

The Illinois Height Modernization Program: Improving Elevation Data for Illinois

Bev Herzog and Sheen Beaverson

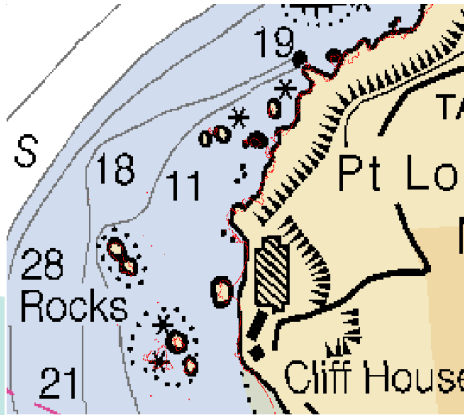


Illinois State Geological Survey
Institute for Natural Resource Sustainability
University of Illinois



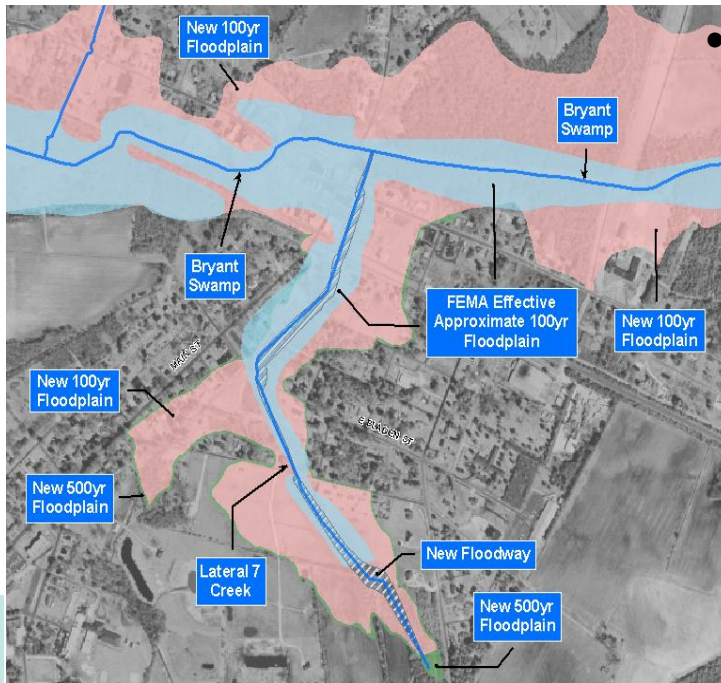
Height Matters: Transportation

- Transportation
- Mapping and Charting
- Construction, Engineering
- Recover decimated control networks



Height Matters: Flooding

Flooding: river overflow, coastal, storm surge, flash flood



- FEMA Map

Modernization Program

- Flood Insurance Rate Maps
- Elevation Certificates
- FEMA Cooperative Technical States, e.g. NC

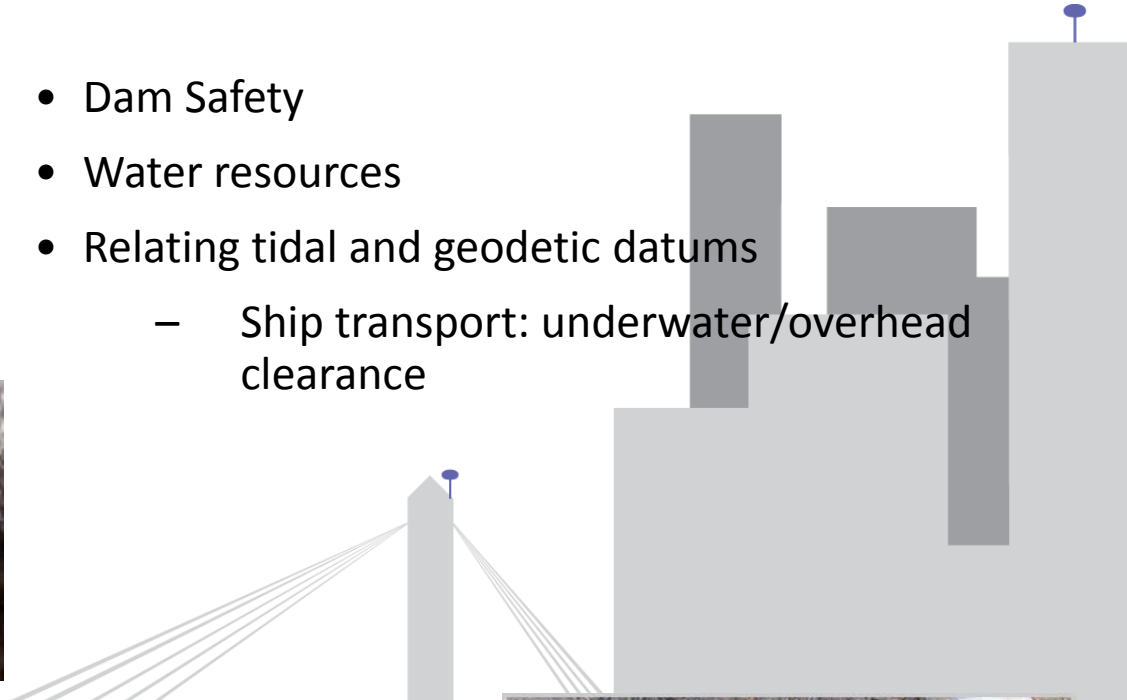
- Determining High Water Marks
- Evacuation Route Surveys
- Damage Mitigation



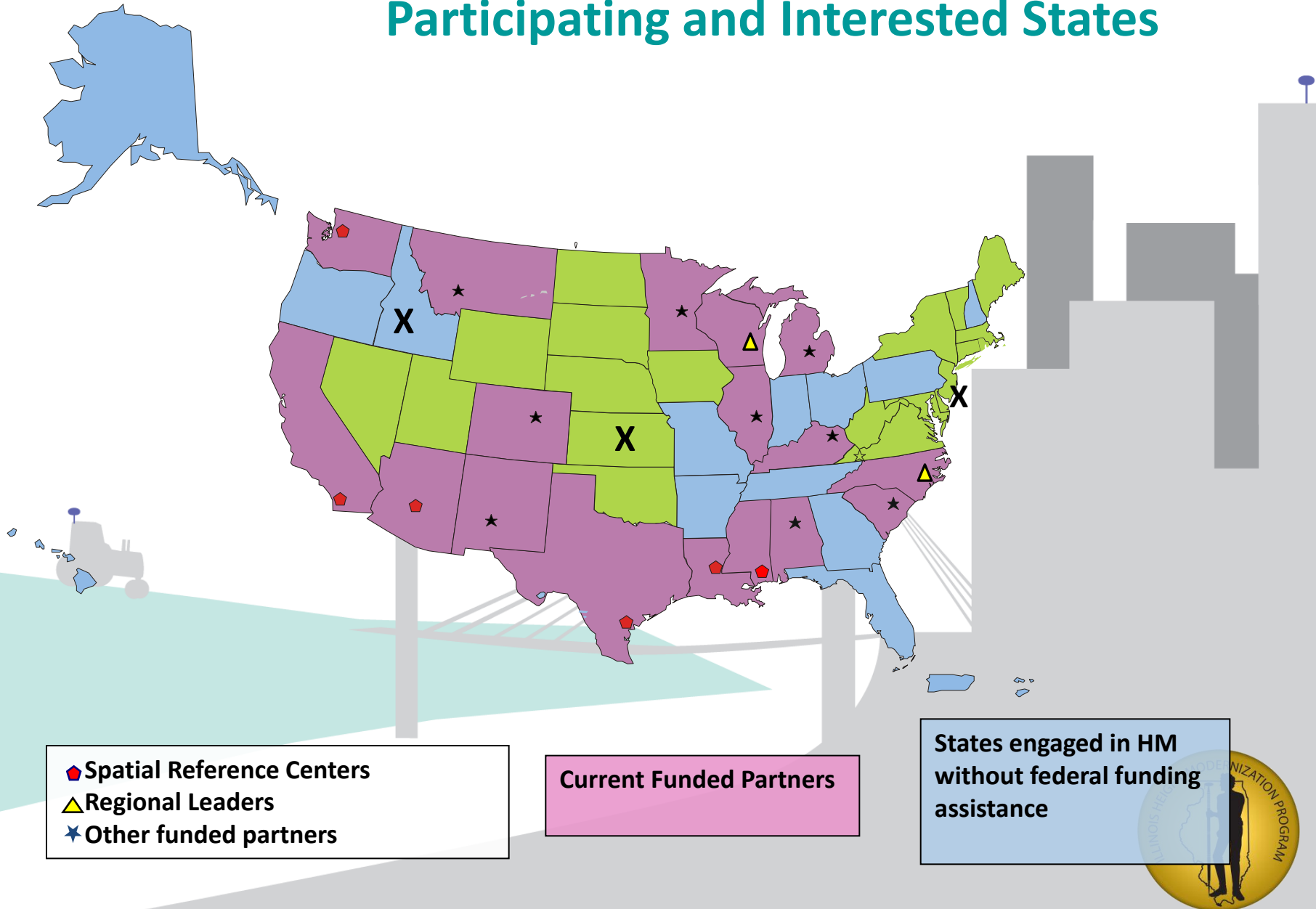
Height Matters: Water Resource Management



- Dam Safety
- Water resources
- Relating tidal and geodetic datums
 - Ship transport: underwater/overhead clearance



Participating and Interested States



Height Modernization Appropriations

Fiscal Year	Appropriations	States
FY 2001	2.25 M	CA, NC
FY 2002	3.75 M	CA, NC, LA, WI
FY 2003	3.75 M	CA, NC, LA, WI, MS
FY 2004	9.0 M	CA, NC, LA, WI, MS, AL, WA, SC
FY 2005	9.6 M	CA, NC, LA, WI, MS, AL, WA, TX, KY
FY 2006	9.9 M	CA, NC, WI, MS, AL, SC, TX, KY, AZ
FY 2007	9.9 M	“without direction”
FY 2008	4.995 M + 1.152 M	Line + AL, KY, IL
FY2009	\$2.54 M + 9.06 M	Line + earmarks (AL, MS, LA, IL, WI)

ILHMP Project Participants

- Illinois State Geological Survey
 - Beverly Herzog, Co-Principal Investigator
 - Donald Luman
 - Christopher Stohr
 - Sheena Beaverson
- Illinois Department of Transportation
 - Amy Eller, Co-Principal Investigator
 - Michael Blumhoff



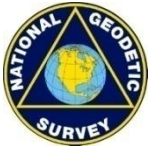
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Illinois Department
of Transportation



ILHMP Steering Committee



- National Geodetic Survey
- US Geological Survey
- IDNR Office of Water Resources
- IL Professional Land Surveyors Association
- Illinois State Water Survey



Project Goals

- Establish a datum-consistent vertical and horizontal statewide network of survey benchmarks.
- Acquire a high-resolution digital elevation model (DEM) of the earth's surface based upon that network.



Need for Height Modernization: Benchmarks

- Illinois Benchmarks

- Illinois in bottom 10 states for height information.
- Nearly half of all known benchmarks destroyed.

- Illinois datums

- Multiple datums in use.
- Stream gage datums
 - Memphis, Mean Gulf Level, 1912, and 1929.
 - Adjustments to NAVD88 are significant and complex.



Need for Height Modernization: Benchmarks

- NGS Benchmarks
 - Benchmark condition
 - Red: good condition
 - Blue: no reported recovery
- IDOT Benchmarks
 - about 56% survive



Need for Height Modernization: DEM Data

- Digital Elevation Model (DEM) Data
 - Few counties have data.
 - Data sets large, complex.
 - No statewide collection.
 - Unique parameters.
 - Differences at county lines.
 - Reluctance by counties to share data.



Project Activities

- Information survey Northern Illinois University
- Run level lines in northern Illinois
- Acquire available LiDAR and DEM data
- Develop project web site



Project Activities: Survey

- NIU Survey of existing information and data
 - Benchmarks
 - Condition
 - Datum
 - Known discrepancies
 - Current and proposed work
 - LIDAR data
 - Availability
 - Standards
 - Current and proposed work data acquisition



Project Activities: Survey



2008 Height Modernization Data Acquisition and Usage

Please use the 'Next' and 'Previous' buttons at the bottom of each page to navigate through the survey.

The State of Illinois, under the leadership of the Illinois State Geological Survey at the University of Illinois and the Illinois Department of Transportation, has recently been accepted into the Height Modernization Program of the National Geodetic Survey.

The primary goals of the Illinois Height Modernization Program are:

- (1) to establish a datum consistent vertical and horizontal statewide network of survey benchmarks, and
 - (2) to develop a high resolution digital elevation model (DEM) derived from LiDAR data,
- To best use this federal funding and avoid duplication of efforts, we ask you to share information on what data you possess and/or plan to collect in the foreseeable future.

Thank you for your participation in this important endeavor.

- ☐ I am involved with geodetic survey data
- ☐ I am involved with LiDAR data
- ☐ My organization has plans to obtain LiDAR
- ☐ I am involved with both geodetic survey and LiDAR data
- ☐ I am not at all knowledgeable about geodetic survey or LiDAR

Please select the category that best represents your involvement in the collection and/or use of data.



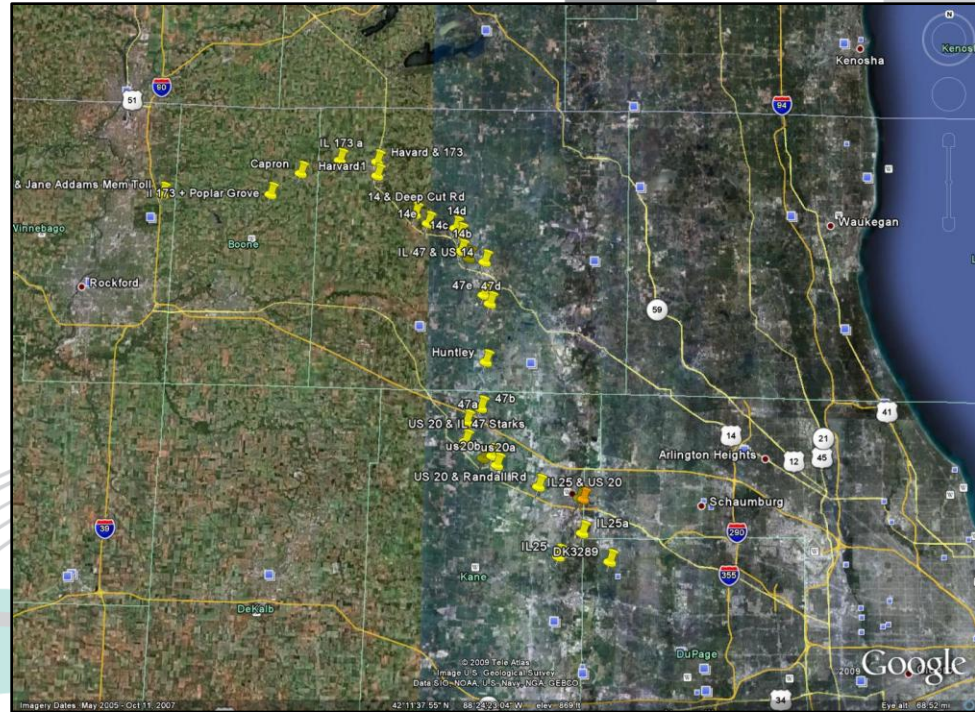
Project Activities: Survey

- NIU Survey of existing information and data
 - Benchmarks and geodetic data returned for
 - 79 Municipalities
 - 61 Counties
 - 5 Watersheds
 - 6 States
 - LIDAR data acquisition
 - 23 Municipalities
 - 17 Counties



Project Activities: Benchmarks

- Tie to Wisconsin, Iowa and Indiana lines.
 - Benchmark installation and leveling work tied to Winnebago County datum.
 - Tie Winnebago County line to DuPage County benchmarks.
 - Installed 24 new benchmarks
 - Completed a 47-mile line



Project Activities: Benchmarks

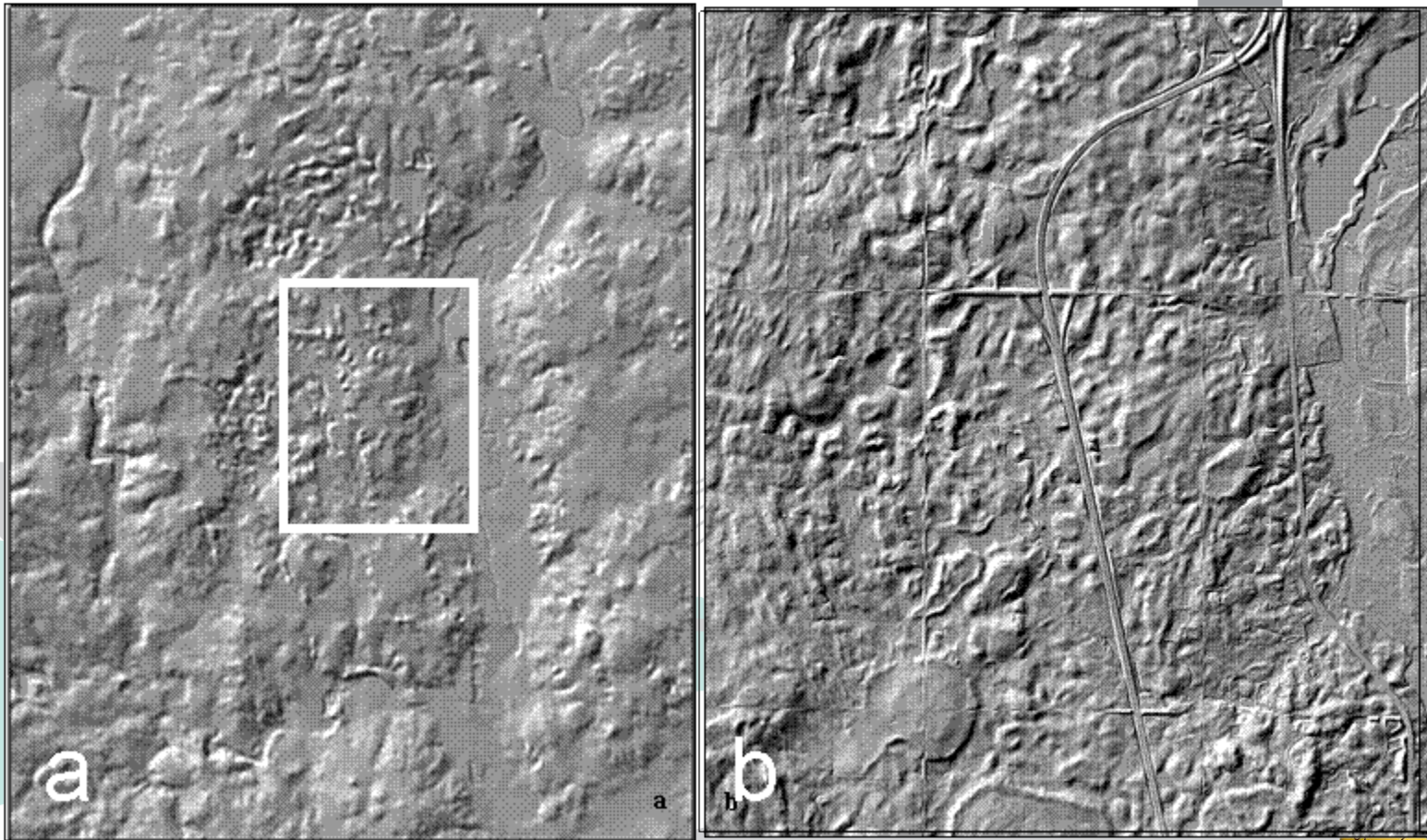


Project Activities: Year 2 Benchmarks

- Tie to Wisconsin, Iowa and Indiana lines.
 - Negotiating contracts for three level lines, totaling 142 miles
 - Will cover from Lake to Boone County
 - Will connect Lake Co to Year 1 line



Benefits of LiDAR: Lake County

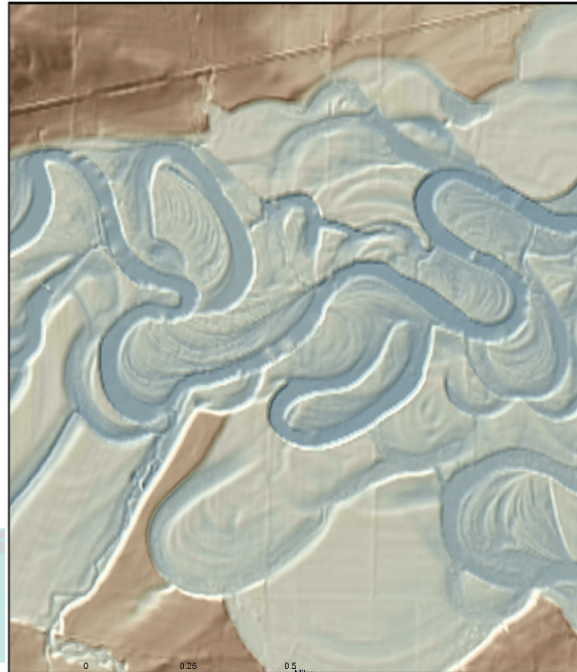


Benefits of LiDAR: Winnebago Co.

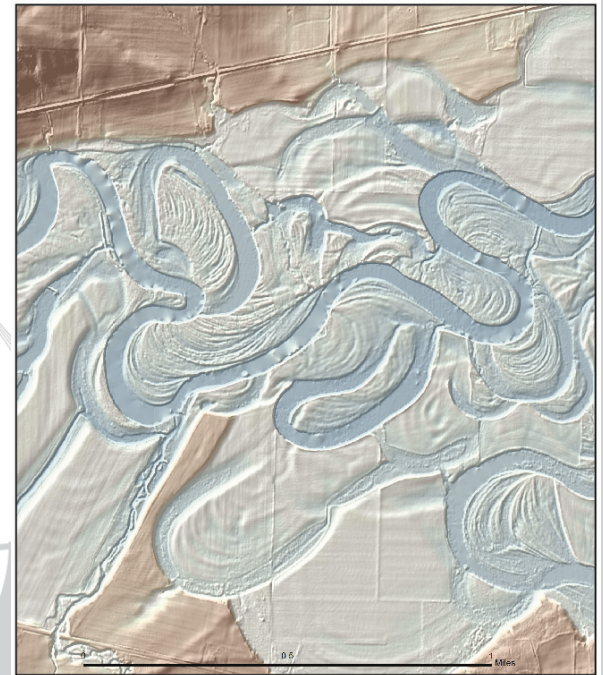
30 Meter DEM



10 Meter DEM



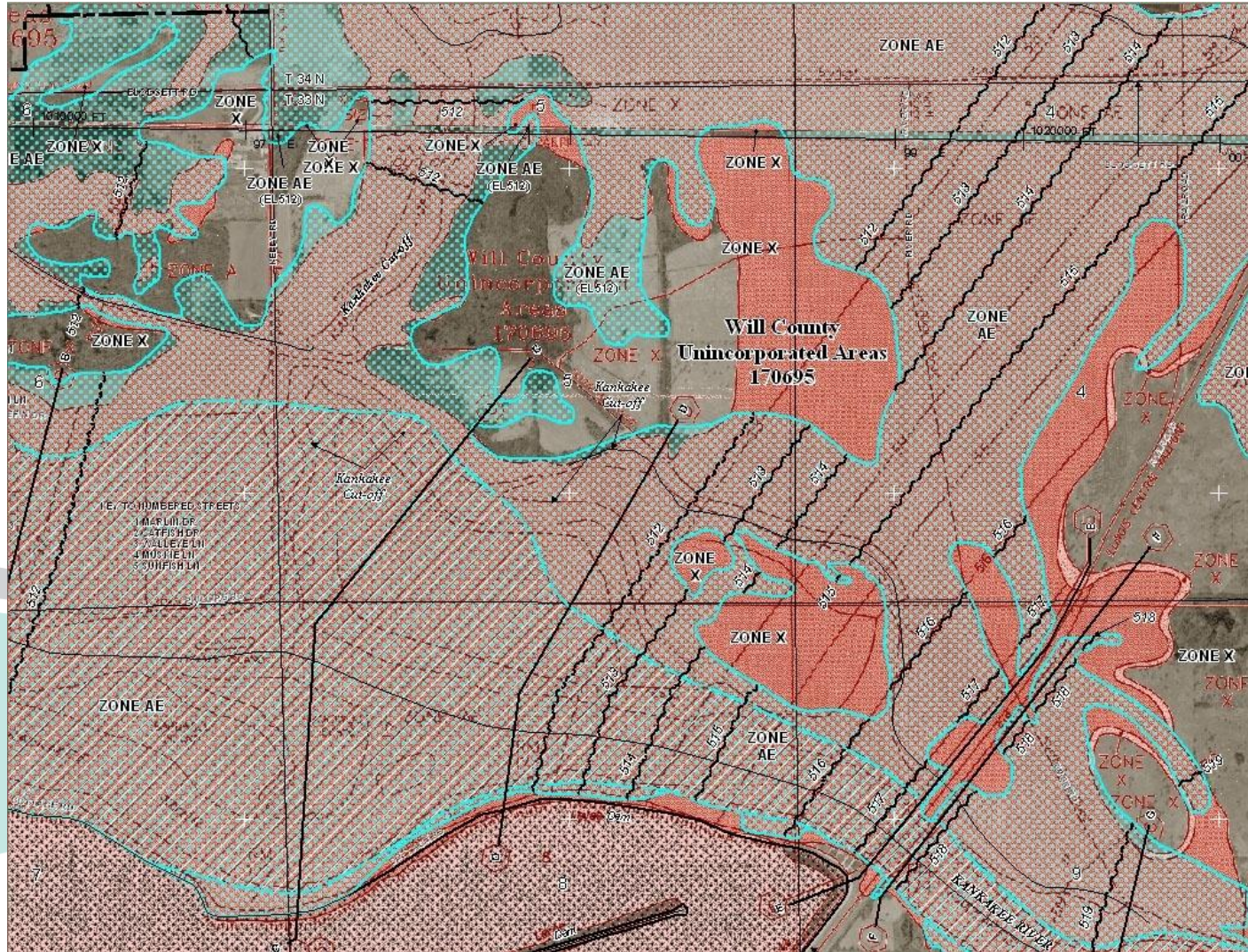
LidAR DEM



Winnebago County: Pecatonica River, 2 miles east of Harrison, IL



Benefits of LiDAR: Will County



Project Activities: LiDAR

- Acquire available LiDAR and DEM data
 - IDOT Data Available for Download
 - Carroll: DAT, DGN, TIN, First Return, Bare Earth
 - JoDaviess: DAT, DGN, TIN, First Return, Bare Earth
 - Lee: DAT, DGN, TIN, First Return, Bare Earth
 - Stephenson: DAT, DGN, TIN, First Return, Bare Earth
 - Whiteside: DAT, DGN, TIN, First Return, Bare Earth
 - USGS Data Available for Download
 - Boone: ArcGrids, 2-Foot Contours, Bare Earth, All Returns
 - Winnebago: ArcGrids, 2-Foot Contours, Bare Earth, All Returns



Project Activities: LiDAR

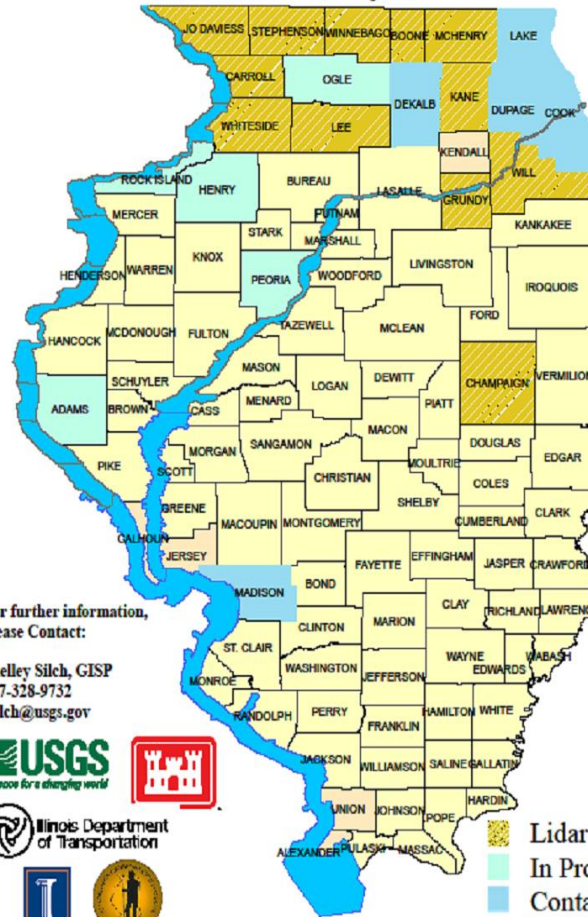
- Acquire available LiDAR and DEM data
 - Data from USGS, ASACE, IDNR, & 4 counties undergoing archival procedures
 - Champaign: Bare Earth, All Returns, Breaklines, Contours
 - Grundy: Bare Earth, All Returns, Breaklines, Contours
 - Kane: Bare Earth, All Returns, Breaklines, Contours
 - McHenry: Bare Earth, All Returns, Breaklines, Contours
 - Will: XYZ, DGN, Metadata for Survey Points and Contours
 - Delivery not started
 - Henry, Ogle, Rock Island
 - Contract let, but data not acquired
 - Adams



Project Activities: LiDAR

Lidar Status for Illinois

January 2010



For further information,
please Contact:

Shelley Silch, GISP
217-328-9732
ssilch@usgs.gov



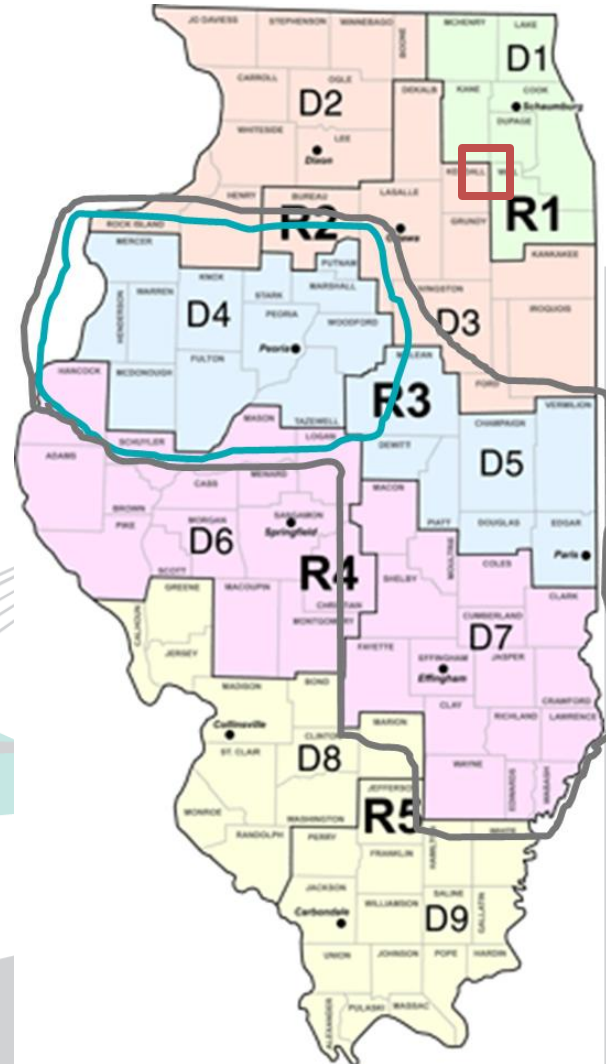
For more information about the Illinois Height
Modernization Project (as well as access to data) visit:
<http://www.isgs.illinois.edu/nsd/home/webdocs/ilhmp/>

- Lidar Complete
- In Progress
- Contact County
- Upcoming Project
- Corps River Project
- County



Project Activities: LiDAR

- Acquisition Plans
 - HM Program:
Kendall County this year
 - IDOT
 - District 4 has funds in hand
 - Districts 5 & 7 have plans to start within 2 years



Project Activities: Data Access

The Illinois Natural Resources Geospatial Data Clearinghouse, Illinois - Microsoft Internet Explorer provided by ISGS

http://www.isgs.illinois.edu/nsd/home/

File Edit View Favorites Tools Help

Convert Select Links AltaVista- Translations Customize Links Falling Fast Free Hotmail Internet Explorer News

GoodSearch Search I support: Champaign County Hu... GoodShop Amazon eBay Donation Coupon Update Toolbar

McAfee SiteAdvisor

The Illinois Natural Resources Geospatial Data Clearing...

Illinois Natural Resources Geospatial Data Clearinghouse

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A gateway to Illinois GIS data sets and orthoimagery.

Access Illinois GIS data sets and documentation (metadata) for ArcIMS Interactive Map Services, USGS digital topographic maps, aerial photography, orthoimagery, orthophotography, geology, land use, natural resources, and infrastructure. Illinois data sets and map data layers are available for download free of charge.

Aerial Photography and Orthophotography

- [1938 - 1941 Historical Aerial Photographs](#)
- [2005 Chicago Urban Area Orthoimagery](#)
- [2005 NAPP Digital Orthophoto Quarter Quadrangles](#)
- [2004 NAIP Digital Orthophoto Quarter Quadrangles](#)
- [2000 Des Plaines River Watershed Orthophotos](#)
- [1998 NAPP Digital Orthophoto Quarter Quadrangles](#)
- Learn about [Digital Orthophotography](#)

USGS Digital Topographic Maps

- [Digital Raster Graphic Files \(DRG\) Files](#)
- 1:24,000, 1:100,000, and 1:250,000

Illinois Map Data Layers

- [Statewide data: Geology, Elevation, Infrastructure](#)
- [County data have become Statewide data](#)
- [Illinois Geological Quadrangle Data](#)
- [Illinois Height Modernization Program Information](#)
- [Illinois Land Cover Data](#)

Other Data

- [Illinois GIS Data Providers](#)

What's New?

- [Illinois Height Modernization Program](#) data on-line
02/02/10 Lee and Whiteside
12/09 Carroll, JoDaviess, and Stephenson
10/09 Boone and Winnebago
- [RFP 1MKG206](#): open contract for LIDAR Acquisition for Kendall County

Software Tools

- [ArcIMS to GIS](#), load services directly into GIS software.
- [DownThemAll!](#) tool for Firefox to download .zip files.
- [Expressview Browser Plugin \(MrSID\) for Windows](#) to view .sid files.

ArcIMS Interactive Map Services

- [2005 Chicago Urban Area Orthoimagery](#)
- [2005 Illinois Digital Orthophoto Quadrangle Data](#)
- [1998 Illinois Digital Orthophoto Quadrangle Data](#)
- [1938-1941 Illinois Historical Aerial Photography](#)
- [Illinois Base Data, project info](#)
- ISGS [Illinois Natural Gamma-Ray Logs](#), [project info](#)
- ISGS [Illinois Oil and Gas Resources](#), [project info](#)
- ISGS [Illinois Water and Related Wells](#), [project info](#)
- Available for download: [ISGS Wells and Borings Points](#)

[history](#) • [milestones](#) • [project support](#)

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Project Activities: Data Access

Illinois Clearinghouse: Illinois Height Modernization - Microsoft Internet Explorer provided by ISGS

http://www.isgs.illinois.edu/nsd/home/webdocs/ilhmp/

File Edit View Favorites Tools Help

GoodSearch Search 1 support: Champaign County Hu... GoodShop Amazon eBay Donation Coupon Update Toolbar

McAfee SiteAdvisor

Illinois Clearinghouse: Illinois Height Modernization

Illinois Natural Resources Geospatial Data Clearinghouse

University of Illinois at Urbana-Champaign

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Illinois Height Modernization Program (ILHMP)

Height Modernization is the establishment of accurate, reliable heights using global positioning satellite (GPS) technology in conjunction with traditional leveling, gravity, and modern remote sensing. Common program elements include:

- Benchmark installation, to replace those destroyed or to densify the network.
- Continuously Operating Reference System (CORS) installation. CORS receive GPS signals to provide real-time location corrections.
- Creation of a high-resolution digital elevation model of the earth's surface using remote sensing technologies.

Height Modernization provides long-term benefits for the environment, helps to prevent loss of life and property estimates, and saves money. See our [Flyer on Height Modernization for Illinois](#).

[Program Overview and Project Milestones](#)

[Benchmarks, Datums, and Leveling Efforts](#)

Year 1: established [1 level line](#), map provided by Patrick Engineering, Inc.
Year 2: will establish [3 level lines](#), map provided by Patrick Engineering, Inc.

[Monuments, CORS, and RTK Networks](#)

[Illinois Digital Elevation Data](#)

Access elevation data for: Boone, Carroll, JoDaviess, Lee, Stephenson, Will, and Winnebago Counties.

If you download data, please send a screen shot of a derivative product created by your group, along with a 1 paragraph description of your project. We would like to create a gallery of how LIDAR data are being used in Illinois. Contact [S. Beaverson](#).

Project Steering Committee and Affiliated Agencies

Project participants include: [Illinois State Geological Survey](#), [Illinois Department of Transportation](#), [Illinois Department of Natural Resources](#), [Office of Water Resources](#), [Illinois Professional Land Surveyors Association](#), [Illinois State Water Survey](#), and the [US Geological Survey](#), and the [National Geodetic Survey](#).

Project Funding

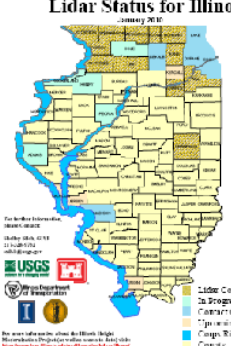
The ISGS received nearly \$300,000 to fund Year 1 project activities with assistance from [Congressman Timothy Johnson](#) through the NGS Height Modernization Program.

The ISGS received nearly \$725,000 to fund Year 2 project activities through the NGS Height Modernization Program, championed by [Congressman Timothy Johnson](#) and Raymond LaHood/ [Congressman Aaron Schock](#).

The ISGS anticipates receipt of about \$792,000 to fund Year 3 project activities through the NGS Height Modernization Program, championed by [Congressman Timothy Johnson](#) and [Congressman Aaron Schock](#).

Lidar Status for Illinois

January 2017



For further information, contact the Illinois Height Modernization Program at [http://www.isgs.illinois.edu/heightmodernization](#)

LIDAR data existing or in development for Illinois. Additional [Illinois LIDAR Acquisition Projects](#) are proposed for counties along the Illinois and Mississippi Rivers. Contact [Shelley Silch](#) at USGS.

history • milestones • project support

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Project Activities: Data Access

Data Delivery: Complete

ALERT: Data collections for Boone County are now accessible. Files are bundled into N-S flightlines, or groups of flightlines; there are either 33 flightlines or 8 groups of flightlines for each data type. Your feedback is appreciated. Can you deal with file bundles up to 600 Megabytes in size? Email [S. Beaverson](#) with your comments.

Boone County: Sanborn Mapping

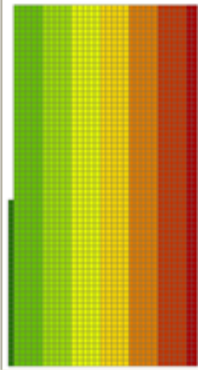
[Metadata](#)

[AGPS IMU for Boone Winnebago](#) (.txt)

[Data Index](#) (shapefile)

[Data Index](#) (dxf)

Data Type	Total GB	Zip File Bundle Ave. Size	Number of Files
ArcGrids	1.25	120 MB	16,360 files, 2,045 folders
Contours, 2 Foot	2.48	140 MB	8,177 files
ENZ Files - Bare Earth	15.80	655 MB	2,045 files
LAS Files - All Returns	37.90	450 MB	2,045 files



Data Type	8180	8200to8280	8300to8380	8400to8480	8500to8580	8600to8680	8700to8780	8800to8820
ArcGrids	8180	8200to8280	8300to8380	8400to8480	8500to8580	8600to8680	8700to8780	8800to8880
Contours, 2 Foot	8180	8200to8280	8300to8380	8400to8480	8500to8580	8600to8680	8700to8780	8800to8880
ENZ Files - Bare Earth	8180	8200to8280	8300to8380	8400to8480	8500to8580	8600to8680	8700to8780	8800to8880
LAS Files - All Returns	8180	0 2 4 6 8	0 2 4 6 8	0 2 4 6 8	0 2 4 6 8	0 2 4 6 8	0 2 4 6 8	0 2 4 6 8

Winnebago County: Sanborn Mapping

ATION PROGRAM

Project Activities: Data Access

Land Survey Monuments in Illinois

[NGS Datasheet Page](#)

Find a Survey Mark

USGS Survey Benchmark Information

Not yet available on the Internet.

[Geocaching Benchmark Benchmark Hunting](#)

Geocachers track down and photograph benchmarks; search by zip code or Point ID.

[HubTack, Inc. Survey Records On-Line](#)

Includes Illinois monument records, GLO Notes, GLO Plats, and County Survey records.

[DuPage County Geodetic Control Resources](#)

[DuPage County, Illinois Geodetic Vertical Control Network](#) (Map)

[Kane County Geodetic Monuments](#)

[Aurora, IL City Benchmarks](#)

[Aurora City Benchmarks](#) (Map and all Control Monuments)

[City of Naperville Land Survey Monuments](#)

[City of Naperville: Survey Monument Locator](#) (Map)

[West Chicago Survey Control Network](#)

[Horizontal Monument Location Map](#)

[Vertical Monument Location Map](#)

CORS in Illinois

[National Geodetic Survey Cooperative CORS](#)

[NGS CORS Using Google Maps](#)

[NGS CORS Network Map](#)

[DuPage County Cooperative CORS Network](#)

[MoDOT: Missouri Department of Transportation](#)

Illinois Stations related to St. Louis area

Real Time Kinematic (RTK) Networks in Illinois

[KARA Company CPRS Sites Information](#)

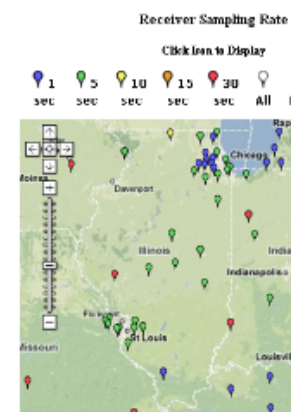
Coverage throughout Illinois

[Seiler Instrument Company: Midwest RTK Network](#)

St. Louis and Indianapolis networks cover south-central Illinois

[Trimble VRS now - USA Illinois Coverage Map](#)

Coverage for northern Illinois



NGS CORS using Google Maps.



Image credit: [Geocaching.com](#).
[Details for Benchmark: LC0155](#)



How Can You Help?

- Request support of earmark
 - Congressman Timothy Johnson
<http://timjohnson.house.gov/>
 - Congressman Aaron Schock
<http://schock.house.gov/>
 - Senator Dick Durbin
<http://durbin.senate.gov/>
- Ask you Congressmen to support earmark of those above



Questions?

Illinois Height Modernization Program

<http://www.isgs.illinois.edu/nsdihome/webdocs/ilhmp>

or

Google “Illinois Height Modernization”

