

Recommendations for Geospatial Metadata Standards for Digital Collections in the Mountain West Digital Library

Report prepared for the
Utah Academic Library Consortium
Digitization Committee

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8/01/2012

This report was prepared by Dorotea Szkolar as the focus of a metadata internship with the Mountain West Digital Library in Summer 2012. In the second year of study for her Master's degree in Library and Information Sciences at Syracuse University, Dorotea undertook the internship to satisfy the practicum requirements of her degree. All research was supervised by the program director of the Mountain West Digital Library, Sandra McIntyre.

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EXECUTIVE SUMMARY

PURPOSE AND OBJECTIVES

Geospatial metadata harmonization is essential to the success of the Mountain West Digital Library, especially as it continues to recruit partners with digital collections covering a wider geographical range and undertake new digital initiatives. The objectives of this report are to:

1. Analyze current geospatial metadata practices in the digital collections in MWDL and how they impact the success of search and discovery of partners' collections in future MWDL projects and initiatives.
2. Give an overview of established standards, formats and vocabularies for geographic metadata in the digital library environment.
3. Provide recommendations (both short- and long-term) to the MWDL Metadata Review Board for actions that would eliminate interoperability issues, enhance discoverability of partner collections, and support MWDL's long-term goals and strategies.

ANALYSIS

A total of 50 collections in MWDL contained rich metadata that is mapped to the Dublin Core "spatial" refinement of coverage. Analysis revealed that, on average, 53 distinct values were utilized by each of those collections in the spatial field. Partners' geospatial metadata usually included some reference to the state, county, and populated place. All collections in MWDL were analyzed to determine how many contained geospatial information mapped to either subject (dc:subject), coverage (dc:coverage) or the spatial refinement of coverage (dcterms:spatial). A little over two-thirds of the collections in the MWDL contained geospatial information in at least one field mapped to one of those three elements. Therefore, many MWDL partners do not need to start completely from scratch in improving their geospatial metadata practices.

One of MWDL's current initiatives is to offer search of resources associated with different geographical places through a Google map interface. The maps will provide a powerful new way for users to navigate MWDL materials and will unify emergent collections across partners. However, interoperability issues, and therefore display problems and inaccuracies, result from the wide variety of formats and vocabularies utilized by partners. Mapping software is not advanced enough to make semantic distinctions using the current geospatial metadata. Programming multiple assumptions to compensate for metadata inconsistencies would be not only confusing and time consuming, but also increasingly complicated as new collections are incorporated into MWDL.

RISE OF GEOSPATIAL INFORMATION AND NETWORKING

A geospatial revolution is underway around the world. Geographic Information Systems (GIS) continue to advance in ways that are improving our everyday lives and are being incorporated into multiple disciplines and fields. The MWDL has an opportunity to be at the forefront of digital libraries by collaborating and taking advantage of GIS software and spatial metadata practices evolving today. The MWDL, by utilizing GIS technology and leveraging geospatial metadata, can visually showcase partners' collections and resources in new and innovative ways. In order for any GIS or map initiative to be successful, however, the spatial metadata which makes the collections discoverable must be standardized and interoperability issues must be resolved.

EXISTING CONTROLLED VOCABULARIES AND STANDARDS

The MWDL does not need to reinvent the wheel. Several vocabularies and standards exist from which the MWDL can either select to enforce or draw from to create its own standards and rules. Additionally, several organizations exist that successfully implement map interfaces to display partner collections or are involved in geospatial metadata solutions. The standards, practices and organizations are outlined and described in the report.

SELECTED RECOMMENDATIONS

Highly Advised

All standards and practices adopted by the metadata review board should be compliant with the ISO 19115 standard for geographic metadata.

Short-Term

1. Partners should map geospatial metadata field(s) to the Dublin Core spatial refinement of coverage (dcterms:spatial). This can be done at the collection level.
2. Partners should perform a global search-and-replace of simple geospatial metadata with more in-depth formatted spatial metadata when possible.
3. MWDL should engage a programmer to create a script that will automatically make assumptions, and add or reformat metadata in the spatial refinement field when the MWDL harvests.

Long-Term

1. The spatial coverage refinement (dcterms:spatial) should be made mandatory for new collections harvested by MWDL.
2. A single geospatial metadata format and selected controlled vocabularies should be enforced.

Recommendations for Geospatial Metadata Standards

3. MWDL should collaborate with libraries and organizations that experiment with geospatial metadata and display collections successfully through interactive map interfaces.
4. MWDL should obtain funding to ensure reformatting of spatial metadata within digital collections can occur in a timely manner.

PURPOSE

The Mountain West Digital Library (MWDL) is an online portal at <http://mwdl.org> that provides free access to over 670,000 resources in more than 360 collections from academic libraries, archives, public libraries, museums, historical societies and government entities in Utah, Nevada, Idaho and other parts of the U.S. West. It is a regional collaborative of more than 60 partners. Metadata is harvested from 20 regional repositories. Funded by the Utah Academic Library Consortium, the MWDL continues to search for both innovative and practical ways to meet the challenges of successfully harvesting partners' metadata and promoting discovery of partners' collections.

Successful harmonization of spatial metadata is important because MWDL continues to grow and undertake new digital initiatives. Specifically, MWDL is undertaking a digital map interface initiative for showcasing and promoting discovering of partners' collections (see the test version at http://test.mwdl.org/map_spatial_coverage.php). Some of the maps will include a "heat map" showing density of specific places occurring in the metadata. Several examples of test maps from the map initiative are included in this report to illustrate the importance of harmonized geospatial metadata.

The wide range of spatial metadata formats and vocabularies continues to create interoperability issues. Therefore, the objectives of this report are to:

- Analyze current geospatial practices in MWDL, especially with regards to geospatial metadata formatting inconsistencies, and how these practices negatively impact the success of search and discovery of partners' collections and MWDL projects and initiatives.
- Overview standards, formats and vocabularies for geographic metadata applicable to the digital library environment.
- Provide recommendations (both short-and long-term) to the MWDL Metadata Review Board of the UALC Digitization Committee and other MWDL partners for the standardization of geospatial metadata, both to eliminate interoperability issues and to enhance discoverability of partner collections.

BACKGROUND

CREATION OF METADATA FOR MWDL

Partners' geospatial metadata becomes available in MWDL through a series of steps:

1. The partner creates a new collection in a digital assets management system, selecting the metadata mapping for each field, with a mapping either to "None" or to an element or refinement in the Qualified Dublin Core set. The *Mountain West Digital Library Dublin Core Application Profile* was created by the UALC Digitization

Committee's Metadata Task Force in 2010 and revised in 2011 to share requirements and recommended practices for MWDL partners to follow. An online set of *General Guidelines for Digital Collections Metadata* accompanies the Profile. As part of this process, partners are encouraged to supply a field mapped to the "spatial" refinement of the Dublin Core element "coverage" (dcterms:spatial). Partners may label the field with any local label. Some commonly used labels are "Geopolitical place," "Location," and "Place name."

2. The partner populates all fields with appropriate metadata for individual materials upon or after digitization and upload.
3. The partner submits the new collection for inclusion in the MWDL.
4. MWDL staff examines selected records in the metadata of the new collection for conformance to the *MWDL Dublin Core Application Profile* and other guidelines.
5. MWDL staff changes settings in back-office tables in the web-scale discovery system Ex Libris Primo to add the new collection. Harvesting pipes are run in Primo to harvest the collection's metadata via Open Archives Initiative (OAI) Protocol for Metadata Harvesting. A set of normalization rules for digital collections is applied during the harvesting process to create values in the Primo normalized XML (PNX). In addition to search via specific fields, the values normalized into the PNX creates the opportunity for customized display, faceting, linking, and relevance ranking.

RISE OF GEOSPATIAL INFORMATION AND NETWORKING: OPPORTUNITIES FOR MWDL AND ITS PARTNERS

Geospatial information and Geographic Information Systems (GIS) continue to evolve in exciting ways that are improving our everyday lives. Through being able to overlay information on a map, GIS presents new opportunities to visualize, consume, access and connect information from different resources, thereby answering important research questions and information needs. True, using maps to indicate significance is nothing new. But the ability to integrate large sets of data into maps to visualize, make connections and answer questions is recent and revolutionary. One only needs to look as far as the GPS in your car or the map application on your smartphone to see how GIS and geospatial technology influences your own life for the better.

The foundation for GIS was established in the 1980s with the creation of Topologically Integrated Geographic Encoding and Referencing (TIGER). TIGER is a "system and digital database developed at the U.S. Census Bureau to support its mapping needs for the Decennial Census and other Bureau programs." (Tiger Overview , 2012) This allowed the creation of highly accurate maps, which could then support the visualization of the decimal census data the bureau collected. More advanced GIS technology soon followed based on this framework, allowing for greater integration and understanding of any kind of data into more complex maps to meet a wide variety of industry needs. (Broadcasting, 2012)

GIS technology and geospatial information continues to create exciting possibilities to improve the world. After the devastating earthquakes in Haiti in 2010, the open software non-profit company Ushahidi and Tufts University collaborated and created a real time map of the disaster

zones in Haiti. They harvested information that was either tweeted, texted, or messaged through the internet. Using crowdsourcing, the collaboration translated and input all that information onto internet accessible maps of Haiti. The map greatly benefitted both aid workers and victims, because it showed aid workers where people needed help, provided information on areas to avoid (such as collapsed buildings) and highlighted the locations of aid and medical clinics in almost real time. More than 2,000 volunteers and 20 organizations from 49 countries participated in the Haiti crisis mapping effort. (Broadcasting, 2012) Another example is in how GIS vastly improves the efficiency of both personal and public transportation. According to GPS.Gov, a Global Position System “enables the automatic vehicle location and in-vehicle navigation systems widely used throughout the world today” and “can automatically transmit data to display screens or computers.” The ability to monitor track, rail, bus and other Mass Transit services, has allowed for the creation of effective strategies to “keep transit vehicles on schedule and inform passengers of precise arrival times.” (Roads and Highways , 2006) Libraries are also taking advantage of GIS technologies to improve users’ access to information and draw connections between resources. The World Digital Library, a collaborative project between Library of Congress, UNESCO and library partners across the world, hosts on the internet an interactive map, in which users can select a region and see all the resources in the library related to that region. (Homepage) Jean-Robert Durocher commented “We are moving away from me having to actively search for something to now search is telling me what I should check out that might be interesting to me.” (Broadcasting, 2012)

Further evidence that geospatial information is an important forefront can be seen in the investments several institutions and governments are making in GIS. For example, in 2011, the U.S. government invested \$1.7 billion to design and construct a world class facility for the National Geospatial-Intelligence Agency in Fort Belvoir North Area, Va. (Division, 2011) President Bill Clinton, in 1994, signed executive order 12906, mandating the standardization of geospatial data across government agencies in order to improve interoperability. (Presidential Documents , 1994) The Open Geospatial Consortium was created to establish international standards for computer systems and software to ensure the proper integration and communication of geospatial information can occur across all types of organizations. (OGC Vision, Mission, & Goals , 1994-2012)

The MWDL has an amazing opportunity to take advantage of GIS technology and, through geospatial metadata, to showcase partners’ collections and resources in new and exciting ways. The MWDL could be a leading library in incorporating GIS technology into its services and on the forefront of the geospatial revolution. But, in order for any GIS initiative or program to be successful, the metadata which connects and makes discoverable spatial information in collection records much be standardized and provide a solid interoperable foundation.

ANALYSIS OF EXISTING SPATIAL METADATA PRACTICES IN MWDL

VARIATION OF FORMATS

A total of 50 collections have metadata fields that currently map to the *spatial* refinement of coverage in MWDL. The collections analyzed contained a combined 103,971 records (although not every record in each collection contained spatial metadata). Collections ranged in variety of formats and vocabularies used. Analysis revealed, on average, 53 distinct values or terms were utilized in each collection for the spatial-based element. Almost all the collections contained spatial terms involving state, county, populated place and feature. State was either represented with the name fully written out or abbreviated. If the state was combined with county or city, the state was usually put in parenthesis. It is important to note, there was a wide variety of features included in the spatial metadata of partner's collections. Furthermore, very few included information on geographic coordinates, and those that did, often utilized a decimal format as opposed to degrees.

All collections were analyzed to determine how many contained spatial information that was mapped to either the subject or the coverage element. Analysis revealed 50 out of 297 collections utilized or mapped to the spatial refinement of coverage. Meanwhile, 170 out of the 297, (not including collections mapping to coverage spatial refinement), contained some sort of spatial term or reference in the subject or coverage field. Therefore, roughly, a little over two thirds of the collections in the MWDL contained spatial information somewhere in the metadata. Since most collections contain some form of spatial information, many partners, therefore, would not have to start from scratch in either including or improving their spatial metadata practices. Please See Appendix A for Tables and Full Analysis

INCONSISTENT SPATIAL SEARCH

Simple searches of basic geospatial terms in MWDL were conducted. The terms were Utah, Arizona, Nevada, Idaho and the United States. Format analysis revealed a state is typically included in the spatial and/or coverage field of the metadata. A search of country was also conducted because it will be a necessary spatial term when the MWDL collaborates and is harvested by international organizations. The number of items, percentage of items, partners, collections and spatial coverage results retrieved was recorded. A simple search of Utah retrieved 479,171 items in the collaboration, but only 2 partners, 2 digital collections and no spatial coverage results. Meanwhile, a simple search for Nevada retrieved 16,658 items in the MWDL, 15 collection partners, 48 digital collections and 84 spatial coverage results. Further analysis is needed to determine if this is a technical issue within MWDL, a harvesting issue with Ex Libris Primo, a mapping issue or a spatial metadata issue.

Spatial Search Term	# of Results Retrieved	# of Partners Retrieved	# of Collections Retrieved	# of Spatial Results Retrieved
Utah	479,171	2	2	0
Nevada	16,658	11	30	88
Arizona	4,083	15	49	65
United States	16,845	10	31	45

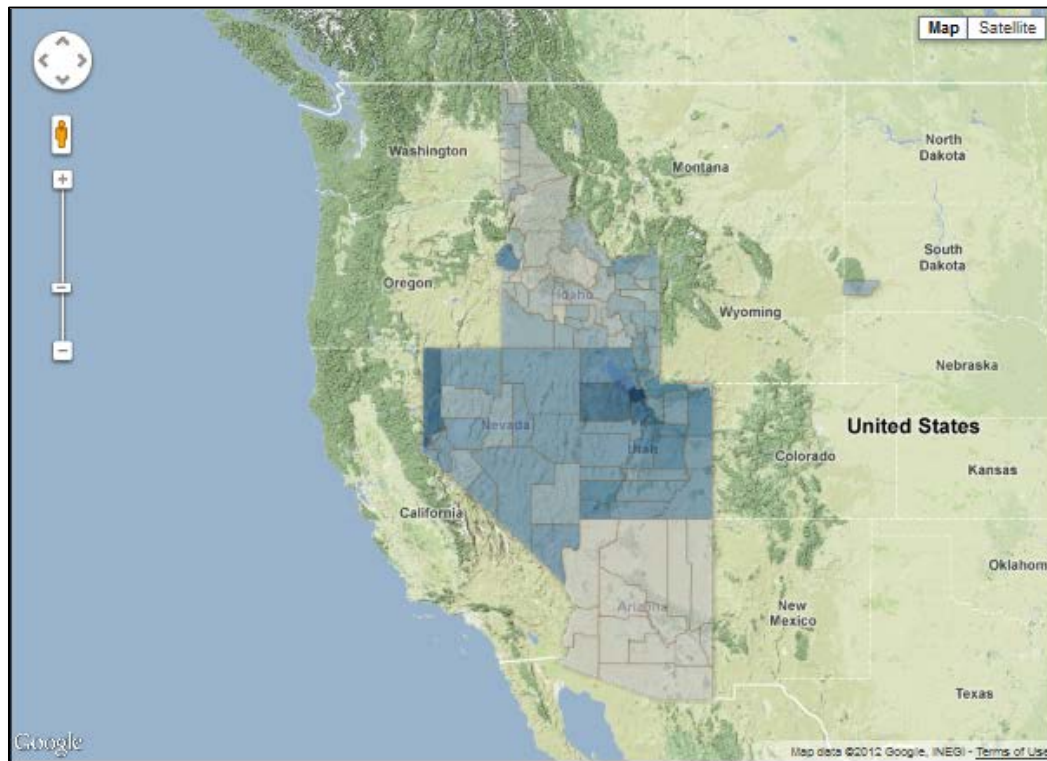
Please See Table 5 in Appendix A for a full analysis.

MAP INITIATIVE

The purpose of the map initiative is to present a new interface through which users can discover partners' collections. As demonstrated in the analysis above, partners do not consistently utilize one format or vocabulary for spatial metadata within the MWDL. Inconsistent formatting of geospatial metadata caused display inaccuracies in test interface maps for the MWDL. Mapping software is not advanced enough to make semantic distinctions in spatial metadata. Programming multiple assumptions into a map to compensate for metadata inconsistencies is not only confusing and time consuming, but becomes especially messy when new collections are incorporated.

Type of Map Interface	List of Issues	Examples	Additional Information
County Based	~ Semantic Based Errors ~Incorrect map densities and visualization of information ~Partners which fail to include County or designate County in spatial metadata do not appear on map	Salt Lake City Vs. Salt Lake County	Will create interoperability issues when MWDL seeks to collaborate with national efforts and projects and/or developer more
State Based	~Semantic Based ~Errors Incorrect map densities and visualization of information ~Partners which fail to include County or designate County in	Utah County Vs. Utah State	Will create interoperability issues when MWDL seeks to collaborate with national efforts and projects and/or developer more

	spatial metadata do not appear on map		
World/Country	<p>~Most items do not appear on a word map because most partners' spatial metadata does not include country.</p> <p>~Those partners who do have collections which are associated with a foreign country, may run into semantic issues if a controlled vocabulary with preferred terms is not selected.</p>	Britain Vs. England Vs. United Kingdom	While not an immediate issue, it will create interoperability problems if the MWDL seeks to collaborate with International collaborative and repositories. Therefore MWDL should resolve country formatting issues early on while still only a medium size regional collaborative.



Please See Appendix A, Table 6 and Appendix B for all maps and analysis.

SUMMARY OF CHALLENGES AND MISSED OPPORTUNITIES

Inconsistent geospatial metadata formatting and vocabulary use creates interoperability issues for the MWDL. The lack of standardization not only results in missed opportunities for MWDL, but also in metadata interoperability issues in current map initiatives and future potential collaborations. The missed opportunities and challenges are summarized below.

1. Inconsistent formatting and use of controlled vocabularies reduces the success of a search. Users may fail to find or discover collections and items because of poor spatial metadata. Partners joined the MWDL to increase the discoverability of their collections and therefore such issues should be resolved, both in the long run and short term, so that partner's expectations can continue to be effectively met.
2. Inconsistent formatting and vocabularies resulted in interoperability issues and display difficulties in map initiatives. Partners vary in format and terms used in spatial metadata or the coverage field (dc: coverage) to describe location, resulting in skewed map density or items not properly displaying on the map. If such basic interoperability metadata issues are not resolved early on, it may prevent the MWDL from engaging in more complex and innovative mapping initiatives and collaborations in the future.
3. Without a strong foundation and framework for spatial metadata, MWDL and its partners will face difficulties, especially in terms of interoperability issues, when collaborating with other organizations in innovative spatial or map based projects. Geospatial metadata and information is one of the major technological forefronts of not just libraries, but governments, information professionals and businesses. Without investing in spatial metadata, the MWDL may be left behind in the geospatial revolution and prevented from collaborating with other major digital libraries such as the World Digital Library, Library of Alexandria, and Digital Public Library of America.
4. Discounting map interfaces and other GIS based interactive technology would be a missed opportunity for MWDL. GIS would allow the MWDL to visual information about partners' collections and resources, as well as engage users in innovative ways. Currently, users are limited to text-based searching. With a solid geospatial metadata framework, the MWDL could be ahead of the curve in terms of implementing different geographic or picture based advanced search options and using GIS technologies.
5. As the MWDL expands, partners' collections will increasingly cover areas outside the Mountain West Region and, therefore, spatial metadata will increasingly become more complex and varied. Therefore, issues involving spatial metadata should be effectively pinpointed and resolved early on to ensure successful entry into future collaborative efforts and spatial map projects.
6. Consideration and respect must be given to the historic place names needed for historic collections of partners versus the modern day political place names required and utilized

by current collections of other partners. Any metadata solution will need to find a balance between the two interests, as well as support effective map interfaces and searches.

OPTIONS FOR ADOPTION: CONTROLLED VOCABULARIES AND STANDARDS

Several controlled vocabularies and spatial metadata practices exist, which the MWDL can both learn from and may consider formally mandating the use of (or at least mandating parts of) in its best practices. Additionally, the MWDL can greatly benefit from collaborating with existing national organizations, which aim to standardize and improve geospatial metadata. The following section briefly describes existing controlled vocabularies, standards and organizations.

SELECTED CONTROLLED VOCABULARIES

A controlled vocabulary is a prescribed set of consistently used and carefully defined terms. (DCMI Glossary, 2005) By having set terms and pre-determined relationships between terms, the MWDL will facilitate consistent information retrieval based on place. This is especially important to facilitate interoperability in large collaboratives spanning multiple collections and partners, like the MWDL. Some of the most well-regarded controlled vocabularies include the Library of Congress Subject Headings and Authorities, and the Getty Thesaurus of Geographic Names. Several additional vocabularies are included, some endorsed by well-known international organizations and collaborations.

LIBRARY OF CONGRESS SUBJECT HEADINGS AND AUTHORITIES

Websites: <http://authorities.loc.gov/>; <http://www.loc.gov/aba/cataloging/subject/>

Description: One of the most widely utilized resources, the Library of Congress Subject Headings (LCSH) and Name Authority file establishes forms of names (for persons, places, meetings, and organizations), titles, and subjects for use in bibliographic records. LCSH authority records contain the authorized forms of name and subjects utilized in MARC records, including subdivisions as references and relationships. The authorities are available for free through the Library of Congress's website and are continuously updated and maintained by the Library of Congress. The Library of Congress Subject Headings is a regularly maintained catalog of the materials held at the Library of Congress. It contains geographic terms including the suggested name and formatting the broader terms and how it relates and finally the sources of the name/term.

Examples of LOC Subject Heading:

Queensboro Bridge (New York, N.Y.)
Dubai (United Arab Emirates)

GETTY THESAURUS OF GEOGRAPHIC NAMES

Website: <http://www.getty.edu/research/tools/vocabularies/tgn/index.html>

Description: The Getty Thesaurus of Geographic Names (TGN) is a controlled Vocabulary for cultural objects, with a focus on showing places through name and relationships. It contains both modern and historic names, and differentiates between the preferred, historic and other terms for a place. One benefit of the TGN is it is hierarchical, and therefore can distinguish between terms with the same name by distinguishing the place on the hierarchy. It is utilized by a variety of organizations including museums, libraries and archives. The MWDL should consider adopting TGN because it is utilized by the World Digital Library to describe geographic place names.

Examples:

<p>New York (state)</p> <p>ID: 7007568</p> <p>Coordinates: Lat: 43 00 00 N degrees minutes Lat: 43.0000 decimal degrees Long: 075 00 00 W degrees minutes Long: -75.0000 decimal degrees</p> <p>Note: Occupied by Algonquians (Mohican & Munsee) and Iroquois (Five Nations) when Europeans settled here in 17th cen.; French and Algonquians warred with English & Iroquois in 18th cen.; state was divided during Revolution; supported Union in Civil War.</p> <p>Names: New York (preferred, C,V) renamed when land passed from Dutch to duke of York, brother of Charles I of England in 1660s NY (C,V,USPS) New York state (C,V,display) New Netherland (H,O) referred to original settlements made by Dutch</p>
<p>Dubai (emirate)</p> <p>ID: 7016651</p> <p>Coordinates: Lat: 25 00 00 N degrees minutes Lat: 25.0000 decimal degrees Long: 055 20 00 E degrees minutes Long: 55.3333 decimal degrees</p> <p>Note: Most populous & second largest state of the United Arab Emirates; comprises a roughly rectangular area on the Persian Gulf & a detached section in the Wādi Ḥattá; was a prominent founding member of the United Arab Emirates.</p>

Names: Dubayy (preferred,C,V), Dubai (C,O,English-P,U,N), Dibay (C,O)
Dubai (inhabited place)
ID: 1085750
Coordinates: Lat: 25 15 00 N degrees minutes Lat: 25.2500 decimal degrees Long: 055 16 00 E degrees minutes Long: 55.2667 decimal degrees
Note: Located on a small creek in the NE portion of the state; most of the population of this emirate lives here & in nearby areas; center for banking, insurance & import of Western goods; Port Rashid harbor opened in 1972.
Names: Dubayy (preferred,C,V), Bibay (C,O), Dubai (C,O,English-P,U,N)

UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION
(UNESCO) THESAURUS

Website: <http://databases.unesco.org/thesaurus/>

Description: UNESCO's Thesaurus is a controlled list of terms for the organization's subject analysis and retrieval of documents and publications. It is organized into seven subject domains, the last being countries and country groupings. Within this grouping, there are several geographic micro-thesauri: Africa, Americas and the Caribbean, Asia and the Pacific, Europe, Political Groupings, Economic Groupings, Geographic Groupings, Ethnic and Religious Groupings, and linguist Groupings. In addition to TGN, the World Digital Library utilizes UNESCO's Thesaurus for their spatial metadata.

Examples:

There are no entries for cities or bridges. The micro-thesaurus within country groupings only contain terms for countries.

USA Terme français: États-Unis Término español: Estados Unidos Русский термин : США MT 7.10 Americas and the Caribbean UF United States of America UF US BT North America
United Arab Emirates [96]

Terme français: Émirats arabes unis Término español: Emiratos Arabes Unidos Русский термин : Объединенные Арабские Эмираты MT 7.15 Asia and the Pacific BT Gulf States [147]BT2 Arab States [2258]BT2 Middle East [695] BT Islamic countries [133]

THE ALEXANDRIA DIGITAL LIBRARY FEATURE TYPE THEASURUS-

Website: <http://www.alexandria.ucsb.edu/gazetteer/FeatureTypes/ver100301/>

Description: The feature type thesaurus was developed by the University of California, Santa Barbara, for the Alexandria Digital Library. It is a controlled vocabulary for categories of geographic places and terms to indicate the nature of a place. Entries of features contain the mandated name, as well as the scope and related terms in the hierarchy.

Examples:

<p>Habitats</p> <p>Used for: beaver dams; rookeries</p> <p>Broader Terms: biogeographic regions</p> <p>Related Terms: reserves</p> <p>Definition: Particular environments or places where an organism or species tends to live. [Glossary of Geology, 4th ed.]</p>
<p>Monuments</p> <p>Used for: cairns; landmarks (monuments); memorials; national monuments; pyramids; shrines; statues; tombs;</p> <p>Broader Terms: manmade features</p> <p>Related Terms: archaeological sites; cemeteries; historical sites; parks</p> <p>Definition: Structures erected as memorials. [Adapted from American Heritage Dic. of the English Language, 4th ed.]</p>

GEOREF THESAURUS

Website: <http://www.agiweb.org/georef/about/thesaurus.html>

Description: Published by the American Geosciences Institute, it is in its eleventh edition and contains more than 30,800 controlled vocabulary terms. Terms in the thesaurus contain hierarchical and other relationships, usage notes, dates of addition, indexing rules, geographic coordinates and guidelines for searching. It is interesting to note, geographic coordinates are limited to 30 characters and must define a rectangular geographic area using latitudes and longitudes. It is a subscription based service available through the internet and CD-ROM.

USGS'S GEOGRAPHIC NAMES INFORMATION SYSTEM

Website: <http://geonames.usgs.gov/pls/gnispublic/f?p=132:1:8691820002332772>

Description: The U.S. Board on Geographic Names is a Federal body established in 1890, whose purpose is to maintain uniform geographic name usage throughout the U.S. federal government. The Geographic Names Information System (GNIS) contains information on “physical and cultural geographic features of all types in the United States, associated areas, and Antarctica, current and historical, but not including roads and highways. The database holds the federally recognized name of each feature and defines the feature location by state, county, USGS topographic map, and geographic coordinates.” (U.S. Board of Geographic Names , 2012) Information comes from federal sources and partnerships. This may be an excellent controlled vocabulary for the MWDL to consider utilizing for features, especially because it is utilized by federal government agencies.

Examples:

Feature Name: [Salt Lake City](#)

ID: 1454997

Class: Populated Place

County: Salt Lake UT

Latitude: 404539N

Longitude: 1115328W

Elevation in Feet:4265

Map: Salt Lake City North

Feature Name: Rocky Mountain

ID: 389560

Class: Summit

County: Lemhi ID

Latitude: 453453N

Longitude: 1140125W

Elevation in Feet: 8694

Map: Allan Mountain

GEONAMES

Website: <http://www.geonames.org/>

Description: GeoNames is a free geographical database which maintains over 10 million geographical names. It draws information from the National Geospatial-Intelligence Agency's (NGA) and the U.S. Board on Geographic Names, U.S. Geological Survey Geographic Names Information System (names in US), Ordnance Survey OpenData, gazetteers, ambassadors and crowdsourcing similar to Wikipedia. Entries include the name, country, feature class and latitude and longitude in degrees and inches and decimal and the GeoNameID. It is important to note, Geonames is not governed or maintained by a government agency or a university initiative. However, it provides a Google map interface so users can visually see the location of an entry.

Examples:

Name: Salt Lake City Country: United States, Utah Salt Lake County Feature Class: seat of a first-order administrative division population 186,440, elevation 1299m Latitude: N 40° 45' 38" Longitude: W 111° 53' 27"

Name: Las Vegas Country: United States, Nevada Clark County Feature Class: seat of a second-order administrative division population 583,756, elevation 610m Latitude: N 36° 10' 29" Longitude: W 115° 8' 14"

SELECTED SPATIAL METADATA PRACTICES

A metadata schema or element set is defined as the “structure and semantics of a group of elements”, with elements being defined as “terms used to describe one of the properties of a resource of a particular type.” (Lei Zeng & Qin, 2008) In Dublin Core, the spatial refinement of the coverage element is used to describe the name of the place or location associated with the resource, including the geographic coordinates. (Dublin Core Metadata Element Set, Version 1.1, 2012) Metadata schemas and standards exist to describe resources with intense geographic information. Even though the MWDL implements Dublin Core and does not require such high caliber spatial schemas for most of its partners’ resources, compliance with such standards should still be considered in order to support future interoperability and potential collaboration with national and international organizations.

GEOGRAPHY MARKUP LANGUAGE

Website: <http://www.opengeospatial.org/standards/gml>

Description: Geography Markup Language (GML) is an XML grammar for expressing geographical features organized and defined by the Open Geospatial Consortium (OGC). Specifically, the OGC designed GML to serve “as a modeling language for geographic systems as well as an open interchange format for geographic transactions on the Internet.” GML contains a rich set of primitives: Feature, Geometry, Coordinate reference system, Topology, Time, Dynamic feature, Coverage (including geographic images), Unit of measure, Directions, Observations, Map presentation styling rules, in order to build schemas or application languages (Insert Wikipedia Reference). GML is compliant with ISO 19100 series standards for both spatial and non-spatial geographic features.

THE CONTENT STANDARD FOR DIGITAL GEOSPATIAL METADATA

Website: http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/v2_0698.pdf

Description: Maintained by the Geographic Data Committee (FGDC), the content Standard for Digital Geospatial metadata furthers a mission of coordinating development, use, sharing, and dissemination of geographic data. It is intended to support the collection and processing of geospatial metadata for both government and private entities. Executive Order 12906 ordered the standardization of geospatial data in order to improve interoperability between agencies and hence the creation of this standards. The requirements of geographic coordinates of this standard may be especially of interest to the MWDL library.

ISO 19115:2003

Website: http://www.iso.org/iso/catalogue_detail.htm?csnumber=26020

Description: The International Organization for Standardization (ISO) is an international federation whose purpose is to develop and publish international standards. (Homepage) ISO 19115 was specifically developed to standardize metadata for describing digital geographic data across a number of professions and geographic information systems. Specifically, according to the ISO, the standard is intended to help data producers:

“1) Provide data producers with appropriate information to characterize their geographic data properly. 2) Facilitate the organization and management of metadata for geographic data. 3) Enable users to apply geographic data in the most efficient way by knowing its basic characteristics. 4) Facilitate data discovery, retrieval and reuse. Users will be better able to locate, access, evaluate, purchase and utilize geographic data. 5) Enable users to determine whether geographic data in a holding will be of use to them.” (Board. & Canada., 2009)

It is important to note ISO 19115 is endorsed by the Federal Geographic Data Committee, and therefore all US federal governmental agencies are encouraged to be compliant with this international standard.

SELECTED ORGANIZATIONS' UTILIZATION OF SPATIAL METADATA

The rise of geospatial information and related GIS technologies allowed libraries to implement map interfaces to showcase their resources and collections. Furthermore, both international and national organizations exist to support interoperability, especially in metadata, across different spatial GIS systems and technologies. A select few examples of such organizations and projects are briefly described in this section.

OPEN GEOSPATIAL CONSORTIUM

Website: <http://www.opengeospatial.org/>

Description: The OGC's mission is to "To serve as a global forum for the collaboration of developers and users of spatial data products and services, and to advance the development of international standards for geospatial interoperability." (OGC Vision, Mission, & Goals, 1994-2012) The purpose of the consortium is to establish standards for computer systems and software to utilize integrate and communicate about geospatial information. OGC has over 390 members from around the world including companies, NGOs, research organizations, agencies and universities. According to its website, OGC specifically "manages a global consensus process that results in approved interface and encoding standards that enable interoperability among and between diverse geospatial data stores, services, and applications." MWDL should consider joining OGC because it is specifically concerned resolving interoperability problems in geo-spatial metadata.

THE ELECTRONIC CULTURAL ATLAS INITIATIVE

Website: <http://ecai.org/index.html>

Description: The Electronic Cultural Atlas Initiative is a global consortium whose "aim is to build a distributed virtual library of cultural information." (Electronic Cultural Atlas Initiative, 2000-2012) It is based at the University of California, Berkeley and is supported by affiliates in institutions around the world. ECAI organizes a range of activities to including technical development, communication, and related research, including conferences. One interesting project to note is the Cultural Atlas Browser, an in-the-works add-on for Google Earth which will be "A matrix of spatial and temporal information with associated cultural information or attributes." (Cultural Atlas Portal, 2012)

THE WORLD DIGITAL LIBRARY

Website: <http://www.wdl.org/en/>

Description: The purpose of the World Digital Library (WDL) is to make available significant primary materials from countries and cultures around the world on the Internet. It is a collaborative project between the Library of Congress, UNESCO and partners throughout the world. It is similar to the MWDL in that it has numerous partners which contribute cultural

content, technology, time and money. The WDL website is hosted by the U.S. Library of Congress and maintained by Library of Congress librarians, with funding primarily by UNESCO. The WDL hosts an excellent map interface for discovering cultural items, in which regions are divided by the UNESCO Standards, and the number of items in each region is displayed. The user can then click on the country, and items can further be divided by places, whose name and distinctions are both based on UNESCO and TGN vocabularies.

DIGITAL PUBLIC LIBRARY OF AMERICA

Websites: <http://dp.la/>; http://dp.la/wiki/Main_Page

Description: The DPLA is an initiative launched by Harvard University's Berkman Center for Internet & Society in 2010, with money from the Alfred P. Sloan Foundation. The mission is to build a national digital public library for supporting the digitization of inventories of cultural and scientific records, setting up and building the infrastructure necessary to connect existing and future digitized content, and making such knowledge universally accessible. The DPLA is still in the planning phases and is still developing a specific document for best practices for potential partners. It is important to note, MWDL was selected as one of the first digital collaborative programs to be included in the launch of the Digital Public Library of America and will be participating in a Digital Hubs Pilot project, which is intended to connect the various content repositories of the United States into one distributed content infrastructure.

THE NATIONAL GEOSPATIAL INTELLIGENCE AGENCY

Website: <https://www1.nga.mil/Pages/default.aspx>

Description: The National Geospatial-Intelligence Agency mission is to be the nation's main source of geospatial intelligence and to "to provide timely, relevant and accurate geo-intelligence in support of U.S. national defense and natural disasters." It maintains the NSG Standards Registry, which consists of technical specifications, guidelines and definitions of characteristics of geospatial data and information.

THE ALEXANDRIA DIGITAL LIBRARY

Websites: <http://www.alexandria.ucsb.edu/> ; <http://www.alexandria.ucsb.edu/public-documents/metadata/standards.html>

Description: According to its website, the Alexandria Digital Library (ADL) is "a distributed digital library with collections of geo-referenced materials." (California, 2004) It is headquartered at the University of California at Santa Barbara and hosted by the Davidson Library. Currently, the ADP is initiating the Alexandria Digital Earth Prototype, whose goal is to "integrate the success of the first stage of ADL into the classroom by creating a [Digital Learning Environment](#) for educators and students based upon ADL technology." (Alexandria Digital Library Project , 2003) The ADL utilized the following standards in its metadata: Content standards for digital geospatial metadata, USMARC (MAchine Readable Cataloging), Library of

Congress subject headings, Library of Congress name authority file, Anglo-American cataloguing rules and Cartographic materials

RECOMMENDATIONS

HIGHLY ADVISED

All standards and practices adopted by the metadata review board should be compliant with the ISO 19115 standard for geographic metadata.

SHORT-TERM RECOMMENDATIONS

1. Partners which do not utilize spatial coverage refinement should be required to do so for future collections that are harvested by the MWDL.
2. Partners should complete a global search-and-replace of simple geospatial metadata with more in-depth formatted spatial metadata. This will not work for adding information to existing metadata, but may be effective for replacing one word spatial metadata entries in some partners' collections. This is possible in CONTENTdm for new collections before indexing, but not for older collections.
3. Hire a programmer to write a code for script which will automatically make assumptions, and add or reformat data in the spatial metadata refinement when the MWDL harvests metadata.
4. Educate partners on the importance and best practices for spatial metadata, especially in regards to interoperability and future initiatives. This may involve circulating information pamphlets, websites and other resources.

LONG-TERM RECOMMENDATIONS

1. Enforce one standard for formatting and use of selected controlled vocabularies for spatial metadata if partners wish to participate in MWDL initiatives
 - a. Formally adopt and enforce a format and controlled vocabulary for spatial metadata.
 - i. Format should allow all terms to be included in one metadata field.
 - ii. Semicolons should be used to separate terms, and not used within terms. Sub-elements of terms should not be separated by semicolons, as MWDL normalization separates terms through semicolon.
 - iii. The controlled vocabulary adopted should be an internationally recognized and utilized standard, especially as MWDL continues to incorporate partners and collections outside the Mountain West region.
 - b. Require all partners to adhere to the adopted format and vocabularies in order to opt into map and future projects/initiatives.

- c. Require partners who do not utilize spatial coverage field in metadata records to do so for future collections.
2. Require partners to set a timeline, or make part of their long term institutional plans, to reformat spatial coverage metadata to adhere to MWDL's selected standards and controlled vocabularies.
 - a. A majority of collections maintain some kind of spatial information, either in subject or coverage. Partners should be encouraged to develop and implement long term plans to reincorporate spatial information into the spatial coverage element of their metadata, especially if they want to participate in MWDL map initiatives.
 - b. The MWDL and its partners should obtain sources of funding, either through grant writing or fund raising, in order to financially support partners in their endeavors to successfully reformat spatial metadata in a timely manner.
 - c. Partners who do not have any spatial information in the metadata of their collections should be given the option of opting out of MWDL's map initiative. These partners should be allowed to determine and decide if the time and cost of researching and inputting spatial metadata is worth the benefit of participating in MWDL map initiatives.
3. Utilize GIS technologies to create map initiatives that are more interactive and web 2.0 friendly
 - a. GIS technologies allow for different types of data to be mapped and visualized to users. The MWDL should consider fundraising and investing in technologies which allow for interactive capabilities.
 - b. Users may learn and be more encouraged to explore if they can interact with the collections. Allowing users to tag location, rotate the map around their location or collections of interest, and share their favorite maps through email or social media, is both innovative and interactive.
 - c. Currently, many libraries utilize text-based searching of resources. The MWDL could be an innovative leader by giving users the option to search resources through visual or map-based interfaces. Users could not only explore by searching a region of interest to them, but also see what collections are physically closest to them to explore.
4. Ensure all standards and controlled vocabularies adopted are compliant with ISO 19115:2003 as it is an internationally recognized and respected standard. This will ensure the MWDL will be less likely to face interoperability issues when it collaborates and is harvested by federal or international collaborative.
5. The MWDL should network and collaborate with other libraries and organizations that are experimenting with maps and improving geospatial metadata interoperability.

Networking with different organizations would allow the MWDL and its partners to collaborate in innovative spatial-based projects.

6. Fundraise and establish a fund to support creating infrastructure and affording personal (especially cartographers, computer sciences and library informational sciences interns) to continually develop MWDL's map interfaces, assist partners with spatial metadata standards, and actively collaborate and communicate with other libraries and organizations on spatial metadata based projects. This is especially imperative as geospatial information continues to be incorporated and play important roles in our everyday lives. A source of funding will allow MWDL to be at the forefront of libraries utilizing GIS technology and spatial metadata to improve both discoverability and search of partners' collections.

LIMITATIONS AND ASSUMPTIONS

It is important to highlight the limitations and assumptions this report contains, especially for the purposes of decision making and future analysis.

ASSUMPTIONS

- It was assumed the search through partners' collections was thorough and accurate, and Ex Libris Primo revealed all the collections which map metadata to the spatial refinement in MWDL.
- It was assumed Ex Libris Primo mapped and displayed all the distinct values for the spatial metadata refinement utilized by partners.
- It was assumed reviewing the side results presented by Ex Libris Primo and examining the first few records in each collection was sufficient to determine if spatial metadata was included in the subject or coverage element of each collection.
- It was assumed the analysis undertaken was thorough enough in representing the interoperability issues faced by the MWDL.

LIMITATIONS

- In-depth analysis was limited by the time constraint of four months for the internship.
- Only the subject, coverage and spatial coverage fields were analyzed for geospatial metadata. Therefore, it is unknown if other metadata elements contain geospatial information.
- The report did not survey or ask partners if they utilize a controlled vocabulary or have rules for formatting their spatial metadata.
- The report did not survey or ask partners if they utilize a standardized formatting for spatial metadata through membership or collaboration with another group.

Recommendations for Geospatial Metadata Standards

- The report presented only a select few controlled vocabularies, geospatial metadata practices, and geospatial organizations and library projects.

APPENDIX A: ANALYSIS

TABLE 1. SPATIAL COVERAGE ANALYSIS: SIZE OF COLLECTION, FIELD LABELS, AND DISTINCT VALUES.

Coll. No.	Digital Collection	Partner	No. of Records	Field(s) Label(s)	No. of Distinct Values
1	American Westward Migration	University of Utah - J. Willard Marriott Library	62	Latitude; Place Names	37
2	Barry Maxfield Railroad Photographs	Utah Valley University Library	252	Coverage-Spatial	64
3	Bear River Watershed Historical Collection	Utah State University - Merrill-Cazier Library	772	Location; Geographic data	85
4	Civilian Conservation Corps in Utah	Utah State Historical Society	1455	Geopolitical place	92
5	Design Workshop Landscape Architecture Archive	Utah State University - Merrill-Cazier Library	303	Geographic Location	4
6	Extension, Enterprise and Education: The Legacy of Cooperatives and Cooperation in Utah	Utah State University - Merrill-Cazier Library	452	Geographic Locations	92
7	Fife Slide Collection of Western U.S. Vernacular Architecture	Utah State University - Merrill-Cazier Library	2668	Place	95
8	Great Basin History of Medicine Photograph Archives	University of Nevada, Reno, University Libraries	686	Location	22
9	Great Basin National Heritage Area Oral Histories	Great Basin National Heritage Partnership	8	Place Name; Geographic Coordinates	16
10	Hidden Water: A Survey of Salt Lake Valley (UT) Surface Water	University of Utah - J. Willard Marriott Library	359	Place name; Drainage; Current Address; Latitude; Longitude	99
11	Historic Landscape of Nevada: Development, Water, and the Natural Environment	University of Nevada, Las Vegas, University Libraries	1237	Geographic Feature (Getty TGN); City or Town (Getty TGN); County	68

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Partner	No. of Records	Field(s) Label(s)	No. of Distinct Values
				(Getty TGN); State (Getty TGN); Country (Getty TGN)	
12	History of Science	Utah State University - Merrill-Cazier Library	36	Geographic Locations;	3
13	Images of Lake Tahoe	University of Nevada, Reno, University Libraries	1040	Location;	70
14	Intermountain Indian School	Utah State University - Merrill-Cazier Library	339	Brigham City (Utah); Box Elder County (Utah)	2
15	Just Passin' Through: The Lincoln and Victory Highways in Nevada	University of Nevada, Reno, University Libraries	171	Location	48
16	Karl Bodmer Aquatint Collection	University of Utah - J. Willard Marriott Library	166	Place Names	36
17	Menus: The Art of Dining	University of Nevada, Las Vegas, University Libraries	1827	City; State/Province/County; Country	100
18	Nevada Barns	University of Nevada, Reno, University Libraries	120	Location	39
19	Nevada in Maps	University of Nevada, Reno, University Libraries	4844	Location Depicted	81
20	Nevada Test Site Oral History Project	University of Nevada, Las Vegas, University Libraries	194	Locations at the Nevada Test Site; Related Locations	76
21	Overland Trails 1846-1869: Maps	Brigham Young University - Harold B. Lee Library	43	Scale; Geographical Place Names	24
22	Peoples of Utah	Utah State Historical Society	868	Geopolitical place; Geographic coordinates	94
23	Practicing Medicine: A Historical Glimpse at Utah and Beyond	Utah State University - Merrill-Cazier Library	14	Geographic Locations	2
24	Salt Lake City Engineers Collection	Utah State Historical Society	1000	Geopolitical place; Historic address; Historic	83

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Partner	No. of Records	Field(s) Label(s)	No. of Distinct Values
				Place Name	
25	Sanborn Fire Insurance Maps	University of Utah - J. Willard Marriott Library	1952	City; Street Names; Geographic Coordinates	52
26	Schools of the Salt Lake Valley (UT)	Utah State Historical Society	100	Geopolitical place; Historic address; Current Address	86
27	Shipler Commercial Photographers	Utah State Historical Society	10014	Geopolitical place;	98
28	Southern Nevada and Las Vegas History in Maps	University of Nevada, Las Vegas, University Libraries	246	Geographic Feature; City; County; State/Province; Country	83
29	Southern Nevada Boomtown Years	University of Nevada, Las Vegas, University Libraries	1761	Geographic Feature; County; City or Town	86
30	Tahoe Resources	University of Nevada, Reno, University Libraries	283	Location	30
31	Tanner Trust Book Collection	University of Utah - J. Willard Marriott Library	14	Coverage-Spatial	2
32	Thorne Photograph Collection	Uintah County (UT) Library	6406	Place Names	51
33	Tooele County (UT) Histories	Tooele (UT) City Library	10	Place Names; Coverage-spatial	25
34	Topaz Museum Collection	Topaz Museum (Delta, UT)	217	Coverage; Geographic Coordinates	3
35	Uintah County Regional History Center Collection	Uintah County (UT) Library	6779	Place Names	47
36	University of Nevada, Reno, Archives Documents	University of Nevada, Reno, University Libraries	4500		5
37	University of Nevada, Reno, Art Collection	University of Nevada, Reno, University Libraries	299	Location	9
38	University of Nevada, Reno, Special	University of Nevada, Reno,	3929	Location	89

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Partner	No. of Records	Field(s) Label(s)	No. of Distinct Values
	Collections Photographs	University Libraries			
39	University of Utah College of Architecture + Planning Collection	University of Utah - College of Architecture and Planning	5260	Location	100
40	University of Utah Photograph Archives	University of Utah - J. Willard Marriott Library	1651	Place Names	93
41	Utah 2002 Olympic Legacy Collection	Utah State Historical Society	371	Origin	42
42	Utah American Indian Digital Archive: Oral Histories Transcripts	University of Utah - American West Center	300	Place Names	8
43	Utah Council of Land Surveyors	Utah Council of Land Surveyors	55	Coverage	24
44	Utah Governor's Olympic Collection	Utah State Historical Society	4906	Geopolitical place	41
45	Utah State Historical Society Classified Photograph Collection	Utah State Historical Society	23841	Geopolitical place	76
46	Utah's Most Elusive: Hard-to-Find Government and Scientific Reports	Utah State University - Merrill-Cazier Library	101	Geographic Locations	13
47	Vernal (UT) Express Photograph Collection	Uintah County (UT) Library	8888	Place Names	28
48	Western Soundscape Archive	University of Utah - J. Willard Marriott Library	2864	Place Names ; Elevation Meters Calculated; Park; Elevation Meters	90
49	Western Soundscape Archive Spectrograms	University of Utah - J. Willard Marriott Library	224	Park; Elevation Meters; Elevation Meters Calculated; Universal Transverse Mercator Zone	100
50	William Edward Hook Glass Negative Collection	Utah State Historical Society	84	Geopolitical place	17
		Totals	103,971		52.6

TABLE 2. SPATIAL COVERAGE ANALYSIS: TYPES OF GEOSPATIAL ENTRIES USED.

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
1	American Westward Migration	Country	Region; Region (U.S.)	State	County (State abbr.)	City (State); City (State abbr.); City (Country); City (Country abbr.)	Feature; Feature (State)	northlimit: decimal eastlimit: decimal southlimit: decimal westlimit: decimal	
2	Barry Maxfield Railroad Photographs			State	County (State)	City; City (State); City (State abbr.); City, County (State abbr.); City (County, State)	Feature (State); Feature (State abbr.)		
3	Bear River Watershed Historical Collection			State	County (State)	City (State)	Feature; Feature (State); Feature (State and State); Feature (State-State); Feature type: Type; Feature type: Type, Type		Found on USGS 7.5' maps: City; Location covered by the following USGS 7.5' map(s): Feature, Feature, Feature, Feature
4	Civilian Conservation)State; (State	County	City; City); Street Address	Feature		

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
	Corps in Utah								
5	Design Workshop Landscape Architecture Archive					City (State abbr.)			
6	Extension, Enterprise and Education: The Legacy of Cooperatives and Cooperation in Utah	Country		State	County (State)	City (State); City (State abbr.); City (Country)			
7	Fife Slide Collection of Western U.S. Vernacular Architecture			State		City (State); City (State abbr.)	Feature; Feature (State); Feature (State and State); Feature (City, State)		No place given
8	Great Basin History of Medicine Photograph Archives					City (State abbr.)			
9	Great Basin National Heritage Area Oral Histories				County (State); County (State Abbr.)	City, State; City, State abbr.	Feature; Ranch, Creek, State Abbr.		11SPD83 49248833 ;
10	Hidden Water: A Survey of Salt Lake Valley (UT) Surface Water								

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
11	Historic Landscape of Nevada: Development, Water, and the Natural Environment	Country		State		City	Feature		Nevada Test Site
12	History of Science	Country							Continent
13	Images of Lake Tahoe			State	County	City (State abbr.); Unincorporated community (subdivision)(State abbr.);	Feature (State abbr. and State abbr.); Feature (State abbr.); Feature; Feature (Historical)(State abbr.)		
14	Intermountain Indian School				County (State)	City (State)			
15	Just Passin' Through: The Lincoln and Victory Highways in Nevada			State	County	City (State abbr.); City (State abbr. and State abbr.)	Feature (State abbr.); Feature (State abbr. and State abbr.); Feature (Historical Place)(State. Abbr.)		
16	Karl Bodmer Aquatint Collection			State	County (State); County (State abbr.)	City (State); City (State abbr.)	Feature; Feature (State abbr.); Feature (County-County, State abbr.); Feature (State abbr.-State abbr. and State abbr.)		

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
17	Menus: The Art of Dining	Country		State		City; Province; District of Columbia			
18	Nevada Barns			State	County; County (State abbr.)	City (State abbr.)			
19	Nevada in Maps	Country; Country -- State - - County	Region (State abbr. and State abbr.)	State	County; County (State abbr.)	City (State abbr.); City	Feature (State abbr.); Feature (State abbr. and State Abbr.); Feature (State abbr. & State abbr.)		City (State Abbr.) -- Maps
20	Nevada Test Site Oral History Project	Country (Country abbr.)				City (State abbr.); City, Country; City, State; City (Country); City, State Abbr.; nuclear weapons production facility (State abbr.)	Feature; Feature (Country); Feature (State); Feature (State abbr.); Feature (Feature) (State abbr.); Feature (Ocean); Feature (Highway, State abbr.)		Feature; Feature (State abbr.); Feature (Country)
21	Overland Trails 1846-1869: Maps								Scale (in various formats)
22	Peoples of Utah	Country			County (State)	City, State; City (State); City (State abbr.); City (Country); City, Province	Feature (State); Feature (City, State); Feature (State abbr. and State)	digital latitude-digital longitude (run together)	Original in vault.; Salt Lake City (Utah); street address,

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
									City; Original photograph in vault; Street and Street (City); Street Address (City, State); Lastname, Firstname
23	Practicing Medicine: A Historical Glimpse at Utah and Beyond				County (State)				
24	Salt Lake City Engineers Collection				County	City	Feature		
25	Sanborn Fire Insurance Maps					City, State;		northlimit: decimal eastlimit: decimal southlimit: decimal westlimit: decimal	
26	Schools of the Salt Lake Valley (UT)			State	County	City	Street address; Street and Street		

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
27	Shipler Commercial Photographers			State	County	City	Feature; Street address; Street and Street		
28	Southern Nevada and Las Vegas History in Maps	Country	Region (State abbr.)	State	County (State abbr.)	City; City (State Abbr.);	Feature; Feature (State abbr.); Townsite (City, State abbr.); Feature (State abbr. and State abbr.)	northlimit = decimal eastlimit = decimal southlimit = decimal westlimit = decimal	
29	Southern Nevada Boomtown Years					City	Feature		
30	Tahoe Resources			State	County	City (State abbr.)	Feature (State abbr. and State abbr.); Feature (State abbr.); Feature (historical) (State abbr.)		
31	Tanner Trust Book Collection			State		City (State) to City (State)			
32	Thorne Photograph Collection				County (State)	City (State); City (State); City (State abbr. and State abbr.); City (County, State)	Feature; Feature (State); Feature (State abbr. and State abbr.)		Ignatio Stage Stop (Utah); Dinosaur (Colorado)
33	Tooele County (UT) Histories					City (State);	Feature (State); Feature (State and State)		

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
34	Topaz Museum Collection							latitude decimal longitude decimal (run together); latitude decimal longitude degree (run together); latitude degree longitude degree (run together)	
35	Uintah County Regional History Center Collection	Country		(State abbr.- State abbr.)	County (State)	City (State); City (State and State); City (County, State); City (State abbr.)	Feature; Feature (State); Feature (State and State); Feature (State abbr. and State); Feature, (County, State); Feature (State abbr.)		
36	University of Nevada, Reno, Archives Documents			State	County	City (State abbr.);			
37	University of Nevada, Reno, Art Collection						Feature (State abbr. and State abbr.)		Special Collections Department,

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
									University of Nevada, Reno Library
38	University of Nevada, Reno, Special Collections Photographs			State	County	City (State abbr.); City, County; City (historical) (State abbr.);	Feature (State abbr.); Feature (State abbr. and State abbr.); Feature; Feature (City, State abbr.); Feature (State)		
39	University of Utah College of Architecture + Planning Collection					City, County, State, Country; City, State, Country; City, City, Country; City, Region, Country; City, District, Country; City, Country	Feature, Country	decimal longitude; decimal latitude (separately)	
40	University of Utah Photograph Archives	Country		State	County (State)	City (State); City (City, State); City (State abbr.)	Feature; Feature (State); Feature (State abbr.); Feature (State and State abbr.); Feature (State abbr. and State abbr.); Feature (City, State); Street Address, City, State; Street Address, City		State--Photographs; (State abbr.-State)--Photographs; Feature (State)--Photographs; Feature

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
									(State Abbr.)-- Photographs; Feature (State abbr.- Country)- - Photographs; County (State abbr.)-- Photographs
41	Utah 2002 Olympic Legacy Collection	Country		State	County	City	Feature		China (Scarf); Los Angeles (Hat) and Burbank (Coat); O. L. Z. Jordan; China (Watch band); Japan (Watch); Origin Michigan

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
	Collection						Feature (State and State abbr.)		Dinosaur, (Colo)
48	Western Soundscape Archive	Country		State	County (State); County (State abbr.)	City (State); City (State abbr.)	Feature; Feature (State); Feature (State abbr.); Feature (State and State); Feature (State abbr. and State abbr.); Feature (City, State)	Latitude decimal; longitude decimal	N ; 12; Y; 11; 10;
49	Western Soundscape Archive Spectrograms						Feature		Elevation in meters; "N"; "Y"; Number for Universal Transverse Mercator Zone
50	William Edward Hook Glass Negative Collection			State	County	City	Street Address; Feature		now 455 West ; 300 South Rio Grande Street (then 355 West ; West end of South Temple (then 300

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Country	Region	State	County	Populated Place	Feature	Latitude and Longitude	Others
									West, now 400 West); Intersection of South Temple and Main Street

TABLE 3. SAMPLE RECORDS FOR DIGITAL COLLECTIONS, COMPARISON OF ORIGINAL TO MWDL.

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
1	American Westward Migration	Map of an exploring expedition to the Rocky Mountains in the year 1842 and to Oregon & North California in the years 1843-4	Northwest, Pacific; West (U.S.); Utah;	Map of an exploring expedition to the Rocky Mountains in the year 1842 and to Oregon & North California in the years 1843-4	Northwest, Pacific; West (U.S.); Utah;
2	Barry Maxfield Railroad Photographs	San Luis Central hopper car near Sugar Junction	Monte Vista (Colo.)	San Luis Central hopper car near Sugar Junction	Monte Vista (Colo.)
3	Bear River Watershed Historical Collection	Man fishing	[Location] Logan Canyon (Utah) [Geographic data] Found on USGS 7.5' map(s): Logan	Man fishing	Logan Canyon (Utah); Found on USGS 7.5' map(s): Logan; Feature type: River
4	Civilian Conservation Corps in Utah	Jack Conway	(Utah; Sevier County; Salina Creek) or (Utah; Millard County; Kanosh) or (Utah; Utah County; American Fork Canyon) or (Utah; Summit County; Kamas)	Jack Conway	(Utah; Sevier County; Salina Creek) or (Utah; Millard County; Kanosh) or (Utah; Utah County; American Fork Canyon) or (Utah; Summit County; Kamas)
5	Design Workshop Landscape Architecture Archive	Patio at resort hotel, Kananaskis, Village, Albert, Canada;	Kananaskis (Alta.);	Patio at resort hotel, Kananaskis, Village, Albert, Canada;	Kananaskis (Alta.);
6	Extension, Enterprise and Education: The Legacy of Cooperatives and Cooperation in Utah	1956 Weber County Annual Report of Agricultural and Home Demonstration Extension Work;	Weber County (Utah)	1956 Weber County Annual Report of Agricultural and Home Demonstration Extension Work;	Weber County (Utah);
7	Fife Slide Collection	Gravemarker, Salmon,	Salmon (Idaho)	Gravemarker, Salmon,	Salmon (Idaho)

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
	of Western U.S. Vernacular Architecture	Idaho, 1971		Idaho, 1971	
8	Great Basin History of Medicine Photograph Archives	Quonset Huts at Washoe Medical Center	Reno (Nev.)	Quonset Huts at Washoe Medical Center	Reno (Nev.)
9	Great Basin National Heritage Area Oral Histories	Oral History Interview of David Sharp (Part 1 of 2)	12TVK2642574104; 11TPE3918676306; White Pine County (Nev.); Ruby Valley; Lehi, Utah; Margaret Wines Park; Wines Ranch, Overland Creek, Nev.; Ruby Marsh Wildlife Refuge	Oral History Interview of David Sharp (Part 1 of 2)	White Pine County (Nev.); Ruby Valley; Lehi, Utah; Margaret Wines Park; Wines Ranch, Overland Creek, Nev.; Ruby Marsh Wildlife Refuge; 12TVK2642574104; 11TPE3918676306
10	Hidden Water: A Survey of Salt Lake Valley (UT) Surface Water	Little Cottonwood treatment diversion	Little Cottonwood Water Treatment Plant; Little Cottonwood Creek; 40°34'45.89"N; 111°47'55.18"W	Little Cottonwood treatment diversion	Little Cottonwood Water Treatment Plant; Little Cottonwood Creek; 40°34'45.89"N; 111°47'55.18"W
11	Historic Landscape of Nevada: Development, Water, and the Natural Environment	Map showing ground-water chemistry and hydro chemical facies, Nevada Test Site and vicinity, southern Nevada, 1965	Nevada Test Site Area 400; Nevada; United States	Map showing ground-water chemistry and hydro chemical facies, Nevada Test Site and vicinity, southern Nevada, 1965	Nevada Test Site Area 400;; Nye;; Nevada;; United States;
12	History of Science	Butterflies of North America (First series) with Synopsis of North American Butterflies by William H. Edwards;	North America	Butterflies of North America (First series) with Synopsis of North American Butterflies by William H. Edwards;	North America

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
13	Images of Lake Tahoe	Log cabin resort at Lake Tahoe	Rubicon Springs (historical) (Calif.); El Dorado County; California; Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif. and Nev.)	Log cabin resort at Lake Tahoe	Rubicon Springs (historical) (Calif.); El Dorado County; California; Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif. and Nev.)
14	Intermountain Indian School	Student drawing of a man relaxing;	Brigham City (Utah); Box Elder County (Utah)	Student drawing of a man relaxing;	Brigham City (Utah); Box Elder County (Utah);
15	Just Passin' Through: The Lincoln and Victory Highways in Nevada	Cisco Grove (Calif.); Placer County; California	Cisco Grove Resort, Highway U.S. 40, California	Cisco Grove (Calif.); Placer County; California	Cisco Grove Resort, Highway U.S. 40, California
16	Karl Bodmer Aquatint Collection	Mehkskeme-Sukahs, Blackfoot chief, Tatsicki-Stomick, Piekann chief	Mehkskeme-Sukahs; Tatsicki-Stomick	Mehkskeme-Sukahs, Blackfoot chief, Tatsicki-Stomick, Piekann chief	Mehkskeme-Sukahs; Tatsicki-Stomick
17	Menus: The Art of Dining	Menu for the Black Watch Regimental dinner, Friday, June 11, 1897, The Monico Louis XV saloon	London; England	Menu for the Black Watch Regimental dinner, Friday, June 11, 1897, The Monico Louis XV saloon	London; England
18	Nevada Barns	Trimmer Barn, Genoa	Genoa (Nev.); Douglas County; Nevada	Trimmer Barn, Genoa	Genoa (Nev.); Douglas County; Nevada
19	Nevada in Maps	City of Reno, Nevada (1940)	Reno (Nev.); Washoe County; Nevada	City of Reno, Nevada (1940)	Reno (Nev.); Washoe County; Nevada
20	Nevada Test Site Oral History Project	Interview with John Chapman Hopkins, April 11, 2005	Hiroshima, Japan; Soviet Union (USSR); Enewetak Atoll (Marshall Islands); Hanford, Wash.; Nagasaki, Japan;	Interview with John Chapman Hopkins, April 11, 2005	Nevada Test Site Area 5;; Hiroshima, Japan; Soviet Union (USSR); Enewetak Atoll (Marshall Islands); Hanford, Wash.;

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
			Alamogordo Bombing Range (White Sands Missile Range) (N.M.)		Nagasaki, Japan; Alamogordo Bombing Range (White Sands Missile Range) (N.M.);
21	Overland Trails 1846-1869: Maps	Johnson's California, with Utah, Nevada, Colorado, New Mexico and Arizona [electronic resource] / published by Johnson and Ward	[ca. 1:3,484,800]. 1 in. to ca. 55 miles (W 124deg--W 102deg/N 42deg--N 32deg)	Johnson's California, with Utah, Nevada, Colorado, New Mexico and Arizona [electronic resource] / published by Johnson and Ward	[ca. 1:3,484,800]. 1 in. to ca. 55 miles (W 124deg--W 102deg/N 42deg--N 32deg)
22	Peoples of Utah	Greeks in Utah	Helper (Utah) ; 39.69154-110.857542	Greeks in Utah	Helper (Utah) ; 39.69154-110.857542
23	Practicing Medicine: A Historical Glimpse at Utah and Beyond	Mary Ann Weston Maughan, Midwife record	Tooele County (Utah); Cache County (Utah)	Mary Ann Weston Maughan, Midwife record	Tooele County (Utah); Cache County (Utah);
24	Salt Lake City Engineers Collection	Street Paving - Main Street, Between 100 and 200 South	Utah; Salt Lake County; Salt Lake City; Main Street, North of 200 South; Tribune Building	Street Paving - Main Street, Between 100 and 200 South	Utah; Salt Lake County; Salt Lake City; Tribune Building
25	Sanborn Fire Insurance Maps	Salt Lake City, 1889: Sheet 004	Salt Lake City, Utah; 100 North; 1st North; West Temple; North Temple; 100 West; 1st West; northlimit:40.773322 eastlimit:-111.893633 southlimit:40.771461 westlimit:-111.895527	Salt Lake City, 1889: Sheet 004	Salt Lake City, Utah; northlimit:40.773322 eastlimit:-111.893633 southlimit:40.771461 westlimit:-111.895527
26	Schools of the Salt Lake Valley (UT)	University of Utah, Presidents' Circle	Utah; Salt Lake County; Salt Lake City; East End of 2nd South, Presidents	University of Utah, Presidents' Circle	Utah; Salt Lake County; Salt Lake City; East End of 2nd South, Presidents

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
			Circle; 201 South Presidents Circle (1440 East)		Circle
27	Shipler Commercial Photographers	Utah State Capitol Construction	Utah; Salt Lake County; Salt Lake City; Capitol Hill; Utah State Capitol	Utah State Capitol Construction	Utah; Salt Lake County; Salt Lake City; Capitol Hill; Utah State Capitol
28	Southern Nevada and Las Vegas History in Maps	Map of irrigable areas near Boulder Dam, February 20, 1935	Colorado River; Hoover Dam; Virgin River; Black Mountains; North Muddy Mountains; Nevada; Arizona; United States;	Map of irrigable areas near Boulder Dam, February 20, 1935	Colorado River; Hoover Dam; Virgin River; Black Mountains; North Muddy Mountains;; Nevada; Arizona; United States;
29	Southern Nevada Boomtown Years	Mount Diablo mines four chute ore loader	Mount Diablo Mine; Pickhandle Gulch; Mineral; Candelaria	Mount Diablo mines four chute ore loader	Mount Diablo Mine; Pickhandle Gulch; Mineral; Candelaria
30	Tahoe Resources	Biodiesel Film Festival Comes to Tahoe	Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif and Nev)	Biodiesel Film Festival Comes to Tahoe	Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif and Nev)
31	Tanner Trust Book Collection	Twelve Mormon Homes : Twelve Mormon homes visited in succession on a journey through Utah to Arizona.	Salt Lake City (Utah) to St. George (Utah).	Twelve Mormon Homes : Twelve Mormon homes visited in succession on a journey through Utah to Arizona.	Salt Lake City (Utah) to St. George (Utah).
32	Thorne Photograph Collection	Fossil Wall at Quarry	Dinosaur National Monument	Fossil Wall at Quarry	Dinosaur National Monument
33	Tooele County (UT) Histories	Early Tooele A Documented Chronology 1886-1888 Vol. VII;	Tooele County (Utah); Tooele (Utah); Grantsville (Utah); Ophir (Utah); Rush Valley (Utah : Valley); Stockton (Utah); Garfield (Utah); Garfield	Early Tooele A Documented Chronology 1886-1888 Vol. VII;	Tooele County (Utah); Tooele (Utah); Grantsville (Utah); Ophir (Utah); Rush Valley (Utah : Valley); Stockton (Utah); Garfield (Utah); Garfield

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
			Beach Resort (Utah); Lake Point (Utah); Rush Lake (Utah); Great Salt Lake (Utah); Dry Canyon (Utah); Deep Creek (Idaho and Utah); Tooele County (Utah);		Beach Resort (Utah); Lake Point (Utah); Rush Lake (Utah); Great Salt Lake (Utah); Dry Canyon (Utah); Deep Creek (Idaho and Utah); Tooele County (Utah);
34	Topaz Museum Collection	Students from Topaz High School	39.415493-112.768736°	Students from Topaz High School	39.415493-112.768736°
35	Uintah County Regional History Center Collection	Black Dragon Mine	Dragon (Utah)	Black Dragon Mine	Dragon (Utah)
36	University of Nevada, Reno, Archives Documents	Report of the Board of Regents of the State University, 1885-86	Metadata is Not Displayed in Original Record	Report of the Board of Regents of the State University, 1885-86	Elko (Nev.); Elko County; Nevada; Reno (Nev.); Washoe County; Nevada
37	University of Nevada, Reno, Art Collection	Lake Tahoe	Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif. and Nev.)	Lake Tahoe	Lake Tahoe (Calif. and Nev.); Tahoe, Lake (Calif. and Nev.);
38	University of Nevada, Reno, Special Collections Photographs	State Prison and Warm Springs, near Carson City	Carson City County; Nevada	State Prison and Warm Springs, near Carson City	Carson City County; Nevada
39	University of Utah College of Architecture + Planning Collection	Panoramic Survey of the South Temple Historic District	Salt Lake City, Salt Lake county, Utah, United States	Panoramic Survey of the South Temple Historic District	Salt Lake City, Salt Lake county, Utah, United States
40	University of Utah Photograph Archives	Don Hatch cooking.	Colorado River (Colo.-Mexico)--Photographs	Don Hatch cooking.	Colorado River (Colo.-Mexico)--Photographs
41	Utah 2002 Olympic Legacy Collection	PIN, EAT WELL LIVE WELL GROCERIES	China	PIN, EAT WELL LIVE WELL GROCERIES	China

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
42	Utah American Indian Digital Archive: Oral Histories Transcripts	Panel Discussion: Alienation of the American Indian (1968)	University of Utah	Panel Discussion: Alienation of the American Indian (1968)	University of Utah
43	Utah Council of Land Surveyors	Fifty Mile Marker, Southern Boundary of the Uintah Indian Reservation	Uintah and Ouray Indian Reservation (Utah); Fort Duchesne (Utah);	Fifty Mile Marker, Southern Boundary of the Uintah Indian Reservation	Uintah and Ouray Indian Reservation (Utah); Fort Duchesne (Utah);
44	Utah Governor's Olympic Collection	Governor Mike Leavitt attends a Womens' Hockey match	Utah; Salt Lake County; West Valley City	Governor Mike Leavitt attends a Womens' Hockey match	Utah; Salt Lake County; West Valley City
45	Utah State Historical Society Classified Photograph Collection	Union Pacific Railroad - Construction Employees P. 6	Utah	Union Pacific Railroad - Construction Employees P. 6	Utah
46	Utah's Most Elusive: Hard-to-Find Government and Scientific Reports	Uses of existing information in the process of setting social standards for proposed wilderness areas of Zion National Park;	Zion National Park (Utah)	Uses of existing information in the process of setting social standards for proposed wilderness areas of Zion National Park;	Zion National Park (Utah);
47	Vernal (UT) Express Photograph Collection	Green River	Flaming Gorge National Recreation Area (Utah and Wyo.);	Green River	Flaming Gorge National Recreation Area (Utah and Wyo.);
48	Western Soundscape Archive	Point Reyes National Seashore, Site PORE002, National Park Service sound spectrograms	Point Reyes National Seashore; 395; N	Point Reyes National Seashore, Site PORE002, National Park Service sound spectrograms	Point Reyes National Seashore; 395; N
49	Western Soundscape	Hawaii Volcanoes	Hawaii Volcanoes	Hawaii Volcanoes	Hawaii Volcanoes

Recommendations for Geospatial Metadata Standards

Coll. No.	Digital Collection	Sample Record (original)	Spatial Value in Sample Record (original)	Sample Record (MWDL)	Spatial Value in Sample Record (as normalized in MWDL)
	Archive Spectrograms	National Park, Site HAVO3D1, National Park Service sound spectrograms	National Park	National Park, Site HAVO3D1, National Park Service sound spectrograms	National Park
50	William Edward Hook Glass Negative Collection	Life in the West-Men and Boy on Donkey	Utah; Colorado	Life in the West-Men and Boy on Donkey	Utah; Colorado

TABLE 4. LOCATION OF SPATIAL DATA.

Collection	Partner	Subject	Coverage	Spatial Coverage
Adams, R. D.	Southern Utah University - Sherratt Library	Yes	No	No
Albert Tissandier Collection	University of Utah - Utah Museum of Fine Arts	No	No	No
Alta (UT) Avalanche Study Center	University of Utah - J. Willard Marriott Library	No	Yes	Yes
American Travelers in Italy	Brigham Young University - Harold B. Lee Library	Yes	No	No
American Westward Migration	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes
Arabic Papyrus, Parchment, and Paper Collection	University of Utah - J. Willard Marriott Library	No	No	No
Aztec Codices	University of Utah - J. Willard Marriott Library	No	No	Yes
Barry Maxfield Railroad Photographs	Utah Valley University Library	Yes	Yes	Yes
Basque Posters	University of Nevada, Reno, University Libraries	Yes	No	No
Bear River Watershed Historical Collection	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
Beaver (UT) Murdock Academy	Southern Utah University - Sherratt Library	Yes	No	No
Bells: Connecting Animals, People, and Land	Utah State University - Merrill-Cazier Library	Yes	No	No
Benson Institute	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Boyden, John S.	Southern Utah University - Sherratt Library	Yes	No	No
Branch Agricultural College	Southern Utah University - Sherratt Library	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Branch Normal School	Southern Utah University - Sherratt Library	Yes	No	No
Brigham Young University Campus Photographs	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Brigham Young University Family Historian	Brigham Young University Family Historian	No	No	No
Brigham Young University Historical Photographs: Walter M. Camp Collection	Brigham Young University - Harold B. Lee Library	Yes	Yes-but is portrait, nothing to do with spatial	No
Brigham Young University Institutional Repository	Brigham Young University - Harold B. Lee Library	Yes	No	No
Brigham Young University Institutional Repository: Herbarium	Brigham Young University - Harold B. Lee Library	No	No	No
Brigham Young University Institutional Repository: Historic Clothing Collection	Brigham Young University - Harold B. Lee Library	No	No	No
Brigham Young University Master's Theses on Mormonism: A-F	Brigham Young University - Harold B. Lee Library	Yes	No	No
Brigham Young University Master's Theses on Mormonism: G-M	Brigham Young University - Harold B. Lee Library	Yes	No	No
Brigham Young University Master's Theses on Mormonism: N-Z	Brigham Young University - Harold B. Lee Library	Yes	No	No
Brigham Young University Special Collections Miscellaneous	Brigham Young University - Harold B. Lee Library	Yes	No	No
Brigham Young University Studies	Brigham Young University - Harold B. Lee Library	No	No	No
Brigham Young University Theses and Dissertations	Brigham Young University - Harold B. Lee Library	No	No	No
Brigham Young University-Hawaii Collection	Brigham Young University-Hawaii	Yes	Yes, but Person and Dates, not Spatial	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Brigham Young University-Idaho Campus	Brigham Young University-Idaho	Yes	No	No
Brigham Young University-Idaho Flash	Brigham Young University-Idaho	No	No	No
Brigham Young University-Idaho Miscellaneous Books	Brigham Young University-Idaho Miscellaneous Books	Yes	No	No
Brigham Young University-Idaho Oral Histories	Brigham Young University-Idaho	Yes	No	No
Brigham Young University-Idaho Student Rays	Brigham Young University-Idaho	No	No	No
Bryner Pioneer Museum, Price (UT)	Bryner Pioneer Museum (Price, UT)	Yes	No	No
Caesaris	University of Utah - J. Willard Marriott Library	No	Yes, but Temporal	No
Charles R. Savage Photographs 1	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Charles R. Savage Photographs 2	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Children's Book and Play Review	Brigham Young University - Harold B. Lee Library	No	No	No
City of Orem (UT)	Orem (UT) Public Library	Yes	No	No
Civilian Conservation Corps in Utah	Utah State Historical Society	No	Yes	Yes
Civilization Hamblin	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Civilization Learning Object Collection	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Clifford Bray Photographs	Utah State Historical Society	Yes	No	No
College of Southern Utah	Southern Utah University - Sherratt Library	Yes	No	No
Colorado Riverbed Case	University of Utah - J. Willard Marriott Library	Yes	No	No
Commissioner of Indian War Records Indian War Service	Utah State Archives	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Affidavits				
Continuum	University of Utah	No	No	No
Cookery and Culture	Utah State University - Merrill-Cazier Library	No	No	No
Crawford Family, Zion National Park	Southern Utah University - Sherratt Library	Yes	No	No
Cycling Utah	University of Utah - J. Willard Marriott Library	No	No	No
Daily Enquirer (Provo, UT) 1	Brigham Young University - Harold B. Lee Library	Yes	No	No
Daily Enquirer (Provo, UT) 2	Brigham Young University - Harold B. Lee Library	Yes	No	No
Dard Hunter Book Collection	University of Utah - J. Willard Marriott Library	No	No	No
Daughters of the Utah Pioneers, Cedar City (UT)	Daughters of the Utah Pioneers, Cedar City (UT)	Yes	No	No
Daughters of the Utah Pioneers, Springville (UT)	Daughters of the Utah Pioneers, Springville (UT)	Yes	No	No
De Naturae Simia	University of Utah - J. Willard Marriott Library	No	No	No
De Viller's Book of Hours: 15th Century Illuminated Manuscript	Utah State University - Merrill-Cazier Library	Yes	No	No
Death Valley Region Photograph Collection	Utah State University - Merrill-Cazier Library	Yes	No	No
Dee Family Correspondence	Weber State University - Stewart Library	No	No	No
Dee Family Photographs	Weber State University - Stewart Library	No	No	No
Dee School of Nursing Yearbooks	Weber State University - Stewart Library	No	No	No
Design Workshop Landscape Architecture Archive	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
Dialogue: A Journal of Mormon Thought	Dialogue Foundation	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Didymus Papyri	Brigham Young University - Harold B. Lee Library	No	No	No
Dixie National Forest	U.S. Forest Service, Dixie National Forest	Yes	No	No
Driggs, Howard R.	Southern Utah University - Sherratt Library	Yes	No	No
Early College Catalogs, Southern Utah University	Southern Utah University - Sherratt Library	Yes	No	No
Eccles Business Correspondence	Weber State University - Stewart Library	Yes	No	No
Eccles LDS Church Correspondence	Weber State University - Stewart Library	Yes	No	No
Eccles Personal Correspondence	Weber State University - Stewart Library	Yes	No	No
Edith Irvine	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Edward K. Bryant Photo Collection, 1942-1945	Brigham Young University-Hawaii	Yes	Yes	No
Eisenhower Communiques	Brigham Young University - Harold B. Lee Library	No	No	No
Elsner Sculptures and Sketchbooks	Utah State University - Merrill-Cazier Library	No	Yes	Yes
Emery County (UT) History	Emery County (UT) Archives	Yes	No	No
Encyclopedia of Mormonism	Brigham Young University - Harold B. Lee Library	No	No	No
Esplin Family Collection	University of Utah - J. Willard Marriott Library	Yes	No	No
European Performance Arts (1600-1899)	University of Utah - J. Willard Marriott Library	No	No	No
Extension, Enterprise and Education: The Legacy of Cooperatives and Cooperation in Utah	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
Facing the Color Line: Race and Ethnicity in Cache Valley	Utah State University - Merrill-Cazier Library	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Fife Slide Collection of Western U.S. Vernacular Architecture	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
FolkBistro	Utah State University - Merrill-Cazier Library	Yes	No	No
Frank Beckwith Collection	Delta (UT) City Library	Yes	No	No
Frank Call Photograph Collection, 1909-1911	Brigham Young University-Hawaii	Yes	Yes	No
Frank Lloyd Wright: Wasmuth Portfolio	University of Utah - J. Willard Marriott Library	No	Yes	No
Frederick William Reynolds Lectures	University of Utah - J. Willard Marriott Library	Yes	No	No
French Political Pamphlets	Brigham Young University - Harold B. Lee Library	Yes	No	No
Frontier Homestead State Park (Cedar City, UT)	Frontier Homestead State Park (Cedar City, UT)	Yes	No	No
George Beard Collection	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
George Edward Anderson Photographs	Brigham Young University - Harold B. Lee Library	Yes	No	No
Great Basin Association Photographs	Great Basin Association	No	No	No
Great Basin History of Medicine Photograph Archives	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
Great Basin Museum Collection	Great Basin Museum	Yes	No	No
Great Basin National Heritage Area Oral Histories	Great Basin National Heritage Partnership	Yes	Yes	Yes
Green River Launch Complex, U.S. Air Force	Green River (UT)	Yes	Yes	No
Grouse Creek Cultural Survey: Mormon Buckaroo Territory, 1985	Utah State University - Merrill-Cazier Library	Yes	No	No
Harmonia Macrocosmica	University of Utah - J. Willard Marriott Library	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Health Education Assets Library	Health Education Assets Library	No	Yes	No
Hidden Water: A Survey of Salt Lake Valley (UT) Surface Water	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes
Hinckley Journal of Politics	University of Utah - J. Willard Marriott Library	No	No	No
Historic Aerial Photographs of Early Nevada	University of Nevada, Reno, University Libraries	Yes	Yes	No
Historic Landscape of Nevada: Development, Water, and the Natural Environment	University of Nevada, Las Vegas, University Libraries	Yes	Yes	Yes
Historic Ricks College Viking Scroll 1	Brigham Young University-Idaho	No	No	No
Historic Ricks College Viking Scroll 2	Brigham Young University-Idaho	No	No	No
Historical Photographs, Southern Utah University	Southern Utah University - Sherratt Library	Yes	No	No
History of Science	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
History of Shelley (ID)	North Bingham County (ID) District Library	Yes	Yes	Yes
Hoover Dam Project Scrapbook Vol. 1	Weber State University - Stewart Library	Yes	No	No
Hoover Dam Project Scrapbook Vol. 2	Weber State University - Stewart Library	Yes	No	No
Hoover Dam Project Scrapbook Vol. 3	Weber State University - Stewart Library	Yes	No	No
Huntington Bagley Photograph Collection	Brigham Young University - Harold B. Lee Library	Yes	No	No
Images of Lake Tahoe	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
Intermountain Indian School	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
International Harp Archives	Brigham Young University - Harold B. Lee Library	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Iron County (UT) Extension Office	Southern Utah University - Sherratt Library	Yes	No	No
Iron Mining District (Iron County, UT)	Southern Utah University - Sherratt Library	Yes	No	No
John Donne Sermons	Brigham Young University - Harold B. Lee Library	Yes	No	No
John W. Fitzgerald Collection	University of Utah - J. Willard Marriott Library	No	No	No
John Wesley Powell Collection	University of Utah - J. Willard Marriott Library	Yes	Yes	No
Jones, Homer	Southern Utah University - Sherratt Library	Yes	No	No
Jones, York and Evelyn	Southern Utah University - Sherratt Library	Yes	No	No
Journal of Discourses	Brigham Young University - Harold B. Lee Library	No	No	No
Journal of East Asian Libraries	Brigham Young University - Harold B. Lee Library	Yes	No	No
Journal of Microfinance	Brigham Young University - Harold B. Lee Library	No	No	No
Journal of Mormon History	Mormon History Association	No	No	No
Just Passin' Through: The Lincoln and Victory Highways in Nevada	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
Karl Bodmer Aquatint Collection	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes
LDS Business College Yearbooks	LDS Business College	Yes	No	No
Laie Plantation and Community Photo Collection, 1879-1965	Brigham Young University-Hawaii	Yes	Yes but temporal	No
Land Use-Transportation Scenario Planning	University of Utah - J. Willard Marriott Library	No	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Las Vegas and Water in the West	University of Nevada, Las Vegas, University Libraries	Yes	No	NO
Latino/Latina Voices	Utah State University - Merrill-Cazier Library	Yes	No	No
Latter-Day Saints' Millennial Star	Brigham Young University - Harold B. Lee Library	No	No	No
Leigh, Allen	Southern Utah University - Sherratt Library	Yes	No	No
Lessons: The Journal of the Center for Teaching and Learning Excellence	University of Utah - J. Willard Marriott Library	No	No	No
Letters of Philip II, King of Spain	Brigham Young University - Harold B. Lee Library	No	No	No
Marcel Schwob	Brigham Young University - Harold B. Lee Library	No	No	No
Marcus Bach	Brigham Young University - Harold B. Lee Library	No	No	No
Marcus Bach Outreach	Brigham Young University - Harold B. Lee Library	No	No	No
Marriage and Families	Brigham Young University - Harold B. Lee Library	No	No	No
Mendon (UT): A Page from the Past	Mendon (UT)	Yes	No	No
Menus: The Art of Dining	University of Nevada, Las Vegas, University Libraries	No	Yes	Yes
Middle East Collections	University of Utah - J. Willard Marriott Library	No	No	No
Mormon Missionary Diaries	Brigham Young University - Harold B. Lee Library	Yes	Yes-but is temporal	No
Mormon Pacific Historical Society	Brigham Young University-Hawaii	No	No	No
Morrill, John David	Southern Utah University - Sherratt Library	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Moving Image Archive	University of Utah - J. Willard Marriott Library	Yes	No	No
Murray (UT) Museum Collection	Murray (UT) Museum	Yes	No	No
Music Temple Visitors Register	University of Utah - J. Willard Marriott Library	Yes	Yes	No
Neuro-Ophthalmology Virtual Education Library (NOVEL)	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: AAO-NANOS Clinical Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Alfredo A. Sadun Collection				
Neuro-Ophthalmology: David E. Newman-Toker Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: David G. Cogan Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Frank B. Walsh Society Archives	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Helmut Wilhelm Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Irene E. Loewenfeld Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: J. Lawton Smith Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: John A. Moran Eye Center Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Neuro-Ophthalmology: John S. Kennerdell Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Journal of Neuro-Ophthalmology	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: North American Neuro-Ophthalmology Society Annual Meeting Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Randy H. Kardon Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: Robert B. Daroff Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neuro-Ophthalmology: William F. Hoyt Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Neurology/Neuro-Ophthalmology: Shirley H. Wray Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Nevada Agricultural Publications	University of Nevada, Reno, University Libraries	No	No	No
Nevada Barns	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
Nevada Test Site Oral History Project	University of Nevada, Las Vegas, University Libraries	Yes	Yes	Yes
Nevada in Maps	University of Nevada, Reno, University Libraries	Yes	No	No
New World Archaeological Foundation	Brigham Young University - Harold B. Lee Library	Yes	No	No
Nineteenth Century Mormon Publications: 1847 to 1877				

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Nineteenth Century Mormon Publications: The Beginning to 1846	Brigham Young University - Harold B. Lee Library	No	No	No
Ogden (UT) City Churches	Weber State University - Stewart Library	No	No	No
Ogden (UT) City Recorder Birth Register	Utah State Archives	Yes	No	No
Ogden (UT) City Schools	Weber State University - Stewart Library	Yes	No	No
Old Ephraim	Utah State University - Merrill-Cazier Library	Yes	No	No
Olga Reifschneider Botanical Images of Northern Nevada and the Lake Tahoe Region	University of Nevada, Reno, University Libraries	Yes	Yes	No
Orem (UT) Heritage Museum	Orem (UT) Heritage Museum	Yes	No	No
Overland Trails 1846-1869: Biographies	Brigham Young University - Harold B. Lee Library	No	No	No
Overland Trails 1846-1869: Diaries	Brigham Young University - Harold B. Lee Library	Yes	No	No
Overland Trails 1846-1869: Images	Brigham Young University - Harold B. Lee Library	Yes	No	No
Overland Trails 1846-1869: Maps	Brigham Young University - Harold B. Lee Library	Yes	Yes	Yes
Overland Trails 1846-1869: Trail Guides	Brigham Young University - Harold B. Lee Library	Yes	No	No
Pacific Studies	Brigham Young University - Harold B. Lee Library	No	No	No
Palmer, William R.	Southern Utah University - Sherratt Library	Yes	No	No
Park City (UT) Historical Society and Museum Collection	Park City (UT) Historical Society & Museum	Yes	No	No
Paul Jones, the Portal, and the Building of St. John's Episcopal Church	Utah State University - Merrill-Cazier Library	Yes	No	No
Paul R. Cheesman Collection	Brigham Young University - Harold B.	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
	Lee Library			
Pearl Biddlecomb Baker Collection	Green River (UT) Public Library	Yes	No	No
Peoples of Utah	Utah State Historical Society	Yes	No	No
Philo T. Farnsworth Television Tubes Collection	Utah State Historical Society	No	No	No
Polynesian Cultural Center Photo Collection, 1961-1979	Brigham Young University-Hawaii	Yes	Yes	No
Practicing Medicine: A Historical Glimpse at Utah and Beyond	Utah State University - Merrill-Cazier Library	Yes	Yes but temporal	No
Provo (UT) City Library Historical Photographs	Provo (UT) City Library	Yes	Yes	No
Provo (UT) Historical Images	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Provo (UT) Municipal Council and Commission Minutes	Provo (UT) City	Yes	Yes	No
Religious Education	Brigham Young University - Harold B. Lee Library	Yes	Yes but temporal	No
Religious Educator	Brigham Young University - Harold B. Lee Library	No	No	No
Religious Studies Center	Brigham Young University - Harold B. Lee Library	Yes	No	No
Saga of the Sanpitch	Snow College Libraries	No	No	No
Salt Lake City Engineers Collection	Utah State Historical Society	No	Yes	Yes
Salt Lake Community College Photograph Archives	Salt Lake Community College Libraries	No	No	No
Salt Lake Community College Scholarly and Creative Works	Salt Lake Community College Libraries	No	No	No
Salt Lake Community College Student Newspapers	Salt Lake Community College Libraries	No	No	No
Sanborn Fire Insurance Maps	University of Utah - J. Willard Marriott Library	No	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Sanpete County (Utah). County Clerk Birth Register	Utah State Archives	Yes	No	No
Sanpete County (Utah). County Clerk Death Register	Utah State Archives	Yes	No	No
Schools of the Salt Lake Valley (UT)	Utah State Historical Society	No	Yes	Yes
Shipler Commercial Photographers	Utah State Historical Society	No	Yes	Yes
Showgirls Collection	University of Nevada, Las Vegas, University Libraries	No	No	No
Singin' Sam Agins Collection	Utah State University - Merrill-Cazier Library	No	No	No
Socotwa, Glen Canyon Voyage	Southern Utah University - Sherratt Library	Yes	No	No
Southern Nevada Boomtown Years	University of Nevada, Las Vegas, University Libraries	No	Yes	Yes
Southern Nevada and Las Vegas History in Maps	University of Nevada, Las Vegas, University Libraries	Yes	Yes	Yes
Southern Utah State College	Southern Utah University - Sherratt Library	Yes	No	No
Southern Utah University Drama	Southern Utah University - Sherratt Library	No	No	No
Southwest Utah Livestock Association	Southern Utah University - Sherratt Library	Yes	No	No
Sudan Studies	Brigham Young University - Harold B. Lee Library	No	No	No
Syriac Studies Reference Library	Brigham Young University - Harold B. Lee Library	No	No	No
TESL Reporter	Brigham Young University - Harold B. Lee Library	No	No	No
Tahoe Resources	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
Tanner Trust Book Collection	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Taylor Woolley Photograph Collection	Utah State Historical Society	Yes	No	No
The Ridgway Brothers: Explorers, Scientists, and Illustrators	Utah State University - Merrill-Cazier Library	No	No	No
The Signpost: A Decade Sampling	Weber State University - Stewart Library	No	No	No
The White and Blue	Brigham Young University	Yes	No	No
Thomas D. Dee Marriage Register	Weber State University - Stewart Library	Yes	No	No
Thorne Photograph Collection	Uintah County (UT) Library	Yes	Yes	Yes
Tooele County (UT) Histories	Tooele (UT) City Library	Yes	Yes	Yes
Topaz Japanese-American Relocation Center Digital Collection	Utah State University - Merrill-Cazier Library	No	No	No
Topaz Museum Collection	Topaz Museum (Delta, UT)	Yes	Yes	Yes
U-News and Views	University of Utah - J. Willard Marriott Library	No	No	No
Uintah County Regional History Center Collection	Uintah County (UT) Library	Yes	Yes	Yes
Undergraduate Research Abstracts Journal	University of Utah - Undergraduate Research Opportunities Program	No	No	No
University Neighborhood Partners Program	University of Utah - J. Willard Marriott Library	Yes	No	No
University of Nevada, Reno, Archives Documents	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
University of Nevada, Reno, Art Collection	University of Nevada, Reno, University Libraries	Yes	Yes	Yes
University of Nevada, Reno, Campus Images	University of Nevada, Reno, University Libraries	Yes	Yes	No
University of Nevada, Reno, Special Collections Photographs	University of Nevada, Reno, University Libraries	Yes	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
University of Utah Archives Photograph Collection	University of Utah - J. Willard Marriott Library	Yes	No	No
University of Utah College of Architecture + Planning Collection	University of Utah - College of Architecture and Planning	Yes	Yes	Yes
University of Utah Electronic University Archive	University of Utah - J. Willard Marriott Library	No	Yes but temporal	No
University of Utah Encoded Archival Description (EAD) Finding Aids	University of Utah - J. Willard Marriott Library	Yes	No	No
University of Utah Health Sciences Photograph Collection	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
University of Utah Marriott Library Permanent Art Collection	University of Utah - J. Willard Marriott Library	Yes	No	No
University of Utah Photograph Archives	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes
University of Utah Press Open Access Works	University of Utah - University Press	No	No	No
University of Utah Rare Books Collection	University of Utah - J. Willard Marriott Library	No	No	No
University of Utah Special Collections Manuscripts				
University of Utah Theses and Dissertations 1	University of Utah	Yes	No	No
University of Utah Theses and Dissertations 2	University of Utah	Yes	No	No
University of Utah Theses and Dissertations 3	University of Utah	Yes	No	No
University of Utah UScholar Works	University of Utah	Yes	No	No
Upper Snake River Valley Idaho Histories	Brigham Young University-Idaho	Yes	No	No
Utah 2002 Olympic Legacy Collection	Utah State Historical Society	No	Yes	Yes
Utah Academic Library Consortium Archives	Utah Academic Library Consortium	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Utah American Indian Digital Archive: Oral Histories Transcripts	University of Utah - American West Center	No	Yes	Yes
Utah Architects Project	University of Utah - J. Willard Marriott Library	Yes	No	No
Utah Board of Pardons: Prisoner Pardon Application Case Files	Utah State Archives	No	No	No
Utah Board of Regents	University of Utah - J. Willard Marriott Library	Yes	No	No
Utah Construction-Utah International Annual Reports	Weber State University - Stewart Library	No	No	No
Utah Construction-Utah International Photographs	Weber State University - Stewart Library	Yes	No	No
Utah Council of Land Surveyors	Utah Council of Land Surveyors	Yes	Yes	Yes
Utah Division of Animal Industry Brand Books	Utah State Archives	No	No	No
Utah Division of Corporations incorporation case files index, 1981	Utah State Archives	No	No	No
Utah Division of State Archives Oaths of Office	Utah State Archives	No	No	No
Utah Division of State Archives Series Inventories	Utah State Archives	Yes	No	No
Utah Fifth District: Beaver County Case Indexes	Utah State Archives	No	No	No
Utah Fire and Rescue Academy	Utah Valley University Library	Yes	No	No
Utah Folklorists Image Collection	Utah State University - Merrill-Cazier Library	Yes	No	No
Utah Government Publications Online	Utah State Library	Yes	Yes	No
Utah Governor Jon M. Huntsman (2005-2009). Schedule	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) 2K2 Program Records	Utah State Archives	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Utah Governor Michael O. Leavitt (1993-2003) Administrative Constituent Correspondence	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Chief of Staff Records	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Ethnic Office Records	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Executive Orders and Proclamations	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Newspaper Clippings	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Photographs	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Press Releases	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Programs of the First Lady	Utah State Archives	No	No	No
Utah Governor Michael O. Leavitt (1993-2003) Time Capsule Records	Utah State Archives	No	No	No
Utah Governor Olene S. Walker (2003-2004) Executive Correspondence	Utah State Archives	No	No	No
Utah Governor Olene S. Walker (2003-2004) Newspaper Clippings	Utah State Archives	No	No	No
Utah Governor Olene S. Walker (2003-2004) Photographs	Utah State Archives	Yes	No	No
Utah Governor Olene S. Walker (2003-2004) Press Releases	Utah State Archives	No	No	No
Utah Governor Olene S. Walker (2003-2004) Scrapbooks	Utah State Archives	No	No	No
Utah Governor Olene S. Walker (2003-2004) Speeches and Official Statements	Utah State Archives	No	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Utah Governor Scott M. Matheson (1977-1984). Committee on Executive Reorganization, 1978	Utah State Archives	No	No	No
Utah Governor's Olympic Collection	Utah State Historical Society	No	Yes	Yes
Utah Health Sciences Library Consortium	University of Utah - Spencer S. Eccles Health Sciences Library	No	No	No
Utah Historic and Prehistoric Publications	Utah State Historical Society	No	No	No
Utah Historical Statutes	University of Utah - S.J. Quinney Law Library	Yes	Yes-but is temporal	No
Utah Legislature. Commission on the Organization of the Executive Branch of the Government, 1966	Utah State Archives	No	No	No
Utah Legislature. House of Representatives Working Bills, 1896-1989	Utah State Archives	No	No	No
Utah Legislature. Little Hoover Commission, 1965-1966	Utah State Archives	No	No	No
Utah Legislature. Senate Working Bills	Utah State Archives	No	No	No
Utah Office of Vital Records and Statistics. Birth Certificates, 1905-1910	Utah State Archives	Yes	No	No
Utah Office of Vital Records and Statistics. Death Certificates, 1905-1958	Utah State Archives	Yes	Yes	No
Utah Parks Company	Southern Utah University - Sherratt Library	Yes	No	No
Utah Peace Activists Oral History	Utah Valley University Library	Yes	No	No
Utah Press Association: UPA - A Century Later	University of Utah - J. Willard Marriott Library	No	No	No
Utah Revised Statutes 1933	Utah State Archives	No	No	No
Utah Ski Archives Newsletter	University of Utah - J. Willard Marriott Library	Yes	No	No
Utah State Historical Society Classified Photograph	Utah State Historical Society	No	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Collection				
Utah State Historical Society Encoded Archival Description (EAD) Finding Aids	Utah State Historical Society	Yes	No	No
Utah State Records Committee. Minutes, 1992-2009	Utah State Archives	Yes	No	No
Utah State University Buzzer Yearbooks	Utah State University - Merrill-Cazier Library	No	Yes	Yes
Utah State University Historical Photograph Collection	Utah State University - Merrill-Cazier Library	Yes	No	No
Utah State University Institutional Repository: Graduate Theses & Dissertations	Utah State University - Merrill-Cazier Library	No	No	No
Utah State University Press Publications	Utah State University - USU Press	No	No	No
Utah State University Special Collections Digital Exhibits	Utah State University - Merrill-Cazier Library	Yes	No	No
Utah State University Special Collections Registers (EAD Finding Aids)	Utah State University - Merrill-Cazier Library	Yes	Yes but temporal	No
Utah Statehood Constitutional Convention State Constitution	Utah State Archives	Yes	No	No
Utah Technical College Yearbooks	Utah Valley University Library	No	Yes but temporal	No
Utah Valley University Departmental Publications	Utah Valley University Library	No	No	No
Utah Valley University Faculty Collection	Utah Valley University Library	No	No	No
Utah Valley University Library Collection	Utah Valley University Library	No	No	No
Utah Valley University Student Theses Collection	Utah Valley University Library	No	No	No
Utah's Most Elusive: Hard-to-Find Government and Scientific Reports	Utah State University - Merrill-Cazier Library	Yes	Yes	Yes
Utonian Yearbooks	University of Utah - J. Willard Marriott Library	No	Yes but temporal	No
Vernal (UT) Express Photograph Collection	Uintah County (UT) Library	Yes	Yes	Yes

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Water Wise Utah	University of Utah - J. Willard Marriott Library	Yes	No	No
Weber College Yearbook 1924-1963	Weber State University - Stewart Library	Yes	No	NO
Weber County (UT) World War I Photographs	Weber State University - Stewart Library	Yes	No	No
Weber County (UT) World War II Correspondence, Newsletters and Photographs	Weber State University - Stewart Library	Yes	No	No
Weber County (UT) World War II POW Camp 1943-1946	Weber State University - Stewart Library	No	No	No
Weber County (UT) World War II POW Oral History Project	Weber State University - Stewart Library	Yes	No	No
Weber Normal College Yearbooks 1919-1923	Weber State University - Stewart Library	Yes	No	No
Weber Stake Academy Yearbook 1905-1918	Weber State University - Stewart Library	Yes	No	No
Weber State College Yearbook 1964-1982	Weber State University - Stewart Library	Yes	No	No
Weber State University 50th Anniversary	Weber State University - Stewart Library	No	No	No
Weber State University Buildings 1 and 2: A Photo History	Weber State University - Stewart Library	Yes	No	No
Weber State University Encoded Archival Description (EAD) Finding Aids	Weber State University - Stewart Library	No	Yes	No
Welcome Home, Howard! (Howard Hughes Photograph Collection)	University of Nevada, Las Vegas, University Libraries	No	No	No
Western Soundscape Archive	University of Utah - J. Willard Marriott Library	Yes	No	No
Western Soundscape Archive Spectrograms	University of Utah - J. Willard Marriott Library	Yes	Yes	Yes
Western Waters: AZ vs. CA	University of Utah - J. Willard Marriott Library	Yes	No	No
Western Waters: Audio-Video Collection	University of Utah - J. Willard Marriott Library	Yes	No	No

Recommendations for Geospatial Metadata Standards

Collection	Partner	Subject	Coverage	Spatial Coverage
Western Waters: Book Collection	University of Utah - J. Willard Marriott Library	Yes	No	No
Western Waters: Diary Collection	University of Utah - J. Willard Marriott Library	No	No	No
Western Waters: Documents	University of Utah - J. Willard Marriott Library	Yes	Yes but temporal	No
Western Waters: Electronic Resources	University of Utah - J. Willard Marriott Library	Yes	No	No
Western Waters: Photograph Collection	University of Utah - J. Willard Marriott Library	Yes	No	No
Western Waters: Treaties and Compacts	University of Utah - J. Willard Marriott Library	No	No	No
Western Waters: University of Utah Special Collections	University of Utah - J. Willard Marriott Library	Yes	No	No
Westminster College Finding Aids (EAD)	Westminster College - Giovale Library	Yes	Yes	Yes
Westminster College Institutional Repository	Westminster College - Giovale Library	Yes	No	No
Westminster College Photograph Collection	Westminster College - Giovale Library	Yes	Yes but temporal	No
Westminster College Textual Works Collection	Westminster College - Giovale Library	Yes	No	No
William Edward Hook Glass Negative Collection	Utah State Historical Society	No	Yes	Yes
William Henry Jackson	Brigham Young University - Harold B. Lee Library	Yes	No	No
Williamson, John Wesley	Southern Utah University - Sherratt Library	Yes	No	No
Wilson W. Sorensen Photograph Collection	Utah Valley University Library	Yes	No	No
World War II Photographs by J. Malan Heslop	Brigham Young University - Harold B. Lee Library	Yes	Yes	No
Young Woman's Journal	Brigham Young University - Harold B. Lee Library	No	No	No

Collection	Partner	Subject	Coverage	Spatial Coverage
Total Collections with Geo-Spatial Terms in Subject	170			
Total Collections with Spatial Coverage	51			

TABLE 5. SEARCHING SPATIAL TERMS ANALYSIS.

Spatial Search Term	# of Results Retrieved	# of Partners Retrieved	# of Collections Retrieved	# of Spatial Results Retrieved
Utah	479, 171	2	2	
Nevada	16,658	11	30	88
Arizona	4,083	15	49	65
Colorado	10,129	84	15	48
Idaho	4,969	15	39	89
United States	16,845	10	31	45

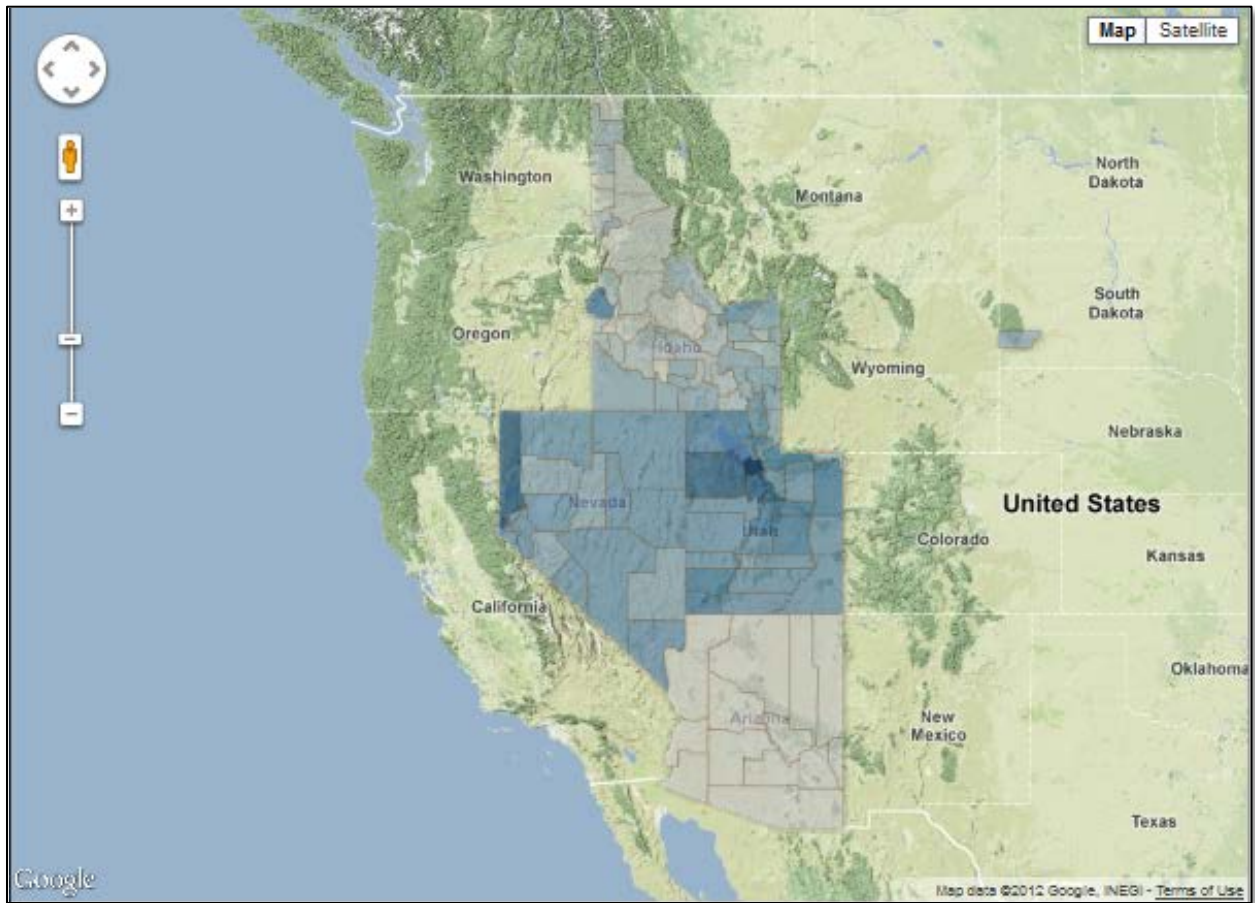
TABLE 6. INTEROPERABILITY ISSUES.

Type of Map Interface	List of Issues	Examples	Additional Information
County Based	~ Semantic Based Errors ~Incorrect map densities and visualization of information ~Partners which fail to include County or designate County in spatial metadata do not appear on map	Salt Lake City Vs. Salt Lake County	Will create interoperability issues when MWDL seeks to collaborate with national efforts and projects and/or developer more
State Based	~Semantic Based ~Errors Incorrect map densities and visualization of information ~Partners which fail to include County or designate County in spatial metadata do not	Utah County Vs. Utah State	Will create interoperability issues when MWDL seeks to collaborate with national efforts and projects and/or developer more

Recommendations for Geospatial Metadata Standards

	appear on map		
World/Country	<p>~Most items do not appear on a word map because most partners' spatial metadata does not include country.</p> <p>~Those partners who do have collections which are associated with a foreign country, may run into semantic issues if a controlled vocabulary with preferred terms is not selected.</p>	Britain Vs. England Vs. United Kingdom	While not an immediate issue, it will create interoperability problems if the MWDL seeks to collaborate with International collaborative and repositories. Therefore MWDL should resolve country formatting issues early on while still only a medium size regional collaborative.

APPENDIX B: MAP EXAMPLE



APPENDIX C: RELEVANT LINKS

- ❖ Geography Markup Language- <http://www.opengeospatial.org/standards/gml>
- ❖ Geonames- <http://www.geonames.org/>
- ❖ Georef Thesaurus- <http://www.agiweb.org/georef/about/thesaurus.html>
- ❖ Getty Thesauruses of Geographic Names-
<http://www.getty.edu/research/tools/vocabularies/tgn/index.html>
- ❖ ISO 19115:2003- http://www.iso.org/iso/catalogue_detail.htm?csnumber=26020
- ❖ Library of Congress Subject Headings and Authorities - <http://authorities.loc.gov/> ;
<http://www.loc.gov/aba/cataloging/subject/>
- ❖ Mountain West Digital Library Dublin Core Application Profile-
http://mwdl.org/docs/MWDL_DC_Profile_Version_2.0.pdf
- ❖ Mountain West Digital Library- <http://mwdl.org/>
- ❖ Open Geospatial Consortium- <http://www.opengeospatial.org/>
- ❖ The Alexandria Digital Library Feature Type Thesaurus-
<http://www.alexandria.ucsb.edu/gazetteer/FeatureTypes/ver100301/>
- ❖ The Alexandria Digital Library- <http://www.alexandria.ucsb.edu/> ;
<http://www.alexandria.ucsb.edu/public-documents/metadata/standards.html>
- ❖ The Content Standard for Digital Geospatial Metadata-
http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/v2_0698.pdf
- ❖ The Digital Public Library of America- <http://dp.la/>; http://dp.la/wiki/Main_Page
- ❖ The Electronic Cultural Atlas Initiative- <http://ecai.org/index.html>
- ❖ The National Geospatial Intelligence Agency- <https://www1.nga.mil/Pages/default.aspx>
- ❖ The World Digital Library- <http://www.wdl.org/en/>
- ❖ Understanding Metadata- <http://www.niso.org/publications/press/UnderstandingMetadata.pdf>
- ❖ United Nation’s Educational, Scientific, and Cultural Organization (UNESCO)
Thesaurus- Website: <http://databases.unesco.org/thesaurus/>
- ❖ USGS’S Geographic Names Information System-
<http://geonames.usgs.gov/pls/gnispublic/f?p=132:1:8691820002332772>

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