The LiDAR Program in Missouri
MGISAC North-Central Workshop
October 24, 2012

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for
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Outline

- Data Development Committee
- Lidar Stakeholders Group
- National Elevation Enhancement Assessment
- National Strategy for complete coverage
- Current Lidar status
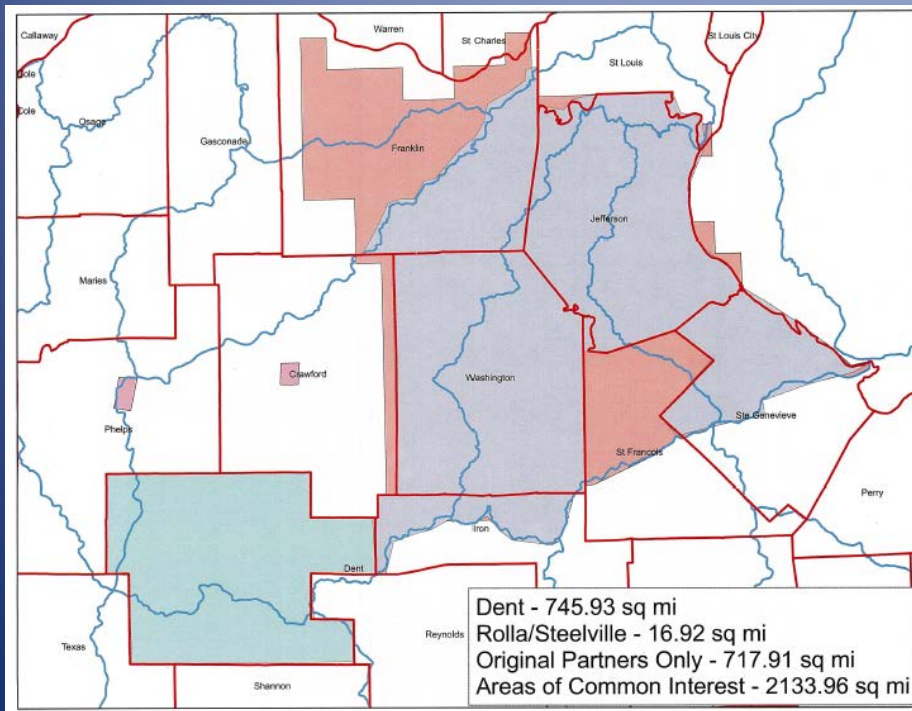
Data Development Committee

- Committee consists of Federal, State, Regional, Local, and Private Industry
- Started in 2004, initial purpose was to acquire state wide imagery
- We meet quarterly either in person or by phone bridge.
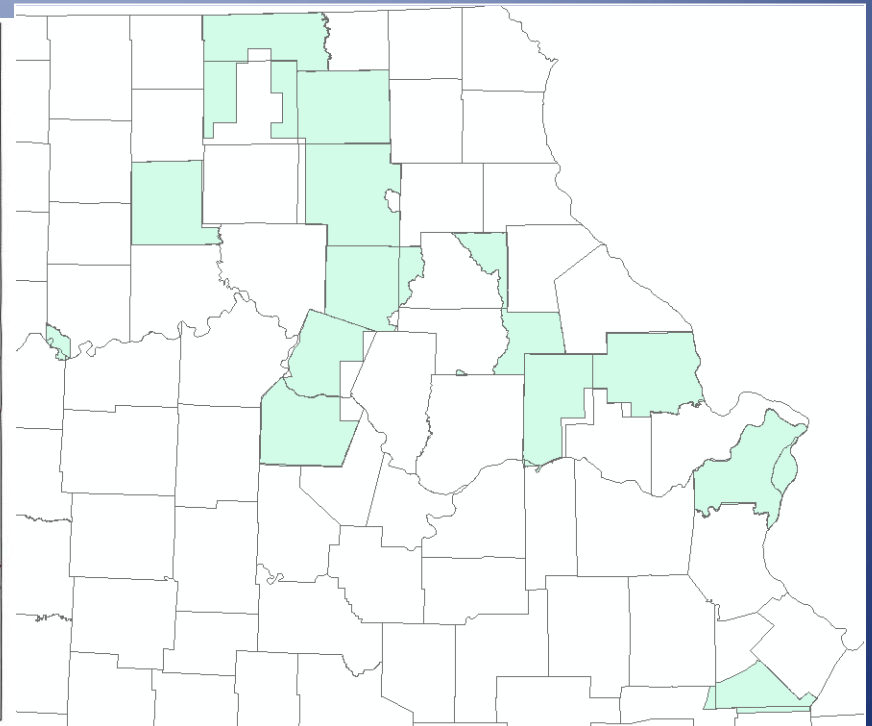
Lidar Stakeholders Group
2009

- Came about to pool resources for LiDAR collection, economy of scale

- Those agencies that have actively acquired Lidar asked to participate

- Includes SEMA, DNR, MDC, NRCS, USACE-KC, StL, Memphis, and RI, USGS, FEMA

- Won MAGIC GIS Coordination award in 2012

Stakeholder Projects

2011 Meramec

2012 Mo Grand

Dent - 745.93 sq mi
Rolla/Steelville - 16.92 sq mi
Original Partners Only - 717.91 sq mi
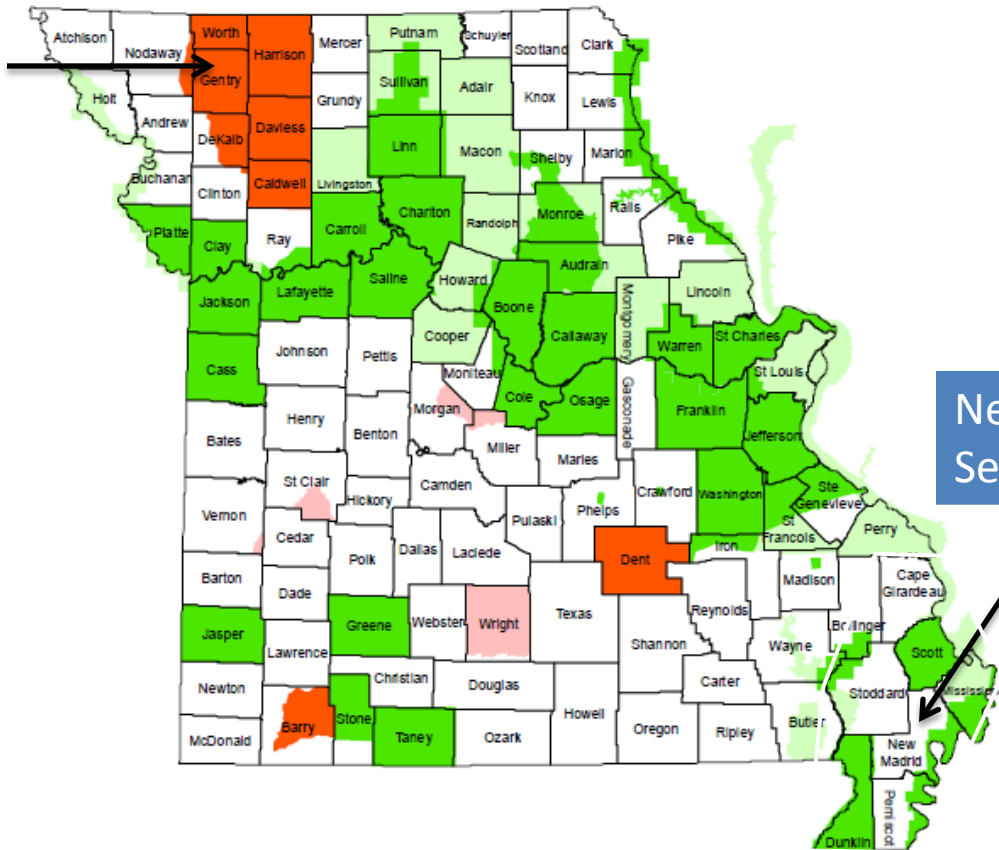Areas of Common Interest - 2133.96 sq mi

2013

- Preliminary plans include upgrading the upper Grand watershed and Dunklin County. Both were processed for RISKMAP, reprocess to 18.5 cm RMSE.

Status of Elevation mapping from Airborne LiDAR in Missouri

Upper Grand

New Madrid Seismic Area

Map provided By Liz Cook, NRCS

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Legend

Status

- Complete: RMSE <=18.5cm
- In Progress: RMSE <=18.5cm
- Complete: RISKMap specs
- In Progress, RISKMap specs

NOTE: RMSE (Root Mean Square Error) is the square root of the average of the set of squared differences between the modeled (DEM) elevation values and known elevations from an independent surveyed source. The overall vertical accuracy of a DEM is 1.96 times RMSE at the 95% confidence level.

RISKMap specs vary some, but generally have an RMSE of 72.6cm and only the floodplain areas are processed into DEMs. For more details on RISKMap see www.fema.gov/library/viewRecord.do?id=4345

Updated June 2012

How do I get my City, County, region collected?

- Let a Stakeholder know (St Francois County added this year due to local need)
- If you have funding it makes your area much easier for partnerships, otherwise it depends on our (stakeholders) having the need.
- There is an economy of scale

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+ National Enhanced Elevation Assessment
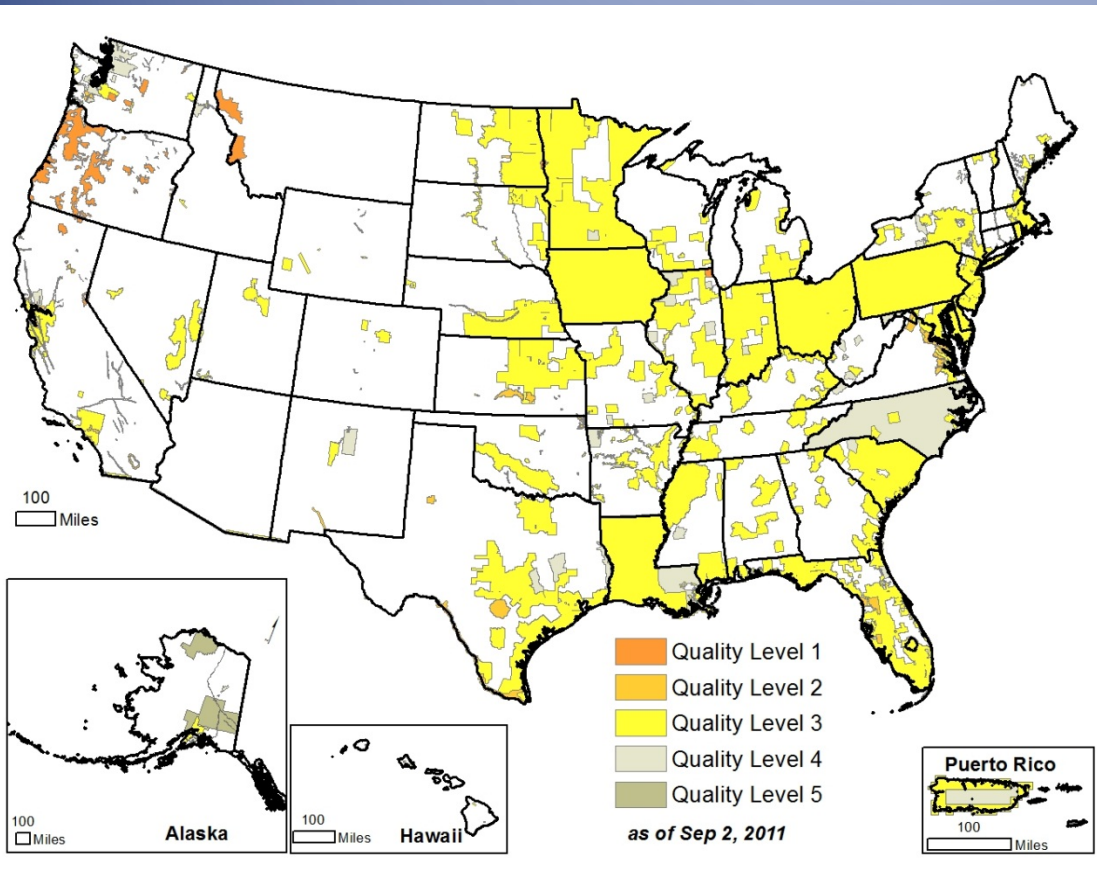## Completed in December 2011

Sponsor:

- National Digital Elevation Program (NDEP) – Twelve-member agencies, NSGIC

Partners:

- U.S. Geological Survey (Managing Partner)

- National Geospatial-Intelligence Agency

- Federal Emergency Management Agency

- Natural Resources Conservation Service

- National Oceanic and Atmospheric Administration

- Study participants - 34 Federal agencies, 50 states and others

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National Digital Elevation Program (NDEP)
Status of Elevation Data

100 Miles

Quality Level 1
Quality Level 2
Quality Level 3
Quality Level 4
Quality Level 5

Alaska

100 Miles

Hawaii

100 Miles

Puerto Rico

100 Miles

as of Sep 2, 2011

Map depicts public sources of LiDAR in all states plus IfSAR data in Alaska

1996 - 2011

- 28% coverage - 49 states
- 15% coverage – Alaska
- 30+ year replacement cycle
- Program is efficient – less than 10% overlap of coverage
- Cooperative data projects work
- Data quality variable

Why is this a problem?

- Remaining 72% coverage is 30 or more years old.
- Alaska – very poor quality
- Meets 10% of need. Current and emerging needs require much higher quality data.

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NEEA Quality Levels

| Quality Levels	Elevation Source	Horizontal Resolution Terms			Vertical Accuracy Terms	
		Point Density	Nominal Pulse Spacing	NED Post Spacing	RMSEz in Open Terrain *	Equivalent Contour Accuracy
QL 1	LiDAR	8 pts/m^2	0.35 m	1/27 arc-sec (~1 m)	9.25 cm	1-ft
QL 2	LiDAR	2 pts/m^2	0.7 m	1/27 arc-sec (~1 m)	9.25 cm	1-ft
QL 3	LiDAR	1 – 0.25 pts/m^2	1 – 2 m	1/9 arc-sec (~3 m)	≤18.5 cm	2-ft
QL 4	Imagery	1 – 0.04 pts/m^2	1 – 5 m	1/3 arc-sec (~10 m)	46.3 cm – 139 cm	5 – 15 ft
QL 5	IFSAR	0.04 pts/m^2	5 m	1/3 arc-sec (~10 m)	92.7 cm – 185 cm	10 – 20 ft

Example Functional Activities (Needs)

602 Functional Activities documented from 34 Federal agencies, 50 States and Territories and from sampled non-profit, industry, local governments and tribes

Precision Farming
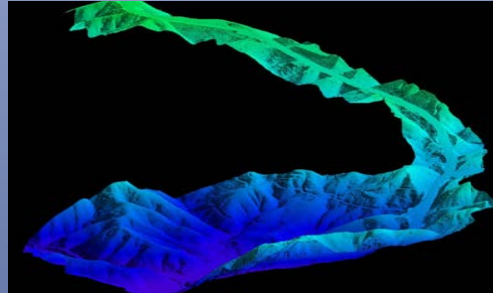
Land Navigation and Safety

Geologic Resources and Hazards Mitigation

Natural Resource Conservation

Infrastructure Management

Flood Risk Mitigation

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Benefits for Top Business Uses

		Annual Benefits	
1	Flood Risk Management	$295M	$502M
2	Infrastructure and Construction Management	$206M	$942M
3	Natural Resources Conservation	$159M	$335M
4	Agriculture and Precision Farming	$122M	$2,011M
5	Water Supply and Quality	$85M	$156M
6	Wildfire Management, Planning and Response	$76M	$159M
7	Geologic Resource Assessment and Hazard Mitigation	$52M	$1,067M
8	Forest Resources Management	$44M	$62M
9	River and Stream Resource Management	$38M	$87M
10	Aviation Navigation and Safety	$35M	$56M
:			
20	Land Navigation and Safety	$0.2M	$7,125M
	Total for all Business Uses (1 – 27)	**$1.2B**	**$13B**

Potential Elevation Data Program Options

Option 1: Quality Level 2 (QL2) LiDAR* - 8 year acquisition (3)
- Average Annual Costs: <u>$146M</u>
- Average Annual Benefits: $690M (B/C Ratio - 4.7:1)
- Total Possible Benefits Satisfied: 58%

Option 2: Uniform QL2 LiDAR - 15 year acquisition (3A)
- Average Annual Costs: <u>$78M</u>
- Average Annual Benefits: $349M (B/C Ratio - 4.5:1)
- Total Possible Benefits Satisfied: 30%

Option 3: Uniform QL2 LiDAR - 15 year acquisition (3A plus cost share)
- Average Annual Costs: <u>$39M</u> plus 50% cost share (partner contribution)
- Average Annual Benefits: $349M (B/C Ratio - 4.5:1)
- Total Possible Benefits Satisfied: 30%

* Note: All scenarios include QL5 (IfSAR) for Alaska
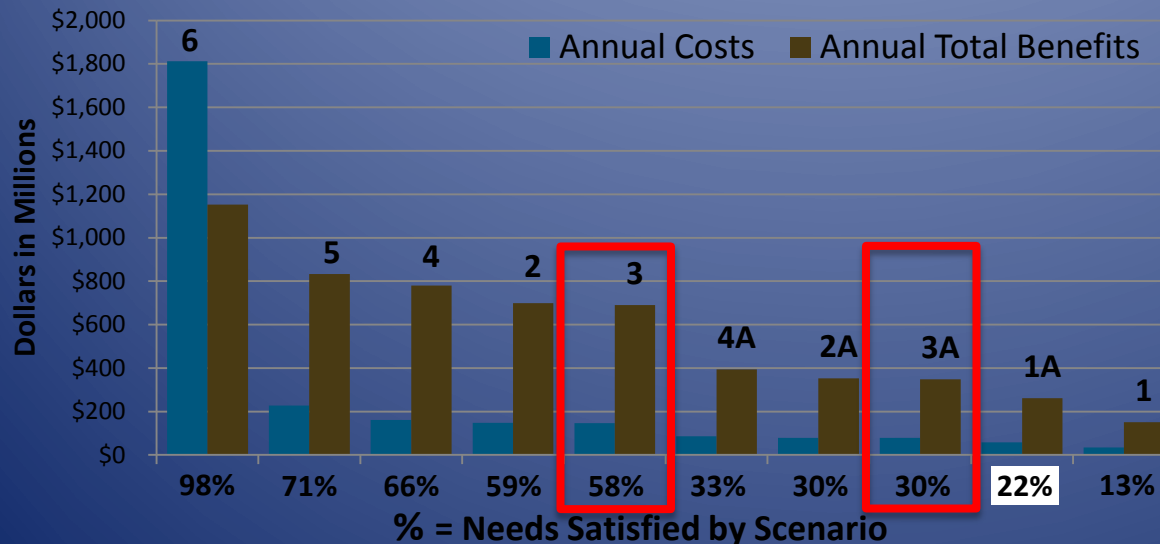
Results

- Best return with QL 2 on an 8 year cycle.

- Most of LiDAR in Missouri is QL 3

- Moving forward with a funding strategy to go before Congress.

- Multi agencies sharing the cost

Contact Information

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