

Reorganizing Around Web Services

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July 2010



UTAH **AGRC**
Automated Geographic Reference Center

- **Mission:**

- *“Encouraging and facilitating the effective use of geospatial information and technology for Utah”*

- **Activities:**

- State Geographic Information Database (SGID)
- Geospatial Infrastructure for:
 - Data and Imagery Acquisition, Sharing, Distribution
 - **Internet-enabled web and mapping services**
 - **Map-based web applications**
 - GPS base station network
- Coordination of local government, state & federal agencies geospatial activities and resources for optimal ROI

- **Hybrid Business Model**

- Cost Recovery & Appropriation



Web & Map Services

- **Definition:**

- **Web Service:** *"a software system designed to support interoperable machine-to-machine interaction over a network."* (WC3)
- **Usually:** Client – Server (Request – Response)
- **Good terms to know:**
 - **WSDL** – protocol describing how to use WS
 - **UDDI** – Registry/Catalog of WS
 - **Formats:** SOAP, JSON, WMS, REST, etc

- **WS/MS Intended Audience – App developers**

- **Web services run in the background of applications**
- **Thin (browser) and Thick clients (ArcMap,etc)**
 - GIS and Non-Spatial Audience
- **.NET, java, php, python, ruby, etc**



Web & Map Services

- **Example: Elevation lookup**
 - Request: SGID Dataset Name, x, y
 - Response: Elevation

here for a complete list of operations:'. The main content area is titled 'GetRasterValue' and includes a 'Test' section. The test section contains a table with parameters and values, and an 'Invoke' button. The 'utmY' parameter value '4495489' is highlighted with a red box."/>

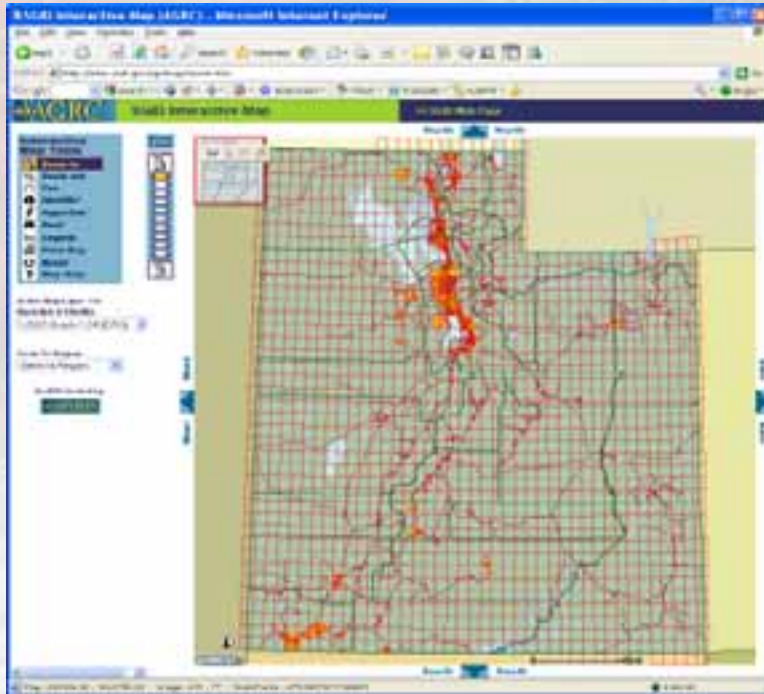
Parameter	Value
userName:	demo
SGIDLayerName:	SGID.SGIDRAS.DEM_10METER
utmX:	430567
utmY:	4495489

```
<?xml version="1.0"
encoding="utf-8" ?>
<string
xmlns="http://mapserv.utah.gov
/WSUTSGID_RasterValues">
1454|meters</string>
```



Utah Map and Web Services:

- **From Exploration:** ArcIMS 2000- 2007 (~15 services, ArcAXL)



- **To Business Solutions:** ArcGIS Server, 2008 →



Utah Geospatial Infrastructure

- **2008 Strategic Plan Addresses Geospatial Services**
 - Goal 4.2: “Services Are Effective, Accessible and Reliable”.
 - Objectives:
 - Create a common **infrastructure** for delivering geospatial **services**
 - Create exemplary services
 - Develop services for **data integration**.
 - Adopt **management** and control processes



Utah SGID Data Reorganization

- **State Geographic Information Database**
 - SDE: 450+ Vector Layers
 - ImageServer: 20+ Raster Layers
- Services Focus and Geospatial Archiving Needs Drive Reorganization



 As of July 7th, 2pm MST, all shapefile and geodatabase download files now carry the new SGID93 name and category conventions.

- ISO Topic Categories
- Easy of update/maintenance
- Attributes for map & web services
 - Ease of use
 - Cartography
- Performance

The SGID 9.3 categories are as follows:

- | | | |
|--------------|---------------|------------------|
| • Bioscience | • Environment | • Planning |
| • Boundaries | • Geoscience | • Political |
| • Cadastre | • Health | • Recreation |
| • Economy | • History | • Transportation |
| • Elevation | • Indices | • Utilities |
| • Energy | • Location | • Water |



AGRC Office Reorganization

- **Organizational**

- Preexisting Model

- Horizontal
 - Project Focus
 - 1 Supervisor

- New Model

- Operational Groups, 4 Section Managers

- Administration

- SGID Data

- Cadastral

- Tech/App Development (Web/Map Services)



- **Physical**

- Designed for collaboration:

- by group
 - shared spaces
 - low walls



UTAH **AGRC**
Automated Geographic Information



Core Web Services:

- Address Location
 - Address/Zip
 - Address/Placename
 - Milepost/Route
- Features At/Near Point
- Get Feature Attributes
- Elevation Lookup
- Keyword lists
 - Cities, placenames, GNIS
- Base Map Services

About:

- mapserv.utah.gov
- SOAP, JSON, Map services info
- User accounts
 - Track usage
 - Communicate with users



Componentizing Strategy:

- 1st Gen: Design web service to specific use
 - District Lookup
 - Address → legislators, tax districts, etc.
 - Easy for application developers



District Lookup Web Service:

Request:

GeocodeAddress

Test

To test the operation using the HTTP POST protocol, click the 'Invoke' button.

Parameter	Value
userName:	demo
streetAddress:	2473 S Nantucket Dr
zipCodeOrCity:	Cottonwood Heights

Response:

```
- <ArrayOfResults>
- <Results>
  <MatchAddress>2473 E Nantucket Dr, 84121</MatchAddress>
  <Geocoder>U024.GC_StatewideStreets</Geocoder>
  <GeocodeScore>100</GeocodeScore>
  <UTM_X>430567.08</UTM_X>
  <UTM_Y>4495488.76</UTM_Y>
  <LONG_X>-111.8207283</LONG_X>
  <LAT_Y>40.6072995</LAT_Y>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.AdjustedUSHouseDistricts2002</DistrictLayer>
  <DistrictValue>2</DistrictValue>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.Municipalities</DistrictLayer>
  <DistrictValue>Cottonwood Heights</DistrictValue>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.SalesTaxAreas</DistrictLayer>
  <TaxDistrict>18020</TaxDistrict>
  <MetroName>Cottonwood Heights</MetroName>
  <FIPS>16270</FIPS>
  <CurrRate>0.0685</CurrRate>
  <RateDate>JAN09</RateDate>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.SchoolDistricts</DistrictLayer>
  <DistrictValue>JORDAN SCHOOL DISTRICT</DistrictValue>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.AdjustedUtahHouseDistricts2002</DistrictLayer>
  <DistrictValue>49</DistrictValue>
  <EMail>jseegmiller@utah.gov</EMail>
  <Name>F. Jay Seegmiller</Name>
  <Party>D</Party>
</Results>
- <Results>
  <DistrictLayer>SGID.U024.VotingPrecincts</DistrictLayer>
  <DistrictValue>4946</DistrictValue>
</Results>
```



Componentizing Strategy:

- 2nd Gen: Design services as building blocks
 - ~~District Lookup~~
 - Address Locator + Feature At Point
 - Application developers have to chain services ☹️
 - First find address location
 - Then find districts at address location
 - Faster, easier to maintain, more flexible 😊



Web Service Advantages

- Get more from investment, reach wider audience
- Application Developers don't need to maintain own geospatial infrastructure, licenses, & data
- Contract with end user defined by request and response definitions
 - Frontend Input/Output parameters must stay the same
 - Backend methodology & data can be changed without breaking contract
- Custom handling of tasks
- Example: Address Locator



Ex. Address Locator Web Service

- Seamless updates: no files, data, parameters, software to be managed by application developers
- Customized Location Methods:
 - Backend is all zipcode-based geocoding
 - But place name input is also allowed
 - Place name to zipcode alias table
 - Three levels of street name aliasing
 - Milepost/Route handled by same service
 - Next? NENA DB direct GC

UTSGID_GeoLocator

Click [here](#) for a complete list of operations.

GeocodeAddress

Test

To test the operation using the HTTP POST protocol, click the 'Invoke' button.

Parameter	Value
userName:	<input type="text"/>
streetOrMilePost:	<input type="text"/>
zipCityOrRoute:	<input type="text"/>

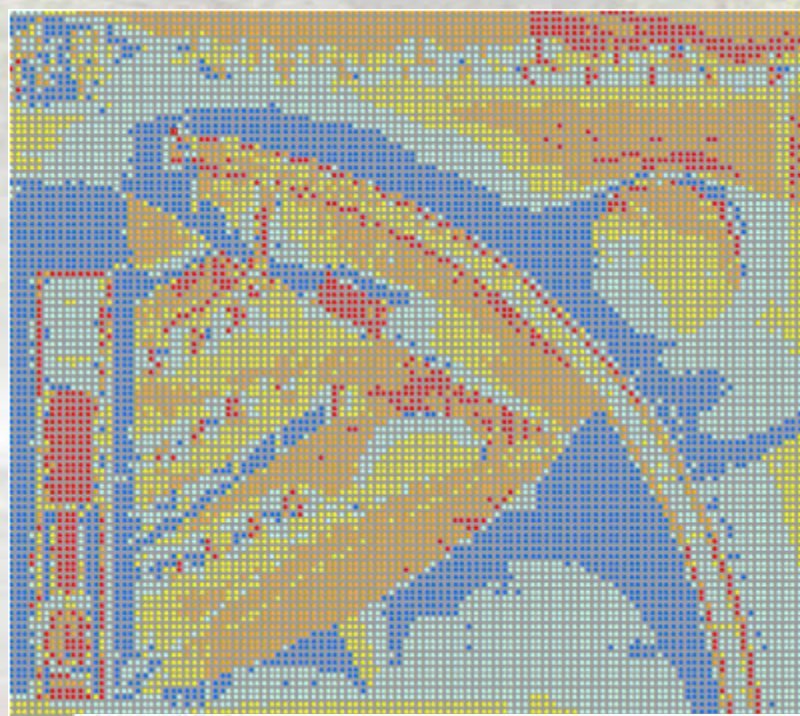
Invoke



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Ex. Solar Energy Web Service

- Input: Polygon (list of coordinate pairs)
- Returns Monthly Averages
 - Solar Energy (watts)
 - Sunlit Hours
- 400 million points each w/ 24 preprocessed attributes derived from LIDAR data w/ ESRI solar tools & custom scripts
 - 1 meter resolution, extent = Salt Lake City
 - Custom python, VBA scripts:
 - Tiled solar tools processing
 - Aggregating tiles & layers



Solar Results

SolarValues

Direct Duration: 264,264,333,362,425,402,417,388,324,317,260,217
Direct Radiation:
70787.83095,124962.160385,192270,170092,158290,134406,85667,60947
Direct Area: 11295
Time: 24.148



UTAH AGRO
Automated Geographic Performance Center



Core Statewide Map Services:

- Publish once, integrate into applications
 - WMS base map services
 - Imagery (via Image Server)
 - Imagery/Streets Hybrid (tile cache)
 - ImageServer
 - Aerial Photography, CIR, (vintages available)
 - Scanned Maps
 - USGS topo series
 - Geology base maps
 - Hillshades



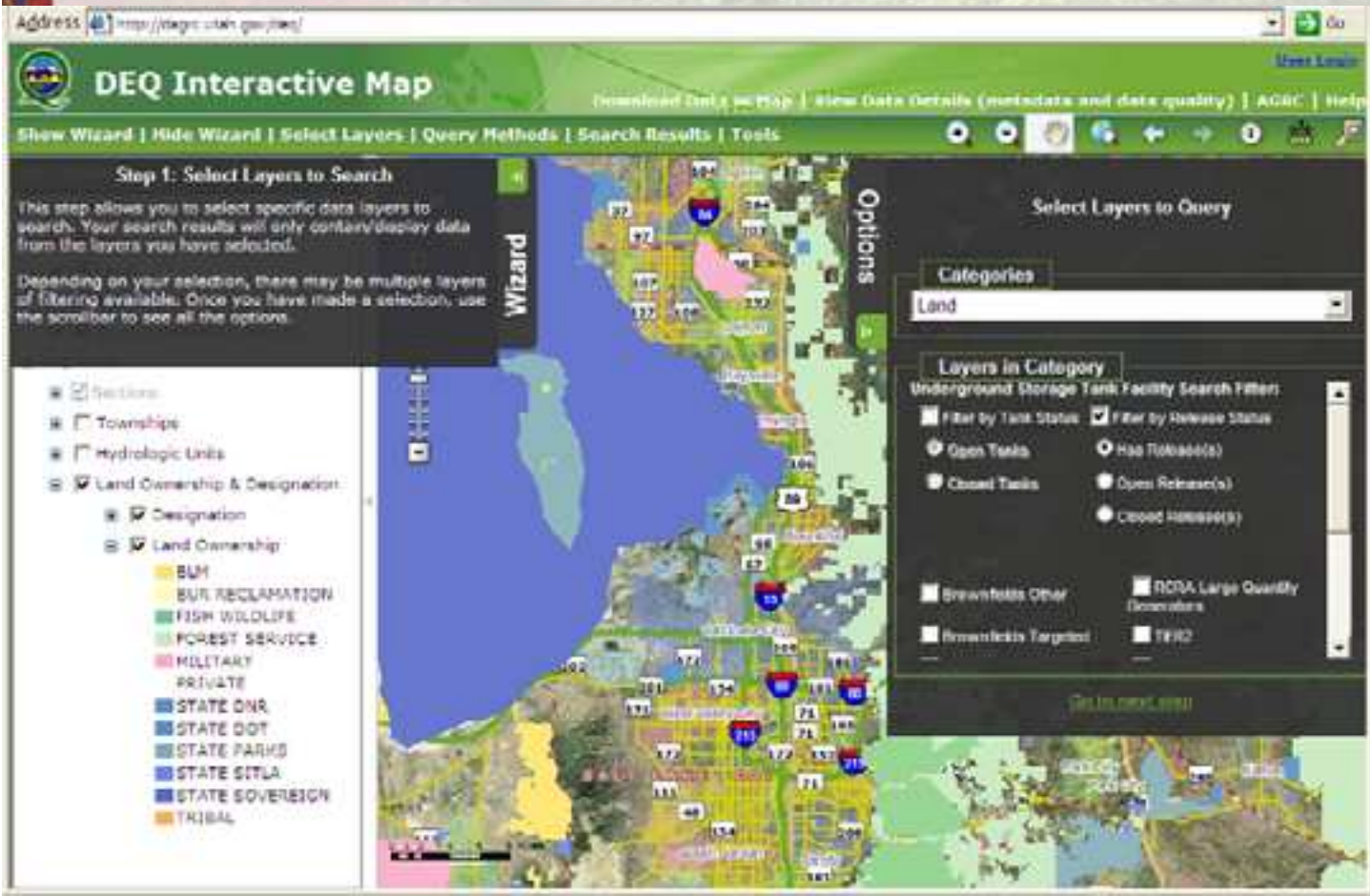
The screenshot shows a web browser window with the URL <http://dgrc.utah.gov/gis/>. The page features the 'agrc' logo and the title 'Digital Utah! beta'. A 'Quick Links' dropdown menu is visible in the top right. The main content area is divided into a map on the left and a 'Control Panel' on the right. The map displays a grid of streets and a large blue area representing a water body. The 'Control Panel' includes three sections: 'Zooming Tools' with 'Street' and 'Zone' input fields and a 'Zoom To Address' button; 'Zoom to City' with a 'City' dropdown menu showing 'Huntsville' and a 'Zoom To City' button; and 'Zoom to Geographic Name' with a 'Place name' input field and a 'Zoom To Place' button. A 'Quick Links' dropdown menu is also present in the top right corner of the page.

Integrating Web & Map Services

- Tile Map Service
- Address Locator
- City List
- GNIS Placename
- Get Feature Geometry

This is the interface template for most of our simple interactive maps





Environmental Quality Public Information Site

Basic Display/Query

- Wizard or GIS style interface
- Search/view cleanup sites and related data
- Make FOIA request and/or link to document management system

Uses web services for: base map, geocoding, city/placename lists





Utah's Watershed RESTORATION INITIATIVE

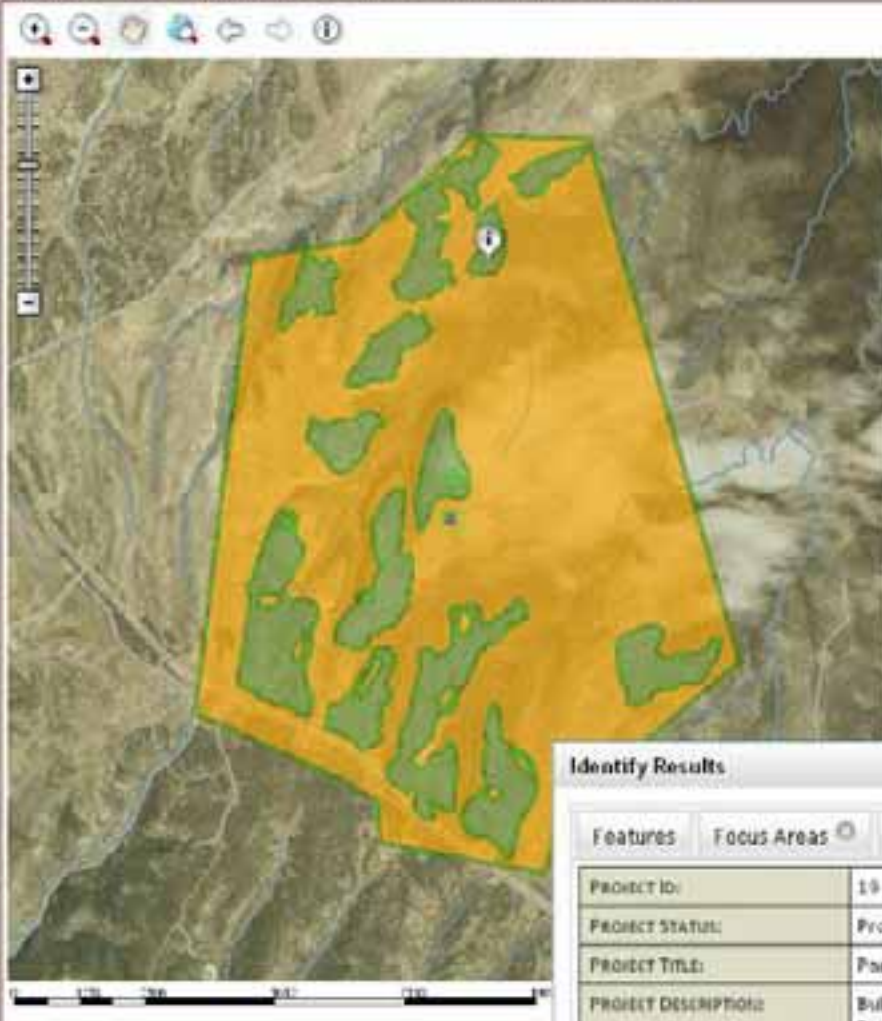
Projects

Map

Query Builder

User Profiles

Project ID: 19 Project Title: Park Ridge Bullhog (return to project portal)



Layers Base Legend Zoom Tools

- Project
 - Project Other Points
 - Project Water Control Stru
 - Project Troughs
 - Project Guzzlers
 - Project Fences
 - Project Pipelines
 - Project Dams
 - Project Aquatic Treatment
 - Project Terrestrial Treatme
 - Project Affected Area
- Completed

Create Project Features
Modify Existing Project Features
Terrestrial Treatment Areas
Treatment Area [Instructions](#)
Other Point Structures

Identify Results

Features Focus Areas Land Owners Project Information

PROJECT ID:	19
PROJECT STATUS:	Project
PROJECT TITLE:	Park Ridge Bullhog
PROJECT DESCRIPTION:	Bullhog 500 Acres Of Encroaching Pinyon And Juniper From An Old Chaining In The Book Cliffs.
PROJECT MANAGER:	Nathan Kota
LEAD AGENCY/ORGANIZATION:	Utah Division Of Wildlife Resources
PROPOSED TERRESTRIAL ACRES:	479.00

Welcome,
Steve Gourley

Logout

- Title Page
- Justification
- Equipment
- Seed
- Archaeology
- NEPA
- Species
- Budget
- Funding
- Monitoring
- Images &
- Attachments
- Project Log
- Expenses
- Proposed
- Features
- Admin
- Project
- Comments
- Final Features

- Completion
- Form
- Submit
- Completed
- Project Data

Submit a bug



DNR Watershed Restoration Initiative: Web-Based Feature Editing

The screenshot displays the web-based feature editing interface for the Utah's Watershed Restoration Initiative. At the top center, the logo features a stylized water drop with a green leaf inside, next to the text "Utah's Watershed RESTORATION INITIATIVE". Below the logo, a navigation bar includes "Projects", "Map", "Query Builder", and "User Profiles". The main content area is titled "What type of feature would you like to create, edit, or delete?" and is divided into three sections: "Treatment Areas", "Structure", and "Affected Area".

- Treatment Areas:** Includes "Aquatic / Riparian" (represented by a river and trees) and "Terrestrial" (represented by a landscape with mountains and a river).
- Structure:** Includes "Dam", "Fence", "Pipeline", "Guzler", "Trough", "Water Control Structure", and "Other Point Feature".
- Affected Area:** Includes "Affected Area" (represented by a map with a red highlighted region).

On the left side, a vertical menu lists various project management options, with "Final Features" highlighted. On the right side, there is a "Submit a bug" button with a ladybug icon and a "Logout" link. The bottom of the page features the "UTAH AGRC Automated Geographic Reference Center" logo.

DNR Watershed Restoration Initiative: Document Management



Utah's Watershed RESTORATION INITIATIVE

[Title Page](#)
[Justification](#)
[Equipment](#)
[Seed](#)
[Archaeology](#)
[NEPA](#)
[Species](#)
[Budget](#)
[Funding](#)
[Monitoring](#)
[Images & Attachments](#)
[Project Log](#)
[Expenses](#)
[Proposed](#)
[Features](#)
[Admin](#)
[Project](#)
[Comments](#)
[Final Features](#)

[Projects](#) | [Map](#) | [Query Builder](#) | [User Profiles](#)

[User Login](#)
[Create User Account](#)

Project ID: 19 Project Title: [Park Ridge Bullhog \(return to project portal\)](#)

Images & Attachments

Images

1 Page 1 of 1

Type	Comments	Thumbnail
Before	Bullhog area, taken 8-24-07	
During	bullhog in action	

Attachments

Attach supporting documents, except for the following:


Document	Link
Seed Documents	Seed
NEPA Documents	NEPA
Monitoring reports	Monitoring

Attachment	Comment
No comments have been added.	

[Submit a bug](#)



DNR Watershed Restoration Initiative: Budget Mgmt Interface



Utah's Watershed RESTORATION INITIATIVE

[Title Page](#)

[Justification](#)

[Equipment](#)

[Seed](#)

[Archaeology](#)

[NEPA](#)

[Species](#)

[Budget](#)

[Funding](#)

[Monitoring](#)

[Images & Attachments](#)

[Project Log Expenses](#)

[Proposed Features](#)

[Admin](#)

[Project Comments](#)

[Final Features](#)

Projects **Map** **Query Builder** **User Profiles**

Project ID: 19 Project Title: Park Ridge Bullhog (return to project portal)

Budget

Budget

1 Page 1 of 1

Item	Description	UWRI	Partner	In-Kind	FY
Contractual Services	Bullhog Contract @ \$275/acre	\$137,500.00	\$0.00	\$0.00	2010
Personal Services (seasonal employee)	Seasonal employee	\$0.00	\$500.00	\$0.00	2010
Motor Pool	Vehicle Mileage	\$0.00	\$2,000.00	\$0.00	2010
NEPA	BLM EA	\$0.00	\$0.00	\$1,500.00	2010
Seed (OERC)	Seed Mix @ \$50/acre	\$0.00	\$50,000.00	\$0.00	2010
Contractual Services	Aerial Seeding Contract @ 15/acre	\$0.00	\$7,500.00	\$0.00	2010


Budget Totals

	UWRI Total	Partner Total	Net Total	
Totals	\$137,500.00	\$40,000.00	\$177,500.00	
			\$1,500.00	In-Kind Total
			Grand Total	\$179,000.00

[User Login](#)

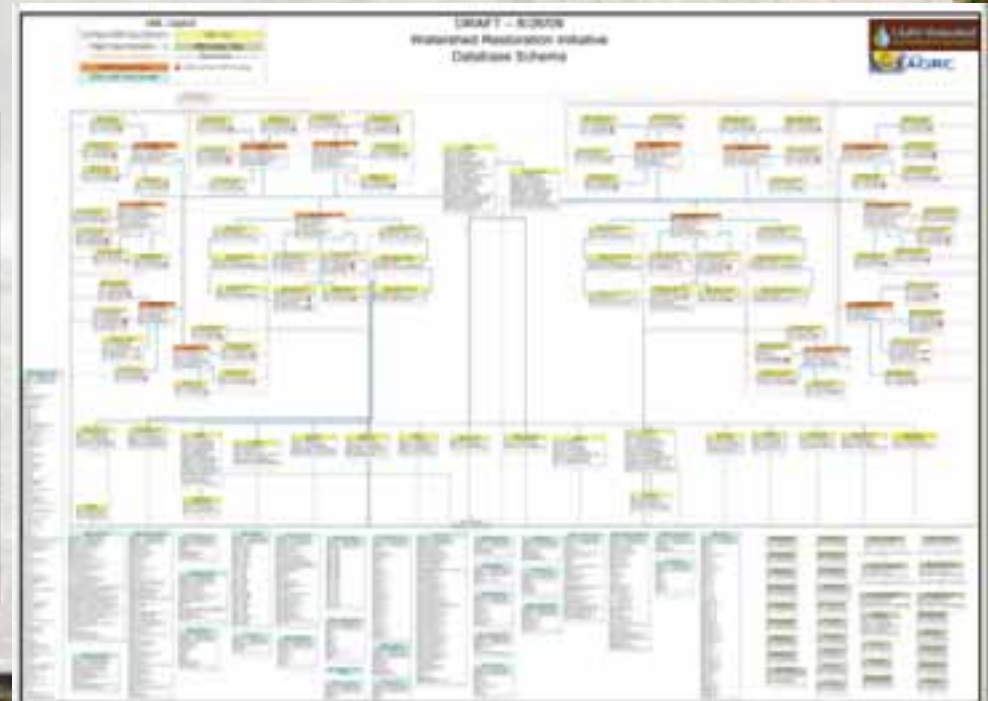
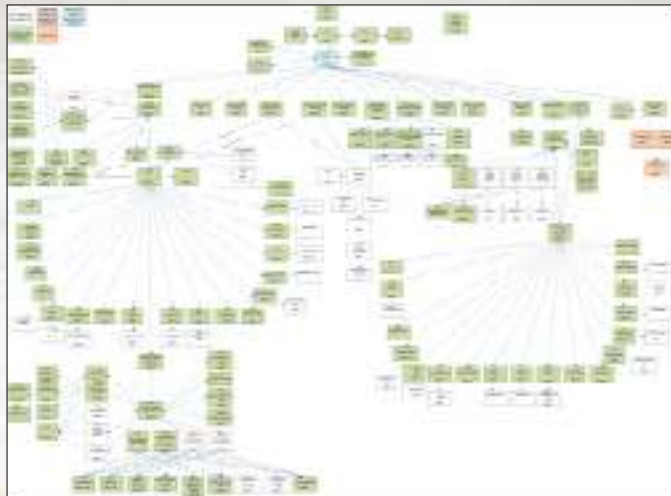
[Create User Account](#)

[Submit a bug](#)



New technical requirements:

- Enterprise apps require skill sets, specializations database design, use cases, flow diagramming
- CS/IT skill set can quickly become more important than geospatial



What's next:

- Refine management processes for web/map services
- More core web & map services
- Outreach to developers
- App Dev Projects
 - Agriculture - salinity
 - Oil & Gas
 - Biotics - T & E species
 - Regional 3 fish DB
 - Health info integration (IBIS, flu)



Summary: SSDI Geospatial Web Services

- Extend benefits of geospatial investment
- Takes commitment, forethought, resources
- Important focus areas
 - Geography → CS, IT
 - Industry standards
 - Performance orientation, focus can't be on the size of the data pile
 - Reaching non-GIS audiences with GIS data and maps



Comments/Questions

- mpeters@utah.gov @mattagrc
- mapserv.utah.gov



Where have we been?

We have all been building databases

Geospatial Database are primarily used by Geospatial folks

You must have certain software/hardware to interact with the data

We needed to develop core services/components so we could build once and use many times

Rely on existing data already developed and stored in a database

AGRC needed to look at its personnel structure and decide what the focus should be

Refer to strategic plan.....does this fit



The Problem

You need to have good data, bad data really shows up bad!

The value of a data set is a direct porportion to the amount of use it gets

Deq screen shots

WRI Screen Shots (3 Slides)

Or 5 or six slides with functionality

