

# Nebraska Spatial Data Infrastructure (NESDI)



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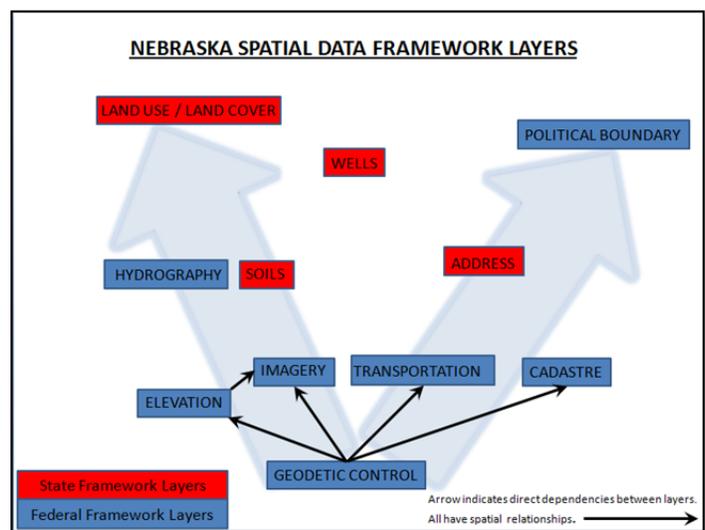
The definition and role for the NESDI is more than just data layers. A priority effort for the successful implementation of the NESDI is to define the specific datasets that comprise the NESDI, associated standards, their relationships to all of the other layers in the NESDI, and how they will be presented for public consumption. It is further defined and broken into the following components:

- Policies and Institutional Arrangements - Governance, management, data privacy, security, data sharing, financial and resource allocation, cost recovery
- Infrastructure - Data framework layers, technology, and networks
- Data Stewardship – Roles, responsibilities, cooperation
- Education – training, education outreach, technical assistance

Nebraska is already a component of the national SDI. It follows federal guidelines and standards by working with relationships that exist at all levels. The NESDI is a framework of geospatial data layers that have multiple applications and are used by a vast majority of stakeholders. These layers meet quality standards and have data stewards to maintain and improve the data on an ongoing basis. These layers are consistent with the Federal National Spatial Data Infrastructure (NSDI) “7 framework layers” and provide additional layers of particular importance to Nebraska.

The following framework layers currently make up the majority of the NESDI.

- Survey and Geodetic Control
- Elevation
- Aerial Imagery
- Transportation (roads, rail, air, etc.)
- Cadastre/Parcels
- Address Points
- Hydrography
- Political and Administrative Boundaries
- Soils
- Groundwater Features
- Watershed Boundaries
- Land Use/Land Cover



The state recently conducted a Strategic Plan in 2012 and identified the need for many enhanced spatial data layers. Five of these data layers were identified as “high priority” and include: elevation, imagery, street centerlines, point addressing, and land records.

### There are several key elements for NESDI

- They contain the most common data sets that the vast majority of stakeholders require
- Build data once and use it many times for many applications
- The data contents are of high quality and reliable
- The data contents are maintained and improved on an ongoing basis
- The data within is readily available
- There are identified data stewards responsible for upkeep and maintenance of data
- Provides for integrated distributed providers of data through cooperative governance
- Share costs of data creation and maintenance
- Support sustainable economic, social and environmental development
- Solutions using the NESDI needs to be defined by a community approach
- Data is made available through the state's geospatial data platform - NebraskaMAP

### Data Stewards and Stewardship

A priority effort for the successful implementation of the NESDI is to define the exact roles and responsibilities of data stewardship. Data stewards are participant members in the creation, maintenance and sustainability of particular spatial data sets. There can be several entities involved with one particular data framework layer and each having a responsibility as data stewards. They are also responsible for the completeness of metadata, keeping data current, improving data quality and accuracy, and assurance of making the data sustainable for the future.

The United State Geological Survey, suggests that a data steward *“is one who manages another's facts or information to ensure that they can be used to draw conclusions or make decisions. Data Stewards are “keepers of the flame” in terms of data quality. They are responsible as stewards to serve and protect the customers' needs or assets (consider an airline steward or a trustee). Stewardship equals taking responsibility for a set of data for the well being of the larger organization, and operating in service to, rather than in control of, those around us. Data stewardship is primarily the job of the professionals who create and maintain data. Although they have significant support roles to play, stewardship cannot simply be delegated to the IT or GIS shops.”*

Source: USGS, <http://www.usgs.gov/datamanagement/plan/stewardship.php>

### **National Spatial Data Infrastructure Defined**

The White House Office of Management and Budget is the core for defining the nation's spatial data infrastructure. *“The NSDI assures that spatial data from multiple sources (federal, state, local, and tribal governments, academia, and the private sector) are available and easily integrated to enhance the understanding of our physical and cultural world. The components of the NSDI are data themes, metadata, the National Spatial Data Clearinghouse, standards, and partnerships.”*

Source: The White House - Office of Management and Budget (2002) Circular No. A-16 Revised, August 19, 2002 [http://www.whitehouse.gov/omb/circulars\\_a016\\_rev](http://www.whitehouse.gov/omb/circulars_a016_rev)

The Federal Geographic Data Committee (FGDC) is further responsible for the guidance provided to the National Spatial Data Infrastructure. They define the NSDI as a *“consistent means to share geographic*

*data among all users could produce significant savings for data collection and use and enhance decision making. It involves technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community.”* The Executive Order 12906 established the NSDI. *“The goal of this Infrastructure is to reduce duplication of effort among agencies, improve quality and reduce costs related to geographic information, to make geographic data more accessible to the public, to increase the benefits of using available data, and to establish key partnerships with states, counties, cities, tribal nations, academia and the private sector to increase data availability.”*

Source: Federal Geographic Data Committee, <http://www.fgdc.gov/nsdi/nsdi.html>

Wikipedia defines a spatial data infrastructure as, *“A spatial data infrastructure (SDI) is a data infrastructure implementing a framework of geographic data, metadata, users and tools that are interactively connected in order to use spatial data in an efficient and flexible way. Another definition is the technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data.”*

Source: Wikipedia, [http://en.wikipedia.org/wiki/Spatial\\_Data\\_Infrastructure](http://en.wikipedia.org/wiki/Spatial_Data_Infrastructure)

### Nebraska Spatial Data Infrastructure (NESDI) Current Inventory

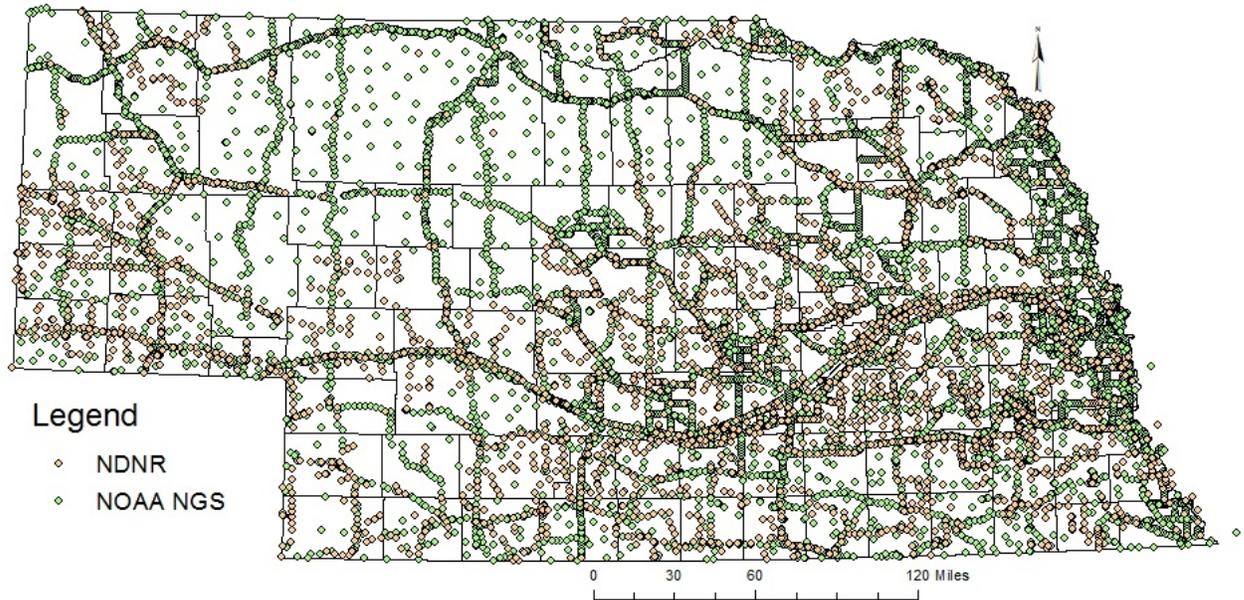
NESDI Framework Layer	Nebraska Status
1. Geodetic Control	The National Geodetic Survey (NGS) is the primary dataset for geodetic control information for the state. The state’s Dept. of Roads, Natural Resources Dept., county surveyors, and private licensed land surveyors collect and manage geodetic control information for their internal uses. Not all of these entities publish their data to NGS or make it readily available for others to consume.
2. Elevation	The best available statewide data set is the USGS 10-meter nationwide DEM. LiDAR elevation data has been acquired for nearly 56% of the state. Derivatives of this data has generated contours as accurate as 2 foot.
3. Imagery	The most current statewide imagery was acquired in 2012 through the USDA FSA NAIP imagery program. This imagery is 4-band color imagery at 1-meter resolution collected at peak growing season. In 2013, there are other city and regional efforts that collected aerial imagery at 4 and 9 inch pixel resolution during times of no vegetative cover.
4. Transportation/Roads	The Dept. of Roads maintains a road network of public streets using a Linear Referencing System (LRS) that also supports reporting requirements to meet federal standards. Street centerlines data have also been created for use in enhanced 911. A statewide street centerline data set was constructed in 2010 to tie all the various E911 data sets together. There exists no sustainable and maintained seamless street centerline database for the state meeting multiple state partner needs. The accuracy and completeness of the current E911 data needs to be assessed. Additional spatial and attribute requirements have already been identified that need to exist in a new street centerline database. The GIS Council working group is currently assessing this data and developing a governance and standards for a future data set to exist.
5. Cadastre / Parcels	The state currently has 95.8% of all parcels digitized in some form. There are six remaining counties left to digitize land records. Efforts are underway to create a statewide parcel database for use in public

	and state operations.
6. Address Points / Structures	There is currently no statewide framework for address points for state business needs other than addressing breaks used by NPSC and enhanced 9-1-1 purposes. A statewide geocode address database has been purchased for state agencies. Other larger cities are exploring the development of their own address points. The GIS Council working group is developing a business plan for the governance, standards, development and maintenance for a master address database.
7. Hydrography	The Nebraska Department of Natural Resources (NDNR) has been formally designated as the state's data steward and collaboratively developed the statewide hydrography data set in association with USGS's National Hydrographic Data Set Program (NHD). NDNR continues to maintain this data set.
8. Political and Administrative Boundaries	The Nebraska Legislative Office along with many state agencies create and maintains many statutory boundaries. County boundaries reside from USGS source materials. Other boundaries are collected from counties, cities, and other jurisdictions. An extensive evaluation and review needs to be conducted to see relationships to common related boundaries in the NESDI.
9. Soils	Statewide Digital Soil Survey data is provided through the Natural Resource Conservation Service (NRCS) and updated on an annual basis.
10. Groundwater Features	The Conservation Survey Division compiles the Nebraska Statewide Groundwater Level Monitoring Report annually with representative maps compiled at the scale of 1:500,000. For water wells, the best available universal well identifier system is the Registered Well ID maintained by NDNR.
11. Watershed Boundaries	Watershed boundaries are available at several levels of coverage areas. Originally developed by the USDA NRCS and incorporated into the National Hydrography Data Set.
12. Land Use/Land Cover	No entity is currently charged with inventory or assessment of Nebraska's land use or land cover. All recent efforts to assess and map Nebraska's land cover or land use have been grant-funded. Some of the most recent work for Nebraska include the USGS National Land Cover Dataset – 2001 and 2006, USDA NASS Crops and Land Cover - Nebraska (2002-present), and Statewide Agricultural Land Use (COHYST II) – 2005

## 1. Survey and Geodetic Control

### Current Status:

The primary dataset of geodetic information for the state is available from the National Oceanic and Atmospheric Administration (NOAA) National Geodetic Survey (NGS). There are many federal, state, local government agencies and private companies which collect and manage geodetic control information for their internal uses. Not all of these entities publish their data to NGS.



In 1996, NGS and several Nebraska partners cooperated in the development of High Accuracy Reference Network (HARN) for Nebraska. This HARN network consists of 214 monumented control stations scattered across Nebraska for which the locational coordinates have been determined, to a very high degree of accuracy, with the use of Global Positioning Satellite (GPS) technology. This HARN data is available through the NGS database.

A statewide GIS-based geodetic control database is not yet in existence and current data has significant gaps across the state. Such a system could provide an organized service for general access to the data or submittals from government or private organizations. Other state government entities including: Nebraska Department of Roads, Department of Natural Resources, and county surveyors maintain records of monuments and other survey control points but all are not necessarily made readily available for others to consume.

There are many monuments in rural parts of the state that are difficult to locate and not available in digital form. There are several factors for incomplete geodetic control information across the state. A few of these include costs to develop and maintain, limited coverage from real-time base station networks for easier access to collect data, and agreements on where missing monuments are located.

There is limited seamless statewide Real Time Network (RTN) solutions being developed and maintained for real-time global navigation satellite system (GNSS) services in the state. These networks consist of high-precision base stations such as Continuously Operating Reference Station (CORS) and accompany services to support a RTN, web-based positioning and location-based services. There are a few CORS rated base stations operated by industry in the state with most of them predominately in the eastern part of Nebraska.

There are other national sources of geodetic control information that may also be used as a reference. These include the Geographic Control Database (GCDB) and data used for the National Agricultural Imagery Program (NAIP). The GCDB was created and managed by the Bureau of Land Management. It is a collection of geographic information representing the Public Land Survey System (PLSS) and some Non-PLSS surveys of the United States. The GCDB grid is computed from BLM survey records. It is one source of PLSS control information, but contains only the points used to create the GCDB and is not an inventory of all points collected. The FSA and NRCS store geodetic

data provided by other entities as needed for the National Agricultural Imagery Program (NAIP). However, the information is not comprehensive or easily accessible.

The current assessment is that for a wide range of GIS applications the current statewide geodetic Nebraska control network and its associated NGS database probably provide adequate horizontal control. However, for some local GIS implementation projects, there may be merit in establishing additional local geodetic control. Efforts to enhance vertical control (elevation) should be a greater priority than efforts to enhance horizontal control.

#### Data Stewards:

Data stewards are those entities that collect known reference positions with high-precision instrumentation while meeting national standards. These standards reside through the National Geodetic Survey (NGS). The geodetic control data for Nebraska comes from multiple sources.

These include:

- NOAA NGS
- County Surveyors
- Licensed Land Surveyors
- Nebraska Department of Roads
- Nebraska Department of Natural Resources
- Bureau of Land Management
- Farm Services Agency/Natural Resources Conservation Service

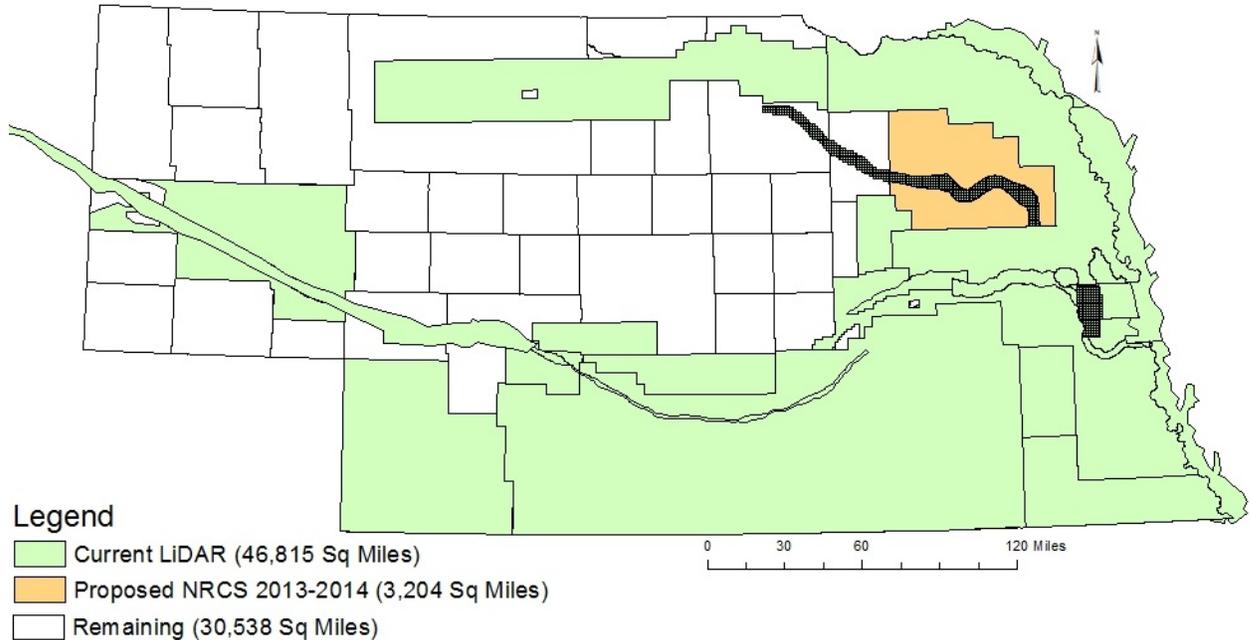
***Total Estimated Investment Cost to Date:*** Unknown

## **2. Elevation**

### Current Status:

A statewide elevation dataset was derived from the contours on the USGS 7.5 minute topographic contours. Elevation contours were hand-drawn using stereo images from photos that are decades old introducing potentially significant errors relating to a changing landscape. These contours are accurate between 2.5 and 10 feet and are derived from information that is from 24 to more than 70 years old. They have become too old and coarse to support current applications. Digital Elevation Models (DEMs) derived from these contours are accurate to within 2.5 to 10 feet relative to the contours from whence they came (1:24,000-scale DEMs, 1998 - NDNR and USGS). The ten-meter cells mask many important but smaller landscape features.

Enhanced digital elevation data started to be collected using LiDAR technology since 2004. LiDAR is an acronym for Light Detection and Ranging. Using this light based ranging technique along with real-time high accuracy Global Positioning Systems (GPS) allows the collection of millions of points along the surface of the earth in mere minutes. These points can be used to construct highly detailed and accurate topography.



Approximately 56% of the state has LiDAR coverage. Another 3,200 square miles in northeast Nebraska is planned for collection during the fall of 2013 or spring of 2014. The current elevation datasets were collected as 10 separate LiDAR projects over a 5 year span. Most were collected at a 1.4 meter Nominal Point Spacing (NPS) and are accurate to 18.5 cm Fundamental Vertical Accuracy (FVA), which was the industry standard at that time. One project along the Platte River has a 0.7 meter NPS and is accurate to 9.25 cm. Portions of Cuming County were collected at a 2 meter NPS which is accurate to 37.1 cm. Breaklines were developed for some of these acquisitions and the derivative products were created with the breaklines. Others had no breaklines and the derivatives were processed without.

Nebraska elevation projects were justified on the basis of:

- Emergency management and response planning (Floodplain mapping, dam safety assessments, H&H analysis, BFEs)
- Natural Resources and Environmental Science (Conservation planning, research, and delivery)
- Infrastructure planning - reduction of planning costs (Engineering design and design reviews, Evaluating alternative options for Infrastructure, field survey planning)
- Permit Process Improvement
- Research (Hydrologic modeling)
- Economic Development
- GIS Infrastructure (Ortho rectification, database development, cartography)

The City of Lincoln, Lancaster county, developed an enhanced DEM in 2004 using LiDAR through a USGS project. The Nebraska Iowa Regional Orthoimagery Consortium (NIROC) produced an enhanced DEM from LiDAR and multi-resolution DOQs in 2004. This also resulted in the development of 2 foot contours.

Data Steward(s):

- Natural Resources Conservation Service
- U.S. Corps of Engineers
- Various Nebraska Natural Resource Districts
- Department of Natural Resources
- Department of Environmental Quality

**Total Estimated Investment Cost to Date:** \$7,147,417

3. Aerial Imagery

The most current statewide color imagery was acquired in 2012 through the USDA Farm Services Agency (FSA) National Agriculture Imagery Program (NAIP). This imagery is typically the most widely used data set for base maps in web mapping services and other referenced type mapping applications. This imagery is 1 meter pixel resolution collected during the peak growing season (i.e., leaf-on status of vegetation). There are other imagery acquisition projects collected either regionally or by county areas of the state.

USDA FSA National Agriculture Imagery Program (NAIP)

The primary application of the NAIP program is to maintain common land unit (CLU) boundaries and assist with farm programs. The NAIP imagery program has been predominately financed at the federal level with the opportunity for local “buy-ups” of higher resolution data. The NAIP imagery resolution collected for Nebraska is a 1-meter ground sample distance (GSD) for 2003, 2006, 2007, 2009, 2010, and 2012. In 2004 and 2005, imagery was collected for compliance uses at the resolution of a 2-meter GSD. The spectral resolution is provided in 4-bands, containing red, green, blue, and near-infrared bands. Until 2006, the horizontal accuracy of all NAIP imagery was required to match within 5-meters to mosaicked digital ortho quarter quads. Beginning in 2006, imagery was tied to ground control points rather than an image source. The imagery needed to fall within +/- 6 meters of true ground at a 95% confidence level. The tiling format of all NAIP imagery is based on a 3.75' x 3.75' quarter quadrangle with a 300 meter buffer on all four sides. NAIP quarter quads are formatted to the UTM coordinate system using NAD83.

Estimated investment: \$7,014,080

United States Geological Survey (USGS) and Nebraska Department of Natural Resources (NDNR)

A partnership between the NDNR and USGS acquired statewide coverage of color orthoimagery for 1993 and 1999. This effort implemented the National Mapping Standards for primary digital ortho-photoquadrangle (DOQ) requiring a 1-meter ground resolution for quarter-quadrangle (3.75-minutes of latitude by 3.75-minutes of longitude) image. It was casted on the Universal Transverse Mercator Projection (UTM) on the North American Datum of 1983 (NAD83) and mapped to 1:12,000 scale. The vertical accuracy of the verified USGS format DEM is equivalent to or better than a USGS level 2 DEM, with a root mean square error (RMSE) of no greater than 7.0 meters. Field control was acquired by third order class 1 or better survey methods for sufficient spacing to meet National Map Accuracy Standards (NMAS) for 1:12,000-scale products.

Estimated investment: \$2,500,000

### Nebraska-Iowa Regional Orthoimagery Consortium (NIROC)

The Nebraska-Iowa Regional Orthoimagery Consortium (NIROC) consists of local government cities, counties, NRDs, state and federal agencies in the eastern most part of Nebraska. It has involved the core Nebraska and Iowa urbanized area but open to other entities to participate. The project is currently on a three year acquisition cycle that started in 2007 and will continue into 2016. The latest acquisition was in 2013 with a data collection of 4 and 9 inch orthoimagery and obliques.

Estimated investment: \$2,670,523

### **Central Nebraska Consortium**

The Central Nebraska Consortium involves eight cities and two counties. It started in 2007 collecting 6 and 12 inch imagery.

Estimated investment: \$266,776

### Data Steward(s):

Federal - US Geological Survey, USDA Farm Services Agency

State – Nebraska Department of Natural Resources

City/County/Regional – Nebraska Iowa Regional Orthoimagery Consortium (NIROC), Central Nebraska Consortium, other local entities based on needs for imagery acquisition.

**Total Estimated Investment Cost to Date:** \$12,684,604

## **4. Transportation/Roads**

Nebraska has approximately 96,725 miles of state and local roads. Of these roads, approximately 10 percent of these miles are state-maintained highways. Another 20 percent include local roads, considered either local arterial routes or local collector routes, and as such are of particular interest to state-level transportation planning. The remaining 70% of local roads serve primarily local transportation needs. There have been separate efforts to capture and maintain portions of the state and local road network in GIS transportation databases. A statewide street centerline data set was constructed in 2010 from enhanced 911 data to tie all the various data sets together. There is currently no sustainable and maintained effort to produce a comprehensive, integrated statewide transportation database. Each individual effort produces transportation data that is tailored to meet their unique agency missions, but at the same time does not include some transportation database elements that are needed by others. The accuracy and completeness of the current data will need to be assessed fully in spatial and attribute context. A GIS Council working group is currently assessing this data and developing a governance and standards for a future data set to exist.

Nebraska Department of Roads. Over the past decade, Nebraska Department of Roads (NDOR) has created, and continues to maintain a GIS database, with associated attribute records, for the 10,000 miles of state-maintained highways and the approximately 20,000 miles of local arterial routes and collector routes, at a scale of 1:24,000. Therefore approximately 30,000 miles of state and local roads are currently in the NDOR GIS transportation database, out of an overall statewide total of 96,725 miles.

Separate from its GIS system, NDOR also maintains county-specific, graphical CAD (computer-aided design) files that include graphical representations of all local roads in a given county. In this system, the local roads that make up 70 percent of all roads are represented by linear graphical symbology,

which is related to the particular road type (gravel, paved, etc.). This network consists of a Linear Referencing System (LRS) that also supports reporting requirements to meet federal standards.

During 2004, the Nebraska GIS Council convened an intergovernmental Advisory Committee on Transportation/Street Address Databases to explore the feasibility, merits and issues involved in developing and maintaining a combined statewide transportation/street address database. The Committee determined that such a combined approach to the development and maintenance of these two interrelated databases should be pursued and structured around efforts to integrate, on an on-going basis, the “best available” data from multiple sources. The Committee worked with NDOR to define a draft minimum subset of standard attributes that should be included in a comprehensive statewide combined transportation/street address database. Further action to formerly adopt these draft standards was deferred until after they could be “tested” as part of an NDOR pilot project. The NDOR conducted a pilot project in 2005 to evaluate this combined database approach and to develop and test software tools to facilitate data integration. The pilot project found that this combination/conflation approach to produce a “best available” dataset was workable, but with the currently available software tools, it was much more time consuming than originally anticipated. To date, no resources have been allocated for the development of such database.

Local Governments. Several local governments maintain local road transportation network GIS databases. This is particularly true in the more urbanized areas of the state (e.g., Omaha/Douglas County, Sarpy County, Lincoln/Lancaster County) as well as some of the less urbanized areas. In some cases, multiple databases are maintained within the same, or overlapping jurisdictions (i.e. city and county, or different departments). At the present time, there is no statewide database standard for how these local transportation databases are developed or maintained. There is also no state-level system for consistently “harvesting” this data and integrating it into a comprehensive statewide database.

Public Service Commission and Enhanced E911. The Public Service Commission (PSC), as part of its efforts to facilitate the development of Enhanced E911 automated emergency response call centers across the state, is working with many Nebraska counties to contract with private vendors to develop and maintain updated street centerline/address databases. Consistent with this mission, the PSC initiated database standards that are tailored to meet the requirements of a range of commercially available, automated dispatching systems. At the time, it was suggested to use currently available imagery to develop street centerline data layer using the 2003 NAIP statewide 1-meter DOQs. The PSC approach is county-specific and the vendor contracts are with specific local governments and the PSC. There was no intent or resources dedicated to the statewide integration of this data.

State Patrol and Statewide Computer-Aided Dispatch. The Nebraska State Patrol has developed a statewide computer-aided dispatch system for its Patrol officers and for the officers of the State Fire Marshall and Game and Parks Commission. While the State Patrol is not producing street centerlines or address data itself, this information is integral to the on-going operation of its CAD system. In 2006-07, a private vendor was contracted to undertake a data conversion and integration effort to integrate available street centerline data (from multiple sources) into the format required for the State Patrol CAD system. This was understood by all parties to be an interim step while a more comprehensive, integrated approach to meeting this on-going need for updated statewide street centerline/address data is developed.

US Bureau of the Census. In preparation for the 2010 US Census, the Census Bureau was in the midst of a major nationwide upgrade of its street centerline/address database, known as TIGER. Historically, the quality of the TIGER database has varied greatly (being particularly poor in rural

areas). While the Census Bureau is willing to accept data from political subdivisions and to some extent share its data with others, it is statutorily prohibited from partnering with political subdivisions in database development efforts.

Data Steward(s):

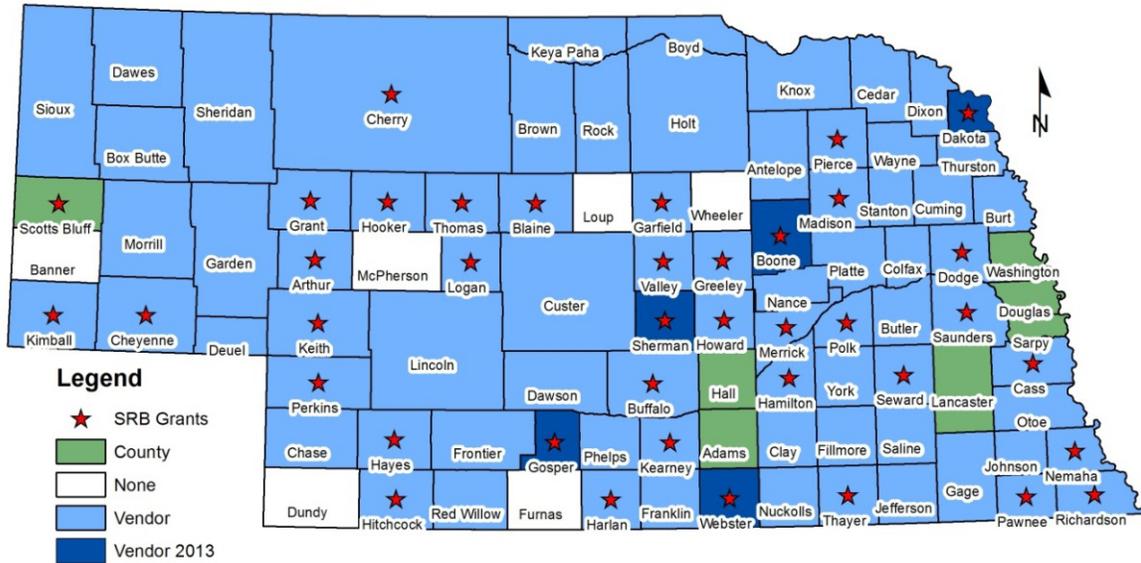
Data stewardship depends on the specific workflows related to development and maintenance of street centerlines and associate attribute data. Local governments need to be involved for street naming, address authority, and verification of road data. The Nebraska Department of Roads has federal requirements in reporting and has higher accuracy spatial requirements in placement of street centerline data. As a more comprehensive statewide street centerline database is developed other agency stewardship identification is forthcoming.

**Total Estimated Investment Cost to Date:** \$2,057,490 plus ongoing maintenance of \$532,000

**5. Cadastre / Parcels**

A basis for the initial development of a statewide cadastre framework involves two relatively low-resolution, statewide Nebraska PLSS databases. These PLSS databases are available for public use. The Nebraska Department of Natural Resources (NDNR) developed a statewide PLSS database in the early 1990s and another was developed by the U.S. Bureau of Land Management (BLM) in 1997 to provide a basis for Nebraska PLSS pilot projects. Using different methodologies, both databases were derived from digitizing section corners, as shown on the USGS 1:24,000 topographic quad maps, and therefore have a spatial accuracy, which cannot be verified without extensive investigation. The two databases have been crosschecked and adjusted for obvious errors beyond  $\pm 50$  ft.

The state currently has 95.8% of all parcels digitized in some form. There are six remaining counties left to digitize land records. The Nebraska State Records Board has provided more than \$928,965 in grant assistance to local county governments to digitize and create geodatabases of the data. Efforts are underway to create a statewide parcel database for use in public and state operations. The figure indicates which counties do their own service and those by outside vendors. The red stars represent state funds used to develop digitized parcel projects.



**Data Steward(s):** Local governments (e.g. county assessor, city engineer, county engineer, city/county surveyor), State Surveyor, Department of Revenue

**Total Estimated Investment Cost to Date:** \$9,138,112 with ongoing annual maintenance of \$65,840

## 6. Address Points

There is currently no statewide framework for geocoded address points for statewide business needs. The NPSC worked with local governments to contract with private vendors to develop and maintain street centerlines for use in automated dispatching systems for E911. This data consists of address break information in the street centerline data but not address points. Address points could be geocoded from breaks but do not provide adequate spatial location of the data to meet many state needs.

Individual state and city/county departments obtain third-party address data to fit other needs. The Office of the CIO and State Patrol purchased a master address geocoded database of the entire state. The plan is to involve other state agencies in the use of the data until a more comprehensive statewide master address database is created. A GIS Council working group is currently developing a business plan for the governance, standards, development and maintenance for a master address database.

**Data Steward(s):** There is no statewide coordination or data steward for addressing and address points for a seamless dataset in the state. Several entities purchase and maintain their own address point data. The Office of the CIO currently maintains the statewide master address point database with partnerships with other state agencies.

**Total Estimated Investment Cost to Date:** Other than the cost of purchased databases, some cities have started the process to create a set of address points. However, there is no cost information provided. There is no investment to date on creation of a statewide address point geodatabase.

## 7. Hydrography

The Nebraska Department of Natural Resources (NDNR) has been formally designated as the state's data steward and collaboratively developed the statewide hydrography data set in association with USGS's National Hydrographic Data Set Program (NHD). NDNR continues to maintain this data set.

- Streams and Water Bodies (NDNR/USGS)
- National Hydrography Data Set (NHD) - Statewide high-resolution digital mapping of Nebraska's surface water features
- Database design incorporates numerous intelligent features, including river and stream addressing schema
- USGS migrating to new data model and NHD Community working on value –added attributes (VAAs)
- Dataset completed 2006 and continues to be updated
- Stewardship in place
- User group promotes and facilitates use of new database

### Data Steward(s):

Nebraska Department of Natural Resources; United State Geological Survey (USGS)

**Total Estimated Investment Cost to Date:** Unknown

## 8. Political and Administrative Boundaries

The Nebraska Legislative Office along with many state agencies create and maintain many statutory boundaries. Redistricting for various city and state intergovernmental boundaries with Census data was updated in 2010-2011. County boundaries reside from USGS source materials. Other boundaries are collected from counties, cities, state agencies and other jurisdictions. A comprehensive review of these boundaries will need to be assessed for spatial matching to likewise jurisdictional boundaries in the NESDI.

### Data Steward(s):

The following is a list of data stewards along with political and administrative boundaries.

Clerk of the Legislature: Legislative Districts, Congressional Districts, State Board of Education, Board of Regents, Supreme Court Districts

Nebraska Department of Natural Resources: NRD Districts, Counties Fire Districts

Nebraska Game and Parks Commission: Game and Parks Districts, Game and Parks Lands

Nebraska Department of Education: School Districts

Nebraska Department of Roads: Municipal Boundaries

Nebraska State Surveyor: Township/Range

Bureau of Indian Affairs: Tribal Lands

**Total Estimated Investment Cost to Date:** Unknown

## 9. Soils

Statewide Digital Soil Survey data is provided through the federal Natural Resource Conservation Service (NRCS) and updated on an annual basis. In 2004, a five-year effort by three agencies (USDA-NRCS, Conservation and Survey Division-UNL, and the Nebraska Department of Natural Resources) developed statewide digital SSURGO county soil surveys.

SSURGO stands for 'Soil Survey Geographic'. This data set is a digital soil survey and is the most detailed level of soil geographic data developed by the National Cooperative Soil Survey. The information was prepared by digitizing maps, by compiling information onto a planimetrically correct base and digitizing, or by revising digitized maps using 1993 DOQ/DEM base maps.

Mapping scales for Nebraska surveys were either 1:12,000 or 1:24,000 scale. The accuracy of these digital data is based upon their compilation to base maps that meet National Map Accuracy Standards at a scale of 1 inch equals 1,000 feet. The difference in positional accuracy between the soil boundaries and special soil features locations in the field and their digitized map locations is unknown. The locational accuracy of soil delineations on the ground varies with the transition between map units.

Information on current status of individual survey areas can be found on Web Soil Survey. Currently the Webster County, Nebraska survey is missing from Web Soil Survey but should be reposted sometime in December of 2013. <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>  
<http://websoilsurvey.sc.egov.usda.gov/DataAvailability/SoilDataAvailabilityMap.pdf>

Steward: USDA Natural Resources Conservation Service (NRCS), Nebraska Department of Natural Resources (NDNR)

**Total Estimated Investment Cost to Date:** Unknown

## 10. Groundwater Features

The majority of groundwater features have been developed through Conservation and Survey Division (CSD). Some of the primary datasets include: Configuration of the Water Table 1979 and 1995 (updates forthcoming for 2010); Generalized Depth to Water 1996 (updates forthcoming for 2010); and, Thickness of the Principal Aquifer 1980. These maps have been developed by CSD geologists and compiled at a scale of 1:250,000. Forthcoming updates incorporate digital mapping techniques and are generally compiled at a scale of 1:500,000. The CSD compiles the Nebraska Statewide Groundwater Level Monitoring Report annually with representative maps compiled at the scale of 1:500,000. The CSD also maintains a real time groundwater level monitoring network.

For water wells, different agencies have developed and maintained separate identification schemes that are used to index the data they collect and maintain. The best available universal well identifier system is the Registered Well ID maintained by NDNR.

Stewards: Nebraska Department of Natural Resources; Natural Resource Districts; Conservation and Survey Division

**Total Estimated Investment Cost to Date:** Unknown

## **11. Watershed Boundaries**

The watershed boundaries for Nebraska originated through development efforts by the USDA NRCS and incorporated into the National Hydrography Data Set.

A variety of public agencies (local, state, and federal) and private entities utilize standardized watershed delineations (hydrologic units) for a wide variety of natural resource planning and regulatory applications. Hydrologic unit boundaries define the areal extent of surface water drainage to a downstream "pour" point. A standardized national watershed boundary dataset (WBD), which subdivides watershed areas into sub-basin areas of 250,000 acres or more (average size 450,000 acres) has been in existence and widely used for several years. This dataset is commonly known as the 4th level or 8-digit HUCs (Hydrologic Unit Catalog), in reference to the standardized, 8-digit numerical identifiers associated with each delineated sub-basin.

For many applications, these 8-digit watershed subdivisions are still too coarse or cover too large of an area (450,000 acre average). Consequently, new national standards were developed to guide the development of standardized watershed delineation databases that further subdivide basins into smaller watershed areas (levels 5th and 6th). Since then these new 5th and 6th level watershed delineations have been developed and certified for completion in 2005.

Stewards: USDA Natural Resources Conservation Service (NRCS), Nebraska Department of Natural Resources

**Total Estimated Investment Cost to Date:** Unknown

## **12. Land Use / Land Cover**

No entity is currently charged with inventory or assessment of Nebraska's land use or land cover (although CSD's charter could be interpreted to include such work). All recent efforts to assess and map Nebraska's land cover or land use have been project to project and grant-funded. Land use and land cover are distinctly different and are best presented as two separate databases. Land cover is defined as the type of material that covers the earth's surface at a specific location at a specific time. Land use is the manner in which human beings utilize a specific tract of the earth's surface at a specific time.

A survey conducted by UNL CALMIT in 2007 for the Nebraska GIS Council indicated at least 54 agencies/organizations have a need for land use and/or land cover information (e.g., for wildlife habitat assessment, conservation planning, facilities siting, utilities routing, emergency preparedness and response, water quality assessment, environmental hazard assessment, property valuation and appraisal, and municipal and county planning and zoning). CALMIT has a record in land use and land cover mapping that goes back over 35 years. Land use/land cover products have never been systematically archived, documented or made available to the public.

### **Land Cover/Land Use Data Produced by UNL CALMIT**

- Land Cover of Nebraska (Gap) - 1992-3
- Platte River watershed west of Columbus (COHYST) - 1997
- Platte River watershed west of Columbus (COHYST II) – 2001
- Platte River watershed west of Columbus (COHYST II) – Change analysis 2001-1997

- Statewide Agricultural Land Use (COHYST II) – 2005
- Niobrara River Watershed - 2000
- Republican River Watershed - 1995
- Rainwater Basin Joint Venture - 2000
- Standardized Vegetation Index - 2000

#### **Other Land Cover and Related Datasets**

- NRD land use maps (produced by CSD ca. 1972)
- Land use of Nebraska (1:1,000,000) - produced by CSD 1974
- Historical vegetation of Nebraska (CSD)
- USGS Land Use/Land Cover Data (“LUDA”) -1980's
- USGS National Land Cover Dataset - 1993
- USGS National Land Cover Dataset – 2001 and 2006
- USGS GAP Land Cover Dataset (with focus on vegetation classification) - 2001
- USDA NASS Crops and Land Cover - Nebraska (2002-present)
  - USDA National Resources Inventory
- National Wetlands Inventory
- EPA - Omernik’s Ecoregions of Nebraska
- USDA - Major Land Resource Areas
- USFS - Bailey’s Ecoregions of Nebraska

Steward(s): Nebraska Department of Natural Resources; Natural Resource Districts, Game and Parks Commission, State Surveyor

**Total Estimated Investment Cost to Date:** Unknown

For more information:

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