A Summary of Geospatial Intitiatives in the University of Utah's Marriott Library

By Ken Rockwell and Anne Morrow

Abstract: The Marriott Library's Geospatial Initiatives Committee consists of librarians and staff involved in projects designed to provide access to different library resources through geospatial interfaces. We are creating maps that link to resources in our digital collections, including the Western Soundscape Archives and historical photographs, and applying georeferencing to scanned geological thesis maps to manipulate them with Google Earth. The library's home page now has a clickable map for accessing digital collections by county, and we are working with a Geography professor on creating a "Historical GIS" that utilizes Sanborn fire insurance maps of Salt Lake City and recreates the downtown area as it appeared a century ago. To pull these various projects together, we set up a geospatial portal through CampusGuides. See: http://campusguides.lib.utah.edu/GIS

History of the GSI Committee

A group of librarians and staff (Ken Rockwell, April Love, Dave Morrison, and Ron Bitton) organized a "Geographic Information Systems Committee" in March of 2006 to investigate bringing GIS services into the Marriott Library. We initially had in mind offering the full ESRI ArcView package to library users, as some other academic libraries have done, but questions arose from our administration about this, and GIS services seemed to be well established on campus through the Geography Department's DIGIT Lab. Our activities in the first few years included bringing in a librarian with GIS expertise to discuss options with staff, making contact with faculty interested in GIS projects, and contacting other users from off campus, including the staff of the Utah Geological Survey and the Utah state government's Automated Geographic Resource Center. We also discussed ways to create searchable or clickable maps that would retrieve digital library resources, such as historical photographs in our numerous digital collections.

Around 2010, the group redefined itself as the Geospatial Initiatives Committee and invited other staff members with geospatial interests to join us. Our contacts with UGS had revealed their interest in digitizing all geologic maps covering parts of Utah, including those done as part of University thesis work, and this led to our first major project: inventorying thesis maps and arranging to have them scanned. This brought into the committee Lisa Chaufty of the Institutional Repository and her assistant, Donald Williams. Meanwhile, Amy Brunvand of the Digital Scholarship Lab arranged for the hiring of GIS specialist, Justin Sorensen. Justin's georeferencing work would make it so that the scanned thesis maps could be manipulated in Google Earth.

Among the projects that we have worked on:

- County-access map interface: Anne Morrow, the Marriott's digital initiatives librarian, caught the vision of geospatial interfaces—clickable maps to retrieve digital resources—and went to work on that, and spearheaded the creation of a clickable map of Utah counties that facilitates retrieval of digital collections pertaining to a given county.
- The Western Soundscape Archive. A group effort in 2010 involved the use of a Google API to generate a Google map that pinpoints the locations of natural sound recordings in the archive. This project involved writing a program that used existing place name metadata to generate latitude and longitude coordinates, which in turn were used to populate the map.
- Sanborn Fire Insurance Maps. The Marriott Library scanned its Sanborn maps years ago, and Anne Morrow created a clickable map in April of 2010 to access various sets by city or town name.
- A Historical Salt Lake City page. In the fall semester of 2011, Dr. Kevin Henry, a Geography professor, contacted Ken Rockwell with questions about using the Sanborn fire insurance maps of Salt Lake City in GIS-related projects. Ken invited Dr. Henry to meet with the GSI Committee, and Dr. Henry laid out his vision of using various resources to create a "historical GIS" for downtown Salt Lake. He hopes to show correlations between old industrial sites and health problems of "downwinders." As a related project, Justin Sorensen created a page using an index map with links to various historical photographs from downtown Salt Lake.
- Hidden Water. Anne also made contact with two professors who had met previously with the GIS Committee about their "Hidden Water" project. This involves mapping the historical courses of streams into the Salt Lake Valley. Anne worked with them to create interactive Google maps linking to their historical photographs.
- Green River. This is another project with links from a base map to historical resources. Anne Morrow worked with Multimedia Archives manager Roy Webb to highlight the area now covered by the Flaming Gorge Reservoir near the Utah-Wyoming border.
- Geological thesis maps. Ken Rockwell and April Love inventoried the geologic maps created as part of theses during the period 1950 to 1975. Donald Williams of the Institutional Repository had these maps scanned, and Justin Sorensen georeferenced them. Then the maps were manipulated in Google Earth for three-dimensional display.

Approaches to Mapping Marriott's Digital Collections

In 2010 Marriott Library took advantage of the free and intuitive tools provided by Google Maps and Google Earth to develop geospatial discovery interfaces for assets housed in the digital library (http://www.lib.utah.edu/collections/digitalCollections.php). Since then, we have used Google mapping tools to create several types of maps: pinpoint maps, area maps and hybrid

maps. We have also begun to explore the benefits of Prezi software for navigation and examination of maps that either do not depend upon, or do not display well in standard geospatial interfaces.

- Pinpoint Maps: The pinpoint map includes individual items (in our case digitized historic and contemporary photographs) plotted using address or coordinate metadata. Along with the image, selected descriptive metadata and links to the full record are included. Pinpoint maps are attractive for the immediacy of access to the image and information about it. However, as there is no mechanism connecting the digital asset management system (CONTENTdm) to the map interface, the map will not include new items as they are added to the digital library. Other issues with single-point maps will be discussed below.
- Area maps. Area maps use keyword queries to generate browse lists of related assets. Area maps typically deal with broad geographic areas, such as a town, city or county. As new assets become available in the digital library they automatically appear in the area map. As the keyword queries are dependent on consistent and reliable metadata, where consistency and reliability are lacking we find individual results that should have been omitted as well as results that have been omitted because the metadata was inaccurate or incomplete. Area maps were not considered to have as immediate access as pinpoint maps because they display brief lists of resources and not the actual resource.
- Hybrid maps: An opportunity presented itself in 2011 to participate in the Hidden Water project. Hidden Water sought to unveil the paths of the water systems as they traveled through Salt Lake County along the Wasatch Front. Anne Morrow, working with professors Peter Goss and Craig Denton, developed a geospatial interface that married both pinpoint mapping and area mapping. The queries we created included additional keywords that dramatically limited the results returned to only the most relevant. Images included in the maps were from a controlled set so that there was no immediate concern of excluding future images. That said, there is interest in seeing the project develop in the future to include new materials relevant to the project. While we were not able to eliminate all shortcomings of pinpoint or area maps, using a hybrid approach helped to mitigate drawbacks of each while capitalizing on their individual strengths.

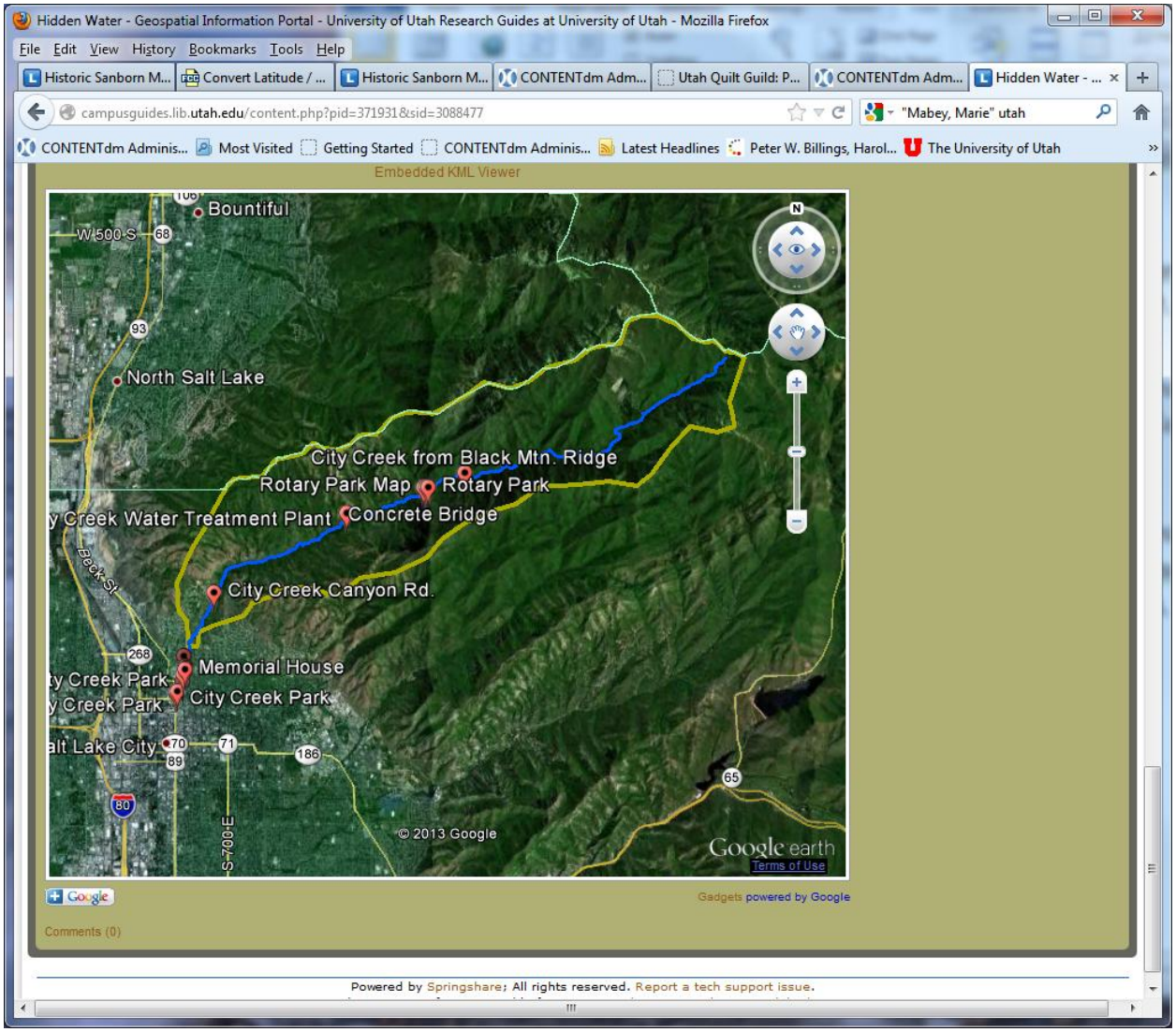

Illustration 1: Screenshot from "Hidden Water"

- Prezi as a Map Display and Navigation Tool: Among the assets in the digital library are series of historic maps that do not fit neatly into geospatial interfaces. Anne Morrow began experimenting with Prezi presentation software to serve as a navigational tool for these maps. Prezi is intuitive to use, accommodates a variety of file types and includes an array of navigational options and features. A high resolution digital map of US troop marches of 1858 put in Prezi (http://prezi.com/gpcunzadyesb/map-of-lines-of-march-by-us-troops-in-1858/?kw=view-gpcunzadyesb&rc=ref-954527) allows seamless transitions for viewers to examine the map extremely close-up and from a birds eye view. A project currently under consideration involves the Green River maps, consisting of a series of six hand-drawn maps. The project would focus on the Green River before the construction of Flaming Gorge Dam and Reservoir with images, filmstrips and other media added to help

tell the story of the Green River and the surrounding community prior to the construction of Flaming Gorge Dam. When considering projects for Prezi that include high-resolution images, it is important to keep in mind that there is a file size limit in the free version.

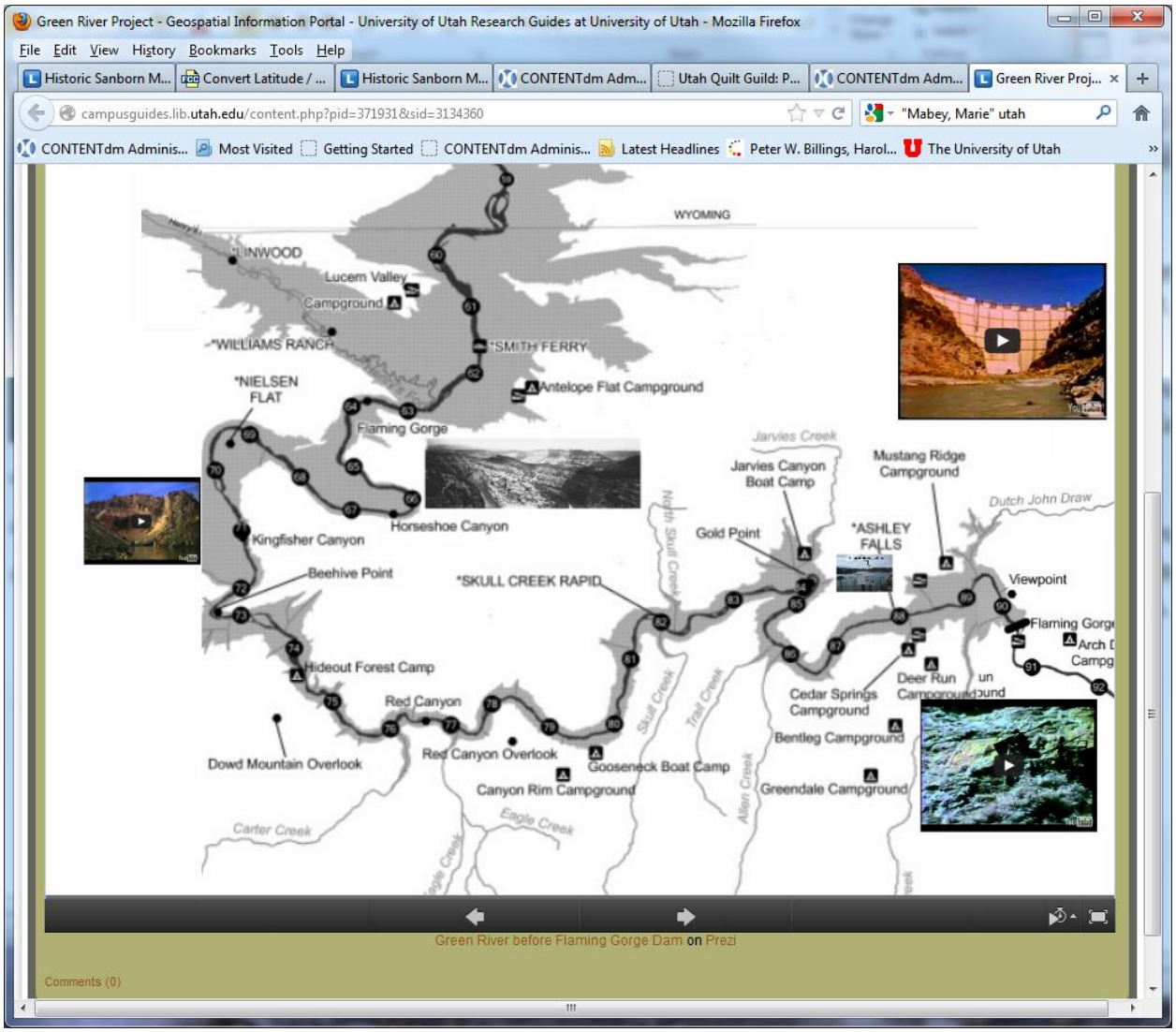

Illustration 2: Screenshot from the Green River project

Pinpointing: the problem

Several of these projects involve index maps that indicate locations covered with a "pushpin" symbol. These pinpoints can be generated using latitude and longitude coordinates. Ideally, each digital resource (photograph, sound recording, etc.) would come with a GPS-generated coordinate pair for its exact location. While such metadata may be easy enough to obtain with today's "born-digital" objects, they are almost always absent from older resources such as

historical photographs. To fill in this vital information, a script can read the **Place names** field, refer to a database such as the federal Geographic Names Information System (http://geonames.usgs.gov/), and generate the coordinates needed to generate the map. This approach works easily enough for collections such as the Sanborn maps, where the basic access point for each set is a single city or town name.

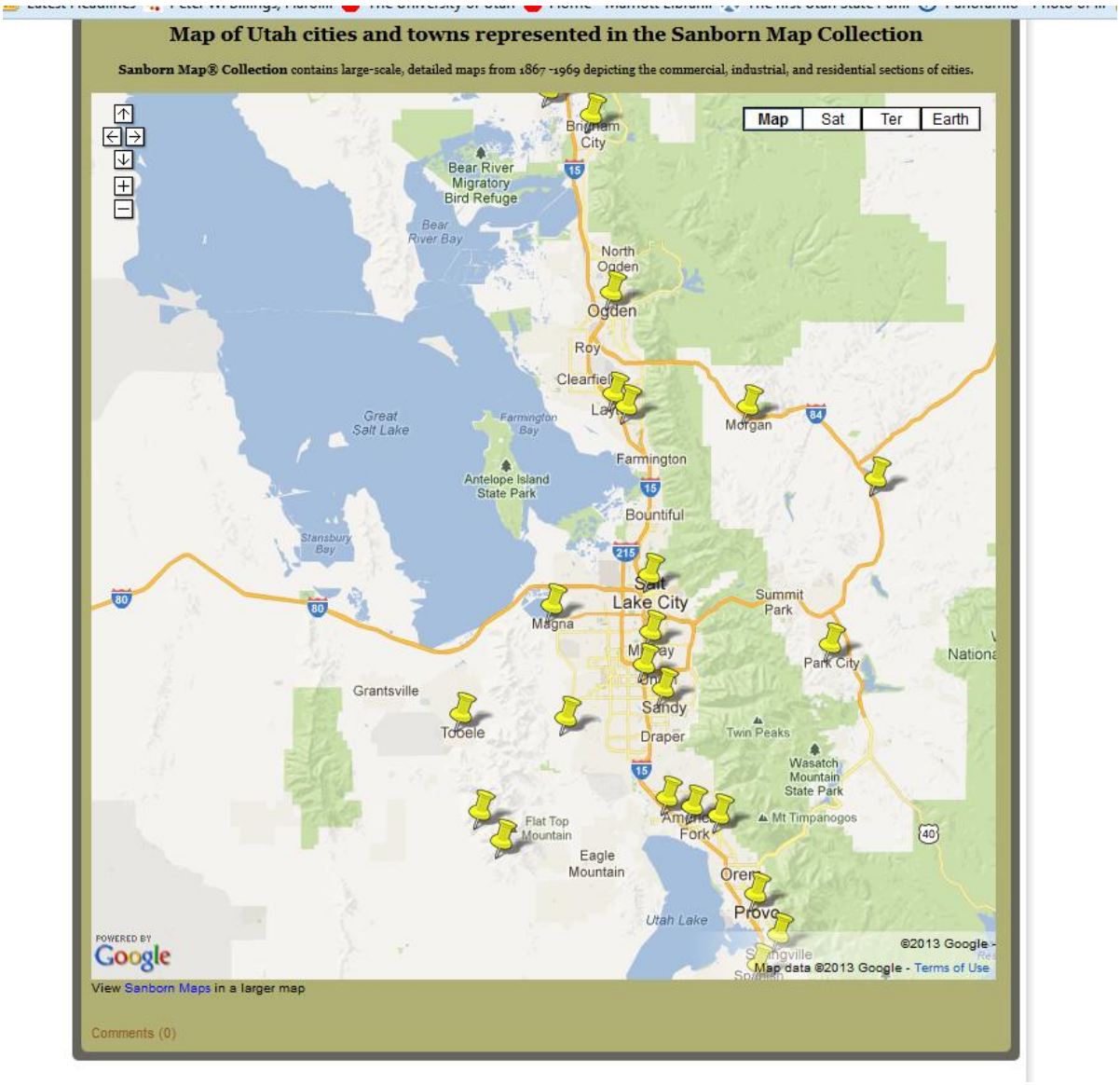

Illustration 3: Screenshot from Sanborn Maps geospatial interface

Coordinate generation is more complicated when multiple place names are included in the **Place names** field. In the Western Soundscape Archive project, the **Place names** field may describe the sound recording's location as occurring at a specific site, such as a campground or nature preserve, and also the setting of that site—in a National Forest, a particular mountain range, or a

county. In such cases, the script can be written to select the most localized, precise place among those given. To facilitate the selection in the script used for our project, Ken Rockwell created a ranking system and assigned the place names a rank number in an Excel spreadsheet, with more localized names having lower numbers. The script uses this spreadsheet to select the lowest numeric value found.

One major complication of this approach is that it depends on the place names database used to generate the coordinates. The database needs to be fairly comprehensive, but even the best database may lack a more obscure locality. An example is the Mary E. Theler Wetlands, located near Belfair, Mason County, Washington, site of a Western Soundscape recording of a cedar waxwing. The script that fetched coordinates for places came up with zeroes because this small preserve was not in the USGS database. In such cases, one can locate the place with a little detective work, locate it on Google Earth, and manually extract the coordinate (translating Google Earth's minute-second coordinates into decimal degrees using a converter such as is provided by the Federal Communications Commission at http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html) Alternatively, one may decide to go with the next larger area, the city or county.

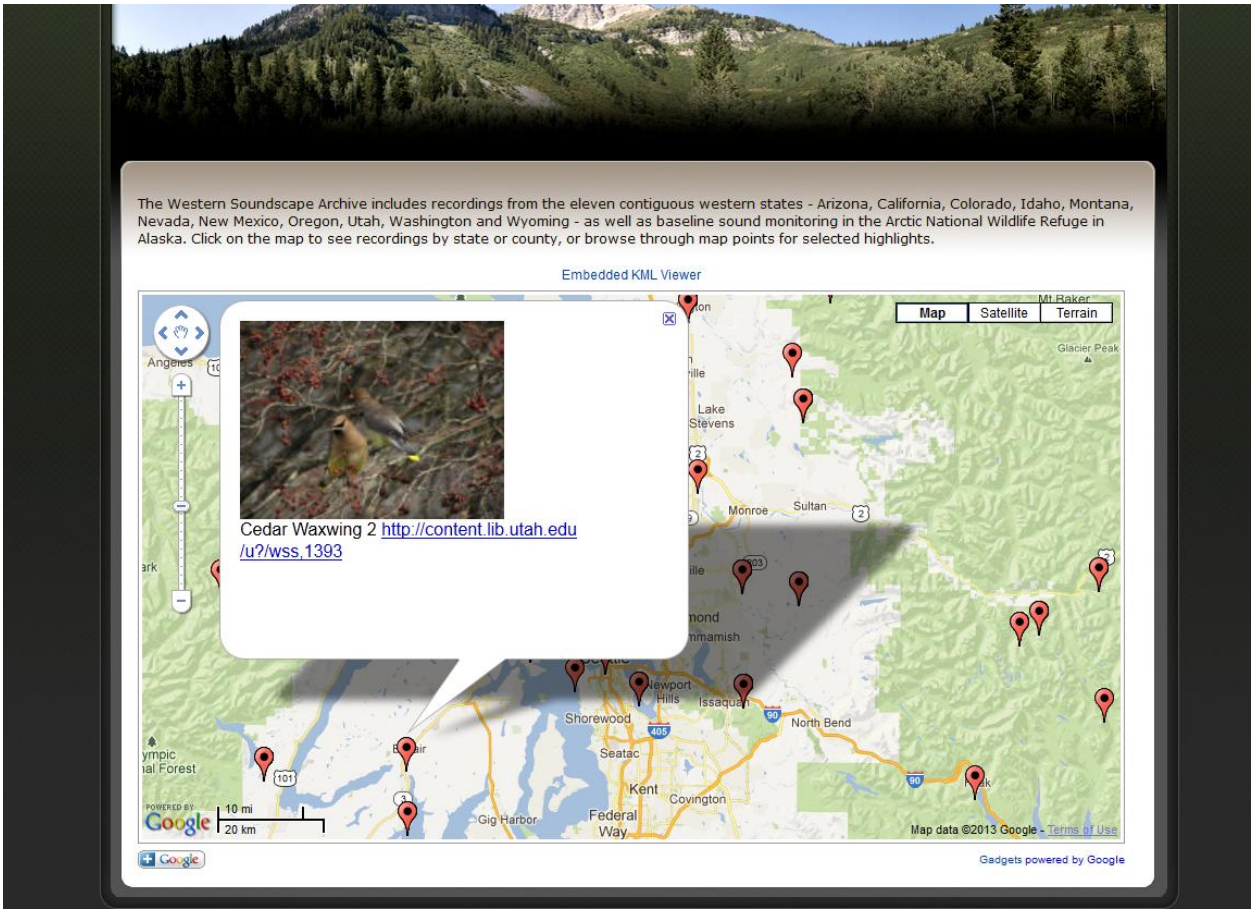

Illustration 4: Screenshot from the Western Soundscape Archive geospatial interface

The place names database may also have a less-than-ideal way of selecting the single coordinate that represents a place. For political and administrative units such as cities, counties, or parks, the coordinate is usually a center point. When all that is available for some resources is the county or another large-area unit, such as a national forest, all of the resources will be artificially forced into the same reference point on the resulting map. If the reference place name is a linear feature such as a trail or a river or stream, the database may use a reference coordinate at one end of the feature, far from the actual recording site. The USGS database invariably selects the lowest point in the stream system, its outlet or confluence with another stream, as the reference coordinate. This is not so bad for smaller streams, but when it's the Colorado River, the result is a point in Mexico where the river empties into the Sea of Cortez (or where it used to before all the water was siphoned off for American water supply)! For such outstanding cases, the coordinates may need to be adjusted manually to be closer to the actual recording site.

A very precise place reference is a street address for the location of a photograph in an urban setting. Currently existent addresses are in some databases and can be used to generate the coordinates. We used this feature with a set of historical photographs for Salt Lake City to generate coordinates and produce a clickable map of the downtown area. The digital collection for these photographs has an address field. One occasional drawback arises when an address no longer exists. For example, a block of First South Street (usually referred to locally as "100 South"), extending west from West Temple Street to Second West (200 West) was removed in the 1960s for the construction of the Salt Palace convention center. The script reads an address for a building in the middle of that block and cannot find it, so it retrieves the coordinates at the east end of the former block.

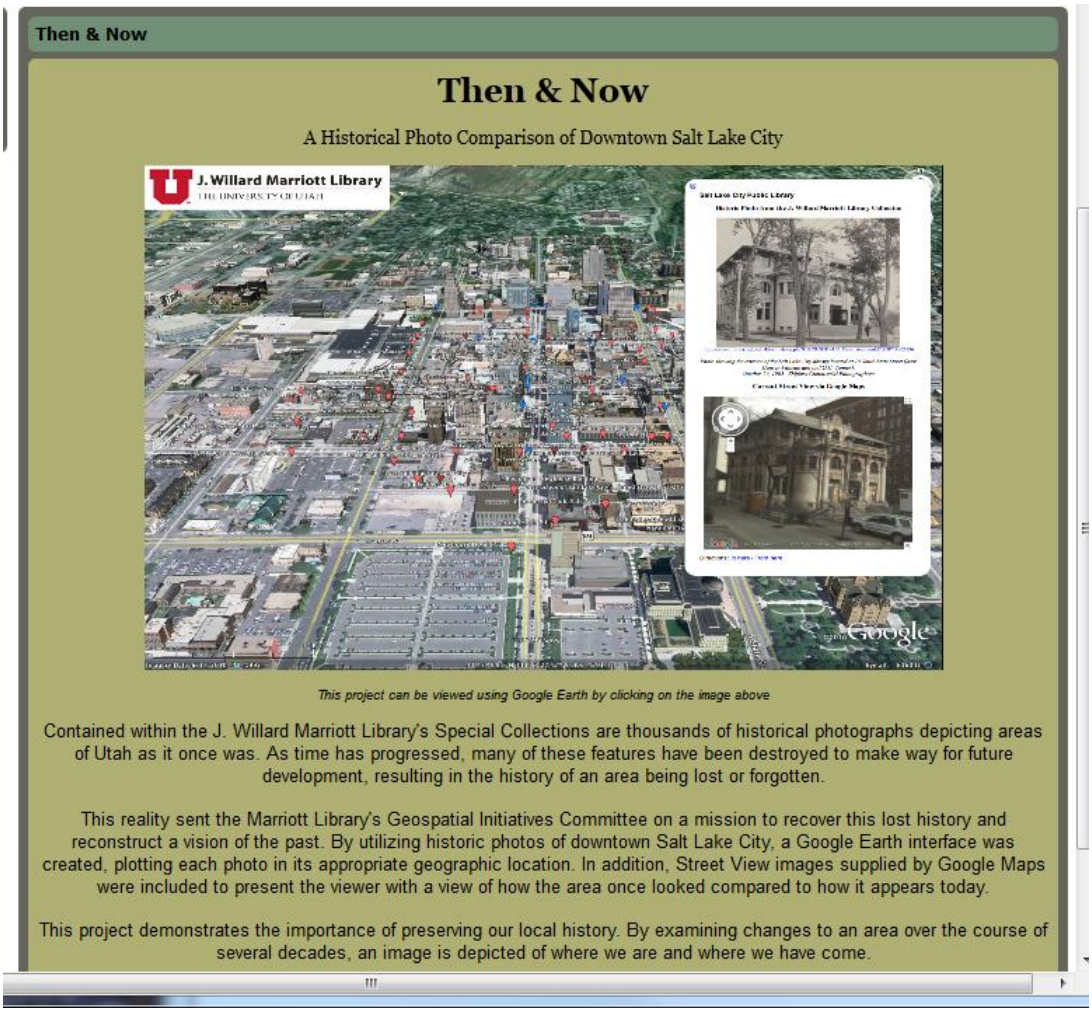

Illustration 5: Home page for the historical Salt Lake City geospatial interface

SUMMARY

Geospatial mapping helps to highlight assets in a digital library by creating an experience of serendipity, interaction and access. Different map interfaces have both strengths and weaknesses, including issues of how to translate place-name metadata into coordinates for the pinpointing of resources. Employing a hybrid approach takes advantage of the strengths and minimizes the weaknesses. Exploring software that is not geospatially anchored as a display tool for atypical maps opens new opportunities to increase access and improve interaction with resources housed in digital libraries.

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