

City of Superior / Douglas County

Enterprise Geospatial Data Infrastructure

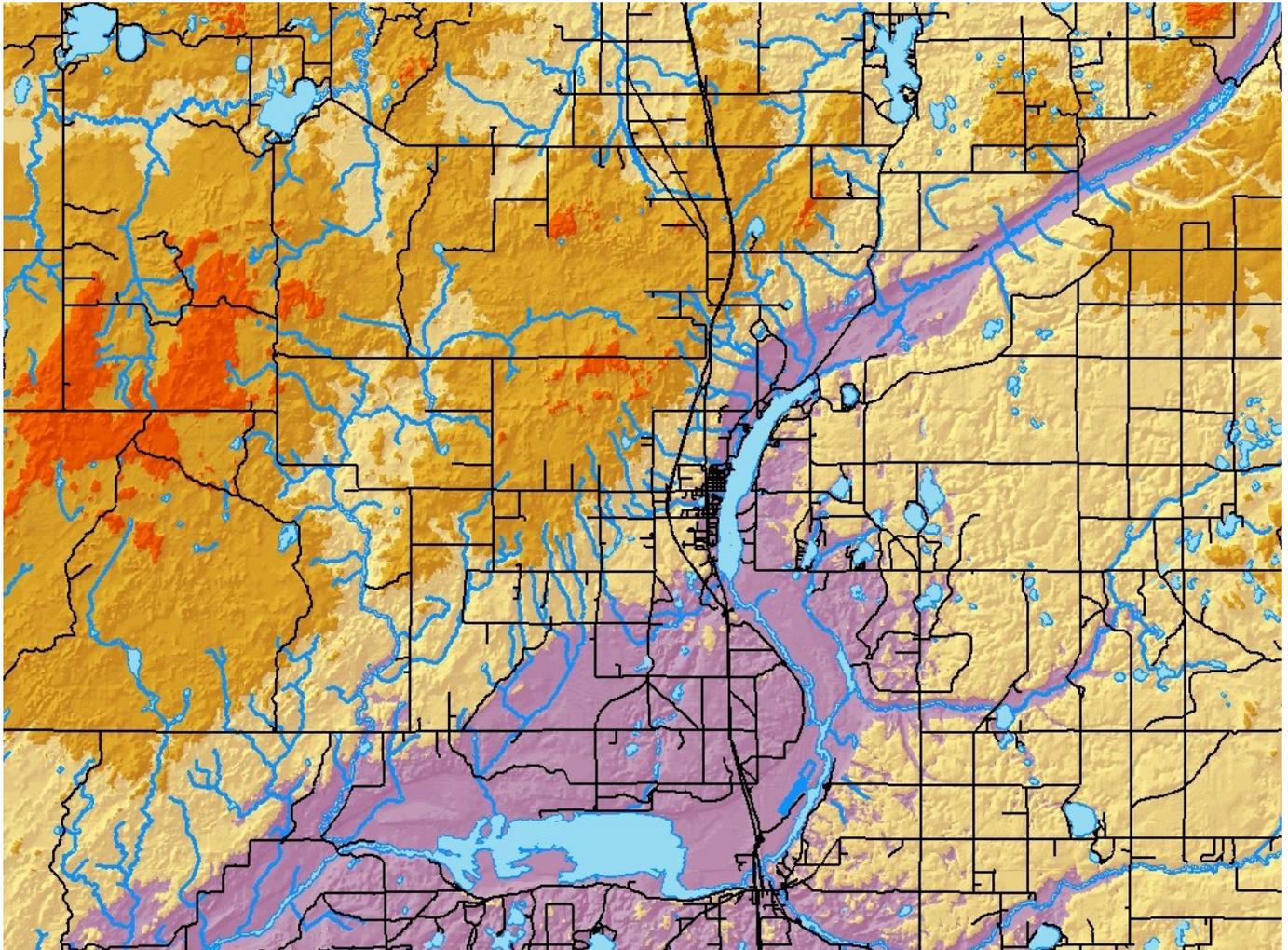


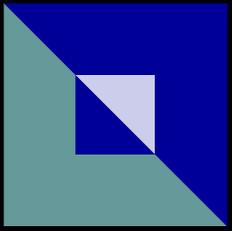
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2008-2010
Version 1.3





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Prepared For: City and County Geospatial GIS Users

Version 1.3 Revised 1-10-09

The City of Superior and Douglas County would like to thank St. Louis County, Minnesota and their Planning, Research, GIS Department and Staff for all the assistance getting the enterprise system and this data catalog up and running. Without their help it would have been a much longer process.

This data infrastructure is a hybrid of St. Louis County's, "*Geospatial Datasets: Core Enterprise Geospatial Data Infrastructure*" For more information on the St. Louis County's Geospatial Data Infrastructure, please contact:

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Introduction: Geospatial data is perhaps the most important component to a successful enterprise Geographic Information System (GIS). All analysis, research, mapping, and data integration starts with a high-quality set of geospatial data.

The City of Superior and Douglas County have been investing in GIS and geospatial data since the early 1990's. While the city/county is rich in data, it lacks a coordinated infrastructure for managing that geospatial data in a most efficient and cost effective manner. Geospatial data can be difficult and costly to acquire and maintain, so it is imperative that the city/county establish a strong coordinated enterprise geospatial data infrastructure system.

This document is intended to serve as a guide to organizing geospatial data types across Douglas County. It covers twelve categories of data that will be referred to as "Enterprise Geospatial Data Infrastructure." It follows national and state organizational standards while recognizing Douglas County's unique differences. As the City of Superior and Douglas County build and maintains their enterprise GIS the enterprise geospatial data categories will be followed as closely as possible to ensure that city/county geospatial data management continues to improve. Which will bring about efficiencies and cost-savings, as well as decision support capabilities that have previously been difficult to realize.



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City of Superior / Douglas County: Data Overview

The City of Superior and Douglas County have adopted the following standards from St. Louis County, MN. This is a geospatial data structure to be used in developing and organizing geospatial data that is interoperable and cataloged along Federal, State, and local structures.

SDE.DBO.E911_COS_FIRE_DISTRICTS

Data Categories

(SDE Naming)

DATABASE.SCHEMA.CATEGORY_(SOURCE)_GEOGRAPHY_LAYERNAME

Imagery

IMAGE

Imagery typically refers to aerial photography, which is used for many purposes at the City of Superior & Douglas County. It is effective as a "background" layer to other geospatial data, and can be used by GIS specialists to delineate real-world features.



Cadastral (Parcels)

CDSTRL

The Cadastral (Parcel) layer at the City of Superior & Douglas County is the fundamental tool for analyzing land ownership information. The county is in the process of developing parcel data. This data will provide the foundation for many applications across the county pertaining to land ownership.



Transportation

TRANS

Transportation features typically include roads (centerlines), trails, airports, shipping ports, and other representations of features that depict the transportation systems in the county. The road centerline layer is critical since it provides the necessary information for emergency dispatch and public works maintenance.



Addressing & Places

ADDRPLCS

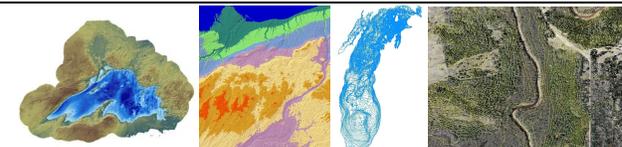
The city/county recently completed an official Address Point layer for use in GIS systems across departments. The address dataset can be used for emergency dispatch and other law enforcement purposes, as well as a further piece of information for land use planning with the parcel data layer.



Elevation

ELEV

Elevation data, typically in the form of contour maps and Digital Elevation Models, is used extensively for modeling the surface of the earth. This type of information is useful for departments such as Land, Planning, Public Works, and others as they determine appropriate land uses, forestry and construction processes.



Structures

STRUCT

Structural data, often known as planimetrics, will be developed in the future to highlight the locations and dimensions of buildings and important structures throughout the county. Along with parcel and address data, this information will be particularly useful for law enforcement, planning, and assessment purposes.



Utilities

UTIL

Utility data is utilized for site planning, economic development, land use planning, emergency / homeland security, and many other operations at the city/county. Having an understanding of the locations of utility features (electric, gas, sewer, water) is key to development and emergency response.



Administrative Boundaries

ADMIN

Many administrative boundaries exist within the City of Superior and Douglas County. Examples include municipalities, state and federal management areas, zoning districts, and many more. Geospatial analysis depends on these boundaries to render accurate results.



Geodetic Control & PLSS

GEOD

Geodetic control refers to precise surveys covering very large areas such as the High Accuracy Reference Network (HARN) developed in Wisconsin in the 1996. The Public Land Survey System is the basis for all land titles and property descriptions in Wisconsin. With GPS surveying, PLS corners can be referenced to geodetic control.



City of Superior / Douglas County: Data Overview

The City of Superior and Douglas County have adopted the following standards from St. Louis County, MN. This is a geospatial data structure to be used in developing and organizing geospatial data that is interoperable and cataloged along Federal, State, and local structures.

SDE.DBO.E911_COS_FIRE_DISTRICTS

Data Categories

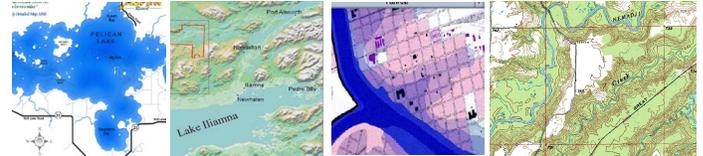
(SDE Naming)

DATABASE.SCHEMA.CATEGORY_(SOURCE)_GEOGRAPHY_LAYERNAME

Environmental

ENVIRO

The physical world within and around Douglas County is represented with numerous environmental layers. Lakes, rivers, streams, wetlands, soils, land cover/land use, geomorphology, mining areas and many other physical earth features will be available for use in mapping and analysis.



Emergency Operations

E911

In addition to the layers listed above, the Sheriff's, 911 Communications, and others will utilize additional geospatial data in emergency response situations such as response districts, hazard areas, critical infrastructure, and other emergency geospatial data to conduct emergency operations.



Recreation

REC

Recreational use trends are increasing around the state and in Douglas County. Recreation information is represented in various layers. Some of the layers are Boat Accesses, Hunting Sites, Trailheads, Marinas, Parks, Points of Interest and many more are available for use in mapping and analysis.



NSDI: National Spatial Data Infrastructure(Seven main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, and Hydrography)

WSDI: Wisconsin Spatial Data Infrastructure(In Development)

MSDI: Minnesota Spatial Data Infrastructure(Eight main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, Hydrography, and Soils)

GN: GIS for the Nation(Fourteen main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, Hydrography, Environmental, Land Use/Land Cover, Addresses, Utilities, Structures/Critical Infrastructure, Emergency Operations, and Base Map)

Feature Class Geography & Source Index (GLOBAL.DBO.ENVIRO_WIDNR_DC_Wetlands)

Geography

COAWI = City/County of Ashland
 COD = City of Duluth
 COS = City of Superior
 COSDC = City of Superior & Douglas County
 DC = Douglas County
 GL = Great Lakes Region
 MI = Michigan
 MN = Minnesota
 US = United States
 STL = St. Louis County Minnesota
 WI or STATE = State of Wisconsin
 WW = Worldwide

ARDC = Arrowhead Regional Development
 Comm.
 Census = US Census
 DU = Ducks Unlimited
 ESRI = Environmental Systems Research Institute
 GLA = Great Lakes Association
 GLIN = Great Lakes Information Network
 GNIS = Geographic Names Info System (USGS)
 LHB = LHB Corporation
 MIDNR = MI Dept of Natural Resources
 MNDNR = MN Dept. of Natural Resources
 NCT = North Country Trail Association
 NPS = National Park Service

Data Source

NWRPC = Northwest Regional Planning
 Comm.
 SALO = Salo Engineering
 SEH = Short Elliott Hendrickson, Inc.
 SWLP = Superior Water, Light & Power
 USFS = US Forest Service
 USFWS = US Fish & Wildlife Service
 USGS = US Geological Survey
 USGS_NHD = US Geological Survey National Hydrology Data
 WHS = WI Historical Society
 WIDNR = WI Dept. of Natural Resources



City of Superior / Douglas County: Data Sub-Categories

The City of Superior and Douglas County have adopted following sub-categories or themes from St. Louis County, MN to further assist in cataloging geospatial data as follows:

Sub-Categories

(SDE Naming)

Imagery

Leaf-Off Aerial
Color Infrared Aerial
Natural Color Aerial

Oblique Aerial
Satellite Images
Ground-Level Photos

Miscellaneous Photos
LIDAR-based Imagery
Scanned Documents

IMAGE



Cadastral (Parcels)

Parcels
Subdivisions/Plats
Blocks

Lots
Right-of-Way
Lease Sites

Discrepancy Points
Pre-Placement

CDSTRL



Transportation

Roads
Forest Roads
Trails

Railroads
Waterways
Airports

Seaports
Alleys

TRANS

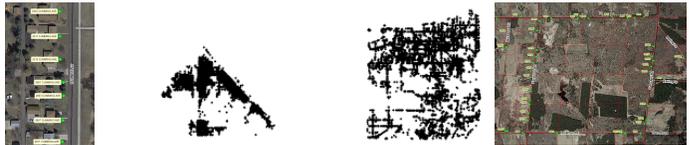


Addressing & Places

Address Points
Geocoding Services

Driveway Locations
Places

ADDRPLCS

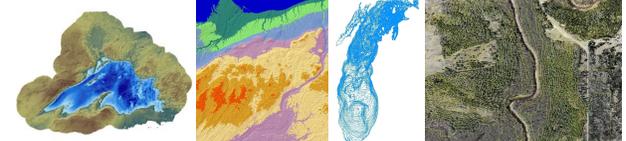


Elevation

Digital Elevation Models
Digital Raster Graphics
Digital Terrain Models

Point-specific Elevations
LIDAR-based points

ELEV



Structures

Building Footprints
County Facilities
Driveways
Parking

Apartment Buildings
Dumpsters
Wells

STRUCT



Utilities

Electric Lines
Gas Pipelines
Sewer Lines

Water Lines
Utility Poles
Radio Towers

Fire Hydrants
Manholes
Steam

UTIL



Administrative Boundaries

Jurisdictional
Judicial
Political
School District

Zoning
Voting
Zip Code
Service Areas

Tax Forfeit
Econ Dev
DNR / Census
TIF/BID Districts

ADMIN



Geodetic Control & PLSS

HARN
PLS Corners
PLS Lines
Sections

Quarter Lines
Quarter-Quarter Lines
Site-specific survey data

GEOD



City of Superior / Douglas County: Data Sub-Categories

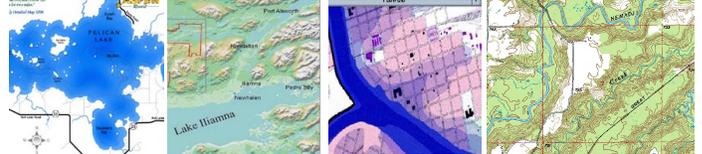
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Sub-Categories (SDE Naming)

Environmental

ENVIRO

Lakes	Soils	Climate & Weather	Trees
Rivers & Streams	Land Cover	Vegetation	
Wetlands	Geomorphology	Physiography	
Watersheds	Flood Plains	Mining	



Emergency Operations

E911

Police Districts/Stations	Evacuation Routes	Disaster Recovery
Fire Districts/Stations	Shelters & Em. Facilities	Hazard Mitigation
First Responders District	Critical Infrastructure	
Ambulance Districts	Road Closures, Ports	
Incidents & Hazards	Containment Areas	



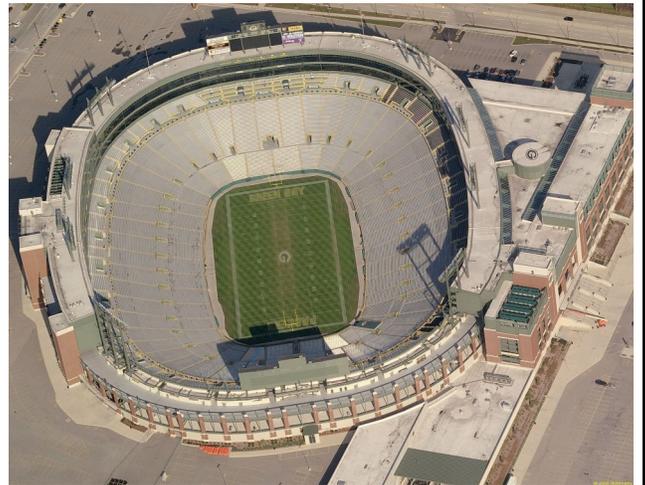
Recreation

REC

Hunting Sites	Parks
Archery Sites	Points of Interest
Boat Accesses	Marinas
Trail Heads	Fishing Piers



NSDI: National Spatial Data Infrastructure(Seven main framework themes: Imagery, Cadastral, Transportation, Elevation, Administrative Units, Geodetic Control, and Hydrography)
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City of Superior / Douglas County: Licensing and SDE

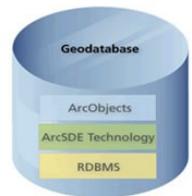
ESRI Enterprise Licensing Agreement

In July of 2008 the City of Superior and Douglas County jointly entered into an Enterprise Licensing Agreement with ESRI the software manufacturer of the GIS software used at the city/county. The agreement is a three year contract that allows for unlimited use of the ESRI ArcMap and ArcEditor software programs and includes the core extensions for those programs. In addition to the user programs, the Server licenses, ArcGIS Server are also unlimited. Which allowed the city/county to move to an enterprise system for its GIS data and software. Currently the City and County are running one Spatial Database Engine (SDE) Server with SQL 2005 as the RDBMS.

For licensing information for city or county employees, please contact the City of Superior GIS Coordinator or the Douglas County GIS Technicians or email gishelp@ci.superior.wi.us.



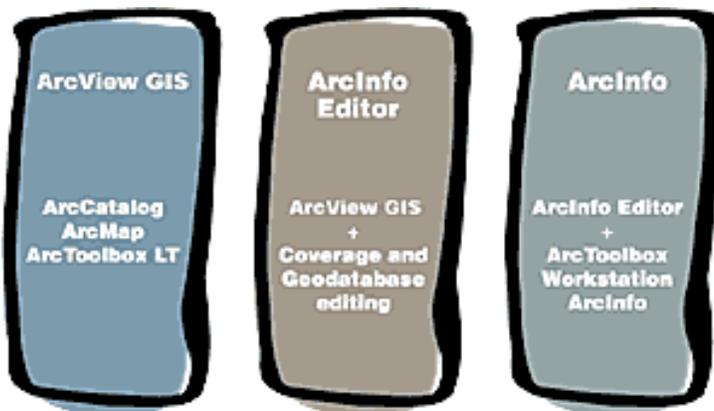
Geodatabases in the Spatial Database Engine (SDE)



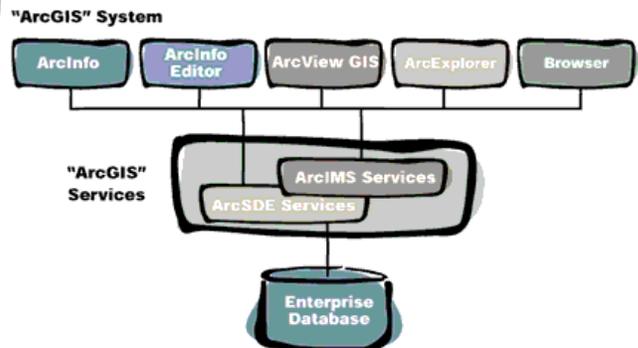
Currently in the City/County GIS SDE there are four (4) Enterprise Geodatabases:

- SDE which is the city/county vector data that is created, edited and/or maintained by city/county GIS staff
- Global which is the vector data from other sources. Agencies like the USGS, WIDNR, WisDOT, etc. This is data that we do not maintain or need to edit.
- Raster which is the raster data the city/county staff uses. Aerial Photography, DRGs, DEMs, RNCs, etc.
- Historical which is any vector data that needs to be archived periodically for historical use and analysis.

Connection to the SDE Geodatabases is made through either ArcMap or ArcCatalog and requires version 9.2 SP 5 or 9.3 of ArcMap.



ESRI Software Architecture



City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Imagery



About

Imagery, in the broadest sense, refers to pictures of features that are typically captured via remote sensing methods. Typically, in a GIS setting, these types of images include aerial photography and satellite imagery; but the types of images available to the county for use in a GIS are many and varied. Aerial photography, in particular, is extremely valuable in GIS applications because it provides a real-world backdrop to all other features being mapped or analyzed.

Types (Examples)

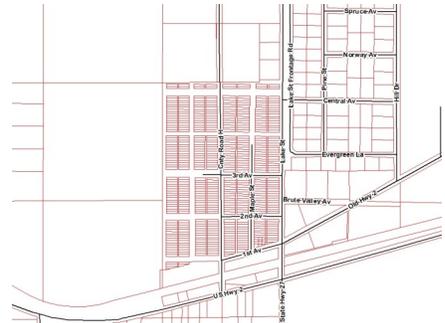
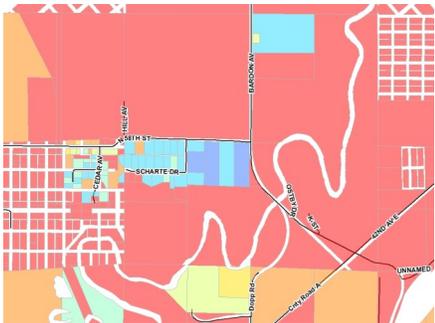
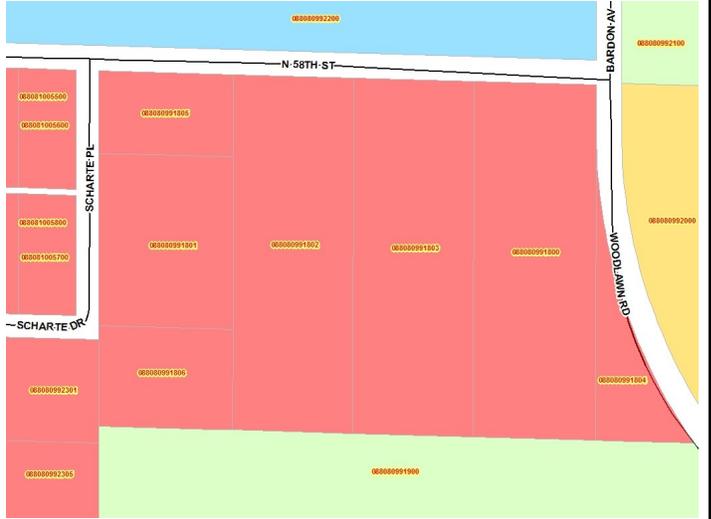
- Orthophotography
- Oblique Aerial Photography
- Infrared
- Satellite Imaging
- Radiometer
- Imaging Radar
- Thermal Imaging
- Radar Scanning
- Light Detection and Ranging

Purpose & Use

The City of Superior and Douglas County utilize imagery, particularly aerial photography, for providing a snapshot of the features that exist on or near ground level in the real world. The county's many types of aerial photography can be used for different types of analysis:

- Identifying buildings and infrastructure
- Monitoring forest growth and tree health
- Identifying agricultural resources
- Determining land use and land cover
- Law enforcement and emergency operations

City of Superior / Douglas County: Cadastral (Parcels)



About

A cadastral (parcel) layer is a digitally stored spatial representation of a legal description, linked to many attributes about the property such as land ownership, parcel size, configuration, land use, improvement values and other related information. One way of thinking about parcel data is to consider it as a digital version of a plat book; but in reality, the data contained within parcel data is much more detailed and designed for analysis. From a county perspective, the presence of a cadastral (parcel) layer allows for the building of an integrated system of land management information.

Types (Examples)

- Parcels
- Subdivisions
- Blocks
- Lots
- Right-of-Ways
- Lease Sites
- Discrepancies
- Annotation
- Topology

Purpose & Use

The City of Superior and Douglas County utilizes the parcel and PLS data to describe and visually identify land ownership. The parcel is the fundamental base from which taxes and assessments are calculated, and it is the basis by which all land-related decisions are based.



City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Addressing & Places



About

Addressing refers to the collection of physical address features and common names of places. These are typically stored as points which reference building locations or driveway entrances. The physical address is important since data is often referenced to addresses, which will help to reference the real world features, access points and other land record data.

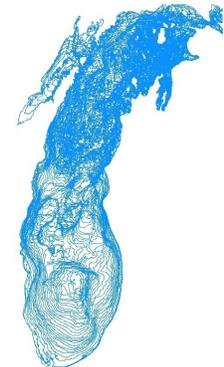
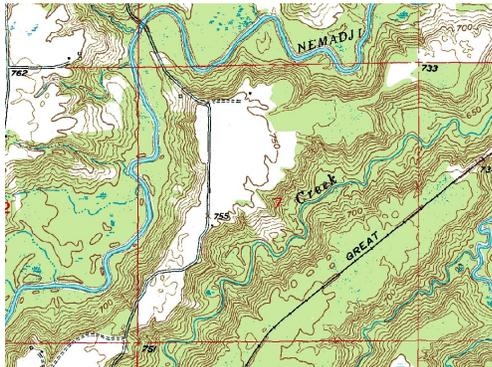
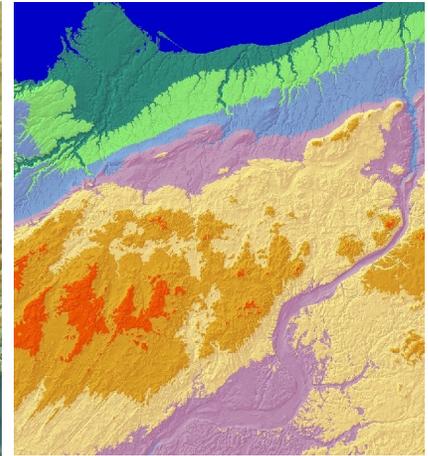
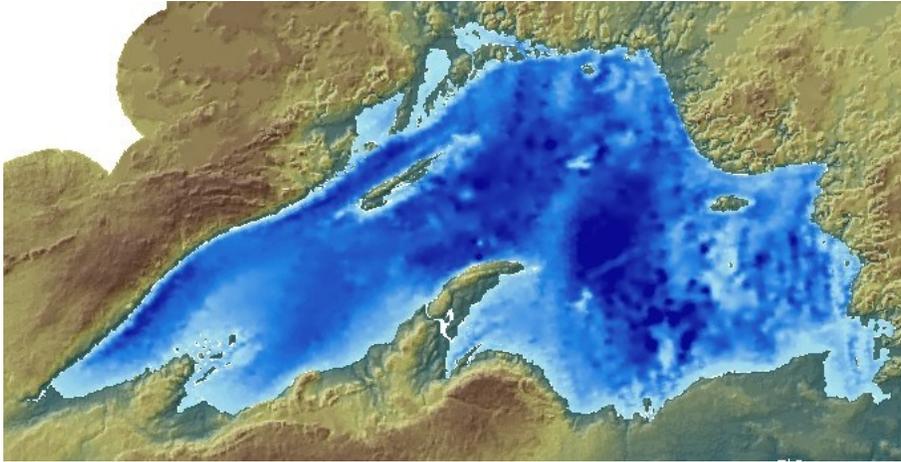
Types (Examples)

- Address Points (Geocoded)
- Places
- Address Grids
- Address Annotation
- Address Locators

Purpose & Use

The City of Superior and Douglas County utilizes address and place data for emergency response and all planning related activities on the parcel level. Addressing is important for emergency response and other law enforcement because it provides the actual physical location of buildings and access points (driveways, etc.) which is sometimes not the case with parcel data. Address information will also be very useful for many county departments in helping to identify multiple land or property ownership issues such as apartment buildings or other multi-unit dwellings. It is important for property notification for various projects, programs, and statute requirements.

City of Superior / Douglas County: Elevation



About

Land elevations and topography is critical to making informed land use decisions. The topography, or “lay of the land”, is an indicator of land use suitability and development potential. It also plays an important role in characterizing the effects of drainage, stormwater runoff, vegetation removal, and other environmental and man-made factors.

Elevation data takes many forms, although typically in a GIS environment, it is formatted as a raster Digital Elevation Model (DEM), Digital Terrain Model (DTM) or contour map Digital Raster Graphic (DRG.) Each of these elevation data models has different characteristics that dictates analysis potential. Another form of elevation data can include point-specific elevation readings collected by surveyors or technicians in the field.

Types (Examples)

- Digital Raster Graphic (DRG)
- Digital Elevation Model (DEM)
- Digital Terrain Model (DTM)
- Point-Specific Elevations
- Contours
- Bathymetry
- Hillshade

Collection methods include stereoscopic aerial photo interpretation, Light Detection and Ranging (LIDAR), or field surveys and observations.

Purpose & Use

The City of Superior and Douglas County utilize elevation data throughout the various departments for a number of applications:

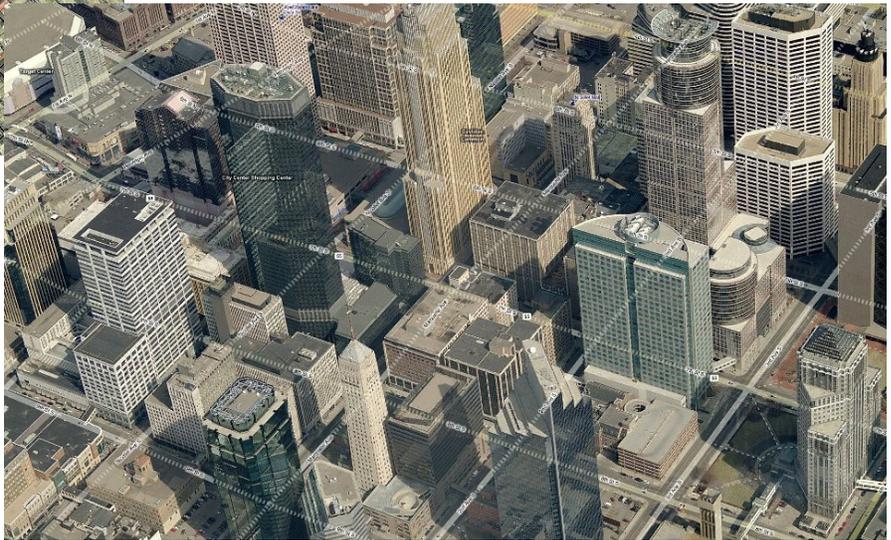
- Development and building suitability analysis
- Vegetation/forestry analysis
- Public Works road construction & maintenance



City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Structures



About

Structural data, or planimetrics, is geospatial data that depicts the location, orientation, shape, sizes and other useful information about buildings, critical infrastructure, and other non-utility manmade features. Understanding the location and layout of buildings helps county departments to more accurately assess property values, and make land use or resource decisions based on human construction activity on the land. Other operations, such as emergency dispatch, are greatly aided by the availability of structural data (planimetrics).

Types (Examples)

- Building Footprints
- Driveways
- Parking
- Sidewalks
- Septic Systems
- Wells

Building footprints, and other planimetric data are typically collected by interpreting shapes from aerial photography, or by field collection of building and other footprint dimensions. Occasionally, field observations are also used to verify these determinations.

Purpose & Use

The City of Superior and Douglas County identifies the locations and sizes of buildings or other man-made structures. Which is increasingly important for determining land values and making informed decisions pertaining to land use. The information contained in planimetric layers attributes can include a number of characteristics about each structure. This data is useful not only for the planner or assessor, but also many other departments that can utilize such data for land use or resource management, emergency/911 dispatch and operations, and more. Structures (Planimetrics) can be a source for identifying critical infrastructure for maintenance or emergency purposes.



City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Utilities



About

Utilities data refers to information about linear features such as electric transmission lines, gas pipelines, water lines, sewer lines; and point features such as utility poles, towers, fire hydrants, and the like. This type of information is used for modeling land use and development scenarios, 911/emergency operations and response, public works construction and maintenance, and potentially many other applications in city/county government. Utilities are, in a sense, a form of planimetric data, but their importance to city/county operations warrants a separate category within the core geospatial data categories.

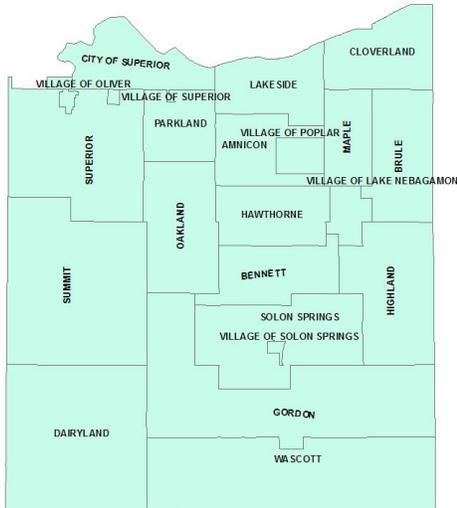
Types (Examples)

- Electric Transmission Lines
- Gas Pipelines
- Sewer Lines
- Water Lines
- Utility Poles
- Radio Towers
- Fire Hydrants
- Manholes

Purpose & Use

Utilities data is important to city/county operations, particularly for planning purposes: land use decision support, future zoning, building potential and suitability, economic development initiatives, and more. Departments such as Public Works need to know utility information to properly maintain and construct roads, bridges, and other infrastructure. The Sheriff's Department and 911 may need to respond to incidents involving utilities, so having this information available in a geospatial format is critical to responding effectively and safely.

City of Superior / Douglas County: Administrative Boundaries



About

Boundaries refer to any line or partition that is used for separating features or limiting movement from one area to another. Sometimes boundaries are represented by real physical objects; but in many cases, boundaries are intangible, perceived lines based on legal or other descriptions. In the case of perceived boundaries, common examples include administrative or jurisdictional lines such as municipalities, counties, park districts, and other governmental units. Additionally, regulatory features such as zoning districts can be found along with the Administrative Boundary layers.

Types (Examples)

- Administrative
- Political
- Jurisdictional
- Statistical (Census)
- Zip Code
- School Districts
- Management Areas
- Special Districts
- Voting Districts
- Zoning Districts
- Service Areas

Purpose & Use

The City of Superior and Douglas County needs to utilize boundary information for numerous reasons. Land use is affected by jurisdictional or physical boundaries, as are almost all other city/county decisions where various physical factors, governing bodies, or agencies operate within or around the county. Even statistical boundaries, such as census areas, need to be factored in many decision making processes.



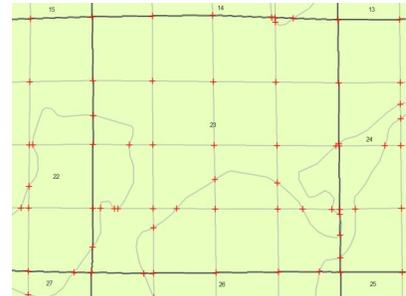
City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Geodetic Control & PLSS



35	36	31	32	33	34	35	36	31	32
02	01	06	05	04	03	02	01	06	05
11	12	07	08	09	10	11	12	07	08
14	13	18	17	16	15	14	13	18	17
23	24	19	20	21	22	23	24	19	20
26	25	30	29	28	27	26	25	30	29
35	36	31	32	33	34	35	36	31	32
02	01	06	05	04	03	02	01	06	05



About

Geodetic Control consists of a network of widely spaced precise survey markers established throughout Douglas County. This network is part of the state wide High Accuracy Reference Network (HARN) which in turn is connected to the North American network (NAD83) and the whole world (WGS84). It is this network that allows the GIS to be developed in "Real World" coordinates so that it is geographically consistent with the rest of the world.

The building blocks for the parcel layer are contained within the Public Land Survey System (PLSS). The PLSS is the system by which surveyors have partitioned the land so it can be subdivided and described consistently. Douglas County possesses digital files that clearly define this rectangular survey system through Township and Range lines (36 sq. mi), Section Lines (square miles or 640 acres), Quarter and Quarter-Quarter sections (160 acre and 40 acre polygons, respectively). The PLSS forms the basis for all land titles and property descriptions in Wisconsin.

Types (Examples)

- HARN
- PLS Corners
- PLS Lines
- Sections
- Quarter Lines
- Quarter-Quarter Lines
- PLSS Annotation

Purpose & Use

Douglas County possesses a series of digital data, largely produced by other organizations, that reflects the Public Land Survey. In addition to these files, the surveyor at Douglas County are regularly updating and enhancing survey control information, such as the High Accuracy Reference Network (HARN) developed in 1996.

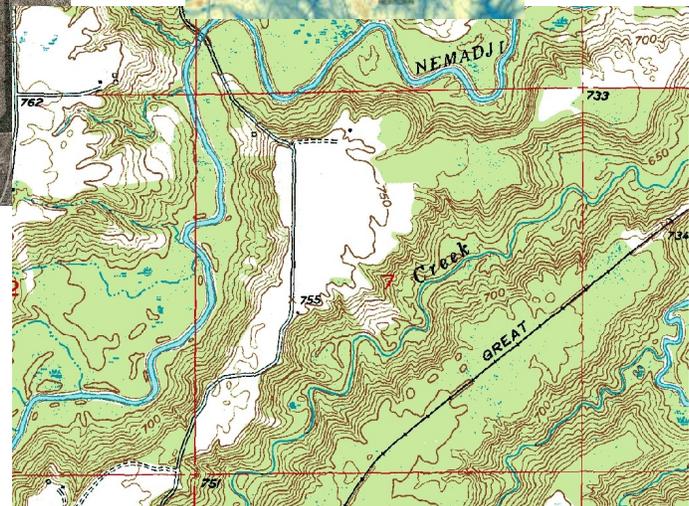
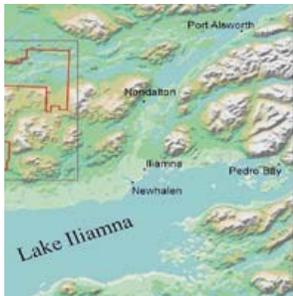
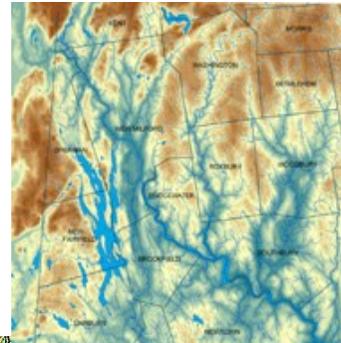
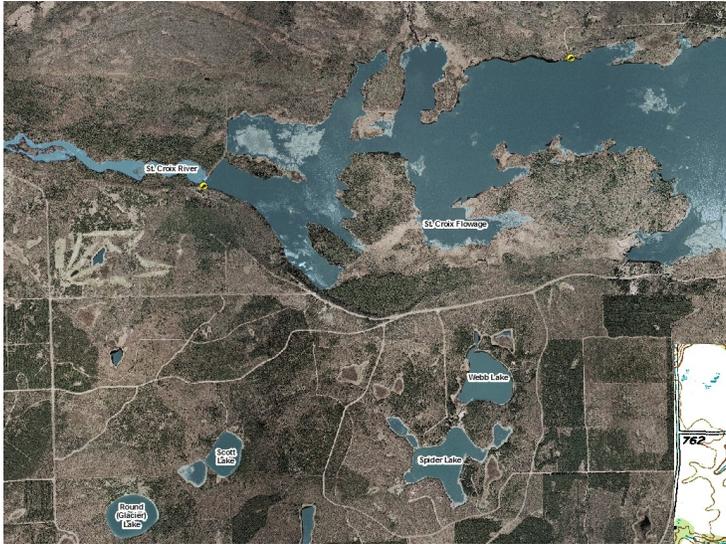
Modern technologies, such as satellite based surveying (GPS, etc.), allow for elements of the Public Land Survey System to be connected to the Wisconsin HARN; which in turn can be used to develop and analyze land ownership information.



City of Superior GIS Department
Douglas County Land Records
Superior, Wisconsin



City of Superior / Douglas County: Environmental



About

All natural features in Douglas County and surrounding areas will be found in the Environmental category. Important base map features, such as lakes and rivers, soils, land cover, wetlands, and geomorphology among others. Having access to this type of information allows the city/county to analyze all other information types against the realities of what exists in the natural world. Natural or Environmental features play a key role in determining development patterns, recreational opportunities, and many other aspects of the way the county's citizens live and the way the city/county does business.

Types (Examples)

- Water (Lakes and Rivers)
- Soils
- Land Cover/Land Use
- Geomorphology
- Flood Plains
- Climate Data
- Wetlands

Purpose & Use

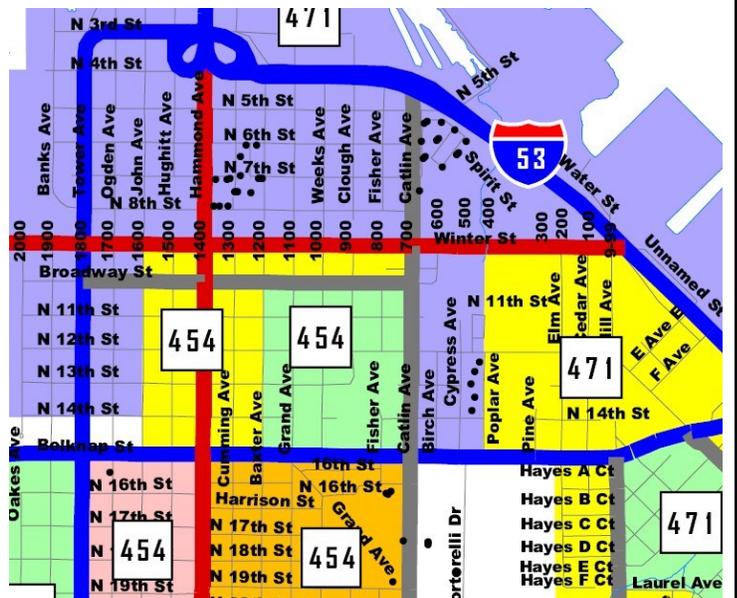
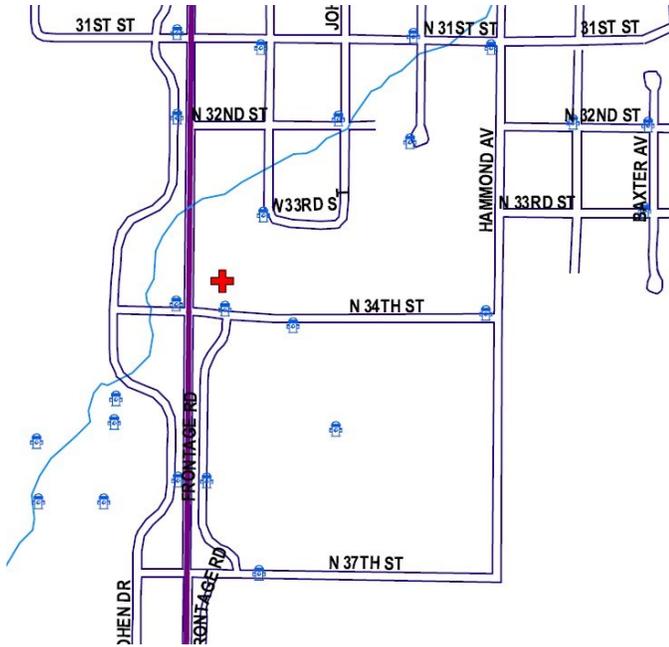
Environmental data can serve a number of purposes. The most common use is as a series of basemap features that help map users understand the locations of features such as lakes, rivers, forested areas, and other important features on the surface of the earth. The city/county will also utilize environmental data in analysis functions that attempt to evaluate the presence of water, shorelines, slope and aspect, soil quality, and other factors.



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City of Superior / Douglas County: Emergency Operations



About

Data related to Emergency Operations which includes incidents, hazards, shelters, evacuation routes, and other sensitive or confidential information typically reserved for law enforcement or Homeland Security.

Types (Examples)

- Police Districts
- Ambulance Districts
- Fire Districts (City and DNR)
- First Responder Districts
- Incidents
- Hazards
- Shelters
- Evacuation Routes
- Road Closures
- Containment Areas
- Disaster Recovery
- Mitigation
- Snow Plow Routes

Purpose & Use

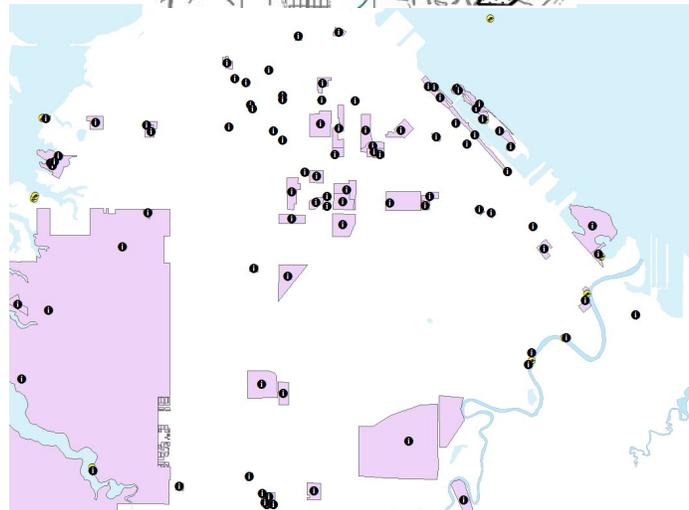
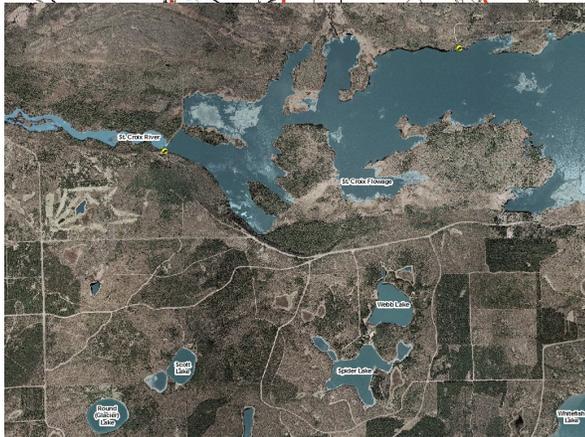
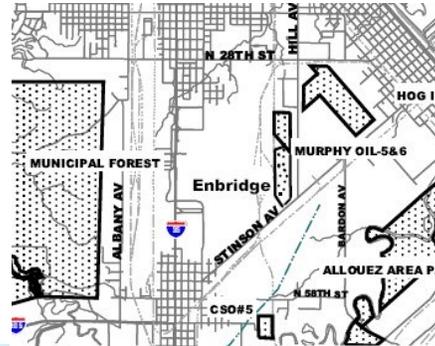
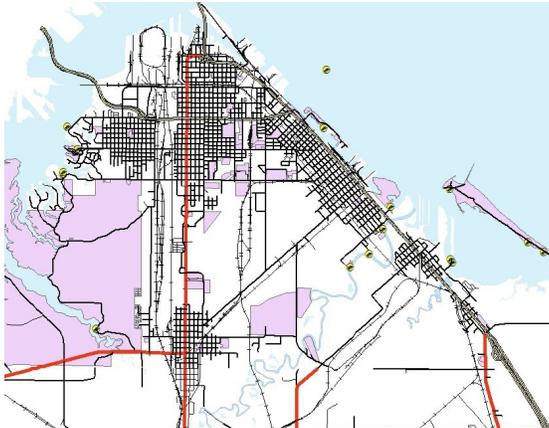
Emergency response and law enforcement depend on quality data to map out and analyze situations they are presented with. GIS will play a greater role in future emergency operations. In addition to regularly used GIS data such as road centerlines, aerial photography, and infrastructure. Emergency Operations will depend on data created for specific incidents or other varied datasets created for hazard response and mitigation.



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City of Superior / Douglas County: Recreation



About

Recreational use trends are increasing around the world and in Douglas County. Recreation information will be represented in various layers. Some of the layers are Boat Accesses, Hunting Sites, Trail heads, Marinas, Parks

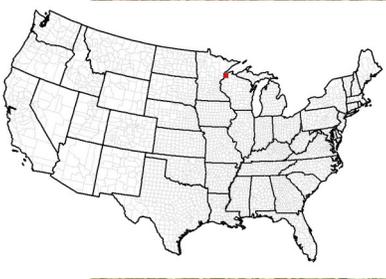
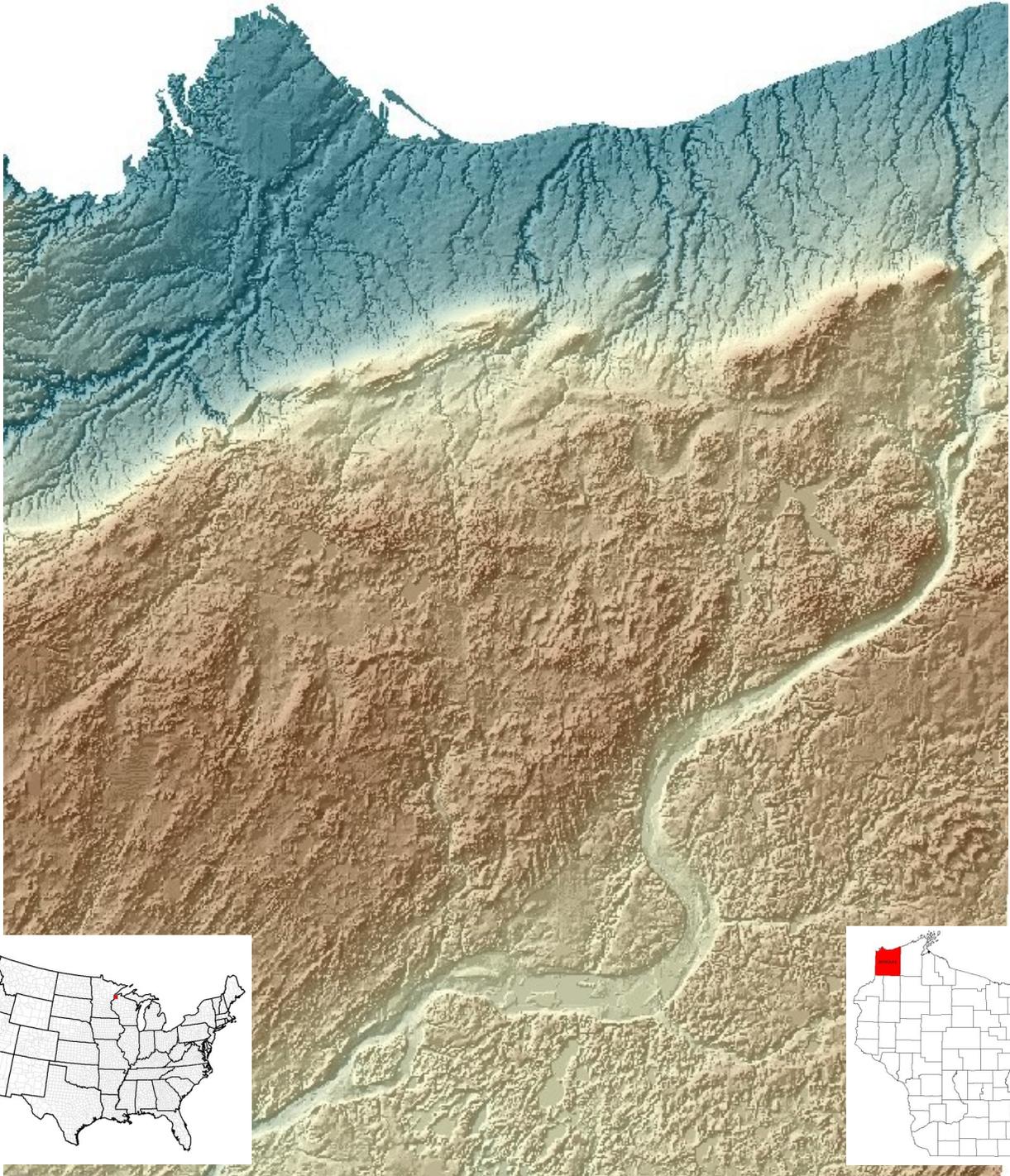
Types (Examples)

- Boat Accesses
- Marinas
- Hunting Locations
- Parks
- Trail heads

Purpose & Use

Recreational data can be used for maps and analysis related to recreation activities.

City of Superior / Douglas County



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Superior, Wisconsin

