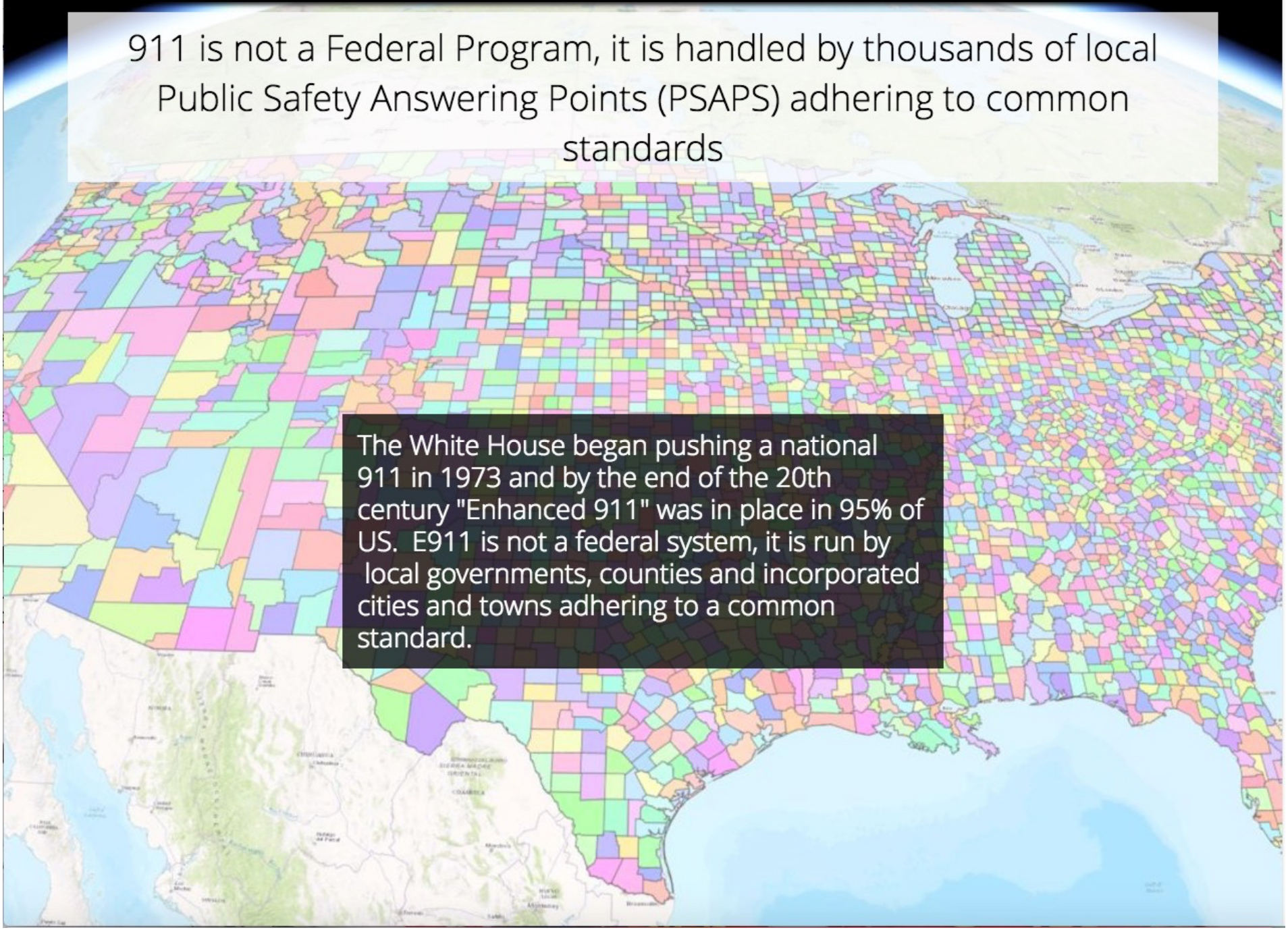

Esri User Conference 2017
Supporting Next Generation 911 with ArcGIS Pro and ArcGIS Online in Rural Counties
Ken Wall, Montana State Library Commission

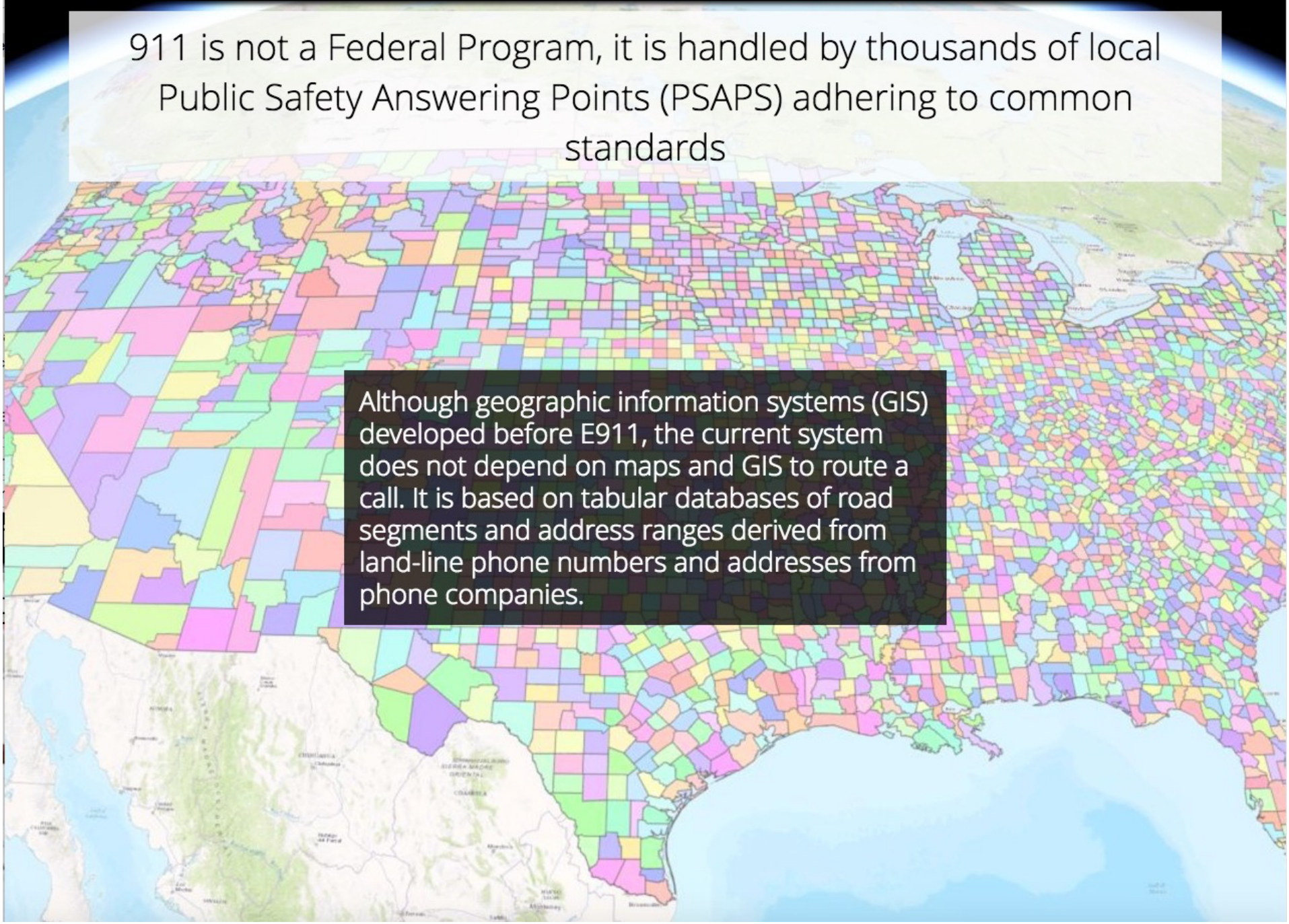
We take it for granted today that we call 911 for emergencies. The initial concept of a single emergency phone number began in 1957.

911 is not a Federal Program, it is handled by thousands of local Public Safety Answering Points (PSAPS) adhering to common standards



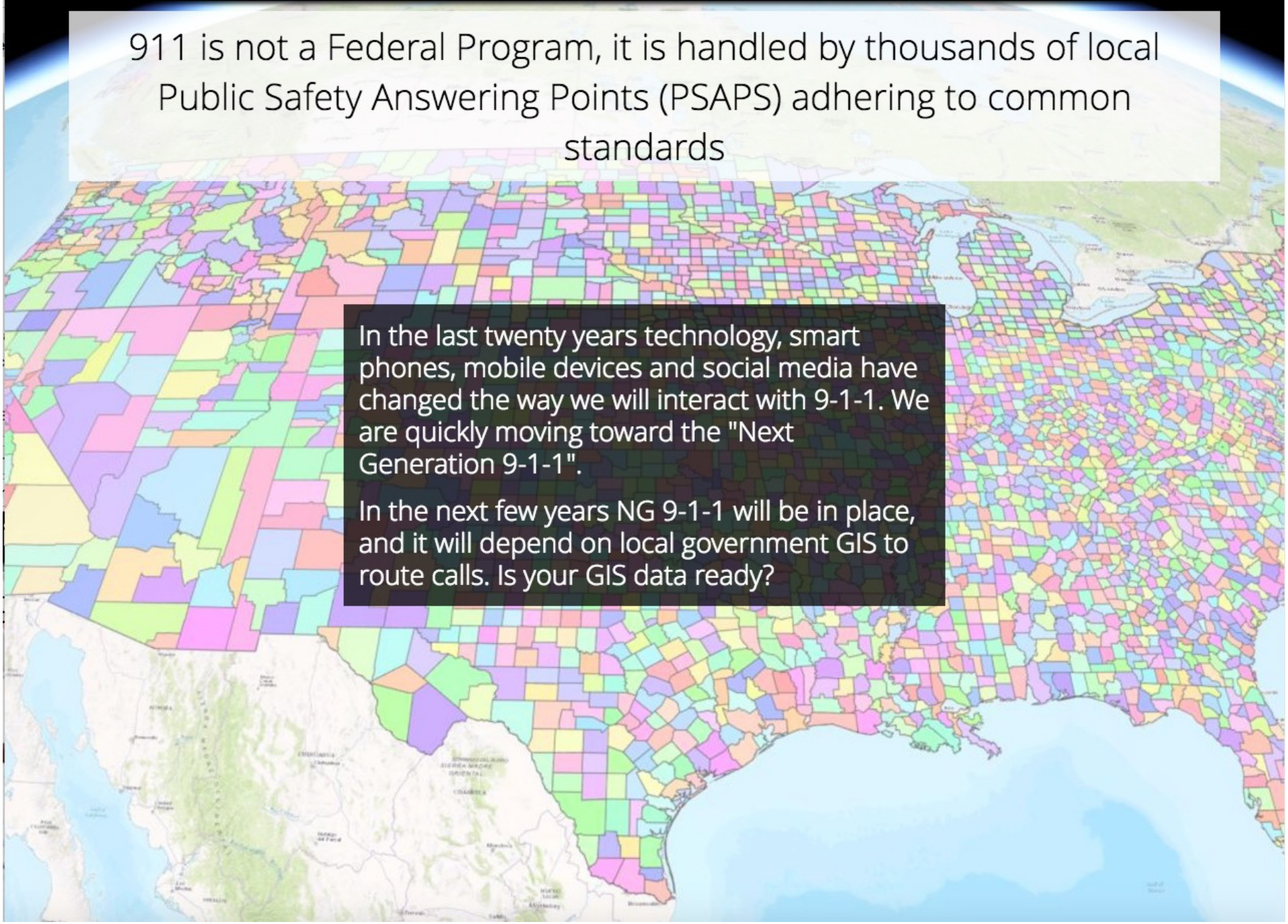
The White House began pushing a national 911 in 1973 and by the end of the 20th century "Enhanced 911" was in place in 95% of US. E911 is not a federal system, it is run by local governments, counties and incorporated cities and towns adhering to a common standard.

911 is not a Federal Program, it is handled by thousands of local Public Safety Answering Points (PSAPS) adhering to common standards



Although geographic information systems (GIS) developed before E911, the current system does not depend on maps and GIS to route a call. It is based on tabular databases of road segments and address ranges derived from land-line phone numbers and addresses from phone companies.

911 is not a Federal Program, it is handled by thousands of local Public Safety Answering Points (PSAPS) adhering to common standards



In the last twenty years technology, smart phones, mobile devices and social media have changed the way we will interact with 9-1-1. We are quickly moving toward the "Next Generation 9-1-1".

In the next few years NG 9-1-1 will be in place, and it will depend on local government GIS to route calls. Is your GIS data ready?

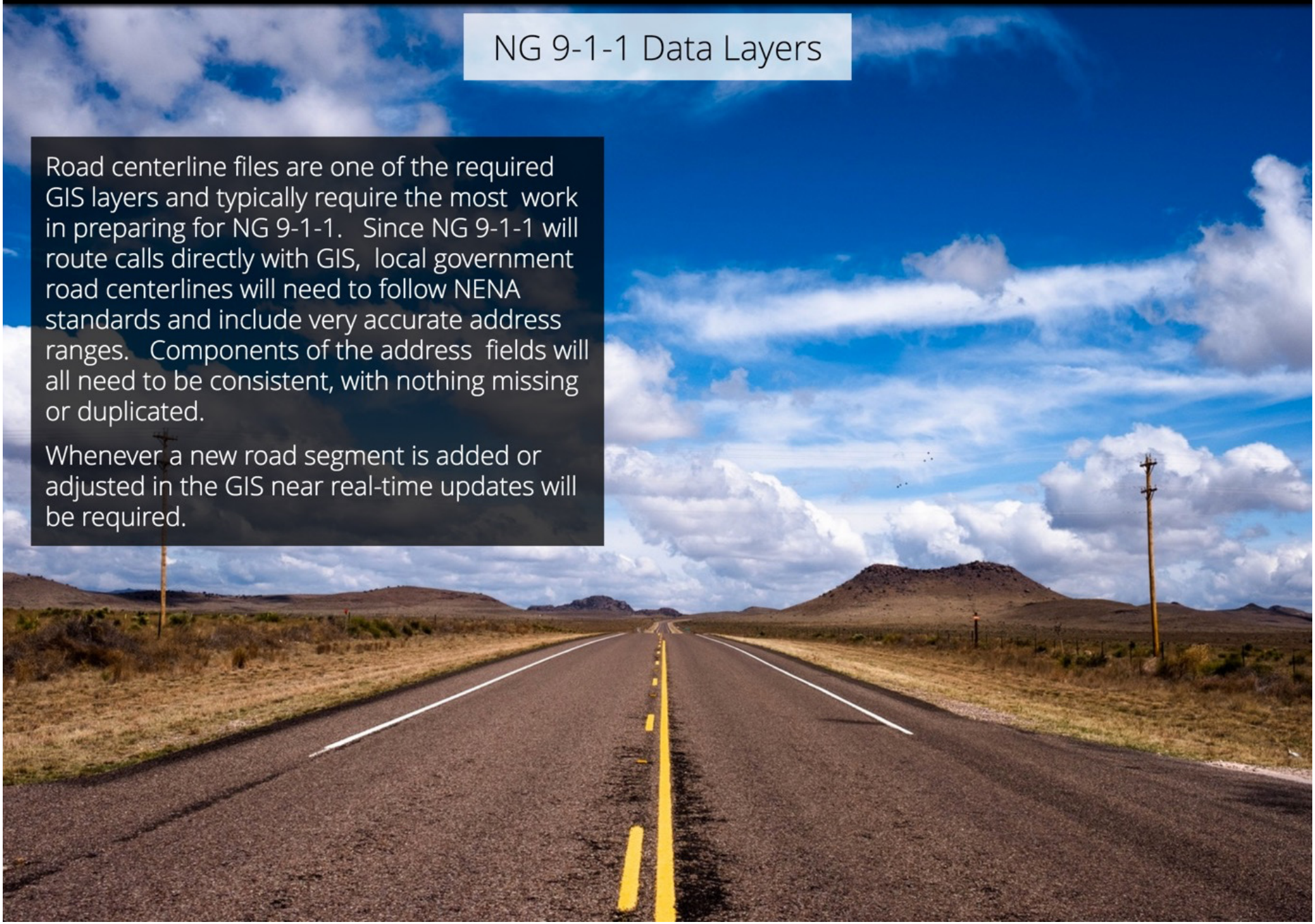
Presentation Outline

1) Background on NG 911, and references for more information on how to prepare.

2) Case studies of two rural Montana counties leveraging Montana Land Information Act grants to prepare for NG 911.

3) GIS tools and best practices with a focus on rural counties with limited GIS staff and programs.

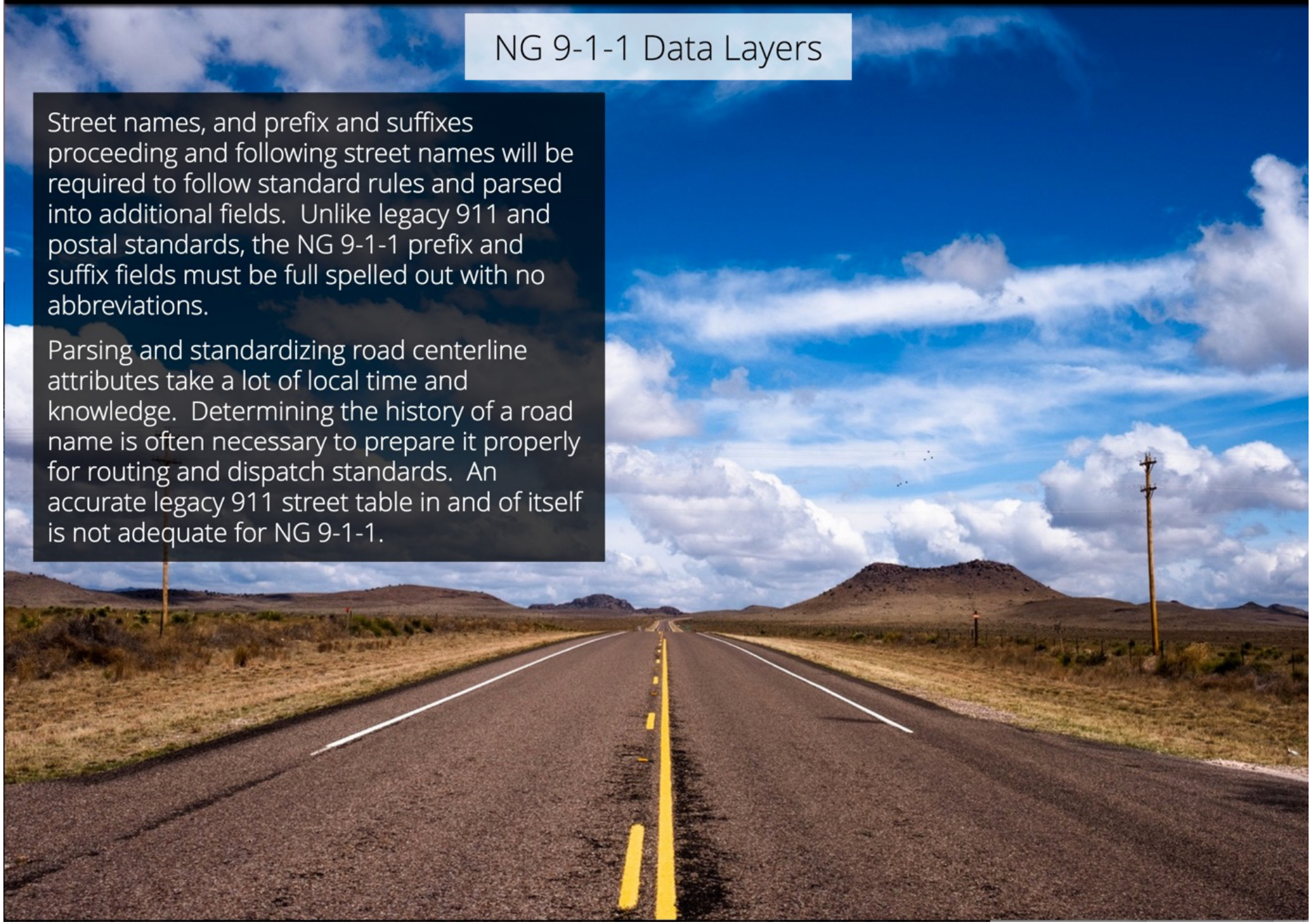
This presentation is available as an Esri Story Map at http://arcg.is/2r8AOd9



NG 9-1-1 Data Layers

Road centerline files are one of the required GIS layers and typically require the most work in preparing for NG 9-1-1. Since NG 9-1-1 will route calls directly with GIS, local government road centerlines will need to follow NENA standards and include very accurate address ranges. Components of the address fields will all need to be consistent, with nothing missing or duplicated.

Whenever a new road segment is added or adjusted in the GIS near real-time updates will be required.

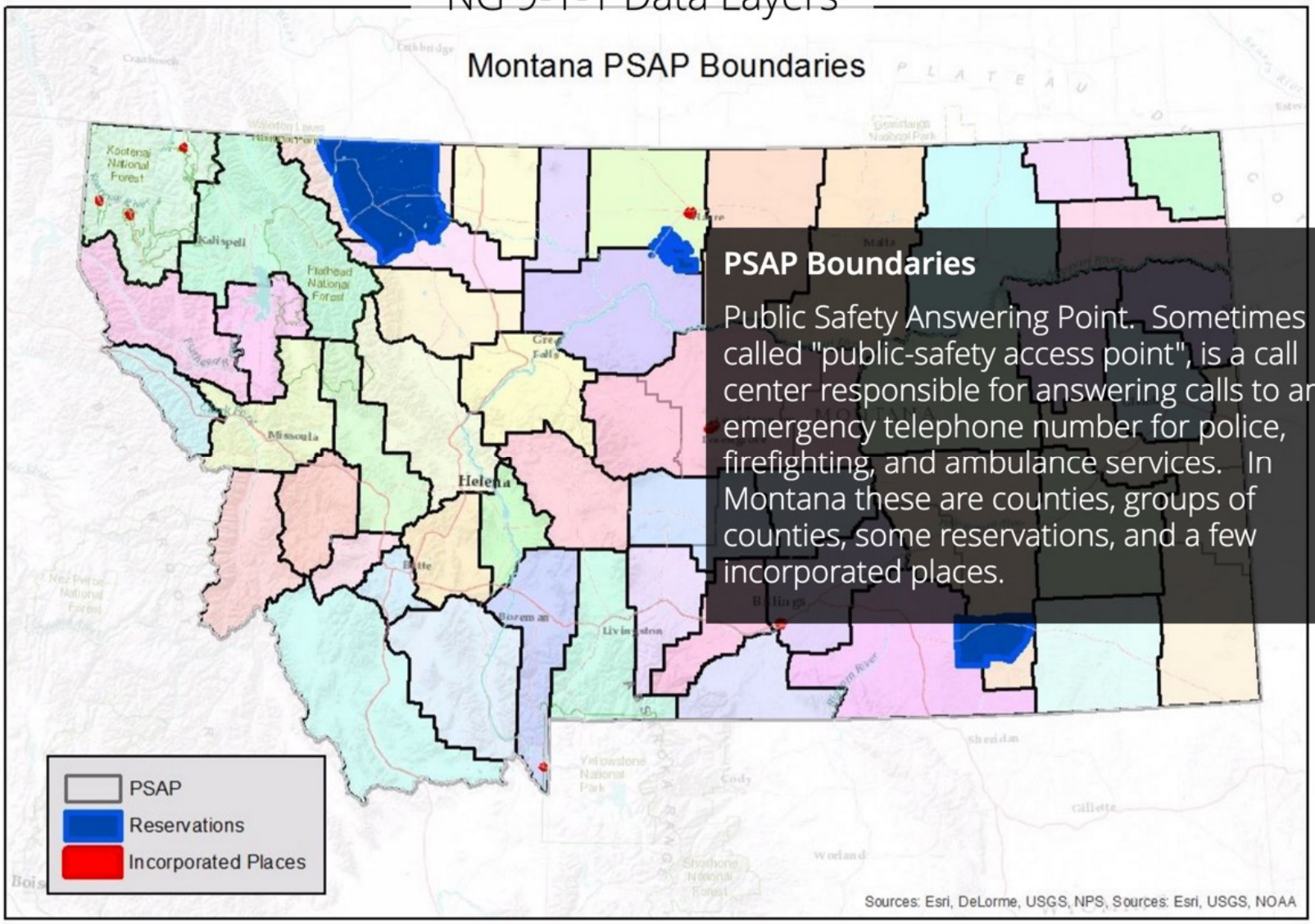


NG 9-1-1 Data Layers

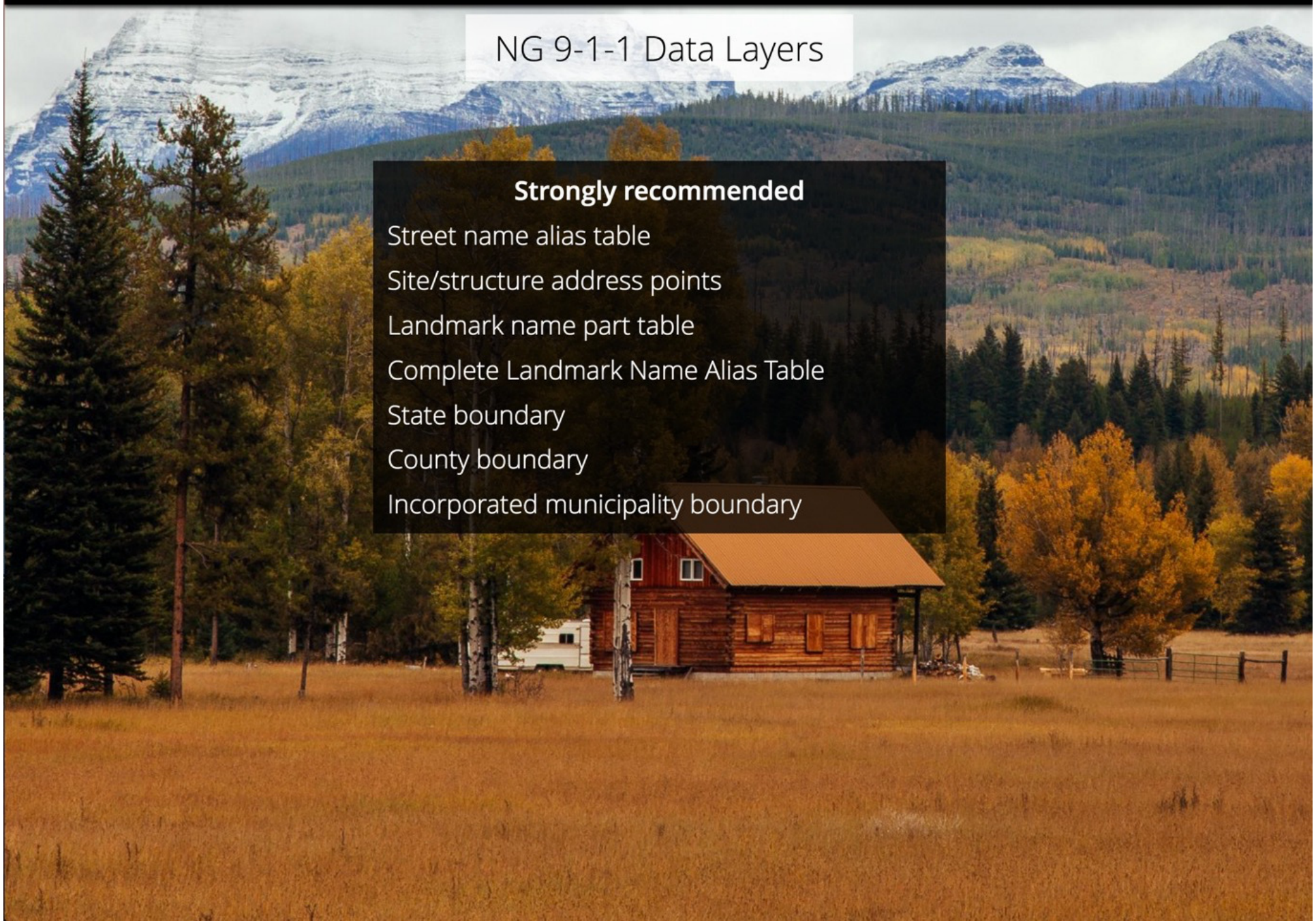
Street names, and prefix and suffixes proceeding and following street names will be required to follow standard rules and parsed into additional fields. Unlike legacy 911 and postal standards, the NG 9-1-1 prefix and suffix fields must be full spelled out with no abbreviations.

Parsing and standardizing road centerline attributes take a lot of local time and knowledge. Determining the history of a road name is often necessary to prepare it properly for routing and dispatch standards. An accurate legacy 911 street table in and of itself is not adequate for NG 9-1-1.

NG 9-1-1 Data Layers




NG 9-1-1 Data Layers
Emergency Service Boundaries
Law enforcement
Fire
Emergency medical services

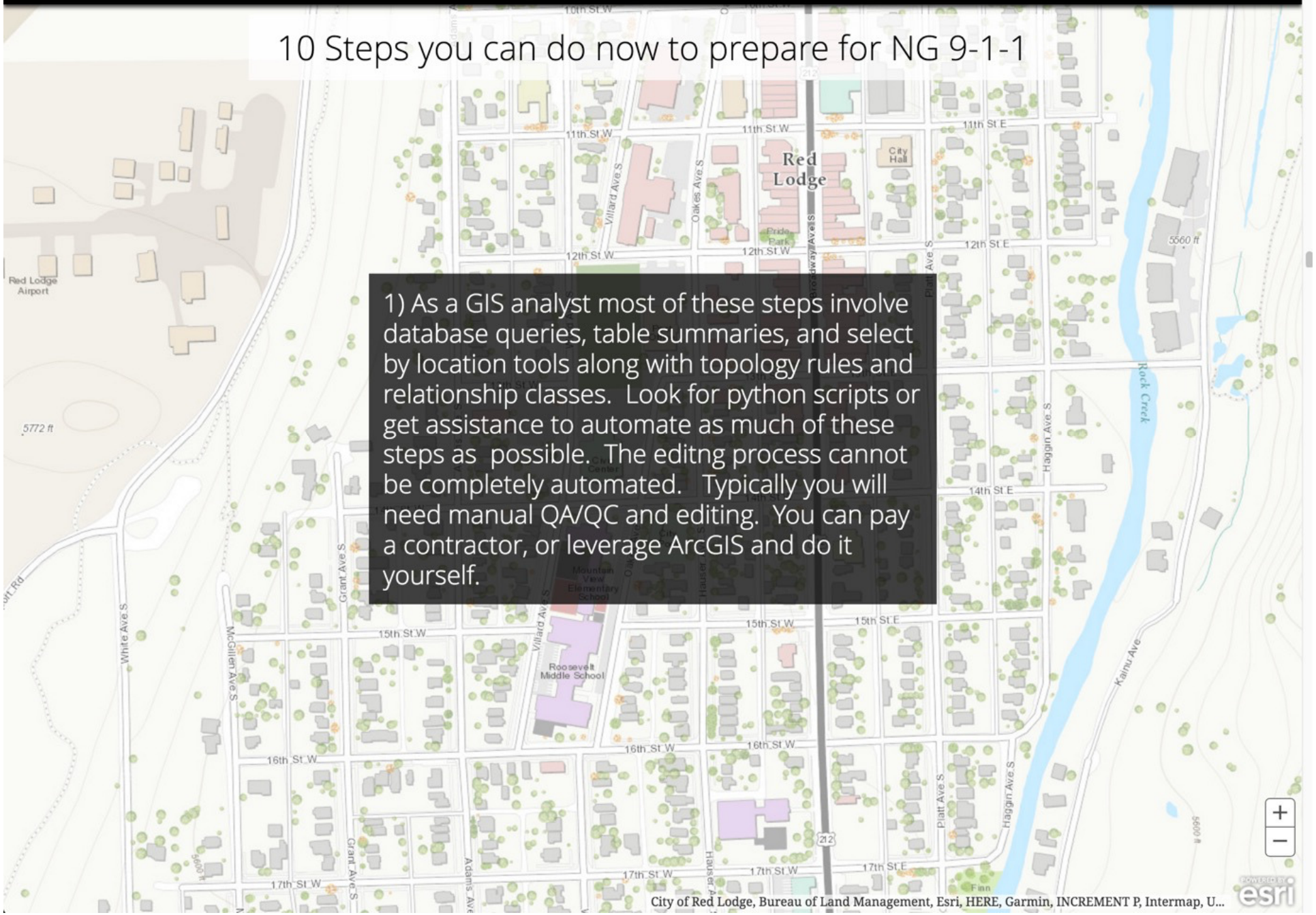


NG 9-1-1 Data Layers

Strongly recommended

- Street name alias table
- Site/structure address points
- Landmark name part table
- Complete Landmark Name Alias Table
- State boundary
- County boundary
- Incorporated municipality boundary

10 Steps you can do now to prepare for NG 9-1-1



1) As a GIS analyst most of these steps involve database queries, table summaries, and select by location tools along with topology rules and relationship classes. Look for python scripts or get assistance to automate as much of these steps as possible. The editng process cannot be completely automated. Typically you will need manual QA/QC and editing. You can pay a contractor, or leverage ArcGIS and do it yourself.

10 Steps you can do now to prepare for NG 9-1-1

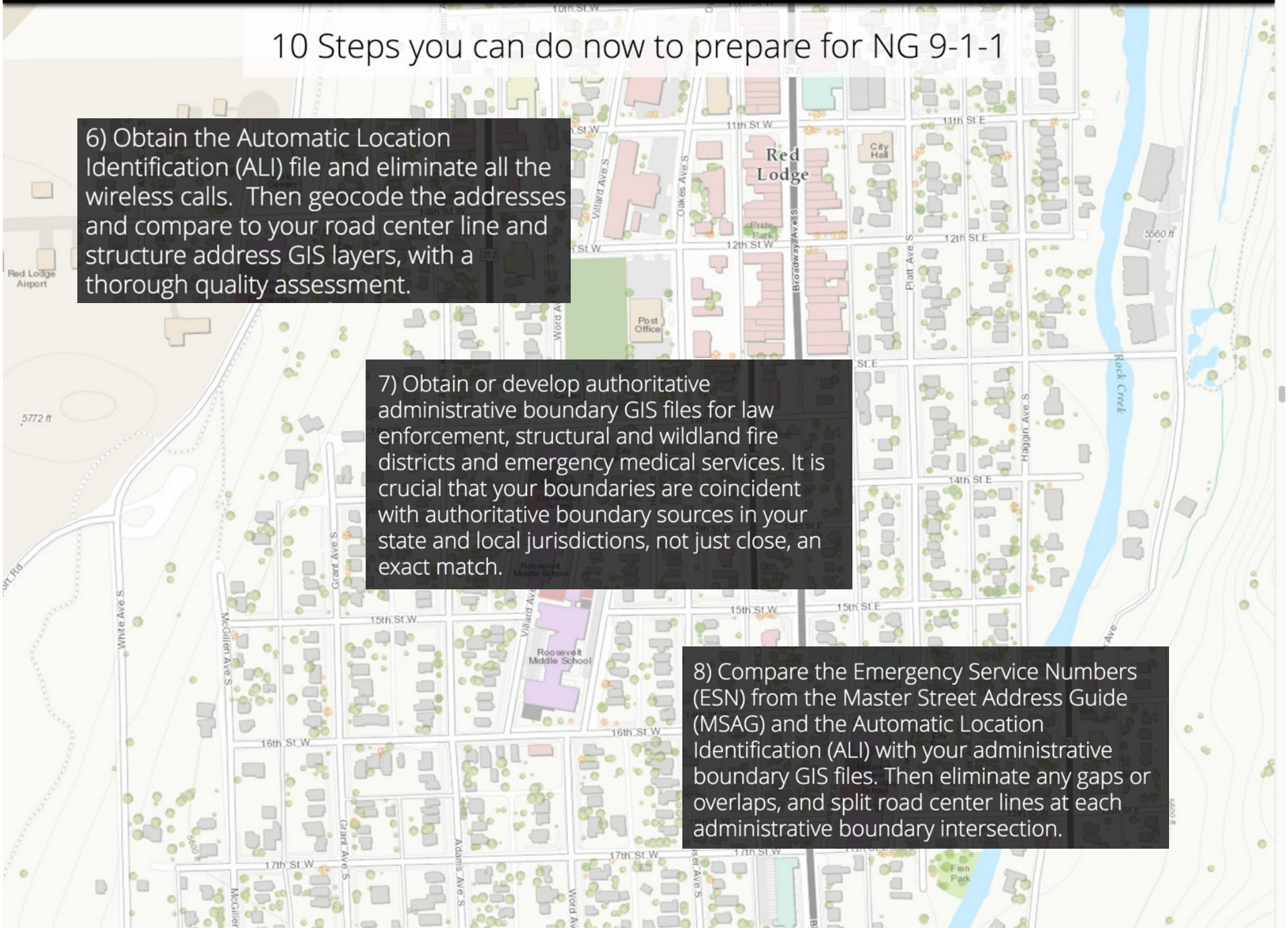
2) Get your address databases ready and standards compliant by splitting address fields in your road and structure GIS layer to make them compatible with the Civic Location Data Exchange Format (CLDXF) and do a thorough quality assessment.

3) Get your road centerline GIS layer ready, make sure it is complete and accurately mapped and has no gaps, overlaps, dangles, and segments are split at every intersection and snapped properly. Parsing the street name field accurately takes a lot of time and local knowledge.

4) Check the address ranges in your road layer making sure the direction of flow increases with the address ranges.

5) Compare your road centerline GIS layers to Enhanced 911 legacy Master Street Address Guide (tabular database) making sure you have a complete road map, names and address ranges agree, and no address locations fall outside the address range in the road layer.

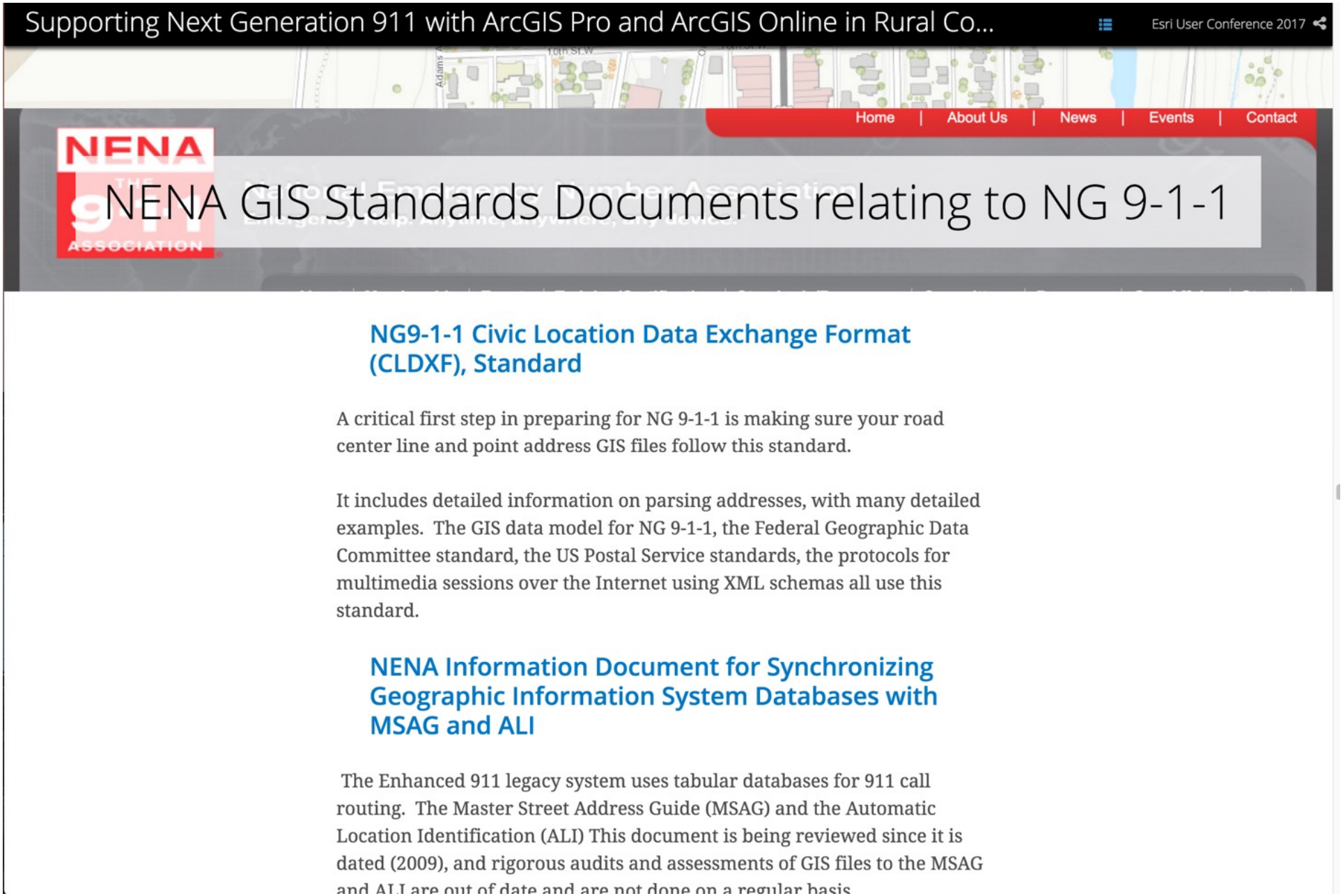
10 Steps you can do now to prepare for NG 9-1-1



10 Steps you can do now to prepare for NG 9-1-1

9) Obtain other jurisdictional boundaries that may be necessary, including incorporated municipalities, Census designated places, zip code boundaries, and come up with a strategy on how to efficiently assign these to either side of your coincident road centerline GIS files.

10) Work with your local government staff and DES and EMS personnel to identify and build alias database tables with alternative names (alias names) of roads and local landmarks. These will be useful for NG 9-1-1 and are very popular in rural communities for making local base maps and map books.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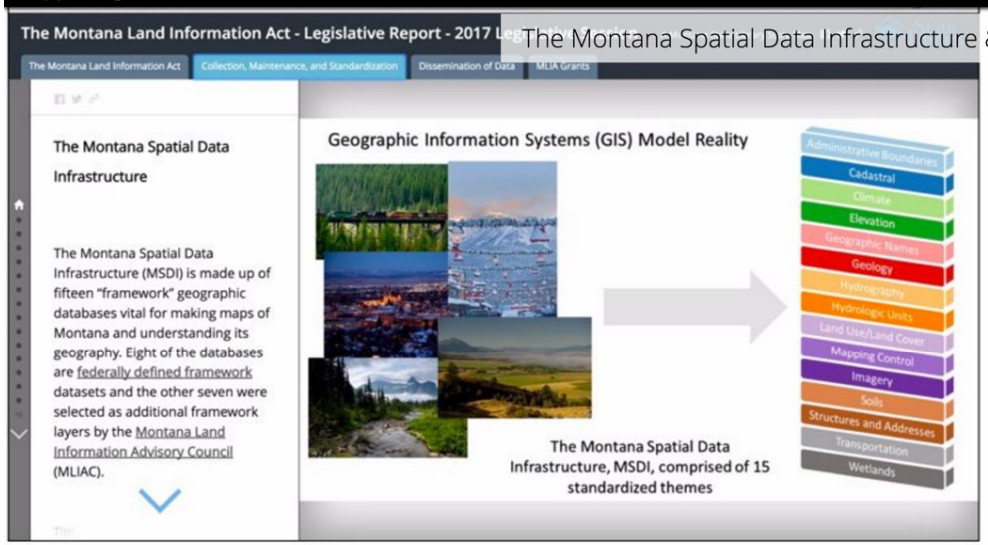
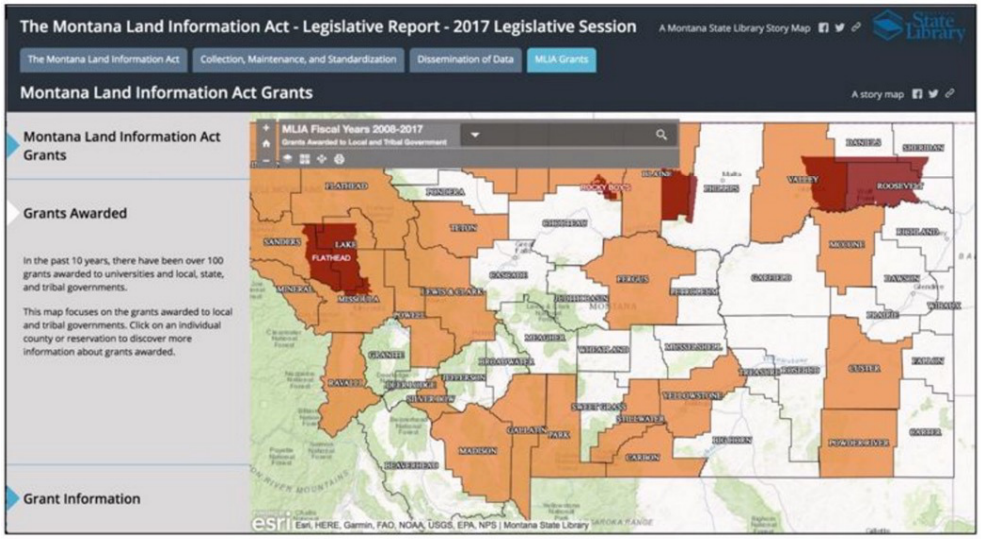
NENA
NENA GIS Standards Documents relating to NG 9-1-1
NG9-1-1 Civic Location Data Exchange Format (CLDXF), Standard
A critical first step in preparing for NG 9-1-1 is making sure your road center line and point address GIS files follow this standard.
It includes detailed information on parsing addresses, with many detailed examples. The GIS data model for NG 9-1-1, the Federal Geographic Data Committee standard, the US Postal Service standards, the protocols for multimedia sessions over the Internet using XML schemas all use this standard.
NENA Information Document for Synchronizing Geographic Information System Databases with MSAG and ALI
The Enhanced 911 legacy system uses tabular databases for 911 call routing. The Master Street Address Guide (MSAG) and the Automatic Location Identification (ALI) This document is being reviewed since it is dated (2009), and rigorous audits and assessments of GIS files to the MSAG and ALI are out of date and are not done on a regular basis

The Montana Spatial Data Infrastructure & Montana Land Information Grants





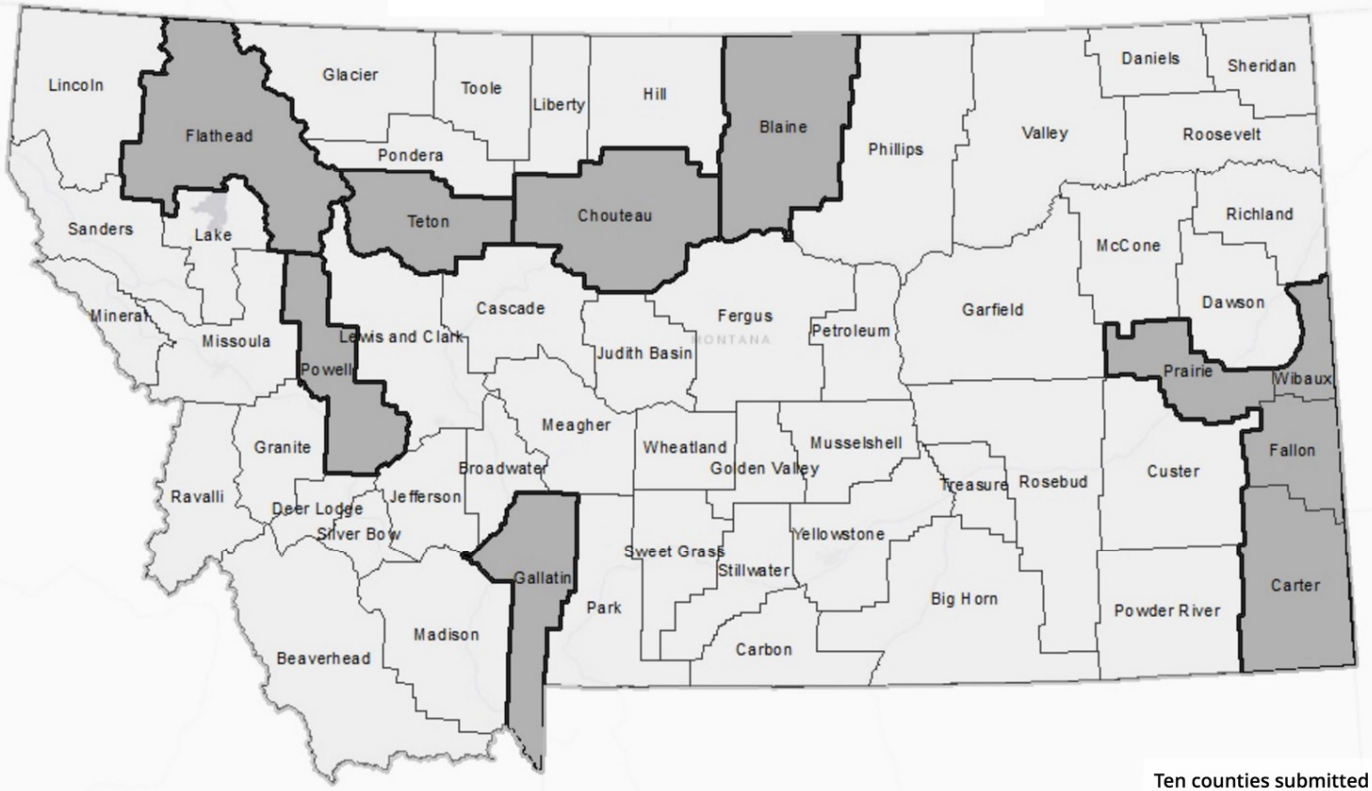
The Montana State Library administers the Montana Land Information Act grant program. They prepared a story map describing the grant process that is available at:

http://arcg.is/2fXCmF4

Go to the site and learn more about the grants funded over the last ten years, and the Montana Spatial Data Infrastructure.
Several NG 9-1-1 related grant proposals have been submitted over the last two years.

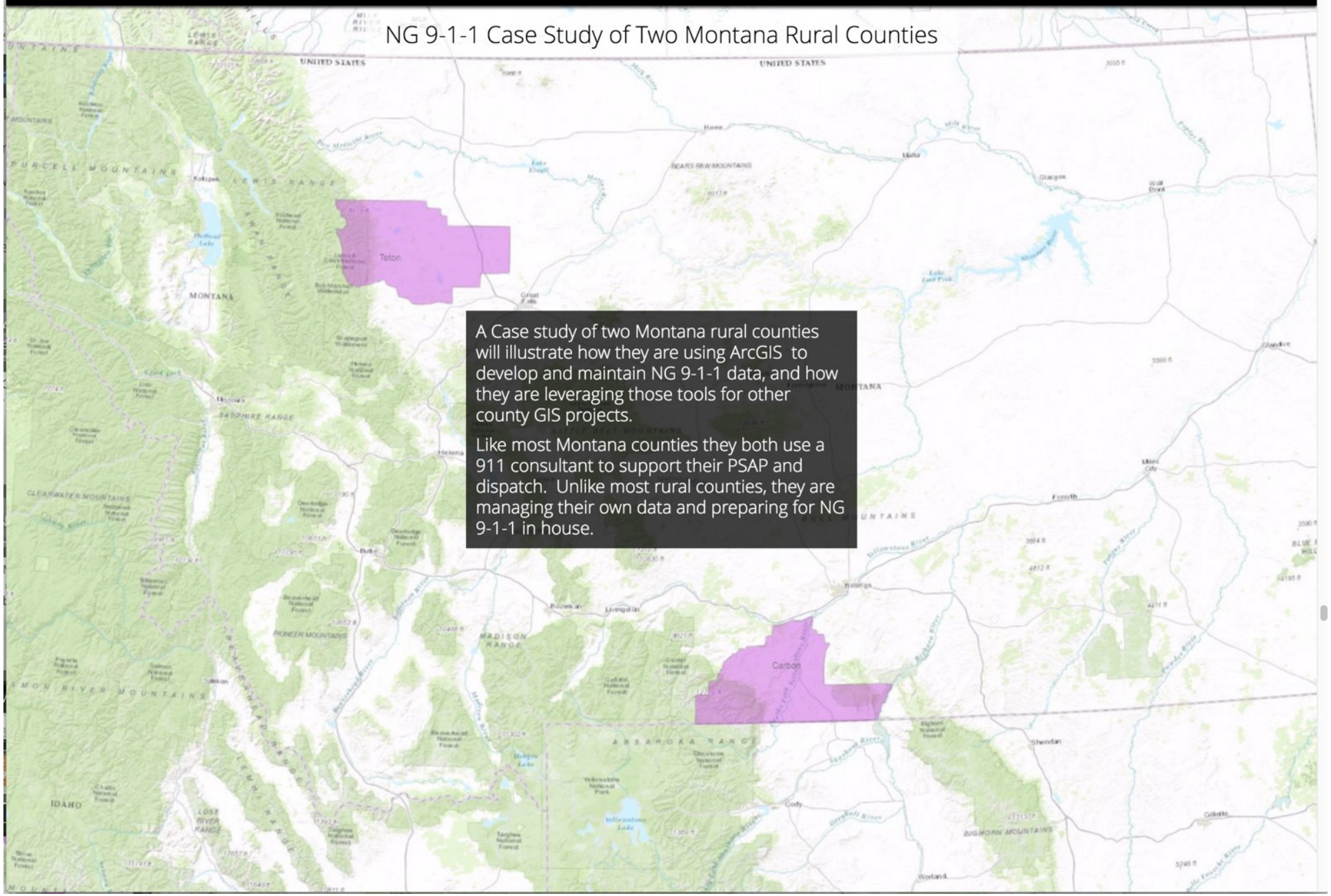
The Montana Spatial Data Infrastructure & Montana Land Information Grants

MLIA 2018 NG 911 Grant Proposals



Ten counties submitted NG 911 proposals to MLIA in FY 2018 (Gallatin was the only one not funded)

NG 9-1-1 Case Study of Two Montana Rural Counties

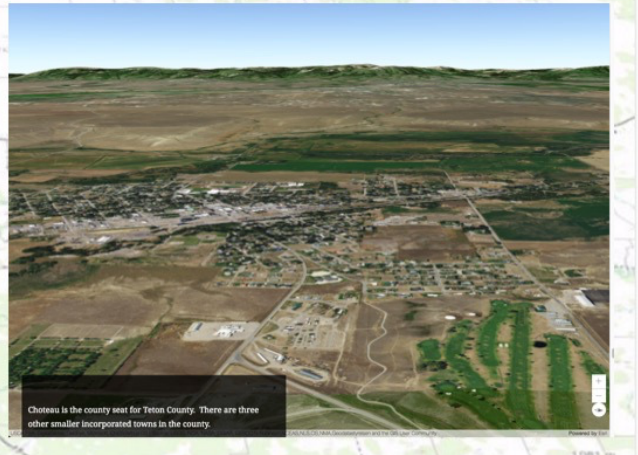


A Case study of two Montana rural counties will illustrate how they are using ArcGIS to develop and maintain NG 9-1-1 data, and how they are leveraging those tools for other county GIS projects.

Like most Montana counties they both use a 911 consultant to support their PSAP and dispatch. Unlike most rural counties, they are managing their own data and preparing for NG 9-1-1 in house.

Teton County has one GIS staff. He is the planner and formerly the weed coordinator. He has not had formal GIS training, but has been self training, and attending web based training sessions for three years.

He primarily uses ArcGIS online and ArcGIS Pro as his software suite. With contracted assistance, he has been modifying legacy data and preparing NG 9-1-1 layers.



Teton County

KEY FACTS

6,215
Population

46.3
Median Age

2.31
Average Household Size

$40,970
Median Household Income

EDUCATION

9%
No High School Diploma

36%
High School Graduate

33%
Some College

22%
Bachelor's/Grad/Prof Degree

BUSINESS

474
Total Businesses

2,851
Total Employees

EMPLOYMENT

61%
White Collar

25%
Blue Collar

14%
Services

3.7%
Unemployment Rate

INCOME

$40,970
Median Household Income

$24,500
Per Capita Income

$87,986
Median Net Worth

Households By Income

The largest group: <$15,000 (15.7%)

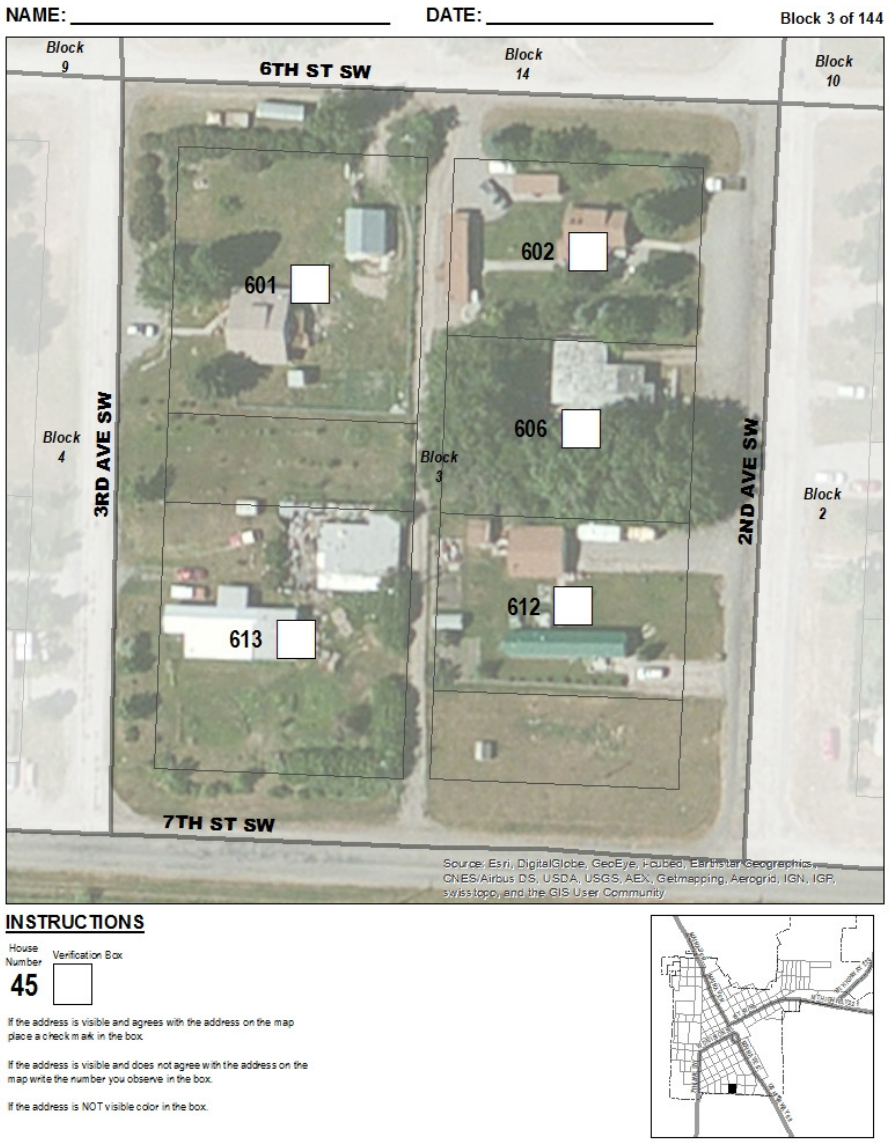
The smallest group: $200,000+ (2.0%)

Indicator ▲	Value	Difference
<$15,000	15.7%	+1.6%
$15,000 - $24,999	14.9%	+2.4%
$25,000 - $34,999	13.9%	+2.6%
$35,000 - $49,999	11.9%	-3.8%
$50,000 - $74,999	15.4%	-4.9%
$75,000 - $99,999	13.8%	+2.7%
$100,000 - $149,999	9.6%	-0.2%
$150,000 - $199,999	2.9%	+0.7%
$200,000+	2.0%	-0.9%

2017 MLIA NG-911 Project
Teton County

- Clean up and update address, street centerline, fire and EMS administrative boundaries
- Implement Collector, Navigator, Survey 123, Geoform and Suite of AGOL map apps
- Develop alias names for roads and landmarks
- Convert data to Esri Local Govt Data Model (LGDM)
- Crosswalk Esri Local Information Data Model attributed to NENA NG-911
- Work flows, best practice guides, and regular coached capacity building – primarily ArcGIS Online and ArcGIS Pro
- Collaborate with city public works to develop collaborative support on addresses and roads

Ground Truth Addresses in Choteau

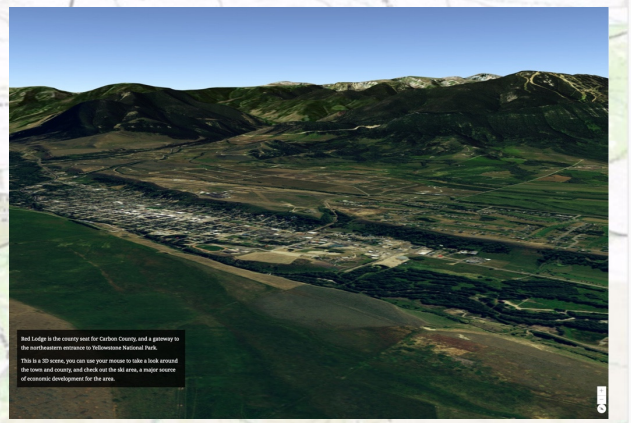


Boy Scouts helped update and verify addresses in Choteau

Carbon County

The Carbon County DES coordinator was a former GIS analyst, for many years and developed the base GIS layers for Red Lodge and Carbon County as a contractor. In addition to emergency services, he maintains the current county GIS data.

He uses Advanced ArcGIS Desktop and has maintained his GIS layers in the Esri local government data model (LGDM) for several years. With MLIA grant assistance contracted services, he has been modifying legacy data and preparing NG 9-1-1 layers, auditing his legacy E911 tabular MSAG and ALI data against his GIS layers and preparing scripts to regularly convert LGDM to the NENA NG 9-1-1 standard.



Carbon County

KEY FACTS

10,388
Population

50.1
Median Age

2.17
Average Household Size

$50,662
Median Household Income

EDUCATION

6%
No High School Diploma

32%
High School Graduate

32%
Some College

29%
Bachelor's/Grad/Prof Degree

BUSINESS

698
Total Businesses

4,079
Total Employees

EMPLOYMENT

58%
White Collar

27%
Blue Collar

16%
Services

1.5%
Unemployment Rate

INCOME

$50,662
Median Household Income

$29,632
Per Capita Income

$108,208
Median Net Worth

Households By Income

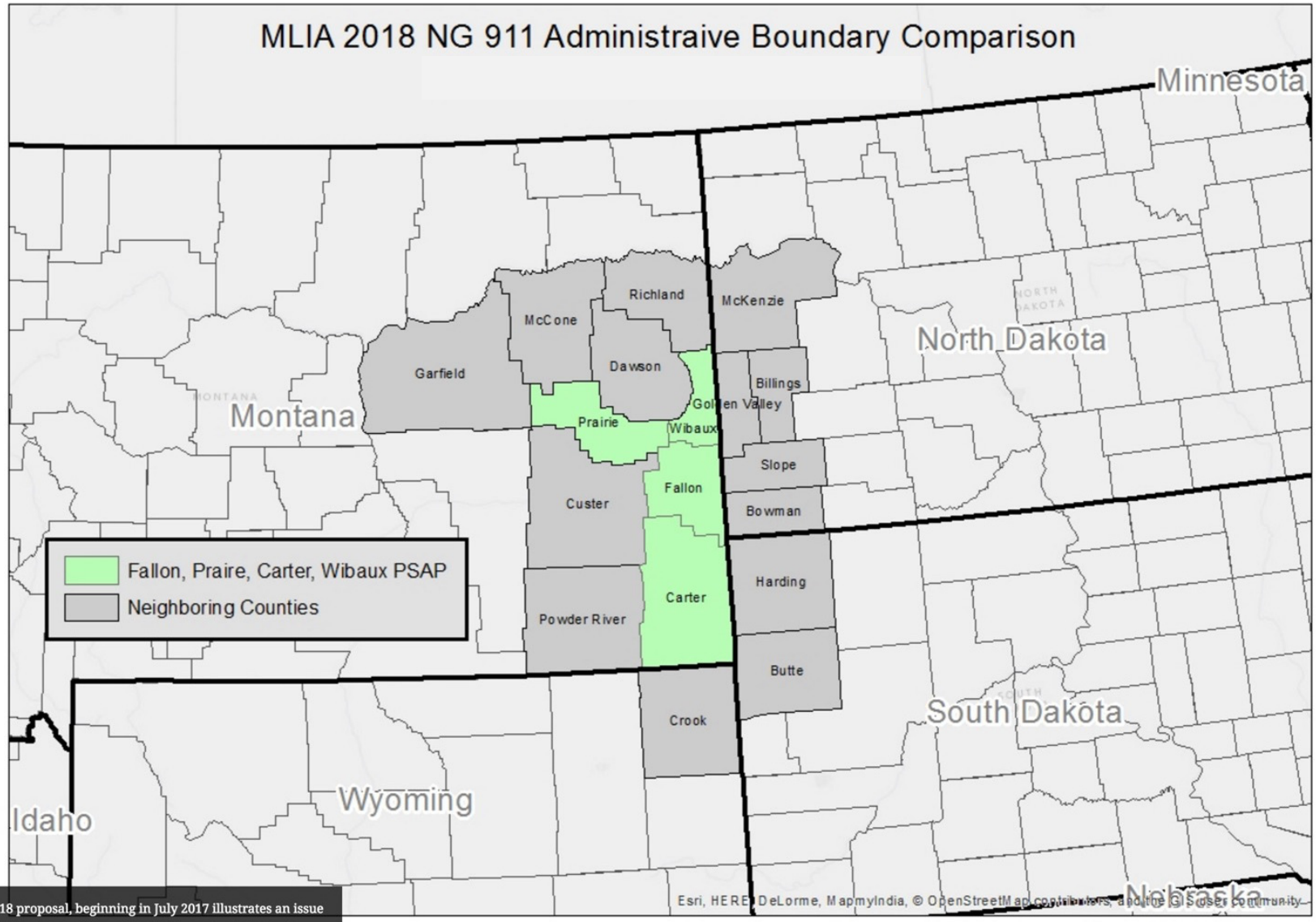
The largest group: $50,000 - $74,999 (21.2%)

The smallest group: $200,000+ (2.3%)

Indicator ▲	Value	Difference
<$15,000	14.1%	-4.3%
$15,000 - $24,999	11.8%	-0.7%
$25,000 - $34,999	10.4%	-4.5%
$35,000 - $49,999	12.9%	-0.5%
$50,000 - $74,999	21.2%	+5.3%
$75,000 - $99,999	11.3%	+1.0%
$100,000 - $149,999	11.8%	+1.6%
$150,000 - $199,999	4.4%	+1.7%
$200,000+	2.3%	+0.7%

2017 MLIA NG-911 Project
Carbon County

- Implement Collector, Survey 123, Geoform and Suite of AGOL map apps – deploy with staff
- Data processing and QA/QC for NG 911 – Comparison audits for MSAG (Legacy 911 table of street segments) and ALI (E911 Addresses derived from Telcos) to Carbon County road centerline, addresses and administrative boundaries.
- Assist with script development and advanced ArcGIS data processing
- Training and development with ArcGIS Online and ArcGIS Pro and web based Address verification tools
- Assist in converting Pre-disaster Mitigation and Community Wildland Fire Protection Plan Esri Story Map Format
- Crosswalk Esri LGDM to NENA NG-911
- Work flows, best practice guides, and regular coached capacity building – primarily ArcGIS Online and ArcGIS Pro
- Collaborate with city public works to develop collaborative support on addresses and roads



This FY 2018 proposal, beginning in July 2017 illustrates an issue that does not get the attention that other aspects of NG 9-1-1. These PSAP in green, comprised of four counties, are planning to hold WebEx conference calls with each neighbor to compare their NG 9-1-1 layers to other PSAPs in Montana, North and South Dakota, and Wyoming to identify gaps and overlaps.

This presentation is available as an Esri Story Map at

http://arcg.is/2r8AOd9