paying and partnering subscribers. Built with Legislature support, a partnership of cities, counties and state agencies the network is able to leverage equipment and facilities, thus keep down the yearly subscription rate to only $400. These low subscription fees result in more usage and more accurate locations for surveying monuments, public lands, and private property.

This map represents the network as of Dec. 2012, we are still expanding and providing a real-time solution for highly accurate GPS surveying.



Mike Heagin
Utah Automated Geographic Reference Center

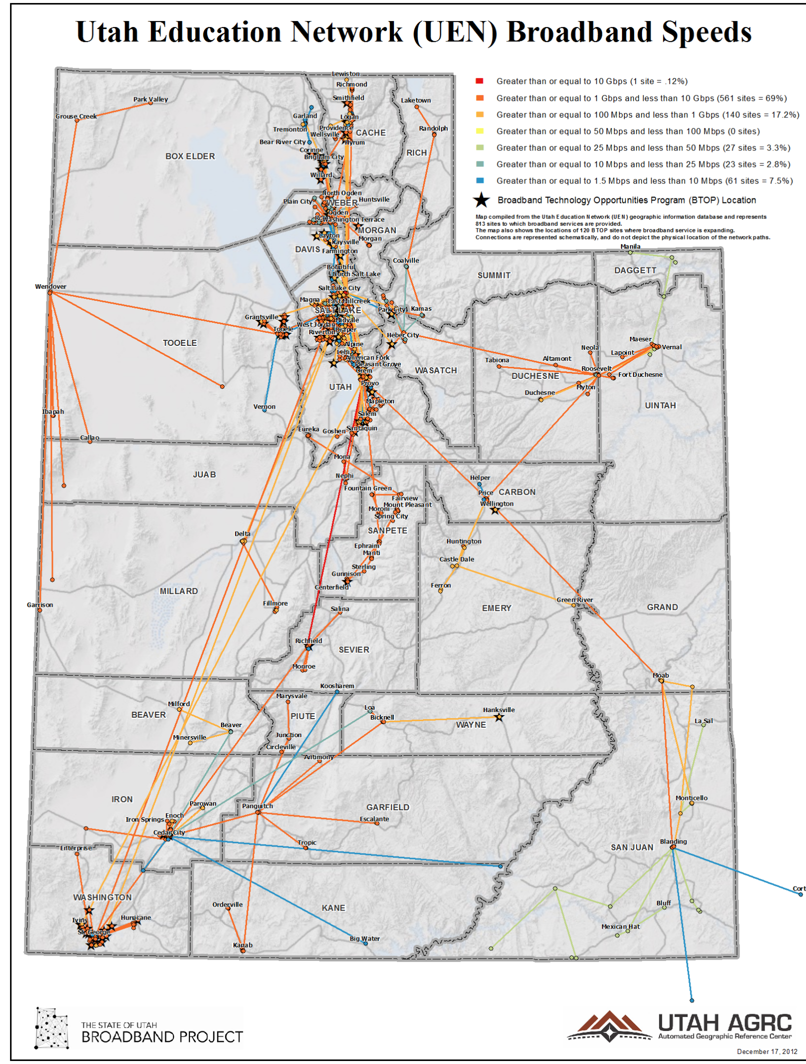
Utah Education Network (UEN) Broadband Speeds

The Utah Education Network (UEN) connects Utah school districts, schools, and higher education institutions to a robust network and provides quality educational resources. In spite of Utah's size and extensive remote, rural areas, UEN is one of the nation's most premiere education networks.

This map shows the locations and connection speeds of the 813 sites where data and/or video broadband services are provided by the Utah Education Network.

The map also shows the locations of 120 sites for which UEN was able to add or enhance services through the Broadband Technology Opportunities Program (BTOP) grant program . BTOP grants are administered by the NTIA and provide funding to deploy new broadband access to, or to improve existing broadband access for community anchor institutions.

The connections between the sites, color coded by bandwidth capacity, are represented schematically, and do not depict the actual geographic location of network paths.



Rick Kelson
Utah Automated Geographic Reference Center

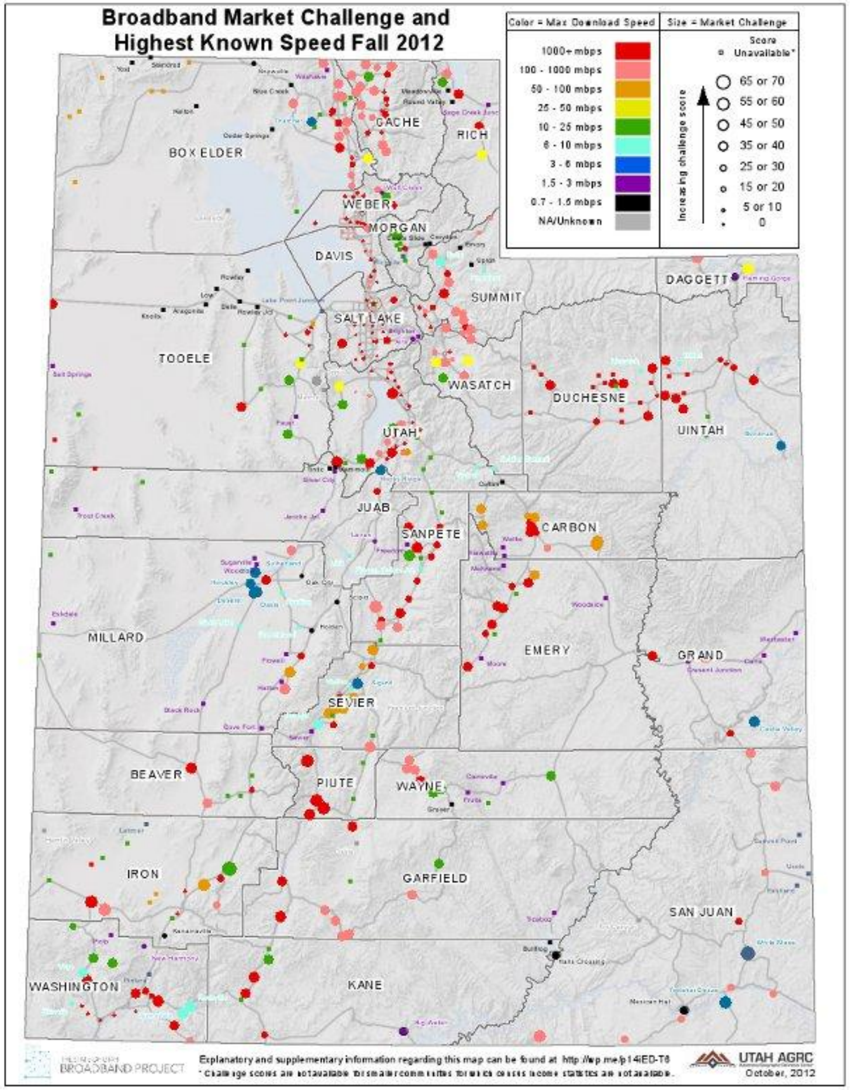
Contrasting Highest Known Speed and Market Challenges for Utah Communities

The goal of this map is to identify and raise awareness of unserved and underserved communities by broadband internet across the state. As rural and/or low income areas are thought to be most likely to be missed by higher capacity broadband, this map was created to highlight the relationship between market challenges and broadband capacity.

Broadband speed is denoted by color, and shows the highest known download speed available from wireless or wireline broadband in each community. The highest known download speed was derived from an examination of both provider-submitted maximum advertised download speeds and broadband data reported to the Project from community anchor institutions, such as schools, hospitals, and public safety buildings.

Market challenges per community are denoted by circle size. The Market Challenge score was calculated using the USDA Community Connect broadband grant program's scoring system that sums an economic need and rurality score. Populated places in Utah that are not recognized by the Census and therefore do not have a market challenge score are represented by small squares.

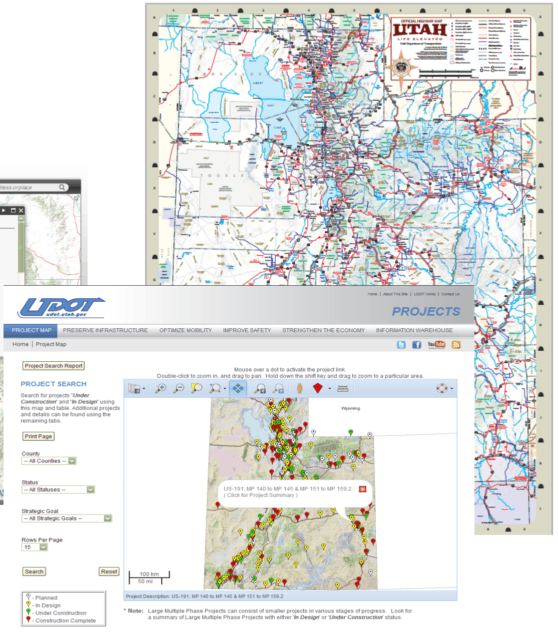
Community names are shown on the map only where the highest known download speed is less than 10 Mbps and are color-coded according to speed.



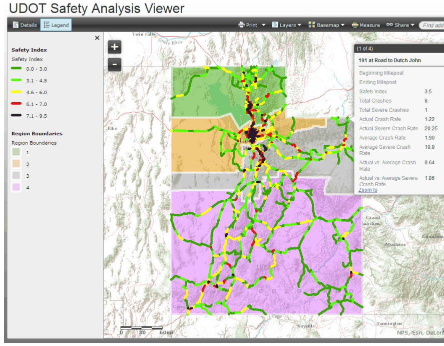
Utah Broadband Project
Governor's Office of Economic Development and
Utah Automated Geographic Reference Center

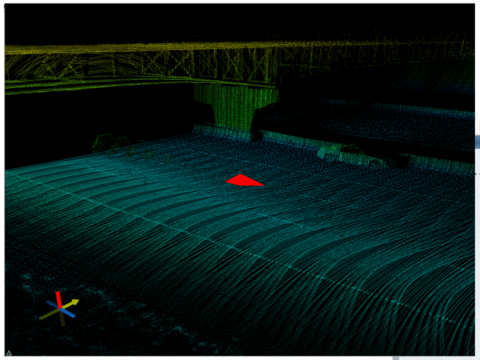
UDOT Enterprise GIS

Mapping is everywhere at UDOT. From the inception of the department mapping has always been a hallmark of our work. From the Official State Highway Map to draft maps for roadway projects, GIS and mapping have supported the department. Energizing UDOT with spatial technology has empowered us to make more than just maps. Today GIS at UDOT is a powerful information system that brings together data from all over the department. These tools are for internal staff and the public. UDOT is using GIS to manage projects, track assets, complete field data collection, develop transportation plans and emergency management. We are now leveraging the power of real time maps into our decision making. To view a sample of UDOT GIS products please view our interactive UPlan GIS tool.

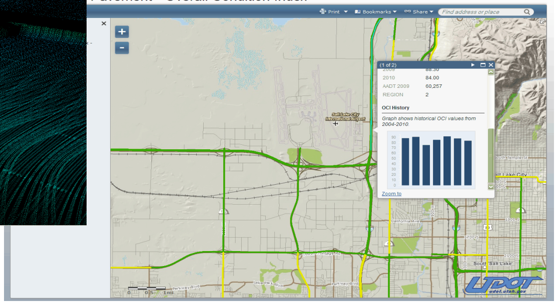


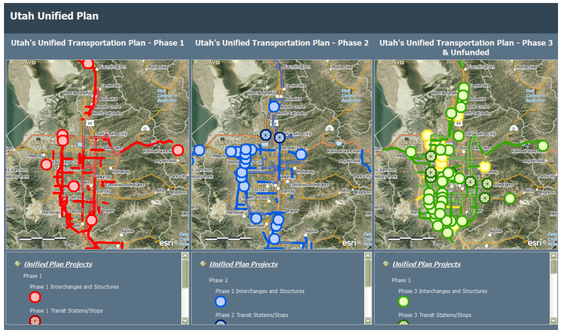
UDOT Safety Analysis Viewer

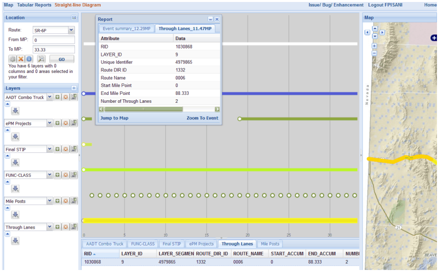




Pavement - Overall Condition Index







udot.utah.gov

Frank Pisani
Utah Department of Transportation

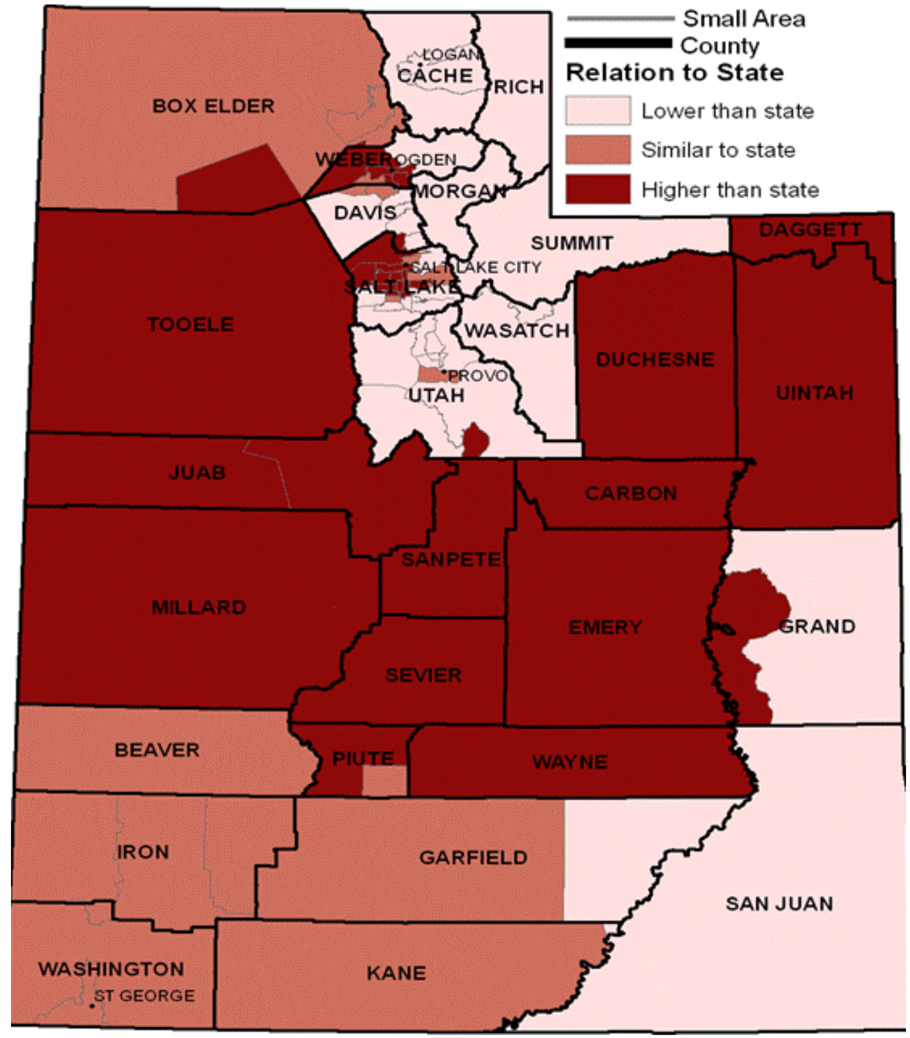
Asthma Emergency Department Visit Age-Adjusted Rates
by Small Area and County, Utah Adults, 2009-2010

Asthma is a serious personal and public health issue that has far reaching medical, economic, and personal implications. The burden of asthma is evidenced by the number of asthma-related medical events, including emergency department visits. In 2010, there were 6,304 asthma-related emergency department visits in Utah. Roughly 20 million dollars were spent on asthma-related emergency department visits in 2010.

The majority of problems associated with asthma are preventable if asthma is managed according to established guidelines. Effective management includes appropriate medication use, reducing triggers that can cause an asthma attack (e.g., tobacco smoke, dust mites, mold, pets, and air pollution), and routine visits to the doctor.

This map is defined by small areas and counties. Small areas are determined by population size, political boundaries, and economic similarity.

This map was created using the Utah Emergency Department Encounter Database. The primary diagnosis code ICD 493 was used to identify emergency department visits due to asthma. Data include adults 18 and over who were treated and released and those who were admitted to the hospital. This map was made using a method called "fixed effect test of significance" where areas are based on statistically different rates than the state.



Holly Uphold
Utah Department of Health
Bureau of Health Promotion

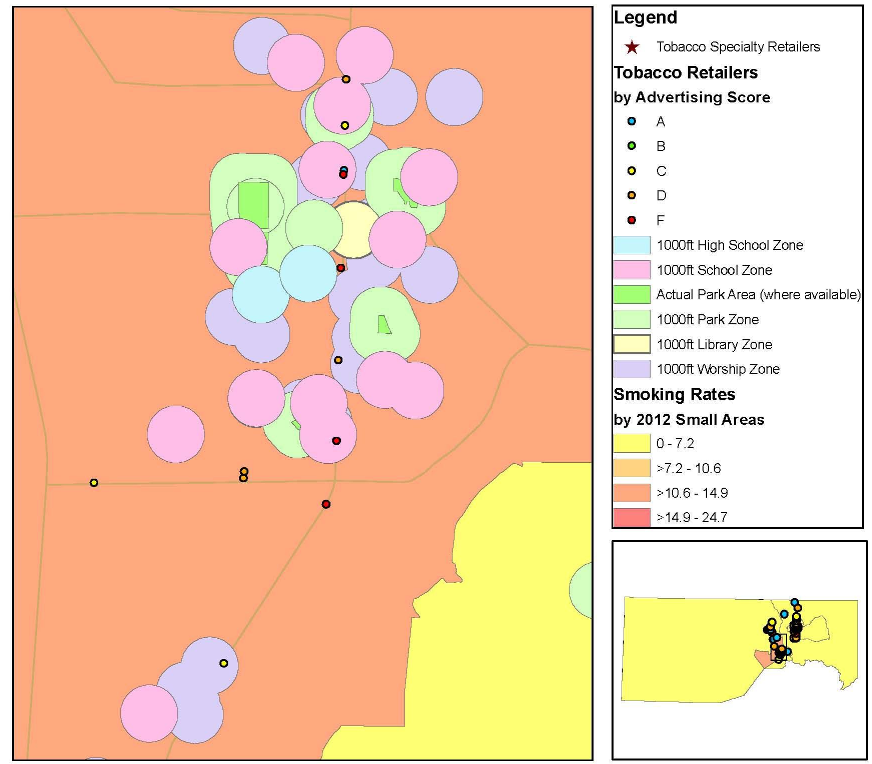
Utah Operation Storefront
Utah Tobacco Prevention & Control Program

Utah Operation Storefront is a retail observation project that examines tobacco advertising, tobacco pricing, and the availability of selected new tobacco products in the point-of-sale environment. The project is a collaboration between the Utah Department of Health's Tobacco Prevention & Control Program and all 12 local health departments throughout the state. Overall, 843 stores were reported visited with 804 "completed" surveys included in the analysis.

Maps were created for each local health department to visualize Operation Storefront results in relation to areas of community interest. Each map has been tailored to the needs of local health departments and most focus on specific cities or local areas. The maps are generally designed to be included and explained in presentations that include background of the project and local results. The project hopes to inform and inspire local policy change around the issues that arise from tobacco and tobacco advertising in the retail environment.

The majority of maps display the retail location by the advertising score that the store received as a result of observations made and recorded during the data collection portion of the project. This is particularly poignant when a store with a poor grade, and thus doing a poor job at protecting its community from the effects of the tobacco industry influence in the retail environment, can be seen to be in very close proximity to a school or park. Additional maps are currently being created for public consumption.

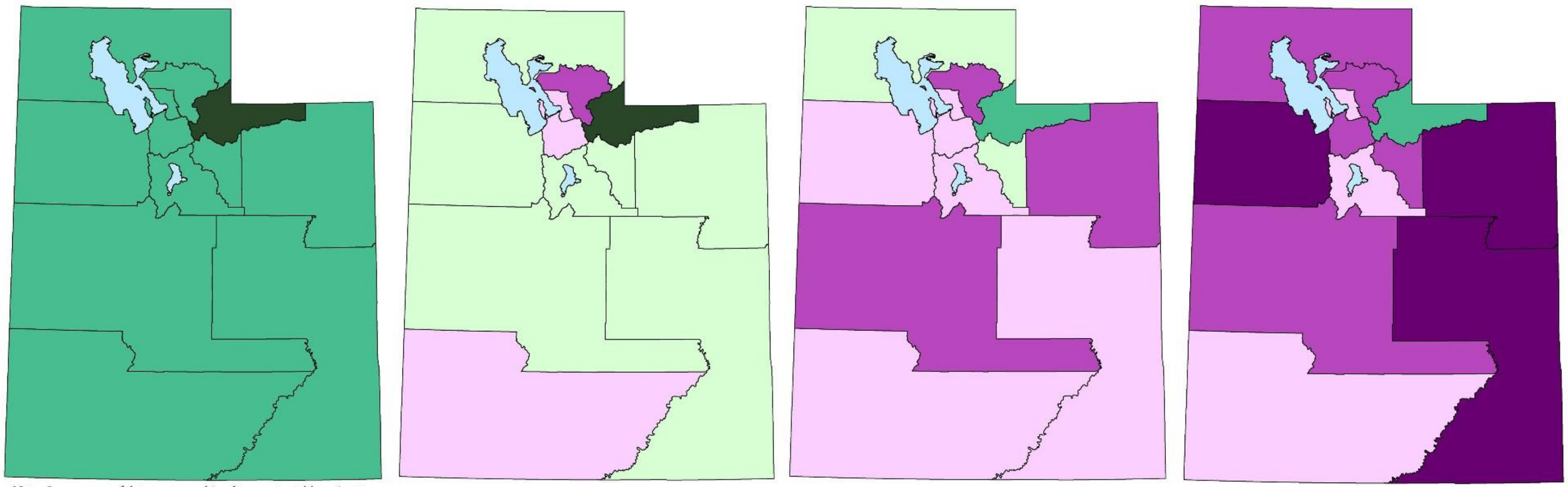
2011-12 Operation Storefront - Bear River
Brigham City - Proximity to Areas of Community Interest



Camille Roundy
Utah Department of Health
Bureau of Health Promotion

Utah Adult Obesity Rates by Local Health District Over Time

1989-1995 | 2000 | 2005 | 2011



Note: Seven years of data were combined to create stable estimates.

State Rate 11.7% (CI: 11.1%, 12.4%) | State Rate 19.5% (CI: 17.7%, 21.6%) | State Rate 22.1% (CI: 20.7%, 23.5%) | State Rate 25.0% (CI: 24.0%, 26.0%)

Legend

- 7-9.9%
- 10-14.9%
- 15-19.9%
- 20-24.9%
- 25-29.9%
- 30-32.0%

General Observations:

- The state adult obesity rate has increased 105% from baseline (1989-1995) to 2011.
- Since 1989-1995, Summit County LHD had a stastistically lower adult obesity rate than the state rate for all time points.
- Summit County is the only LHD to meet the Healthy People 2010 National Obesity Rate Target of 15% or Less.
- In 2011, Tooele County LHD had an adult obesity rate (31.6%; CI: 27.0%, 36.6%) that was significantly higher than the state rate.

Source: Utah BRFSS age-adjusted rates, 1989-1995 combined, 2000, 2005, and 2011. Obesity: ≥30 Body Mass Index. CI: Confidence Interval. Due to changes in BRFSS sampling methods, 2011 data are not comparable with previous years.

Julia Shumway
Utah Department of Health
Physical Activity, Nutrition and Obesity Program

Gestational Weight Gain (GWG) in Utah :

Using maps to communicate data from the Pregnancy Risk Assessment Monitoring System (PRAMS)

Background

In 2009, the Institute of Medicine (IOM) updated their recommendations for pregnancy weight gain, the first revision in two decades. The revised guidelines followed national trends of increased maternal age, higher rates of multiple gestations, and more women entering into pregnancy with elevated body mass indices (BMI).

Over half of all Utah mothers who delivered between 2009 and 2010 gained more than the recommended amount of weight during their pregnancy. Utah mothers with excessive weight gain had significantly higher rates of gestational hypertension, postpartum depression, and were more likely to discontinue breastfeeding than women who gained within the appropriate range.

Public Health Implications:

GWG has some influence on gestational hypertension, preeclampsia, gestational diabetes, caesarean delivery, and having babies that are large for gestational age. Although these findings were not as strong of an association as prepregnancy obesity, their clinical implications may still be significant. Women who gain excessively during pregnancy are more likely to have difficulties losing weight after delivery. This long-term weight retention may increase the risk of being overweight or obese when entering into subsequent pregnancies, thus, significantly increasing the risk of pregnancy-related morbidities.

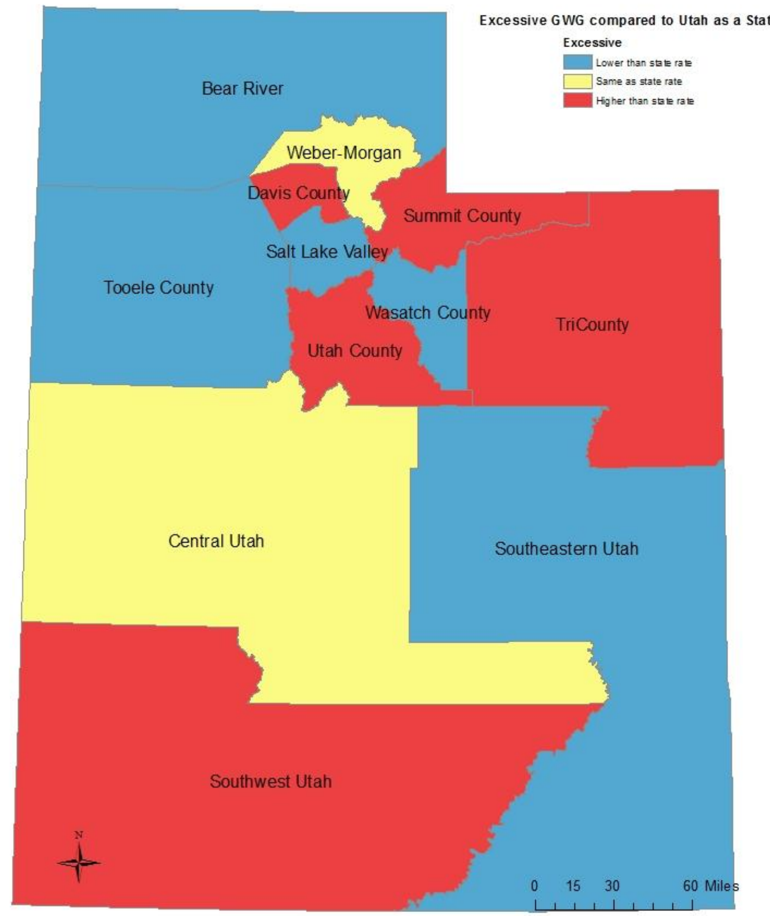
Gestational Weight Gain by local health district:

ArcGIS 10.1 was used to compare Local Health District (LDH) areas of the state to the state overall rate of excessive weight gain.

Data Notes

A "High-Low-Same" map assigns areas to three groups. Group membership and map color are based on whether each area's rate is significantly different (higher or lower) from the state rate. An area's rate is considered significantly different if the overall state rate falls outside (above or below) the confidence interval for that area.

Excessive GWG by Local Health District,
UT PRAMS 2009-2010



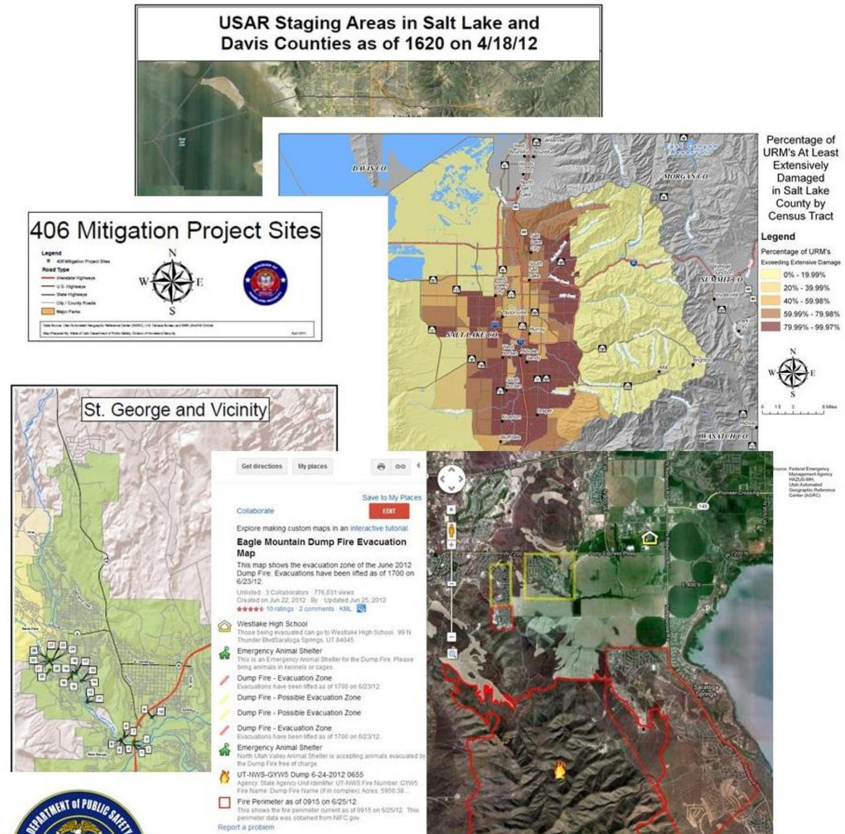
Jessica Sanders
Utah Department of Health
Maternal and Infant Health Program

Mapping Disasters: Using GIS in All Phases of Emergency Management

Data and information are critical to managing response to and preparedness for disaster events. Visualizing this data and information on a map allows decision-makers to analyze what is happening and determine how to respond to those events. There are four phases to emergency management: response, recovery, mitigation and preparedness. Mapping is essential in each phase so that the severity of the disaster or degree of hazard risk can be understood quickly.

The purpose of this poster is to highlight examples of mapping in each phase of a disaster. Utah has had six Presidentially declared disaster events in the last eight years, as well as several Fire Management Assistance Grants (including five alone in 2012). The Utah Division of Emergency Management was active in mapping these disasters, as well as generating maps to help communities prepare for the next emergency.

Each of the maps shown on the poster reflects mapping activities during and after recent disasters. Also included are maps showing simulated response activities during the 2012 Great Utah ShakeOut, which was a three exercise responding to a magnitude 7.0 earthquake on the Wasatch Fault.



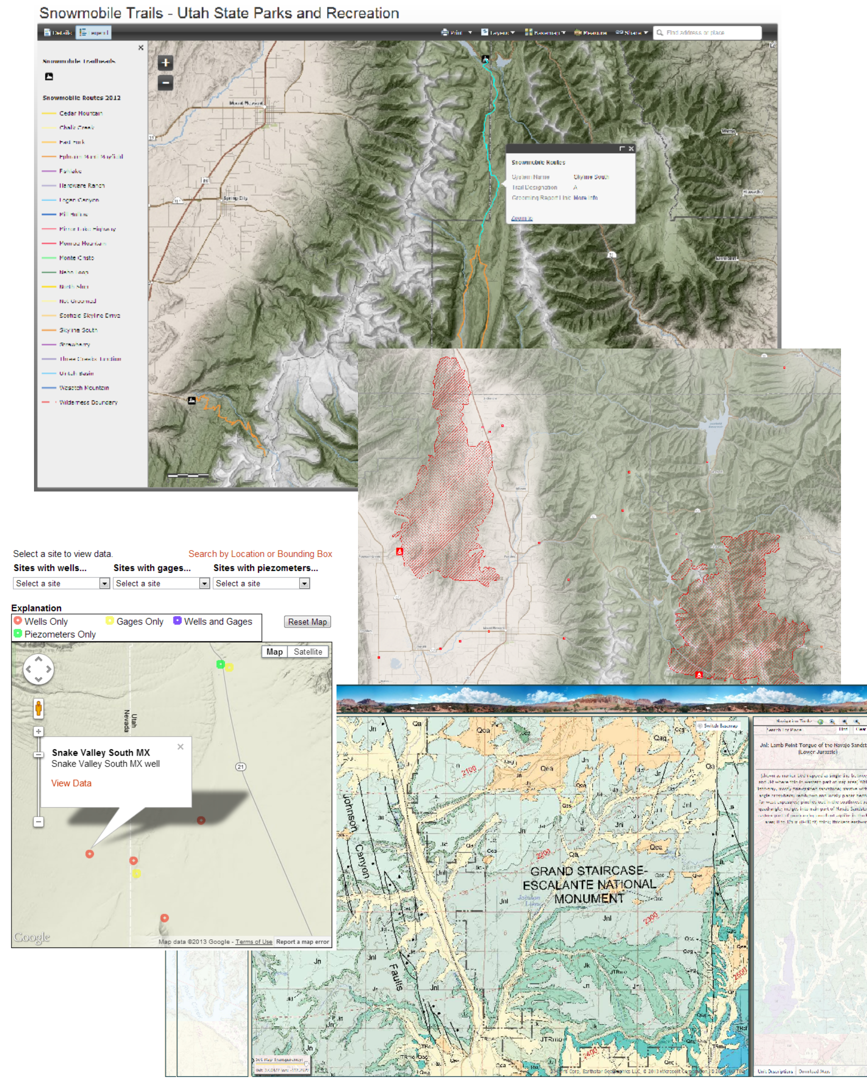
Josh Groeneveld
Utah Division of Emergency Management

Web Maps and Portals at Utah DNR

The Utah Department of Natural Resources are providing web maps and information portals to the public so that they can be better informed about the opportunities, events, and natural resources in Utah.

We will be showcasing **four** of these:

1. **State Parks and Recreation - Interactive Snowmobile Trails Map.** *Showing groomed snowmobile trails and trailheads. The most recent grooming report is provided by clicking on the trail.*
2. **Forestry, Fire, and State Lands - 2012 Interactive Wildfires Map.** *Showing the burn areas for the large wildfires in Utah along with points showing all of the smaller fires.*
3. **Utah Geological Survey - Groundwater Monitoring Portal.** *Stores and distributes large quantities of monitoring data acquired through the West Desert Groundwater Monitoring-Well Project (including Snake Valley). The portal allows easy access to view, query, and download groundwater monitoring data from a dataset containing over 5.2 million records.*
4. **Utah Geological Surveys Interactive Geologic Map.** *A mosaic of over 400 of Utah's geologic maps. Map scales range from 1:500,000 (less detail) to 1:24,000 (more detail). While zooming in, maps of greater detail will begin showing up where they are available. Utah's expansive geologic formations are described in detail by clicking anywhere on the map. Users have the option to download GIS data (raster/vector), and each map's corresponding report. Check back often as there will be additional maps added in the future.*



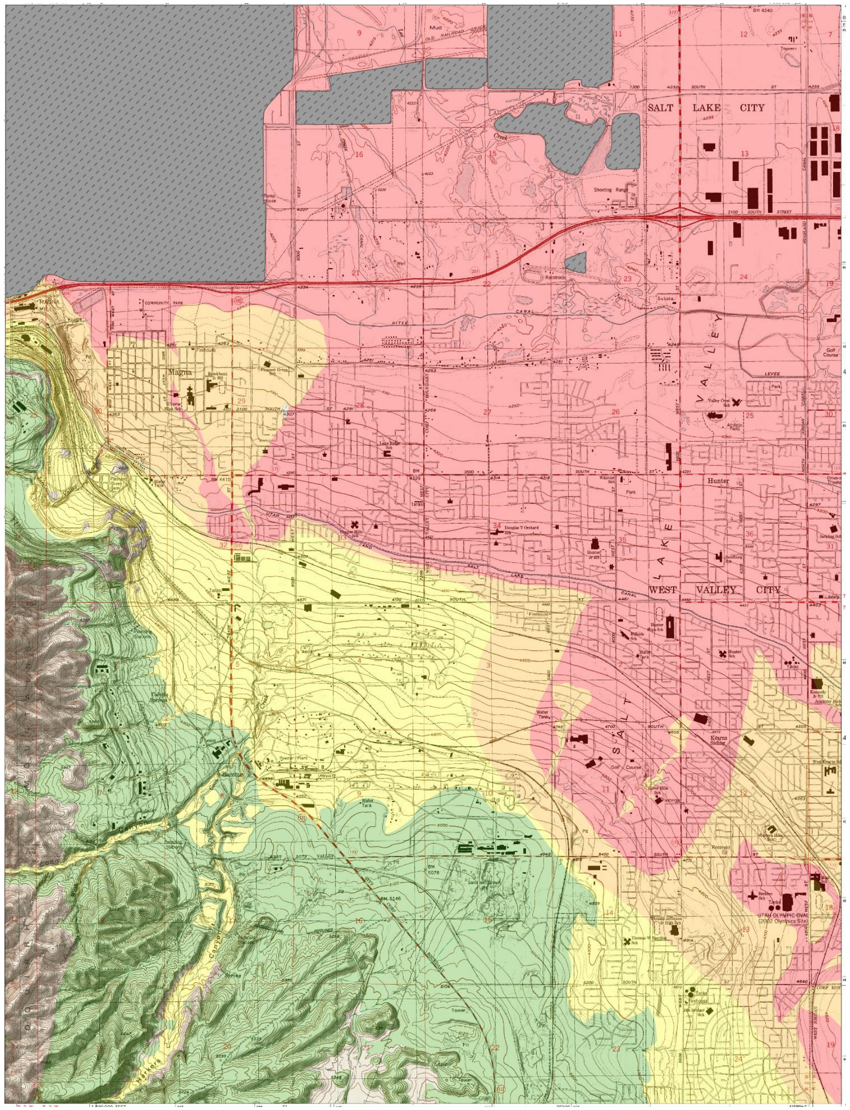
Buck Ehler
Utah Department of Natural Resources

Geologic Hazard Mapping in Utah

New development and redevelopment in urban areas along the Wasatch Front is proceeding at a rapid pace; 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 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, indoor radon, shallow ground water, 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, and field data.

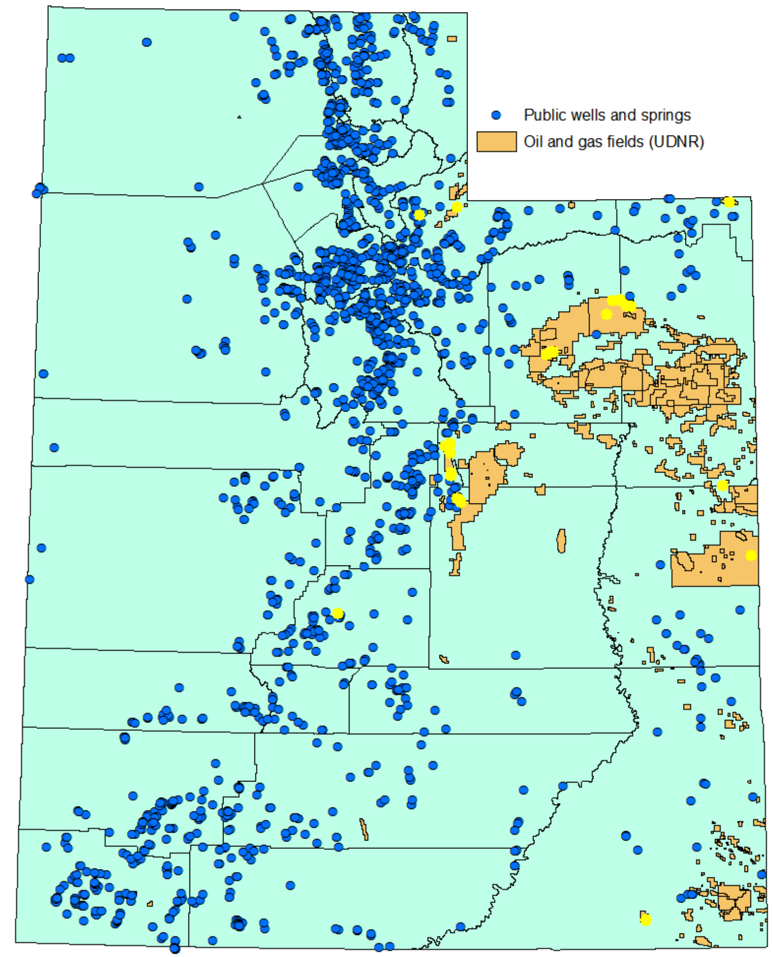
Our final product is a folio of geologic-hazard maps and accompanying text documents that address critical geologic hazards. While site-specific geotechnical investigations should be performed for all development, the maps will identify areas where additional, specialized geologic-hazard investigations 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.



Jessica Castleton
Utah Department of Natural Resources
Utah Geological Survey

Drinking Water and Hydraulic Fracturing

Utah has significant reserves of natural gas and oil. Hydraulic fracturing and horizontal drilling are important technologies which enable increased production of these essential natural resources. In Utah, about 2000 wells and springs are currently used as public drinking water supplies; and 33 of those wells and springs, in 22 public water systems, are located within recognized oil and gas fields.



In Utah, our public supply wells are commonly drilled to several hundred feet deep. Hydraulic fracturing is performed on gas- and oil-bearing formations that are much deeper than the aquifers that produce our drinking water. In order to protect the aquifers, oil and gas operators must construct the wells properly, and properly manage the water used in the hydraulic fracturing process.

The Utah Division of Oil, Gas and Mining provides information about the process of hydraulic fracturing, and requires well operators to report the type and amount of chemicals used in hydraulic fracturing operations to the FracFocus chemical disclosure registry within 60 days of when the hydraulic fracturing work is performed.

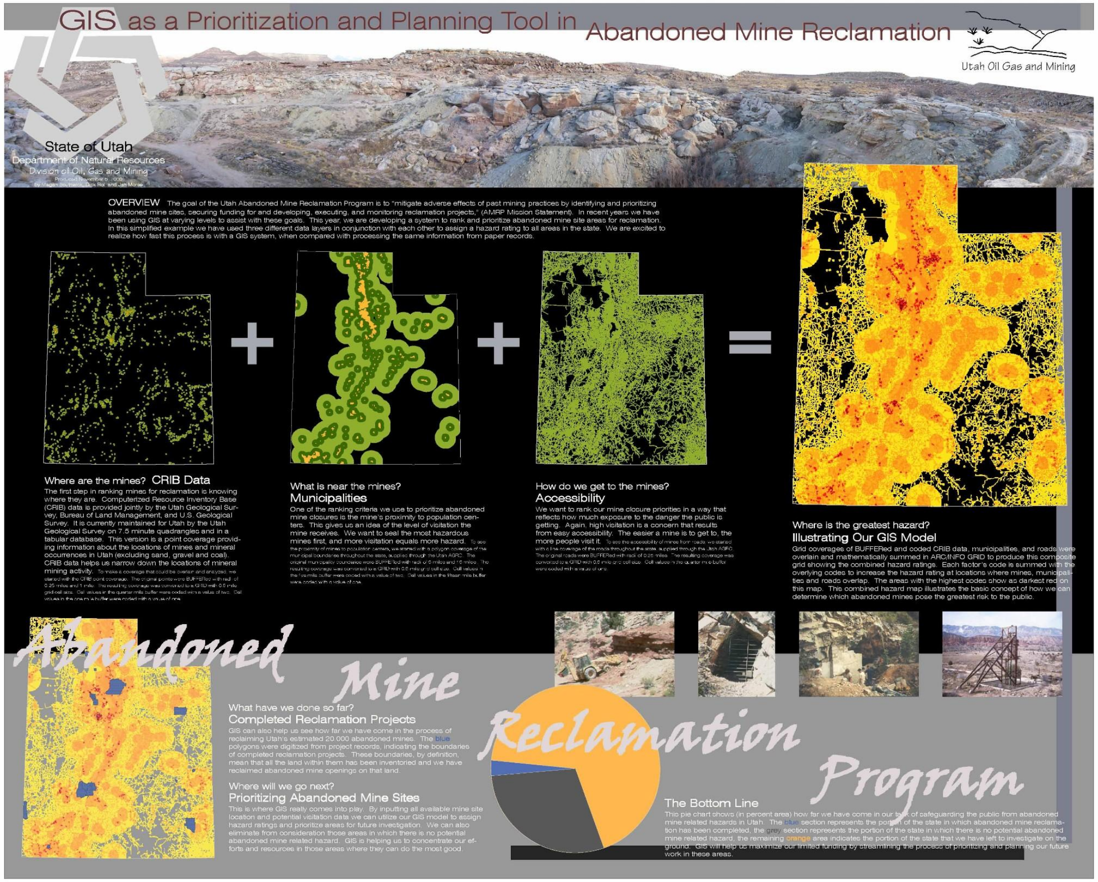
The U.S. Environmental Protection Agency (EPA) also provides information on natural gas extraction and hydraulic fracturing. The EPA is currently studying hydraulic fracturing and potential impacts on drinking water.

Mark E. Jensen
Utah Department of Natural Resources
Utah Department of Environmental Quality: Division of Drinking Water

Prioritizing Abandoned Mine Reclamation

The goal of the Utah Abandoned Mine Reclamation Program is to “mitigate adverse effects of past mining practices by identifying and prioritizing abandoned mine sites, securing funding for and developing, executing, and monitoring reclamation projects” (AMRP Mission Statement). When the program was implemented in 1982, we identified three factors that affect the hazard an abandoned mine poses to the public. These are density of abandoned mine features, proximity to population centers, and condition of access roads. At first, GIS-type operations, such as scoring the population within a specified radius of a site, were done manually, by placing a template over a map and consulting census tables. Besides being crude and slow, this necessitated breaking data types into coarse categories or ranges. Nuances in the data were lost and the scoring became a “point in time” snapshot that was not easily updated as conditions changed.

In 2000, we developed a system to rank and prioritize abandoned mine areas for reclamation. We use the same three factors, captured in data provided by AGRC, to assign a hazard rating to all areas in the state. We were excited to realize how fast this process is with a GIS system, when compared with processing the same information from paper records.



Jan Morse
Utah Department of Natural Resources
Division of Oil, Gas & Mining

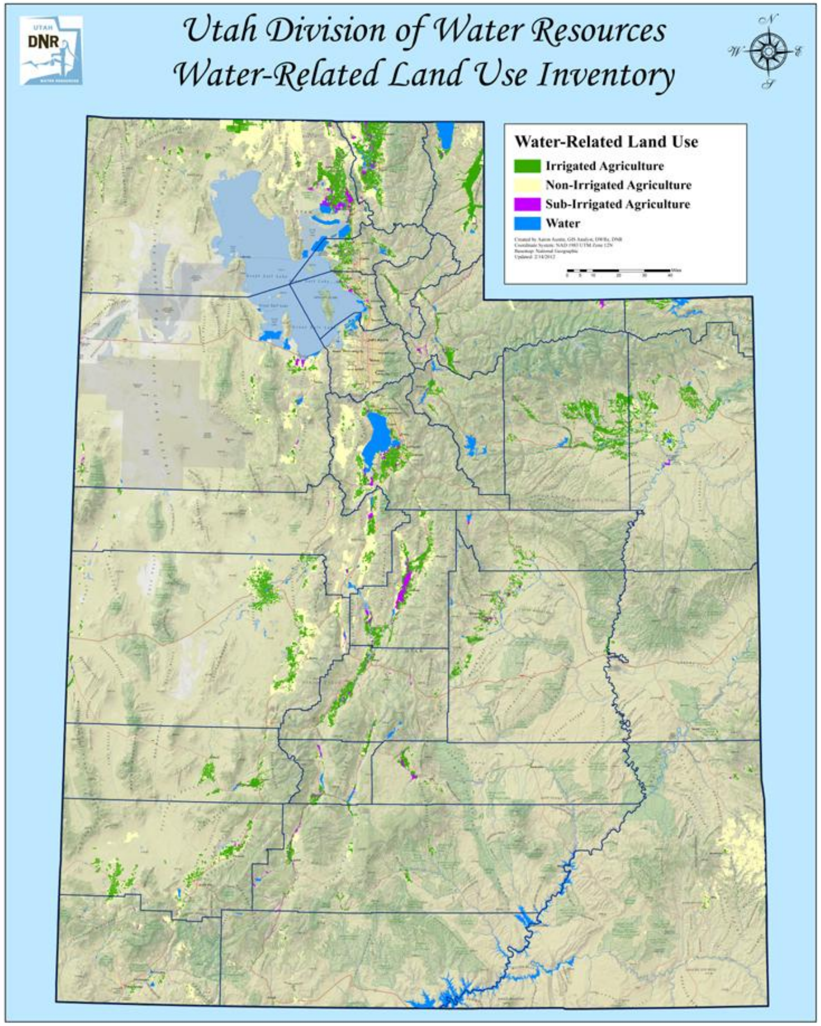
Water-Related Land Use Inventory

The Utah Division of Water Resources develops a State Water Plan to coordinate and direct the activities of state and federal agencies concerned with Utah's water resources. As a part of this objective, the Division of Water Resources collects water-related land use data for the entire state. This data includes the types and extent of irrigated crops as well as information concerning dry land agriculture and urban areas.

The data are used for various planning purposes which include: determining cropland water use, evaluating irrigated land losses and conversion to urban uses, planning for new water development, estimating irrigated acreages for specific areas and developing water budgets. Additionally, the data are utilized by many other local, state and federal agencies.

All boundaries of individual agricultural fields and urban areas are precisely digitized. The division uses NAIP imagery and other digital images in a heads-up digitizing mode for this process. Field crews are then sent to label and field-check the data. Each crew uses a GPS unit and a Tablet PC to track the crew's location and digitally edit the data during the field labeling process. Once processed and checked, the data is filed in the SGID maintained by the Utah AGRC.

The division uses 11 hydrologic basins as the basic collection units. County data is obtained from the basin data. The data collected statewide covers more than 2,700,000 acres of dry and irrigated agricultural land. This represents about 5% of the total land area in the state.



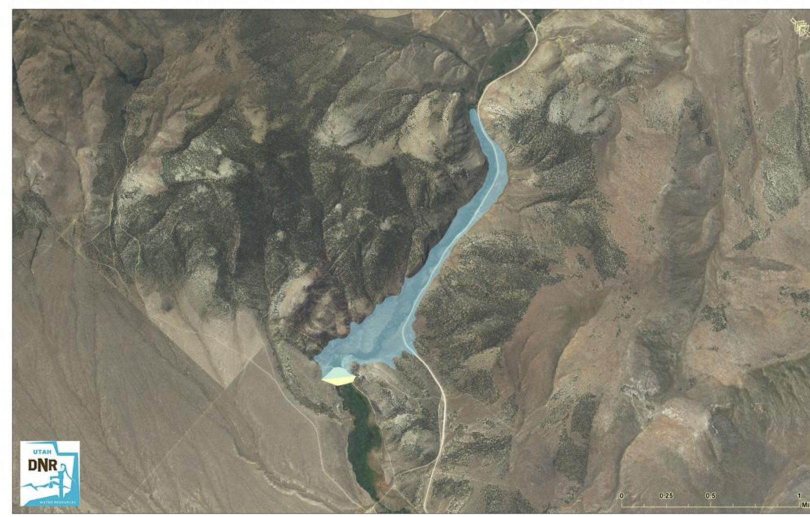
Aaron Austin
Utah Department of Natural Resources
Division of Water Resources

Potential Water Storage Site

The Utah Division of Water Resources conducts feasibility studies of potential water storage and delivery systems. Studies can include reservoirs, pipelines, and sediment structures. These systems are used to conserve water, protect waterways, and provide water for agricultural, industrial, and municipal use.

The division uses many variables to calculate feasibility that include cost, environmental impacts, geology, storage capacity, and water availability. These variables are estimated in models, and then used for planning and managing state water projects.

This particular map depicts a potential reservoir site in both 2D and 3D perspectives to help planners see the potential impacts of a reservoir in this area. Some specific examples of potential impacts are submersion of an existing road, and changes in water flow to agricultural areas downstream.

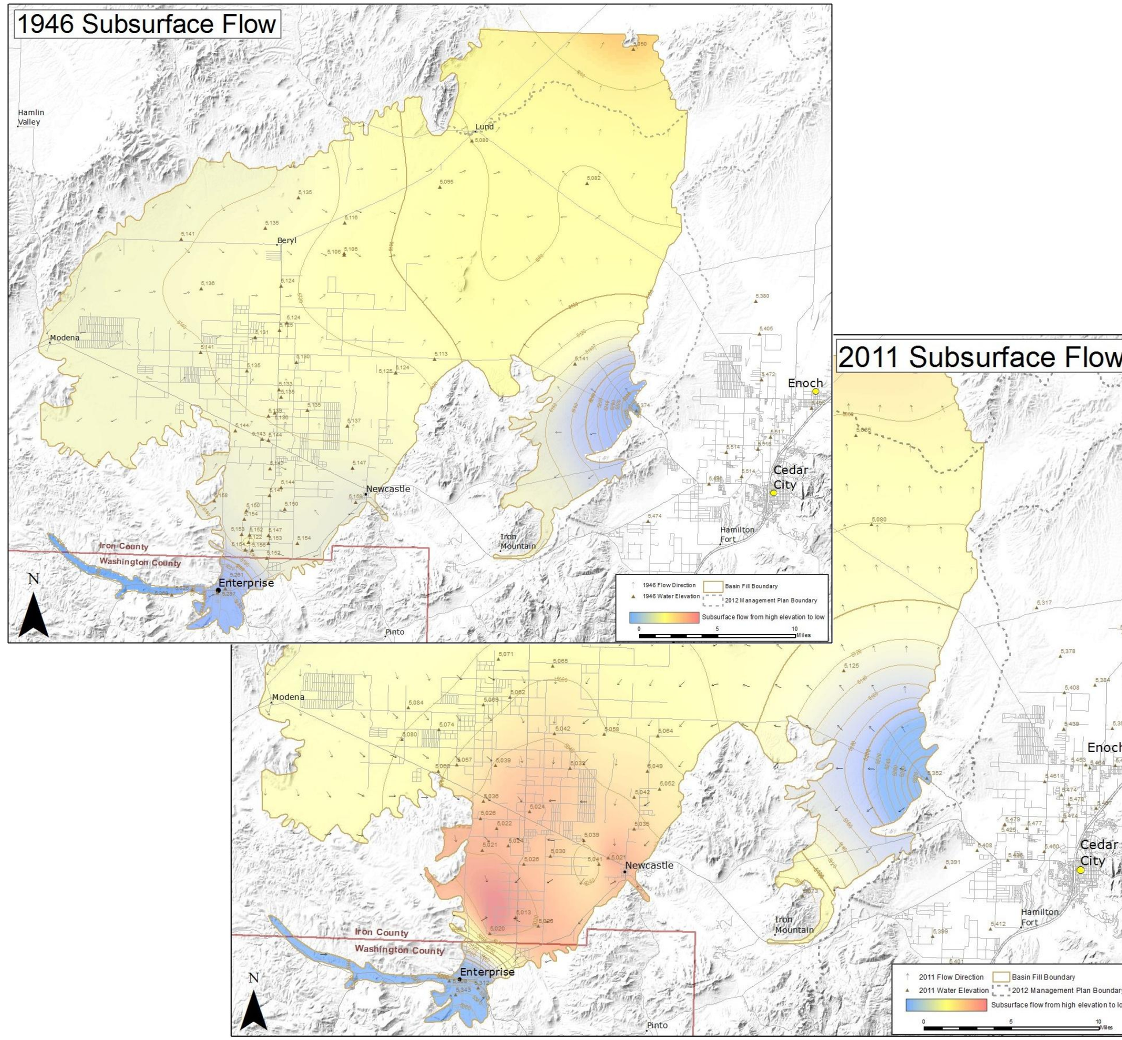


Adam Clark
Utah Department of Natural Resources
Division of Water Resources

Water Rights
Beryl-Enterprise Groundwater Depletion

Around the towns of Beryl and Enterprise in Iron County, heavy groundwater pumping for agricultural and other uses over many decades has resulted in lowered water table depths and altered subsurface water flow. The effects of groundwater depletion are illustrated by comparing water levels and deriving subsurface water flows from the mid-1940s when USGS records began to the levels found in 2011. Depletions have exceeded the groundwater system's capacity by almost 100%, and the basin is considered a critical management area by Utah Code defined in section 73-5-15.

In response, the Division worked with local government entities and water users in to draft and, in 2012, to enact a Groundwater Management Plan that will gradually reduce water depletions by 48% over the next century to the meet the system's capacity.



Sean Breazeal
Utah Department of Natural Resources
Division of Water Rights

Water Rights
Interactive Maps & Groundwater Changes

The Division of Water Rights maintains a computerized database of limited pertinent information for each water right. Various search and listing routines are available to access the database information quickly and easily. The Division currently uses Web applications to display the database information graphically.

Map Applications will be displayed using web applications such as MapServer, Google Earth API and ESRI to display spatial data.

Lee Eschler
Utah Department of Natural Resources
Division of Water Rights

State of Utah Trust Lands

Ownership by Beneficiary

Who benefits from the use of SITLA lands?

trustlands.utah.gov - maps tab

Who receives the revenue from that State Trust Lands parcel?

Revenues generated from the leasing and sales of Trust Lands are distributed to Utah's public schools and 11 other public institutions.

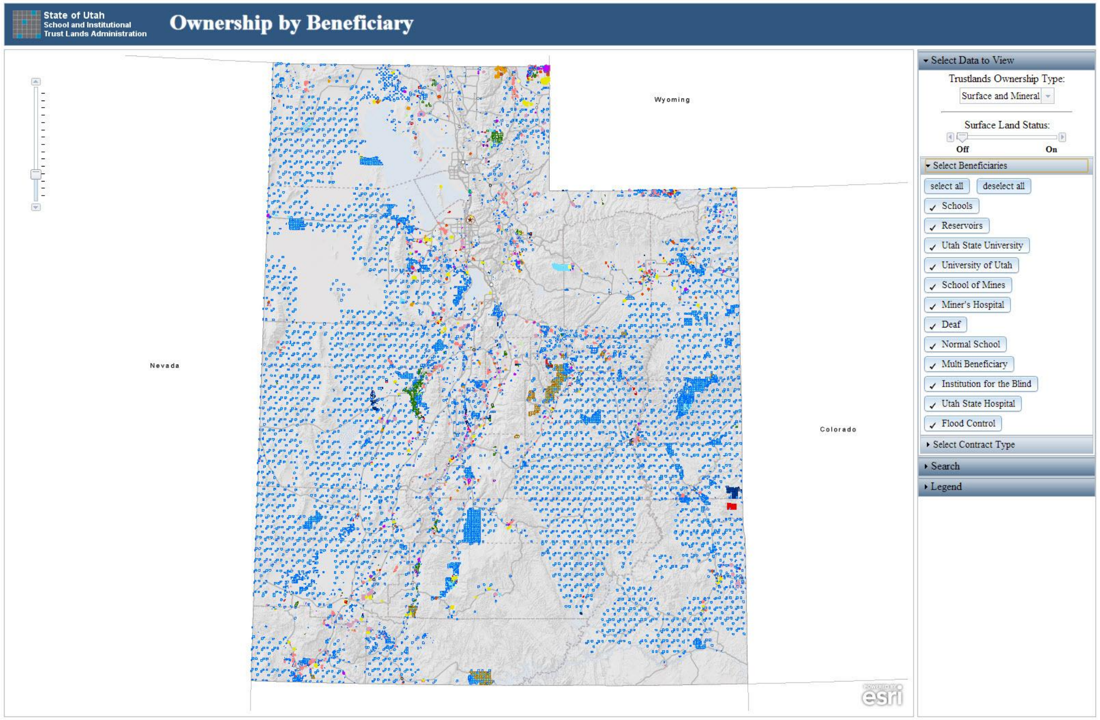
This web map provides a way to view which institution is the beneficiary of each parcel of Trust Lands.

Active contracts for surface use or mineral resources can also be viewed.

Selecting a parcel will show Trust Lands ownership details as well as active contract details, including each beneficiary's proportion of the land in the contract.

The goal of this web map application is to display relevant information in a web based setting so that beneficiaries and the general public have a visual landscape to understand how SITLA is managing each Trust Lands estate parcel.

Beneficiary Map: *http://trustlands.utah.gov* (maps tab)
Trust Lands Website: *http://trustlands.utah.gov*



Barry Biediger
State of Utah School and Institutional Trust Lands Administration

State of Utah Trust Lands

Digital Plat Maps

SITLA Plat Maps for Everyone, Everywhere!

platmap.trustlands.utah.gov

Do you need to find information about the State of Utah School and Institutional Trust Lands Administration (SITLA) Lands ?

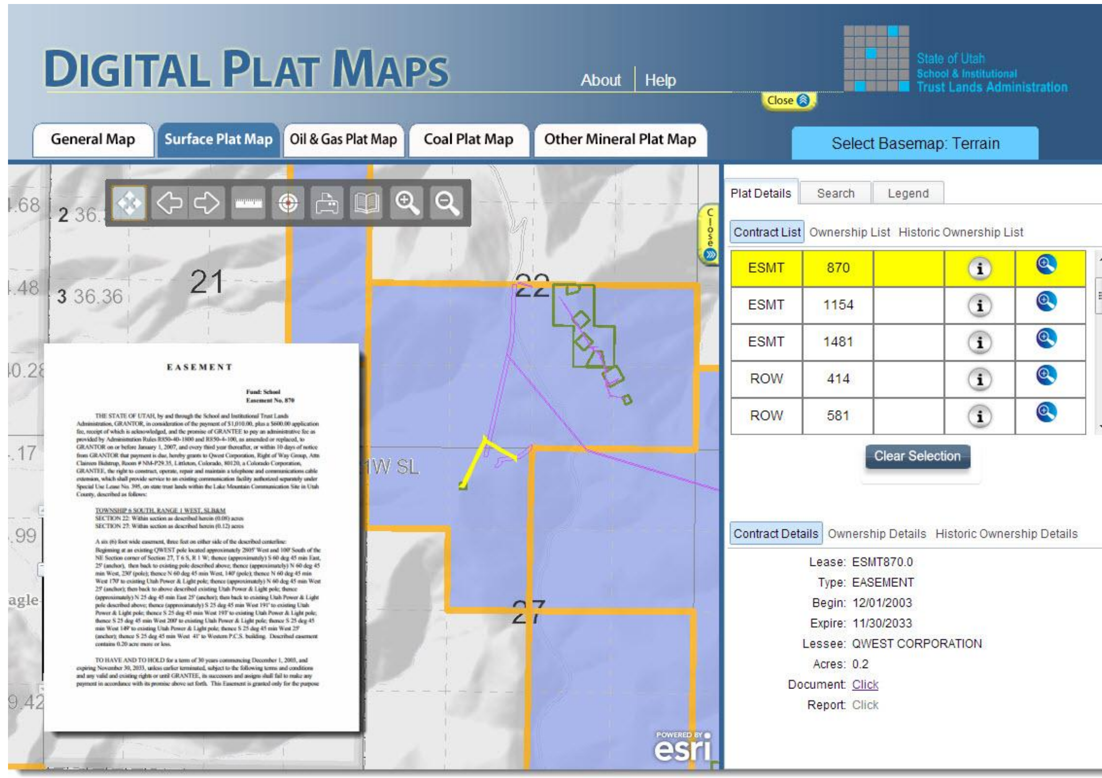
Use our Digital Plat Map, an interactive web map that displays detailed contract, lease, permit and ownership information for SITLA lands throughout the state of Utah.

The underlying GIS data is updated on a weekly basis. Access to official reports and scanned documents are also available.

The web map is organized according to Trust Lands' business system ownership schema, which divides SITLA lands into Surface, Oil & Gas, Coal and Other Minerals. The web maps also features a "General Map" that displays Statewide Utah Surface Land Ownership and Areas of Responsibility. Plat Maps users can toggle between the different tabs depending on their interest and need.

The SEARCH TAB for the Plat Maps gives the user several options to navigate the web map and its differing tabs. The Maps can open a statewide plat or the user can search for a specific location and zoom directly to an area of interest by way of Township and Range, Place name, or by Contract, Lease or Permit number, once a Plat tab has been selected. Scanned Historical and Special Survey Plats are also available.

Digital Plat Map: *http://platmap.trustlands.utah.gov*
Trust Lands Website: *http://trustlands.utah.gov*



Jessica Kirby
State of Utah School and Institutional Trust Lands Administration

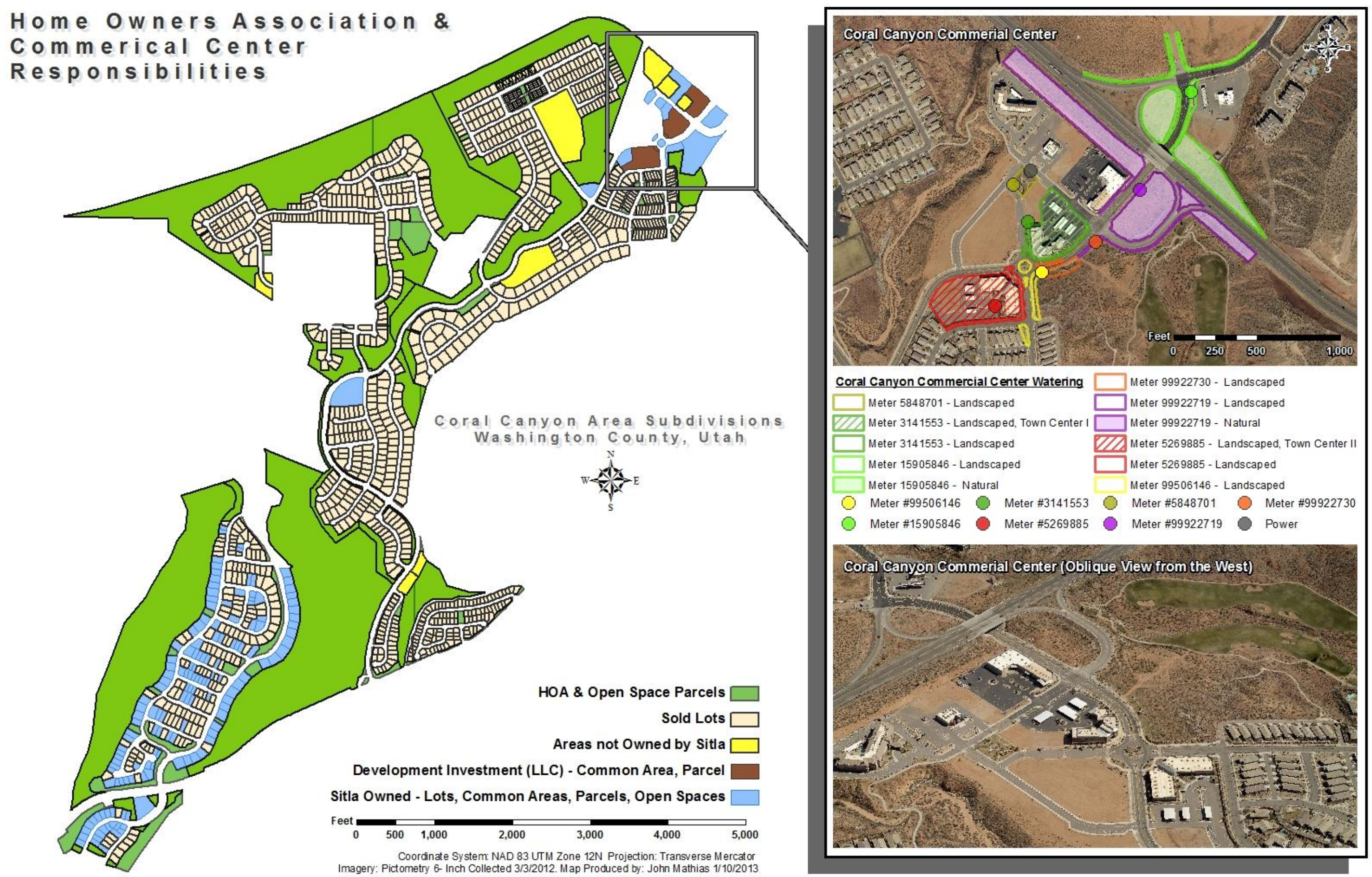
State of Utah Trust Lands
HOA & Commercial Center Responsibilities

Coral Canyon Subdivisions, Washington County, Utah

trustlands.utah.gov

Coral Canyon, a beautiful 2,600 acre master planned community, is thoughtfully designed to provide virtually every amenity and convenience. It includes a central village square, a championship gol course, schools, churches, parks, recreation, restaurants, retail, and office space. Fifty percent of the land is preserved as natural open space to protect views and trails (www.coralcanyon.com).

In 2010 the State of Utah School & Institutional Trust Lands Administration (SITLA) purchased back their interest in the unsold areas of the Coral Canyon Subdivisions. SITLA strives to sustain a thriving development and to ensure current and future residents a well-planned and managed community. To do this, SITLA works with the local builders, Henry Walker Homes anc Coral Canyon Builders, as well as participating with the local Home Owners Association to best meet the needs of the residents and to ensure that their open spaces will be perpetually protected.



John Mathias

State of Utah School and Institutional Trust Lands Administration

State of Utah Trust Lands

Proposed Greater Canyonlands National Monument

How will the GCNM impact State Trust Lands?

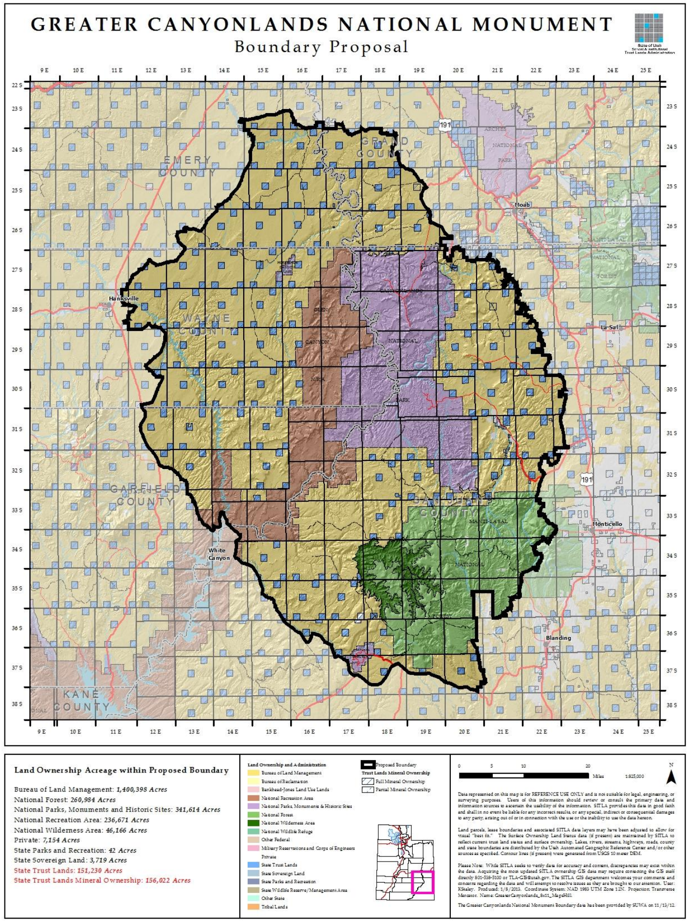
trustlands.utah.gov - GIS PDF Maps

How many SITLA parcels will be impacted by the Proposed Greater Canyonlands National Monument?

The purpose of this map is to depict State Trust Lands ownership within the proposed Greater Canyonlands National Monument boundary. Approximate acreage for each land ownership type within the proposed boundary was calculated.

The proposed Greater Canyonlands National Monument boundary would involve approximately 1.4 million acres of Federal Bureau of Land Management lands, if signed by President Obama. The proposed boundary is located within Southeastern Utah (Emery, Grand, Wayne, Garfield and San Juan Counties) and encompasses Canyonlands National Park.

The Greater Canyonlands National Monument boundary data was provided by SUWA (Southern Utah Wilderness Alliance) on 11/13/12.



PDF download: *http://trustlands.utah.gov- Maps tab - GIS PDF map*
Trust Lands Website: *http://trustlands.utah.gov*

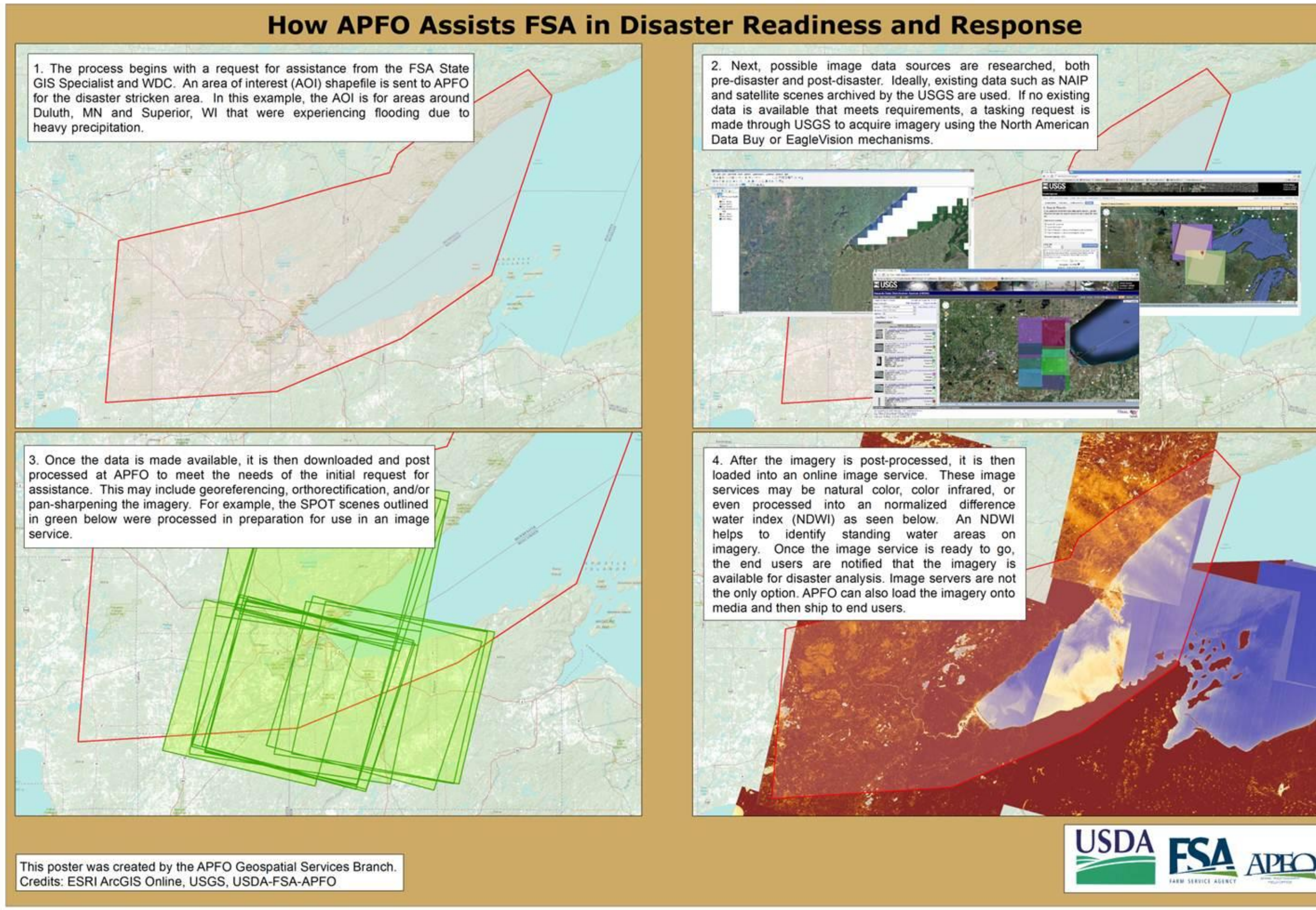
Kate Staley
State of Utah School and Institutional Trust Lands Administration

Federal Government

APFO Imagery Used for Disaster Analysis

This poster illustrates how the Aerial Photography Field Office (APFO) assists the Farm Service Agency (FSA) when a disaster occurs. The FSA maintains programs that assist farmers and other agricultural producers. Wher a disaster occurs, it is important tha aerial imagery is provided for the stricken areas so that areas in need can be identified and aided quickly

The role of the APFO includes researching pre and post disaster imagery sources, acquiring the imagery, post processing the data a necessary, and finally delivering th imagery to the required end users.

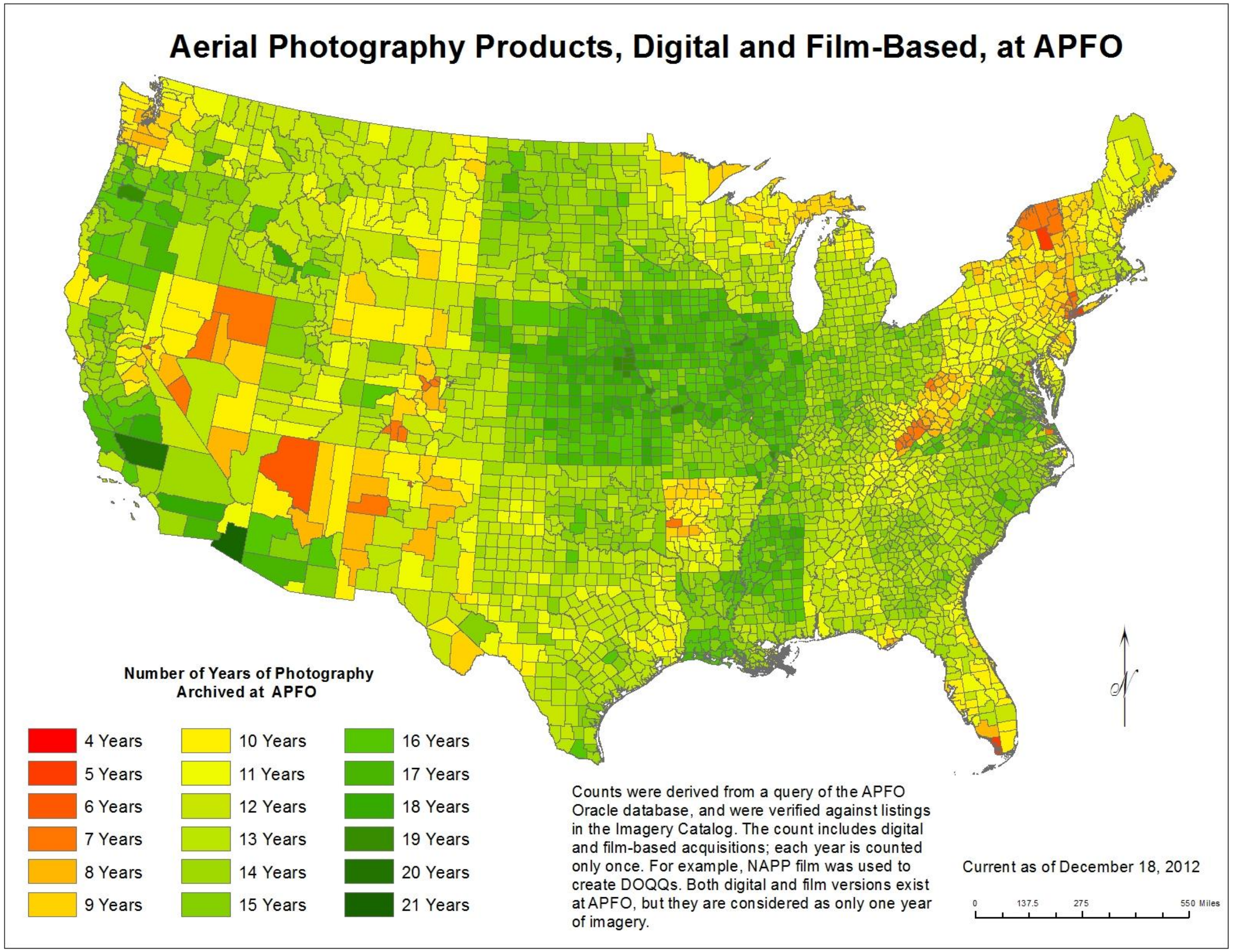


Zack Adkins
USDA FSA
Aerial Photography Field Office

Aerial Photography Available at APFO

The Aerial Photography Field Office (APFO), located in West Valley City, administers the National Agriculture Imagery Program (NAIP), which provides digital aerial imagery to the nation's Farm Service Agency offices. NAIP is used by many other customers, including Google Maps, for a wide variety of uses. Current imagery acquisitions provide four bands of data (red, green, blue, and near infrared.)

APFO also houses one of the largest collections of film based aerial photography in the country. The collection includes film dating from 1955, flown for farm and Forest Service programs. This map displays the total number of years available for each county, of either film or digital imagery. Historical film can be scanned for use in GIS projects.

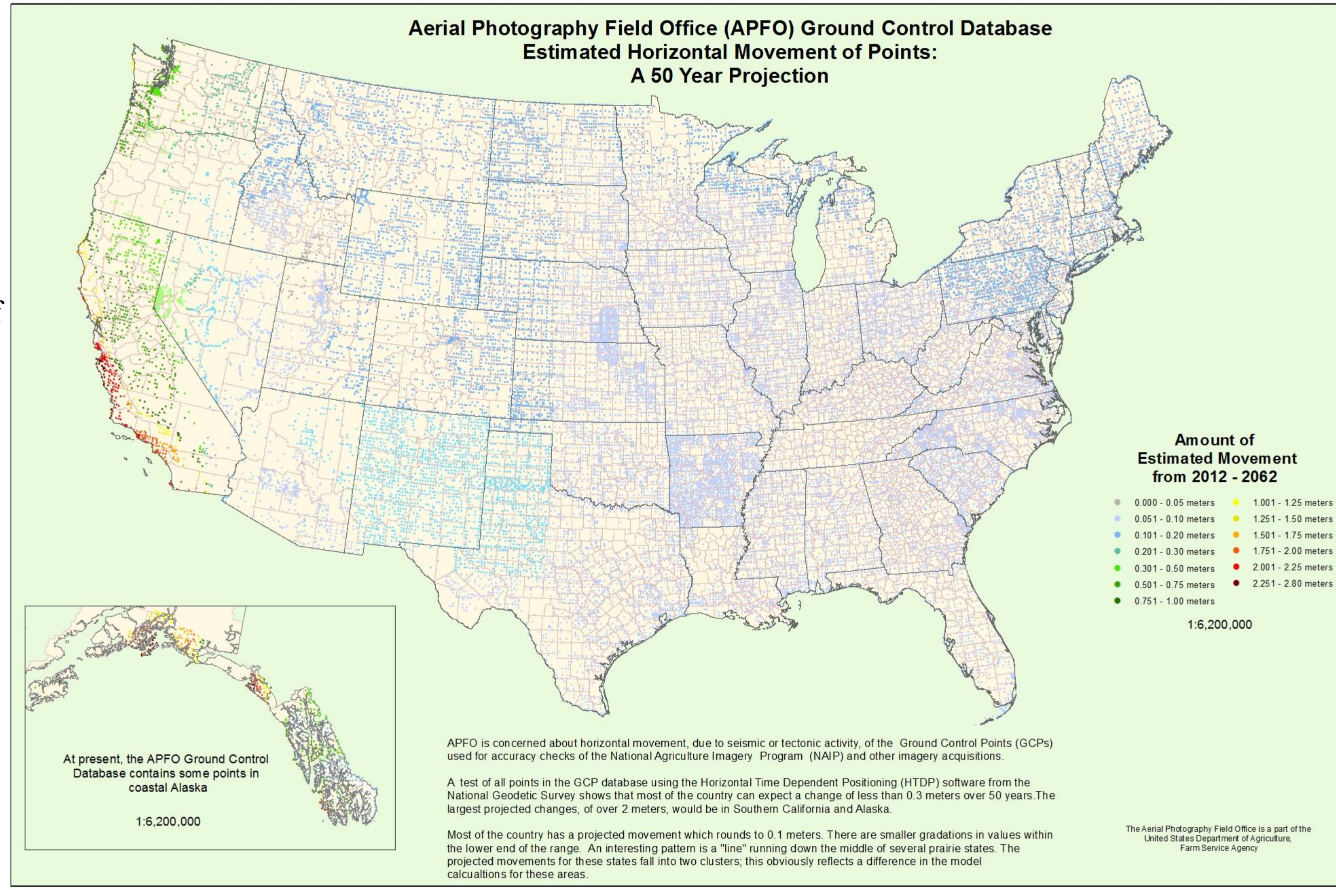


Louise Mathews
USDA FSA
Aerial Photography Field Office

Estimated Horizontal Movement of Ground Control Points

The Aerial Photography Field Office (APFO), located in West Valley City, administers the National Agriculture Imagery Program (NAIP), which provides digital aerial imagery to the nation's Farm Service Agency offices. The horizontal accuracy of NAIP is inspected through the use of ground control points, provided by a variety of sources.

Horizontal Time Dependent Positioning (HTDP) software from the National Geodetic Survey was used to predict the potential for positional change of the points (within the NAD83 Datum) due to seismic activity. As expected, the greatest change might occur along plate boundaries, particularly in Southern California and the Alaska coastline.

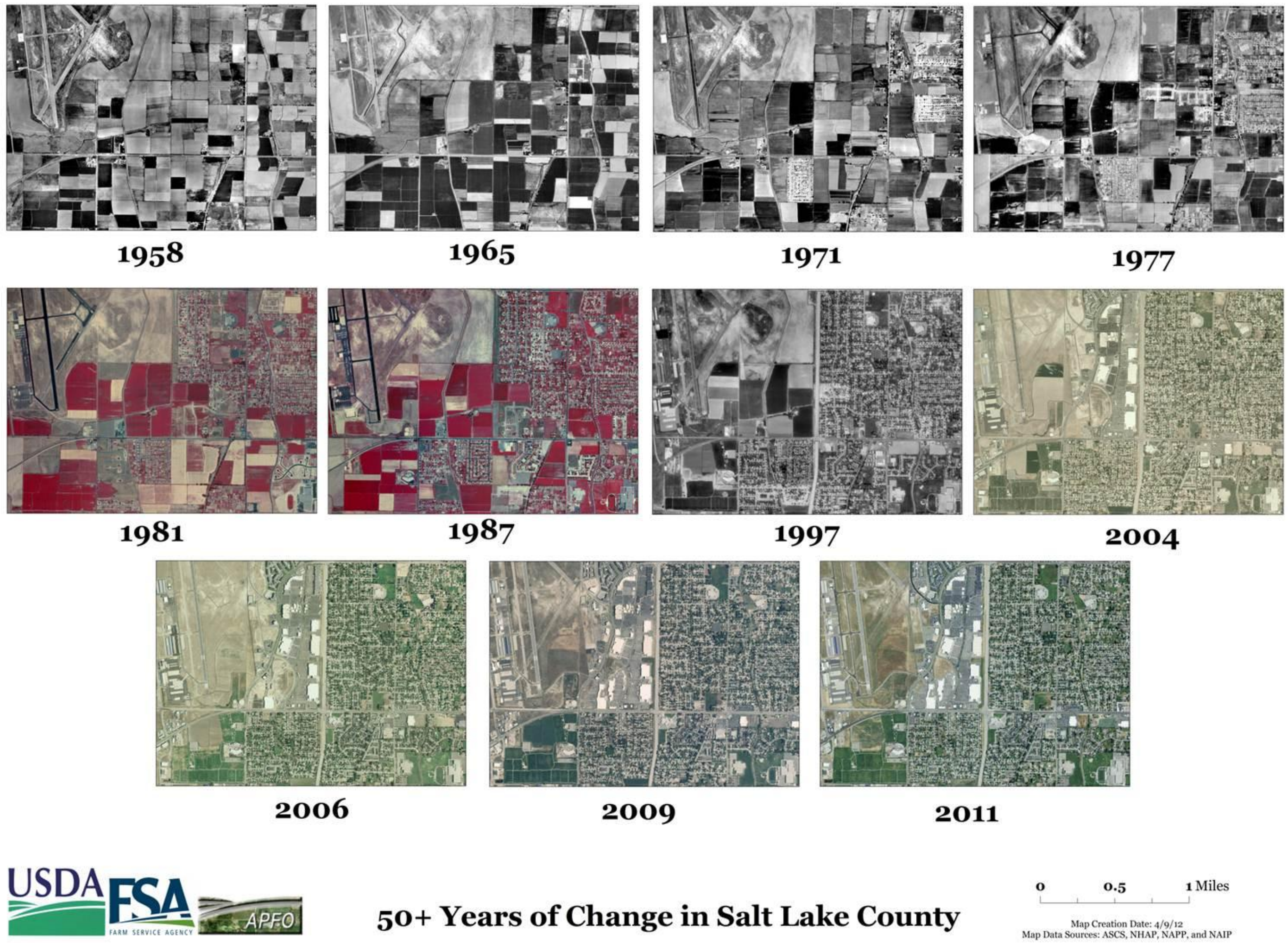


Louise Mathews
USDA FSA
Aerial Photography Field Office

Over 50 Years of Aerial Photography for Salt Lake County

The Aerial Photography Field Office (APFO), located in West Valley City, houses one of the largest collections of film based aerial photography in the country. The collection includes film dating from 1955, flown for farm and Forest Service programs.

This poster displays 11 different years of photography available for Salt Lake County. The earlier years were flown for the Agricultural Stabilization and Conservation Service (ASCS), with national programs coming in the 1980s. The four examples from the 2000s are digital imagery from the National Agriculture Imagery Program.



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For information and resources about Geographic Information Systems (GIS) and other digital mapping technologies, visit: http://gis.utah.gov.