

# 2021 Tamarisk and Russian-olive Aerial Survey Information



## Methodology Summary

On July 7-8, 2021, a US Fish and Wildlife survey plane (Quest Kodiak) was flown at approximately 500-700' AGL (above ground level) over the river courses of interest at approximately 80-100 knots. One USDA Forest Service employee mapped Russian-olive, and one Kansas Forest Service employee mapped tamarisk.

Areas with the plant of interest were recorded by drawing either a polygon (of at least 1 acre) or recording an individual point, using tablets equipped with the Digital Mobile Sketch Mapping (DMSM) software. For polygons, density data was recorded according to the best estimates of the surveyor.

*Notes:* A distinction needs to be made between acreage WITH tamarisk, and acreage OF tamarisk. This project mapped areas that had apparent infestations of tamarisk present; or acres WITH tamarisk. Acres OF tamarisk can only be determined when the only vegetation present is tamarisk, or by reducing the acres mapped according to the density (100 acres WITH tamarisk at 50% density = 50 acres OF tamarisk), however this runs the risk of multiplying error. Data from this survey should be characterized as acres "with tamarisk."

For some areas surveyed, tamarisk polygons could not be created due to extremely sparse densities, or due to heavy overstory cover. This resulted in an underestimate of tamarisk along the South Fork of the Republican River (SFRR) where this survey recorded 0 acres, although tamarisk is known to exist from previous ground survey information. This also likely resulted in an underestimate of tamarisk along the eastern stretches of the Smoky Hill due to hardwood tree cover along the river. Estimates of Russian-olive, a larger tree, did not suffer these same complications.

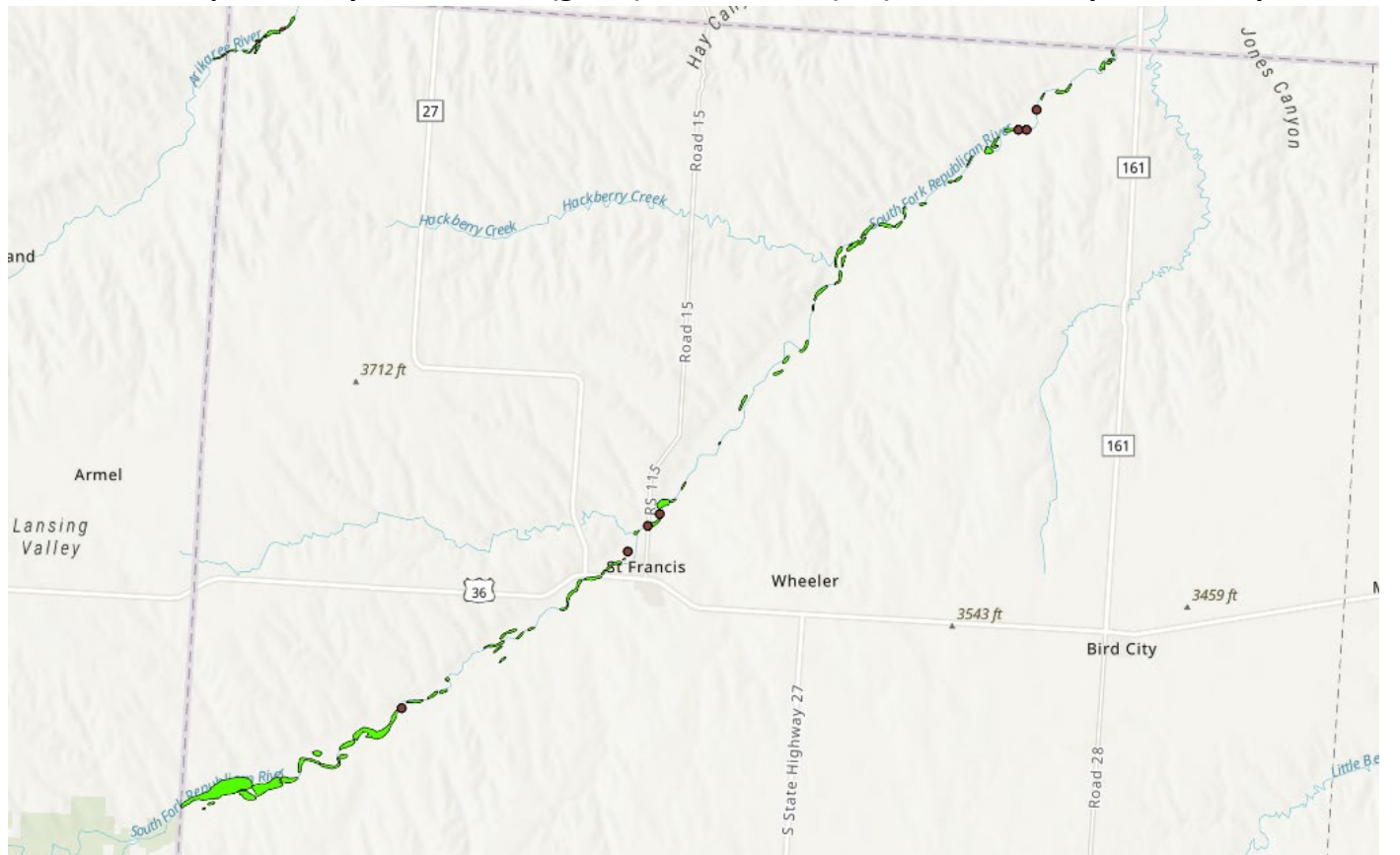


Photo above is typical view from plane, with tamarisk clearly visible along center of Arkansas channel.



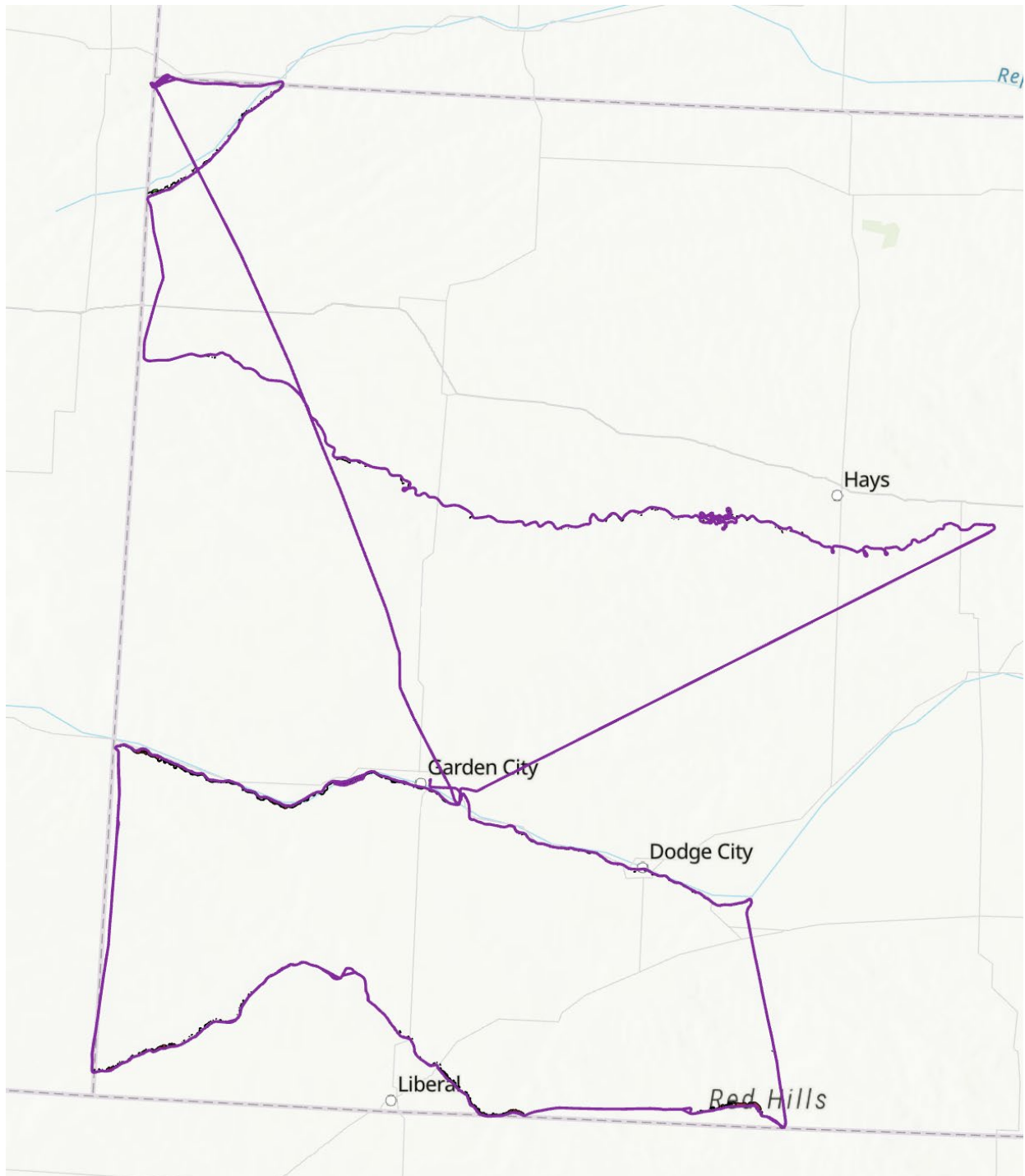
Photo above shows Russian-olive along the Arikaree in Cheyenne County.

Below, preliminary Russian-olive (green) and tamarisk (red) data from Cheyenne County.



## Survey Bounds

- **Arikaree:** CO-KS state line to KS-NE state line; covered Cheyenne county
- **South Fork Republican River:** CO-KS state line to KS-NE state line; covered Cheyenne county
- **Smoky Hill:** confluence of forks of Smoky Hill west of Russell Springs to east of Hwy 281 south of Russell; covered Logan, Gove, Trego, and Ellis counties
- **Arkansas:** CO-KS state line to northeastern bend near Ford/Kiowa county lines; Hamilton, covered Kearny, Finney, and Ford counties
- **Cimarron:** CO-KS state line to KS-OK state line south of Meade, also KS-OK state line to KS-OK state line south in Clark and Comanche counties; covered Morton, Stevens, Seward, Meade, Clark and Comanche counties.

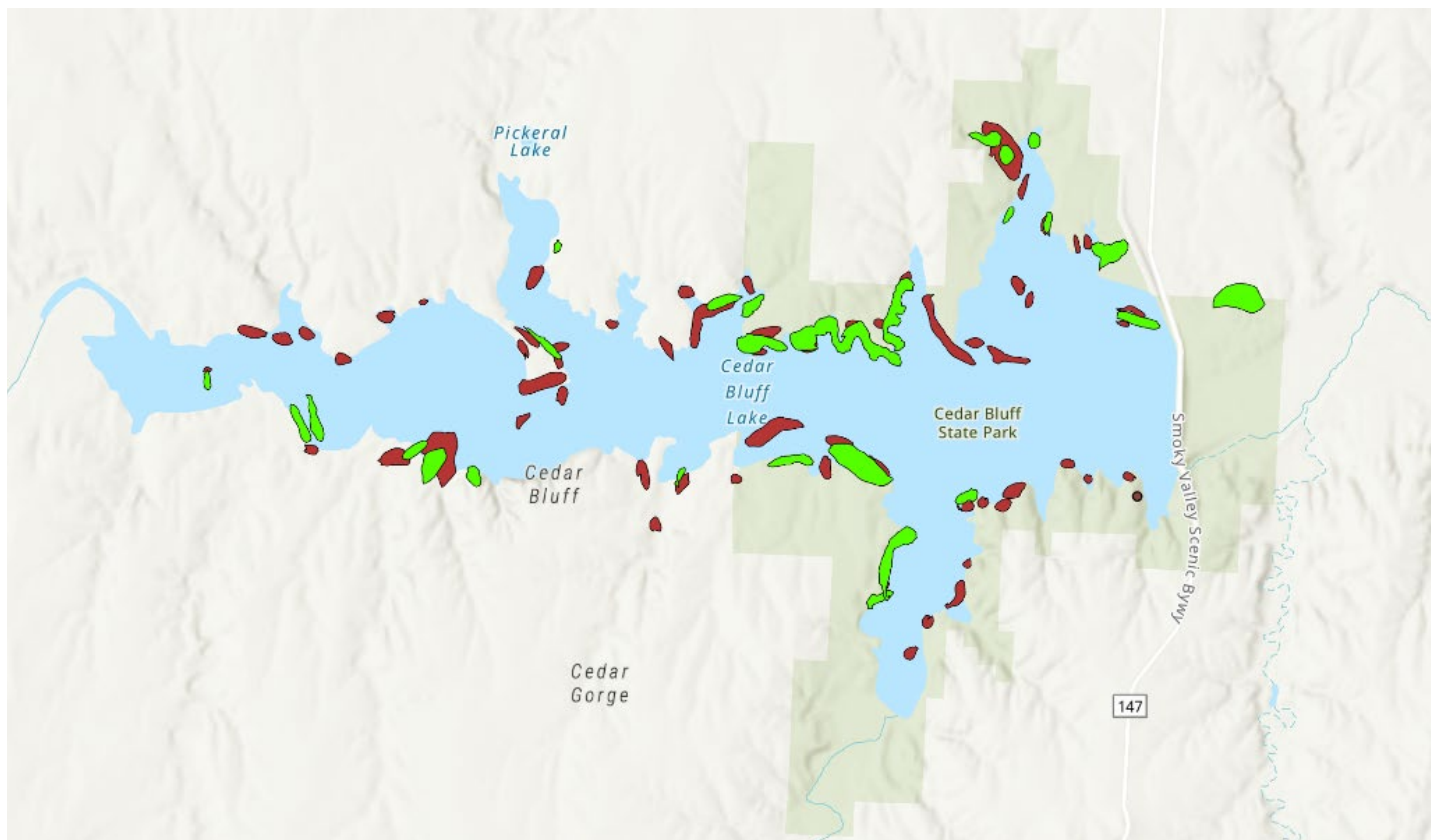


### County Summaries (Acres WITH)

County	River	Russian-olive	Tamarisk
Cheyenne	Arikaree	97	14
Cheyenne	SFRR	1720	0*
Logan	Smoky Hill	426	0*
Gove	Smoky Hill	102	41
Trego	Smoky Hill	518	538
Ellis	Smoky Hill	124	5
Hamilton	Arkansas	203	5270
Kearny	Arkansas	34	2845
Finney	Arkansas	0*	1700
Ford	Arkansas	7	320
Morton	Cimarron	0*	2576
Stevens	Cimarron	0*	249
Seward	Cimarron	632	1236
Meade	Cimarron	254	2496
Clark	Cimarron	0*	3413
Comanche	Cimarron	0*	292

*\*zero acres does not necessarily indicate absence of this species*

**A significant portion of the tamarisk and Russian-olive mapped in Trego County was found immediately surrounding Cedar Bluff Reservoir, as seen in the preliminary polygon data below.**



## Comparison to 2004 Tamarisk Survey

In 2004, a helicopter survey was conducted by Kansas Department of Agriculture staff. Due to varying methodologies between the 2004 and the 2021 surveys, they should not be directly compared to determine trends. However, they both show that relative to other counties/areas surveyed that same year, the highest concentrations of tamarisk are in Clark, Finney, Hamilton, Kearny, Meade, Morton and Seward counties. The exceptions are in Comanche and Ford counties, where the 2004 survey indicated relatively high levels of infestation, but the 2021 survey did not find these densities of tamarisk. This could be due to survey technique differences, or successful projects that have removed tamarisk in these areas.

<u>County</u>	<u>2004</u>	<u>2021</u>	<u>County</u>	<u>2004</u>	<u>2021</u>
Clark	9389	3413	Barber	1513	x
Comanche	3550	292	Barton	58	x
Finney	1804	1700	Cheyenne	x	14
Ford	1798	320	Cowley	1	x
Hamilton	5606	5270	Edwards	989	x
Kearny	3644	2845	Ellis	x	5
Meade	4104	2496	Gove	x	41
Morton	5732	2576	Grant	300	x
Seward	3642	1236	Gray	960	x
Stevens	553	249	Logan	x	0
			Pawnee	492	x
			Reno	1376	x
			Rice	628	x
			Sumner	1	x
			Trego	x	538

## Data Usage

It is important to use the data generated from this survey appropriately. Due to the nature of how it was gathered, the data is *not* necessarily accurate at a very fine scale along the rivers – polygon borders are not exact. However, it *can* be used to indicate relative intensities and locations of infestations and can guide outreach and project work on a County or sub-County level.

County maps have been created and will be made available to local partners and the public. Shapefiles and other GIS data can be made available upon request.

These maps should NOT be shared without also providing the information contained in this document, to avoid errors in interpretation or inappropriate usage of this data.

Any questions or requests should be directed to the Kansas Forest Service contacts below:

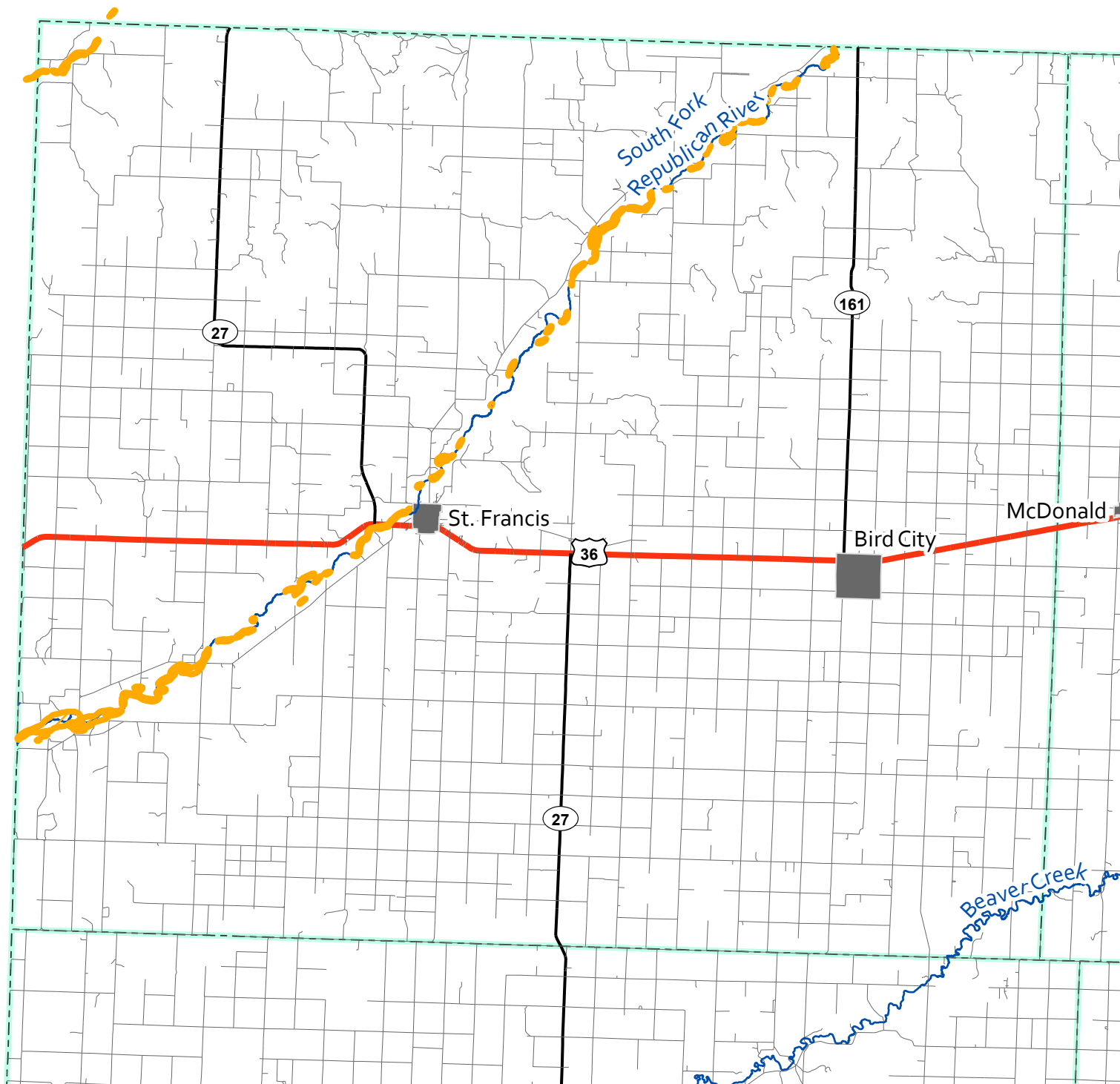
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Forest Health Coordinator  
[rarmbrust@ksu.edu](mailto:rarmbrust@ksu.edu)

**Darci Paul**  
GIS Specialist  
[dpaul@ksu.edu](mailto:dpaul@ksu.edu)

## Acknowledgements

This project could not have taken place without support and assistance from the following partners: Brian Howell and Marianne Davenport, **USDA Forest Service**; Phil Thorpe and Aron Flanders, **US Fish and Wildlife Service**; Kevin Klag and Kurtis Meier, **Kansas Dept. of Wildlife and Parks**; Jeff Vogel and Scott Marsh, **Kansas Dept. of Agriculture**; and others.

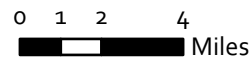
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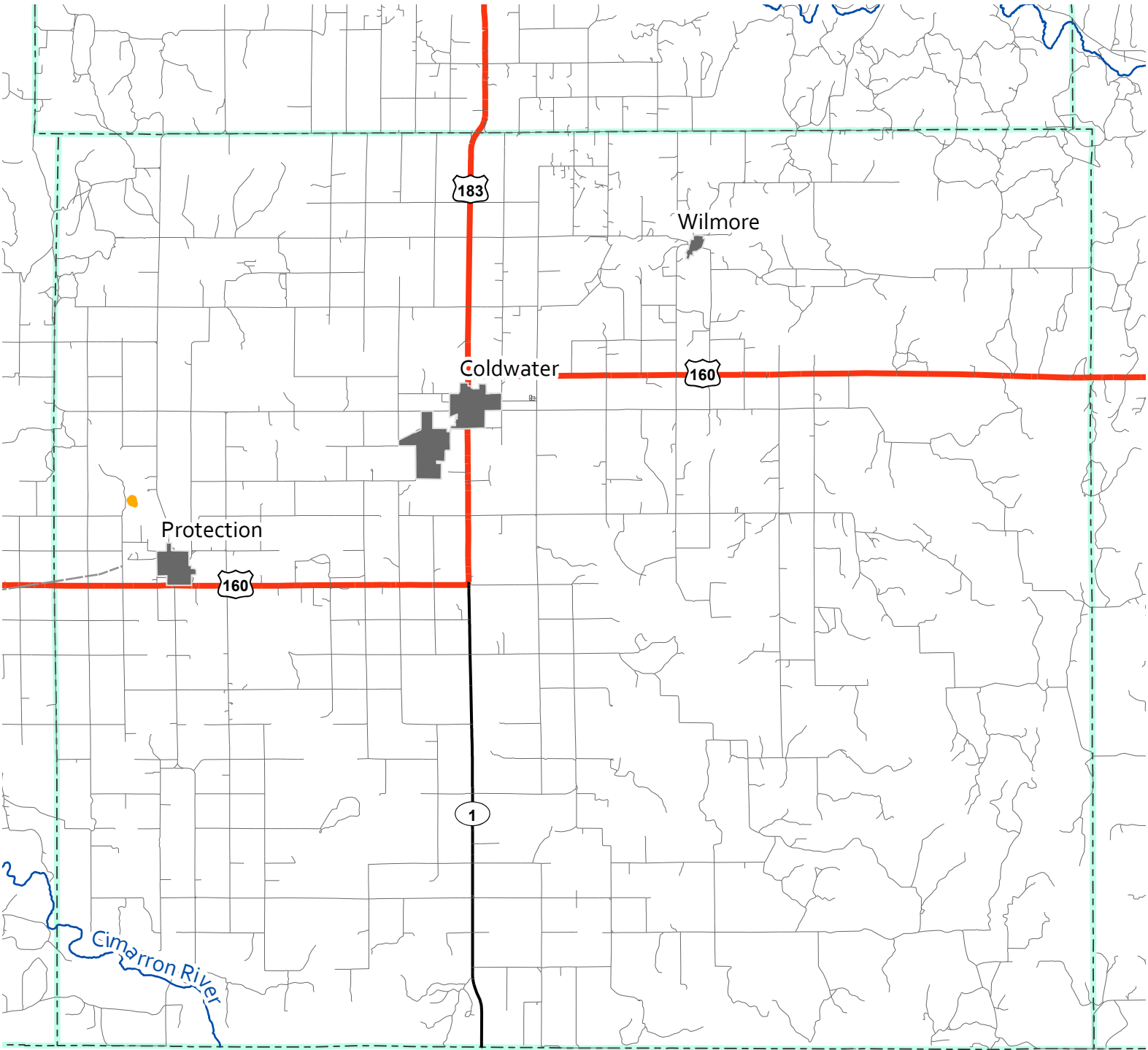
## Transportation System

- Primary US and State Highways
- Secondary State and County Highways
- Local, Neighborhood, Rural or City Street
- 4WD
- On/Off Ramp

- Russian Olive
- Reservoir
- River
- Incorporated Areas
- County



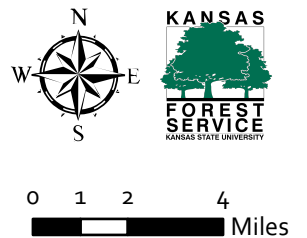
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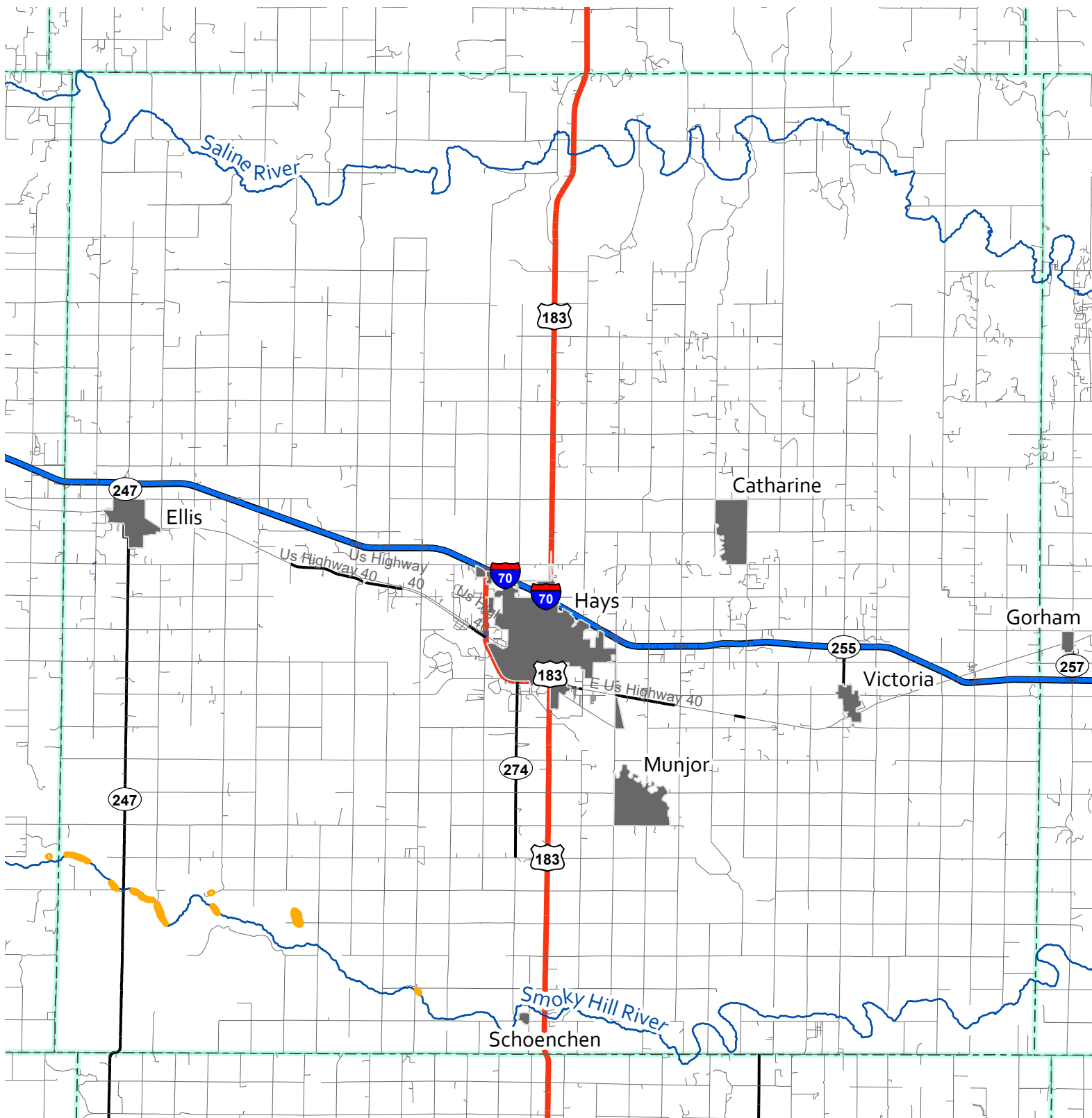
## Transportation System

- Primary US and State Highways
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- Reservoir
- River
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- County



# Ellis County



## Transportation System

Primary Limited Access or Inerstate

Primary US and State Highways

Secondary State and County Highways

Local, Neighborhood, Rural or City Street

4WD

On/Off Ramp

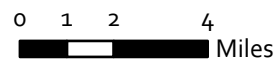
Russian Olive

Reservoir

River

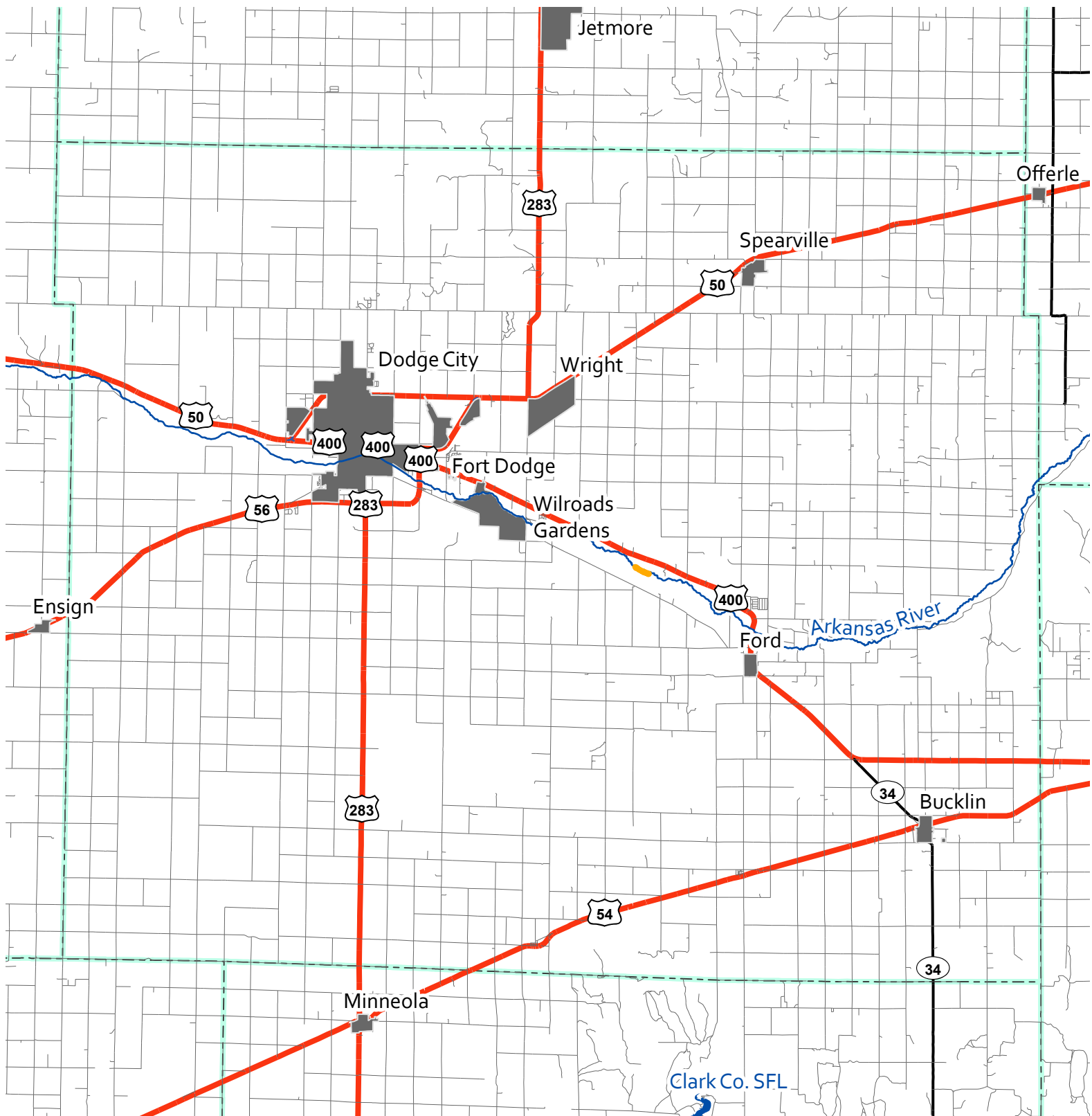
Incorporated Areas

County



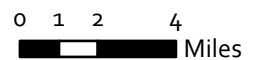


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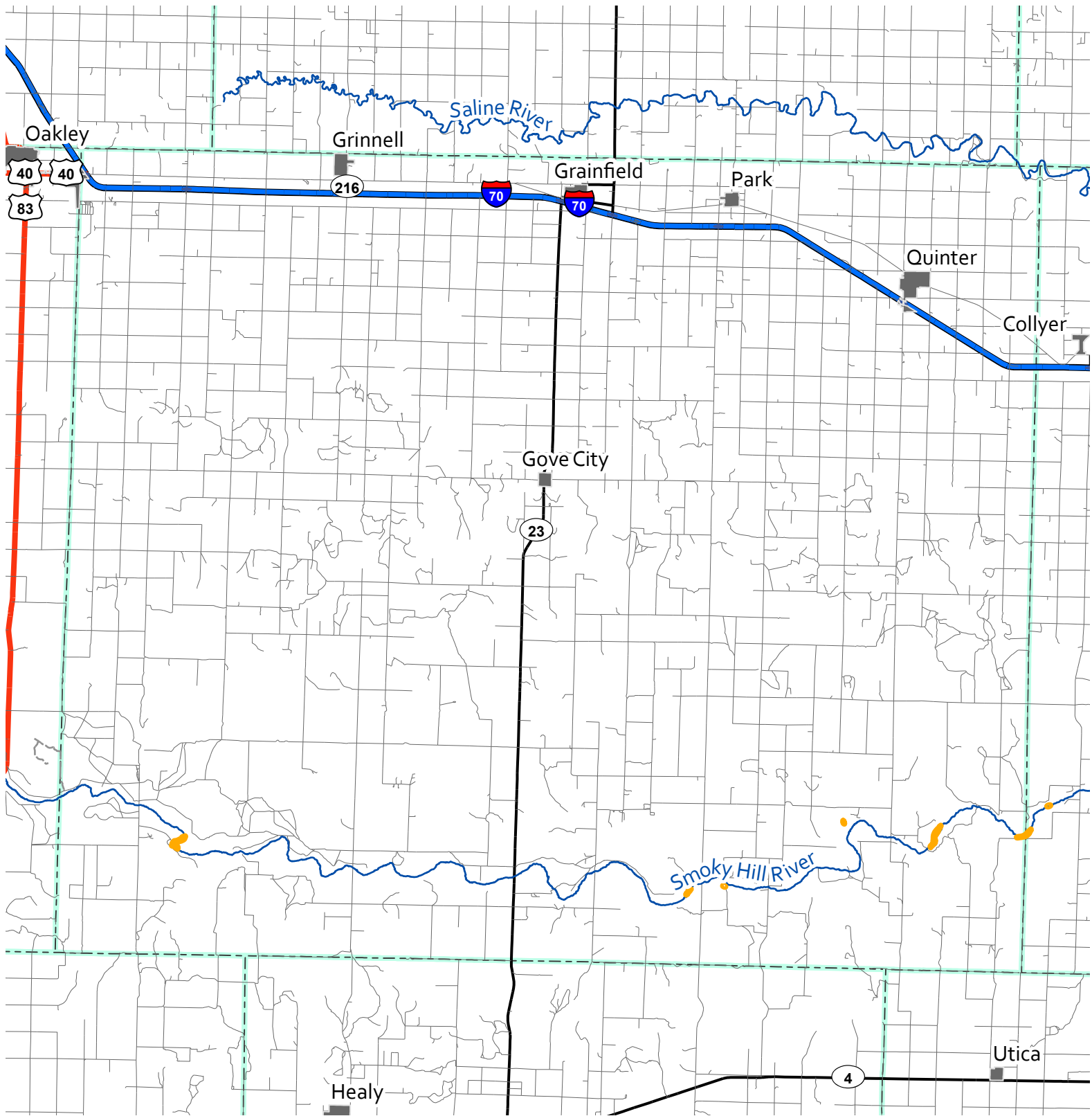


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# Gove County

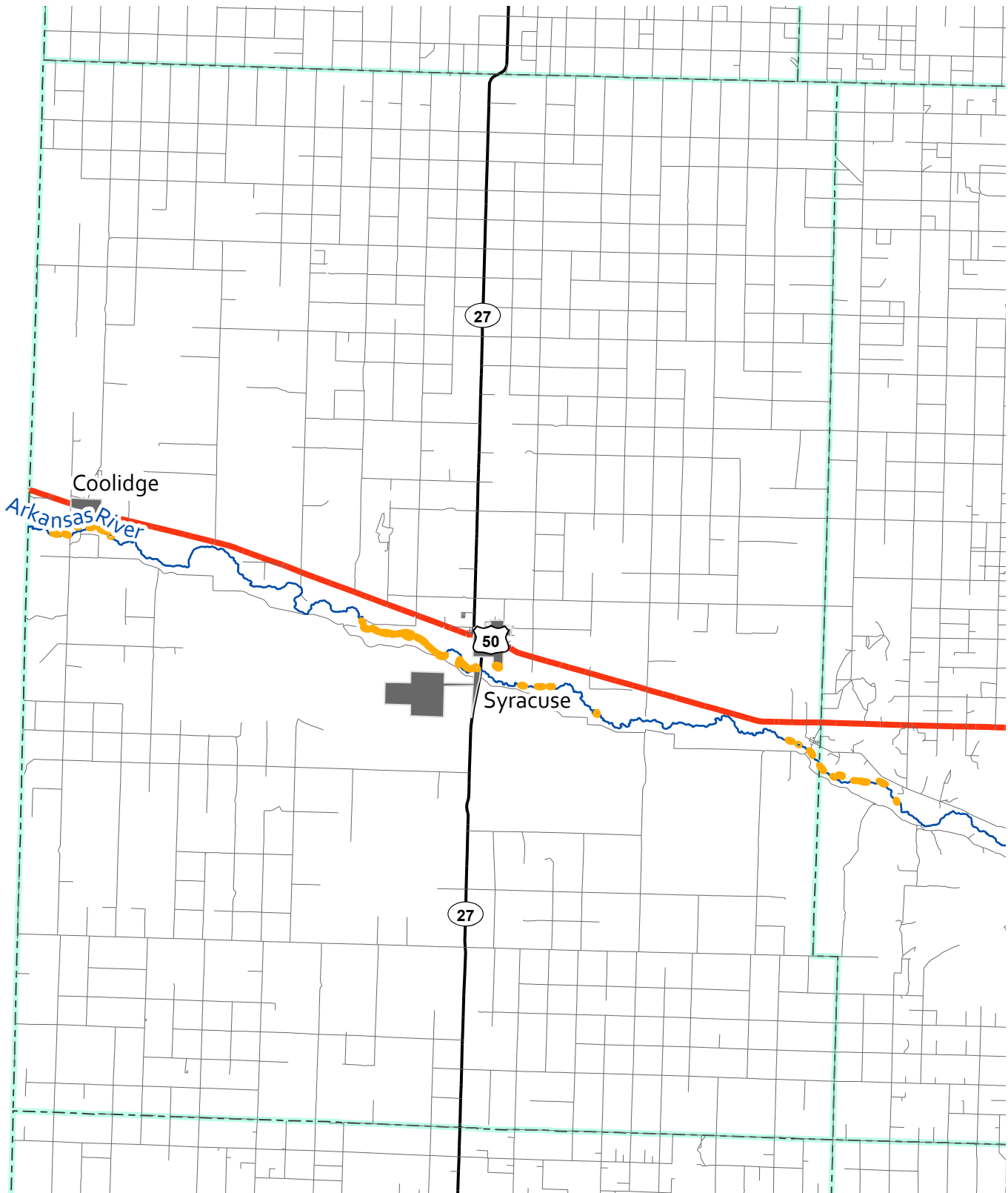


## Transportation System

- Primary Limited Access or Interstate
- Primary US and State Highways
- Secondary State and County Highways
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- 4WD
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- River
- Incorporated Areas
- County



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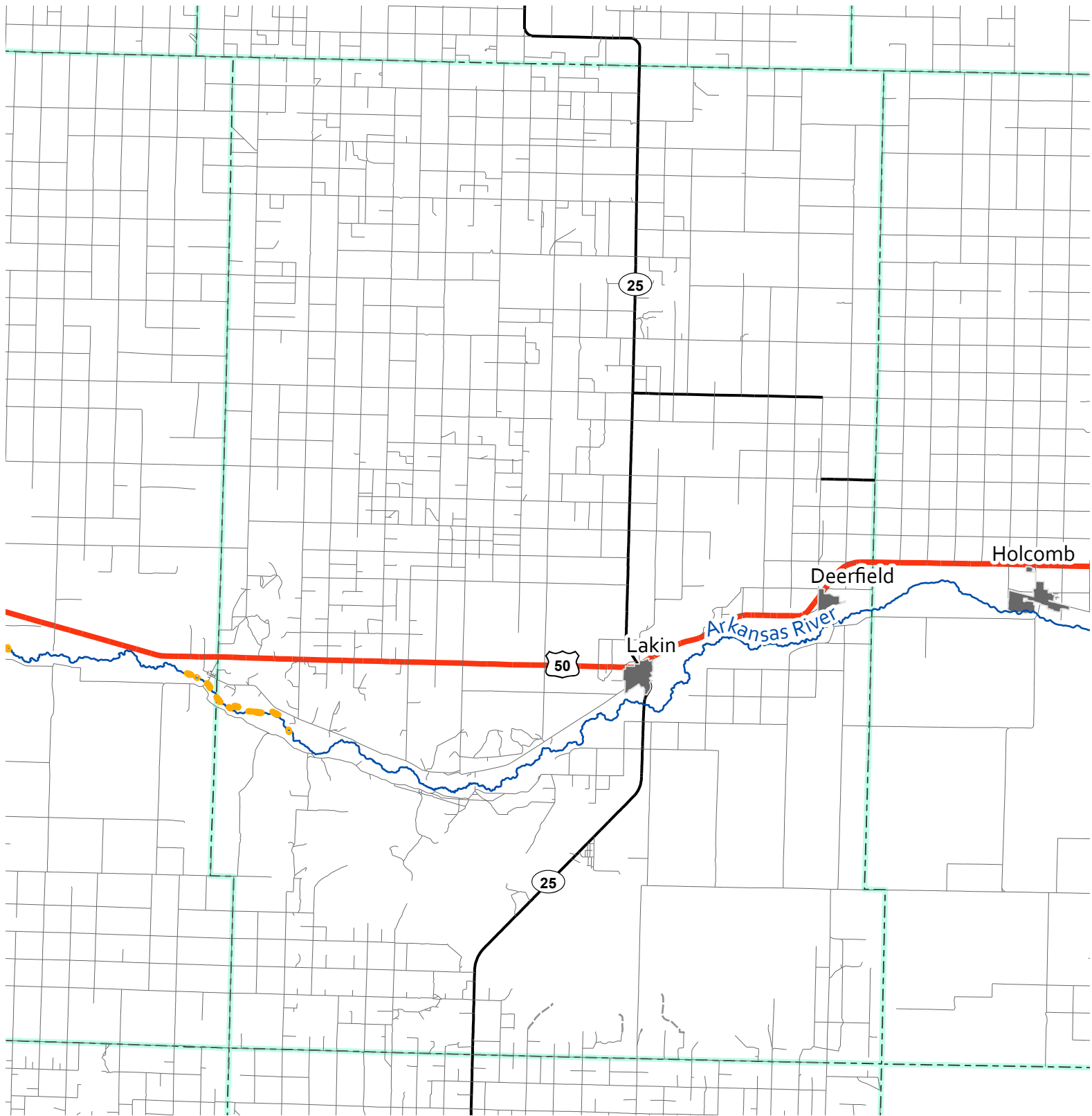
## Transportation System

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- River
- Incorporated Areas
- County



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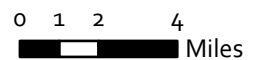
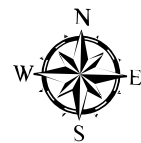
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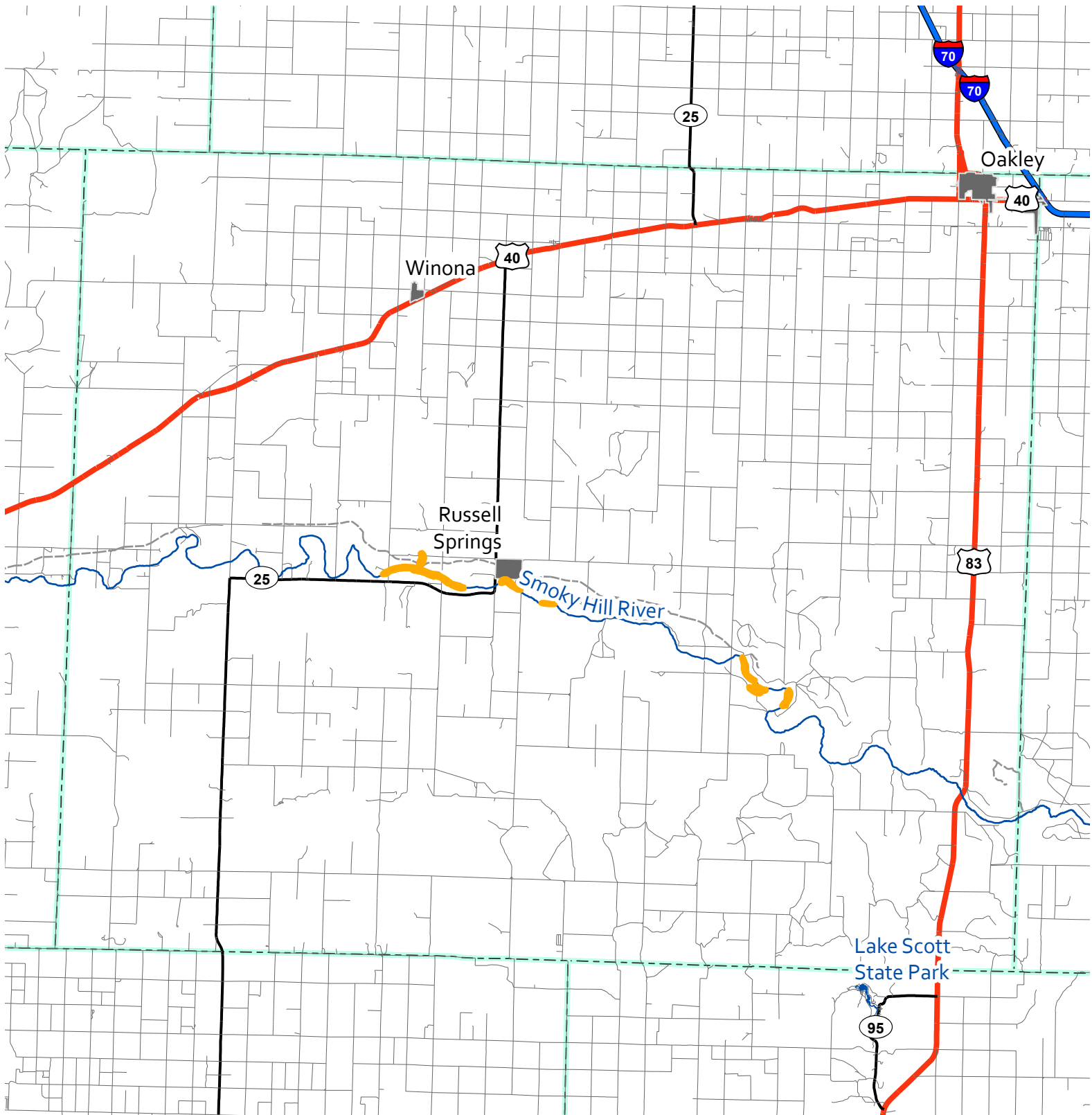
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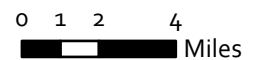
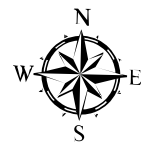


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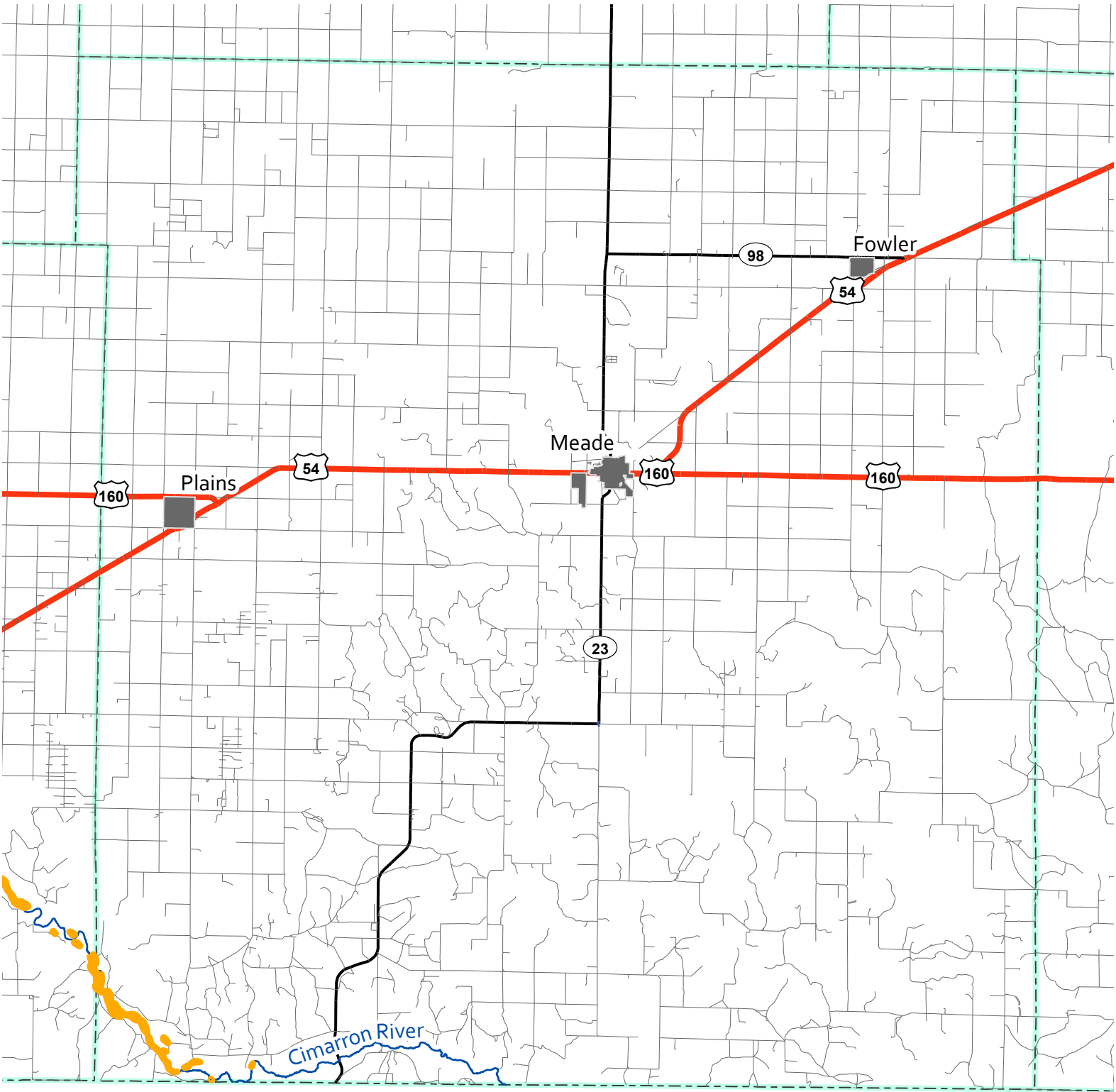


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- 4WD
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- County



# Meade County



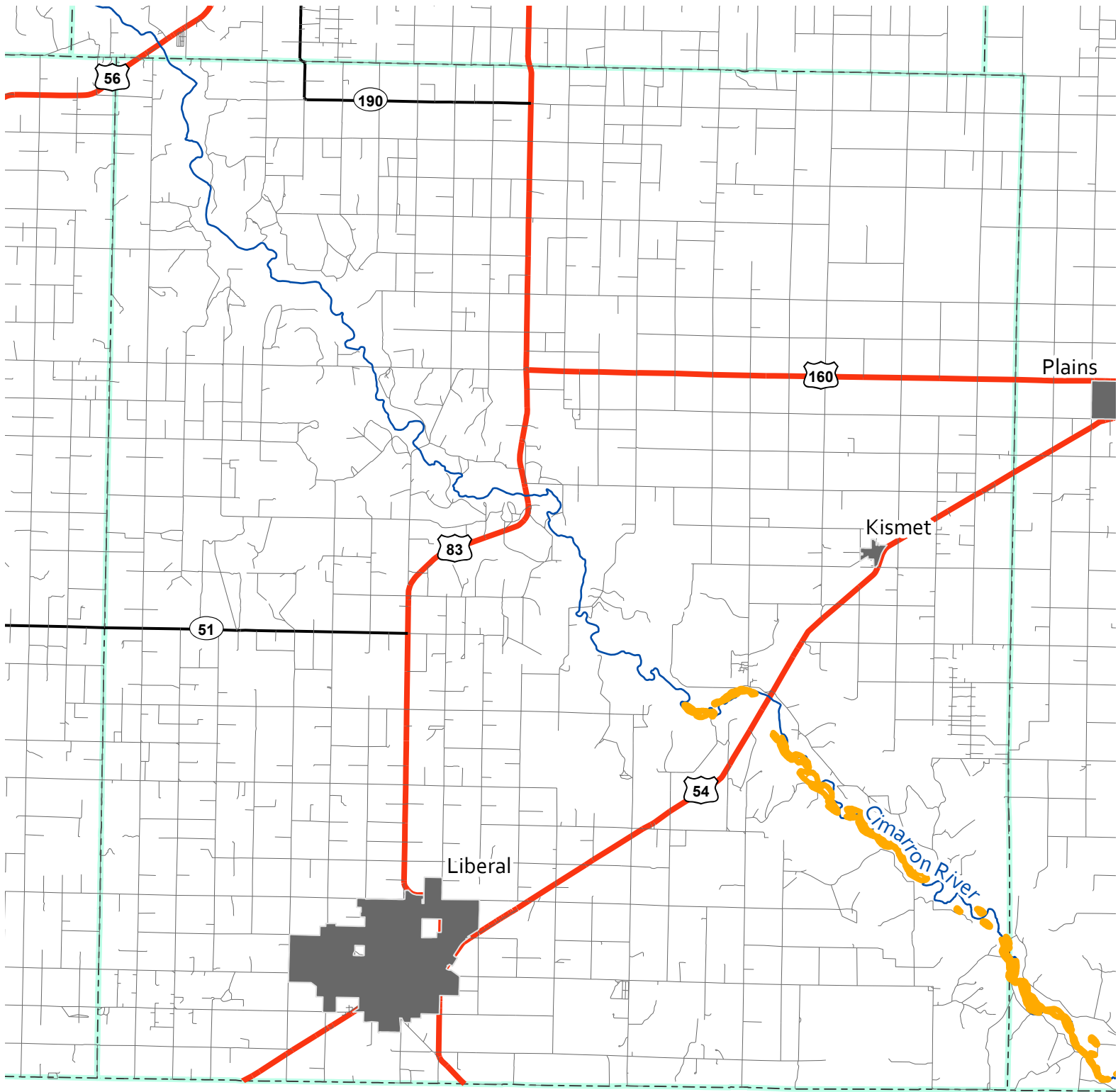
## Transportation System

- Primary US and State Highways
- Secondary State and County Highways
- Local, Neighborhood, Rural or City Street
- - - 4WD
- On/Off Ramp

- Russian Olive
- Reservoir
- River
- Incorporated Areas
- County



# Seward County



## Transportation System

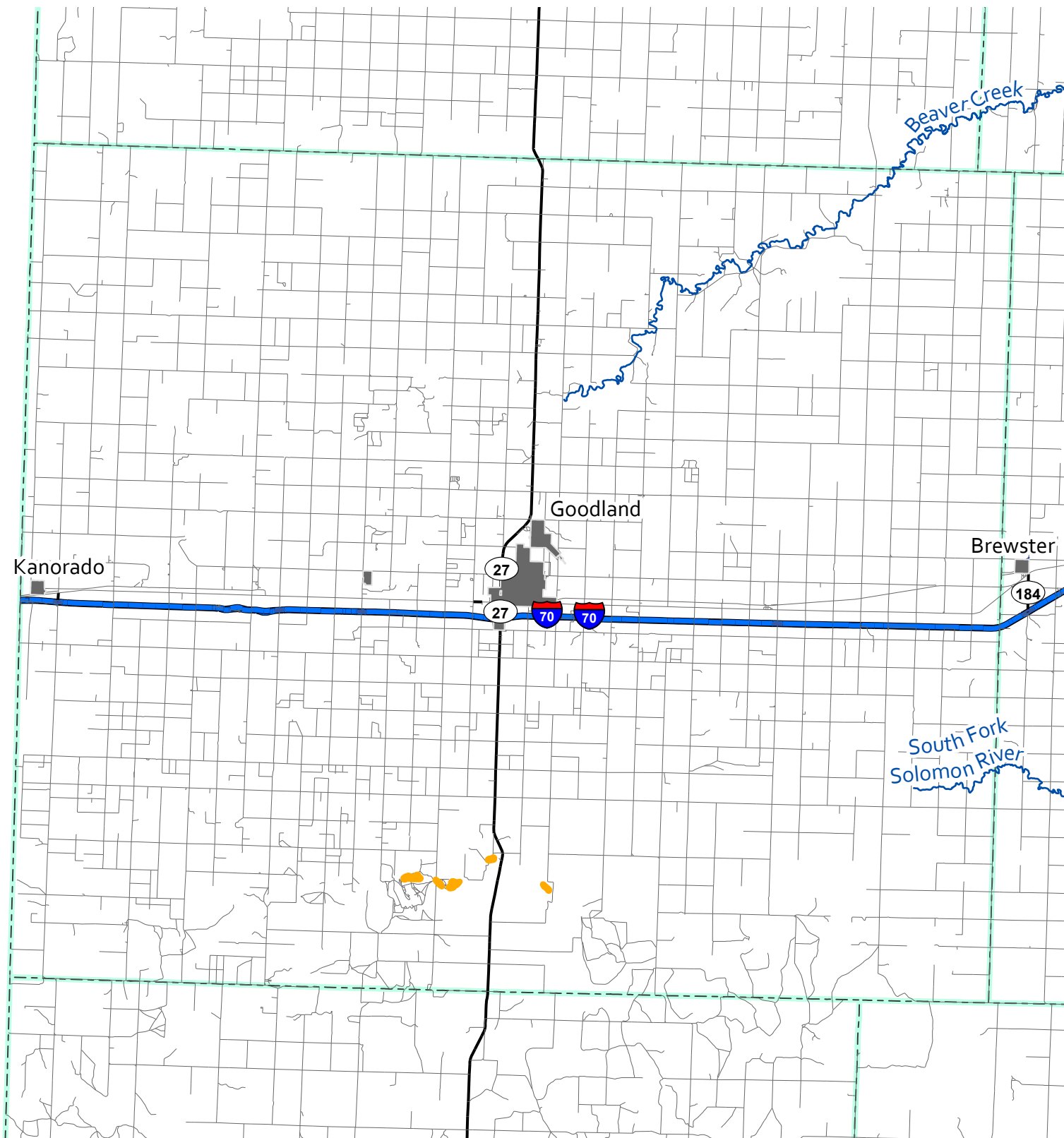
- Primary US and State Highways
- Secondary State and County Highways
- Local, Neighborhood, Rural or City Street
- 4WD

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- Reservoir
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- County












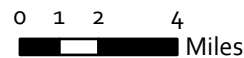
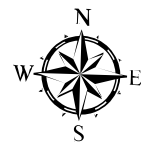
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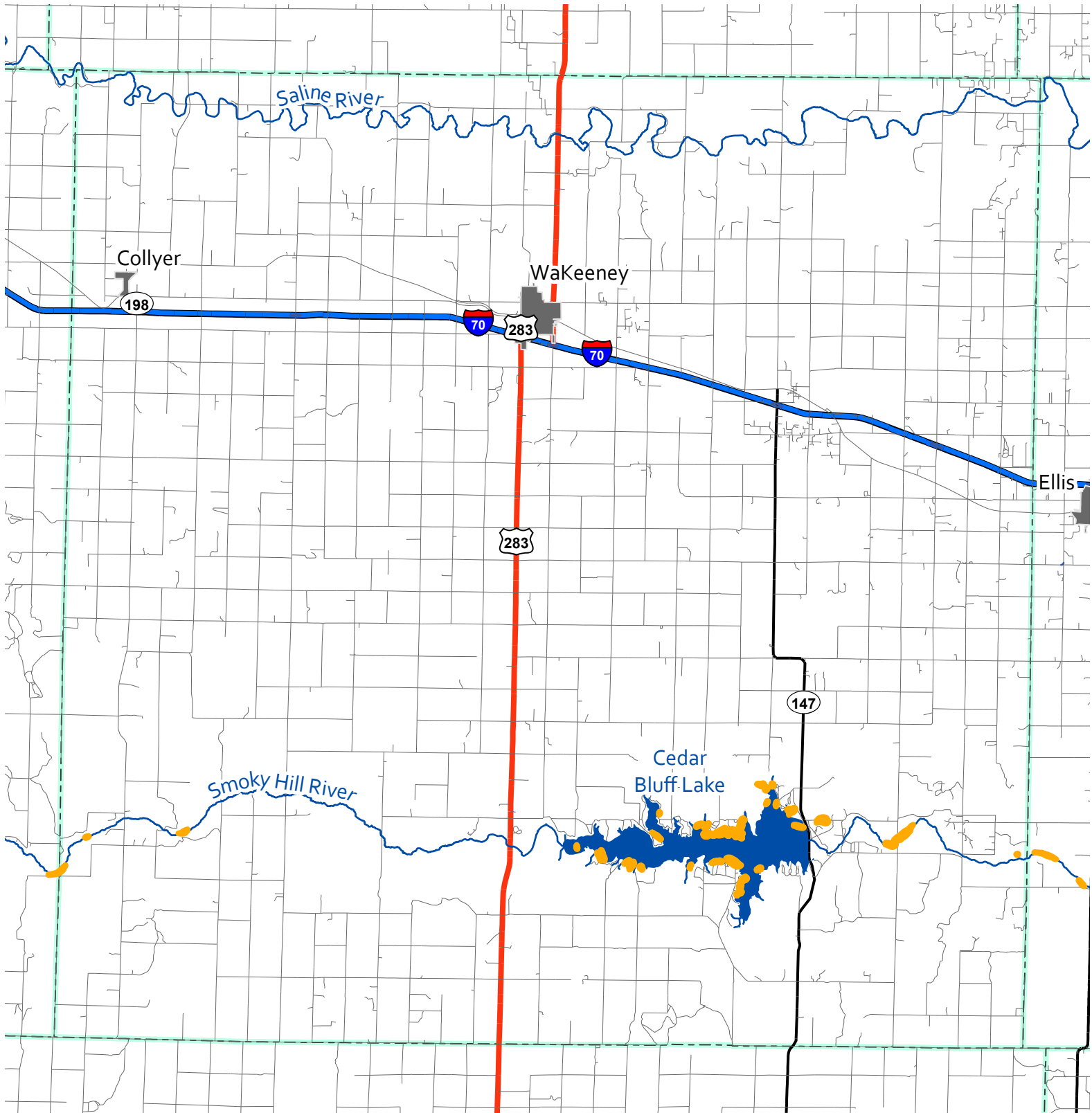
## Transportation System

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-  Secondary State and County Highways
-  Local, Neighborhood, Rural or City Street
-  On/Off Ramp
-  Russian Olive
-  Reservoir
-  River
-  Incorporated Areas
-  County





# Trego County

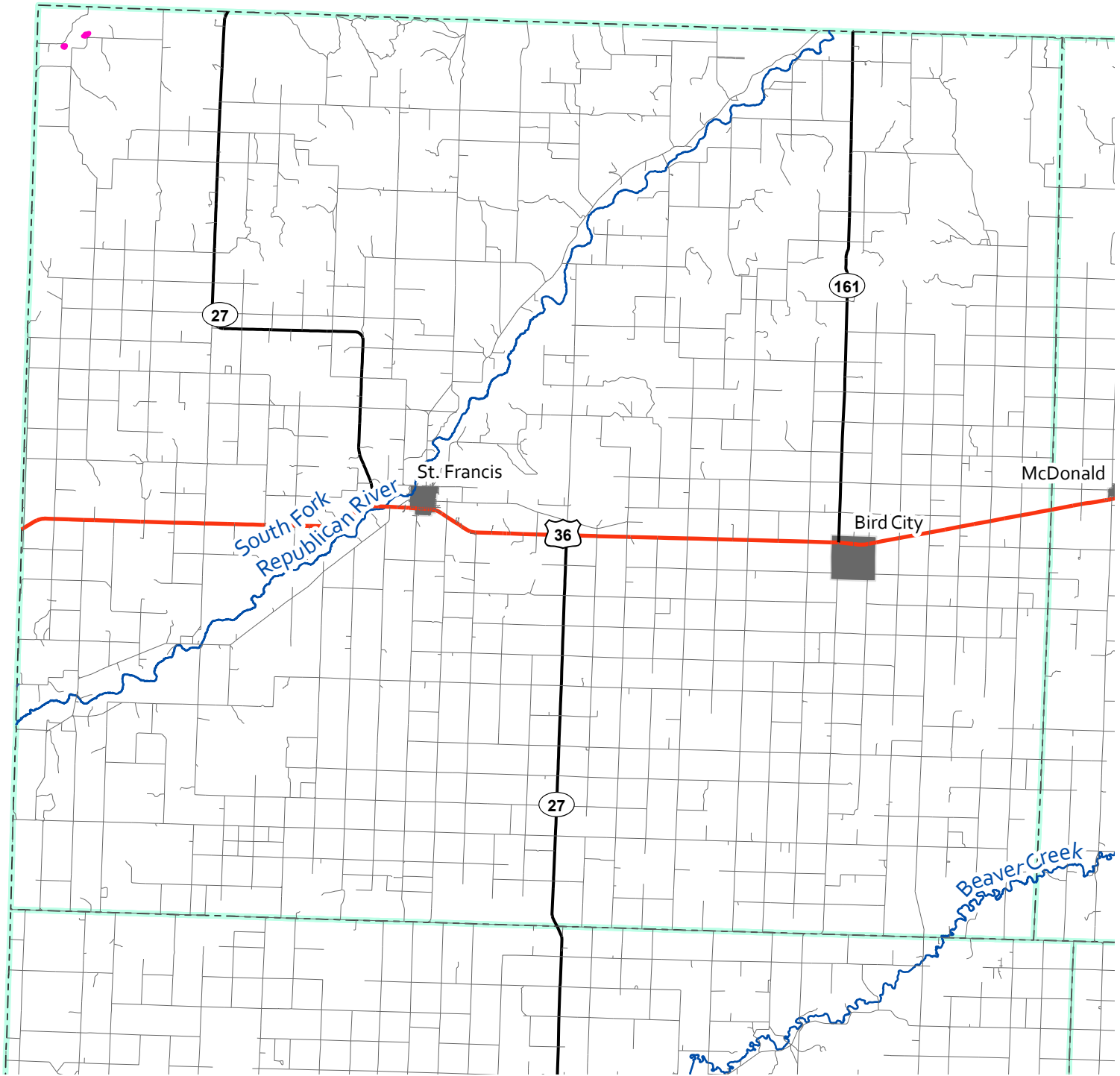













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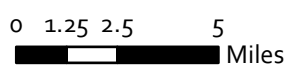
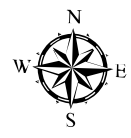
- Primary Limited Access or Interstate
- Primary US and State Highways
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- Local, Neighborhood, Rural or City Street
- On/Off Ramp
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- River
- Incorporated Areas
- County

0 1 2 4 Miles

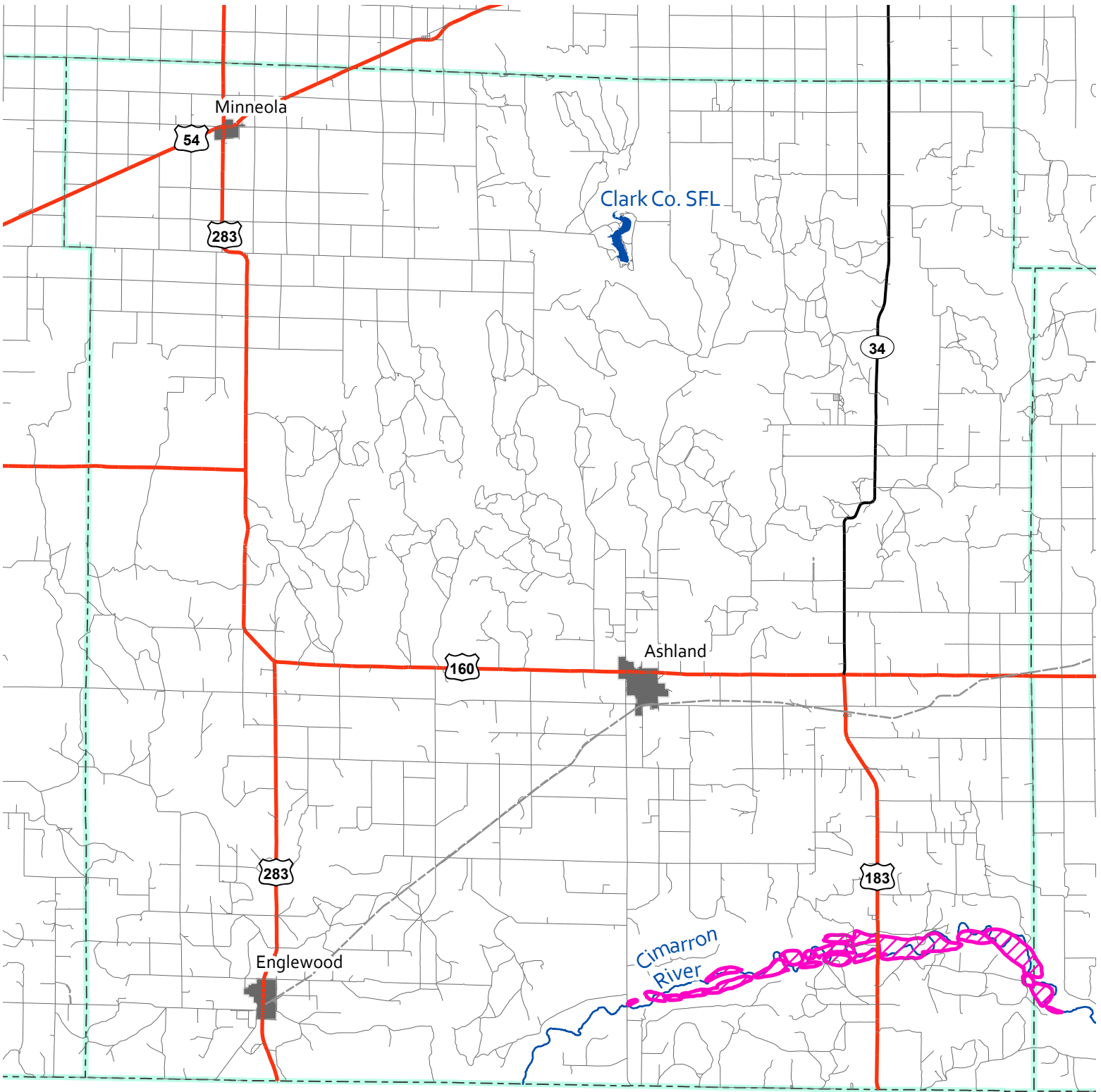
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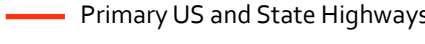



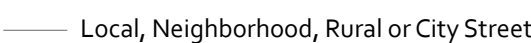

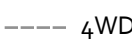


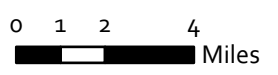
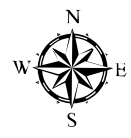
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|  | Tamarisk Survey    |  | Transportation System                     |
|  | Reservoir          |  | Primary US and State Highways             |
|  | River              |  | Secondary State and County Highways       |
|  | Incorporated Areas |  | Local, Neighborhood, Rural or City Street |
|  | County             |  | 4WD                                       |
|  |                    |  | On/Off Ramp                               |



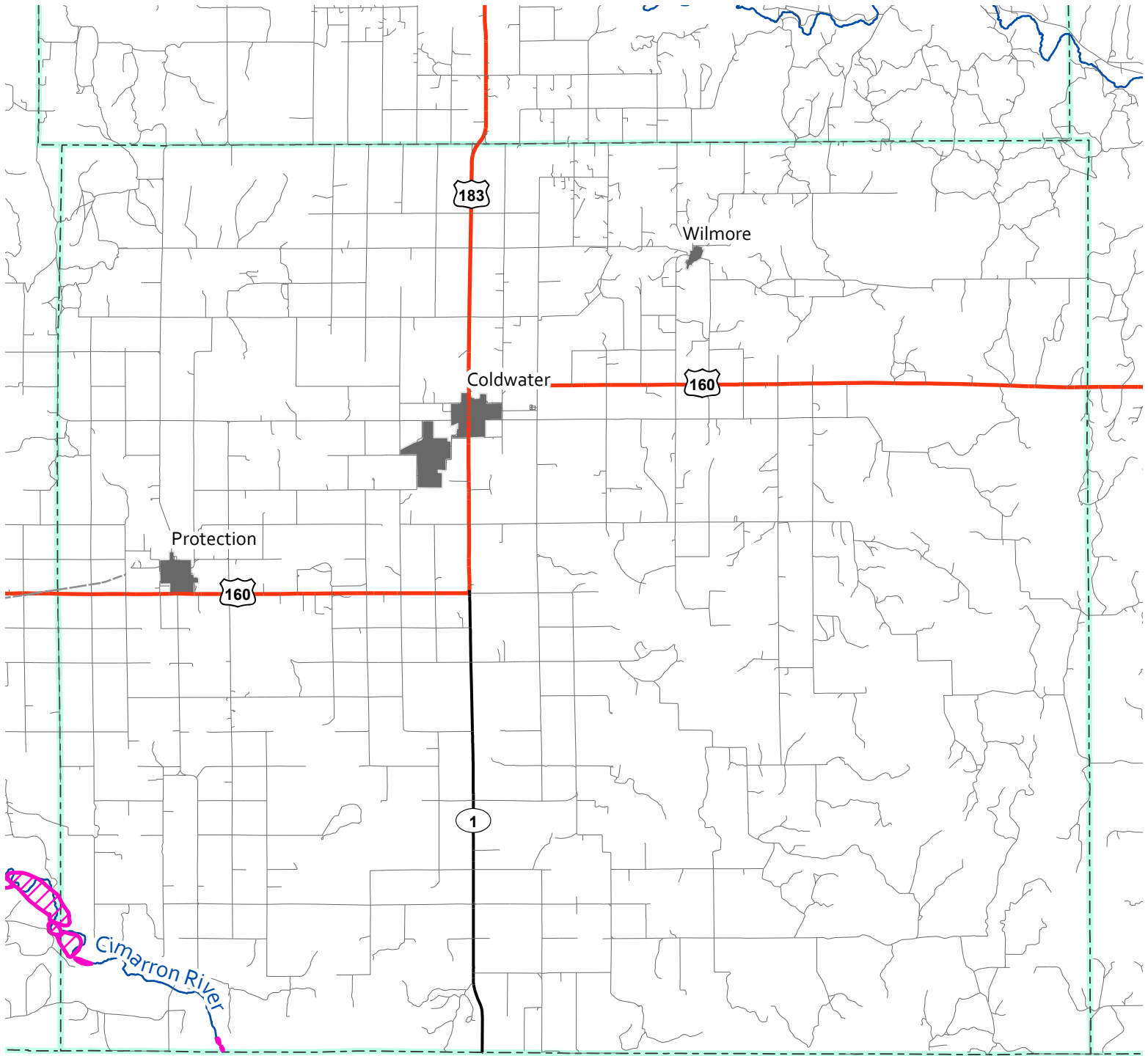
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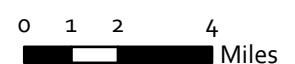
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|  Tamarisk Survey    | <b>Transportation System</b>  |
|  Reservoir          |  Primary US and State Highways             |
|  River              |  Secondary State and County Highways       |
|  Incorporated Areas |  Local, Neighborhood, Rural or City Street |
|  County             |  4WD                                       |



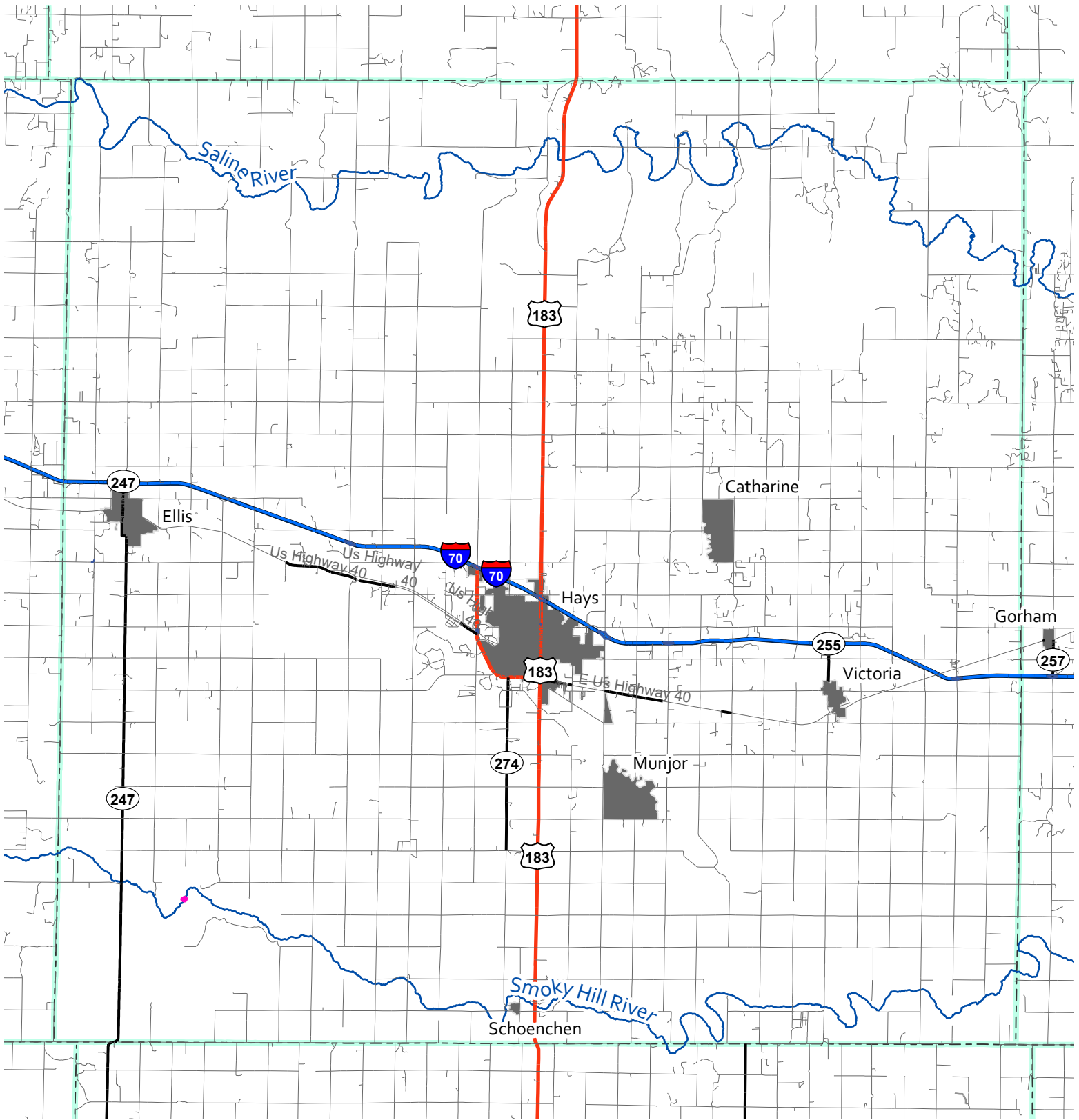
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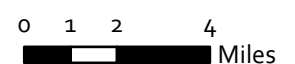
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|  | Reservoir          |  Primary US and State Highways             |
|  | River              |  Secondary State and County Highways       |
|  | Incorporated Areas |  Local, Neighborhood, Rural or City Street |
|  | County             |  4WD                                       |



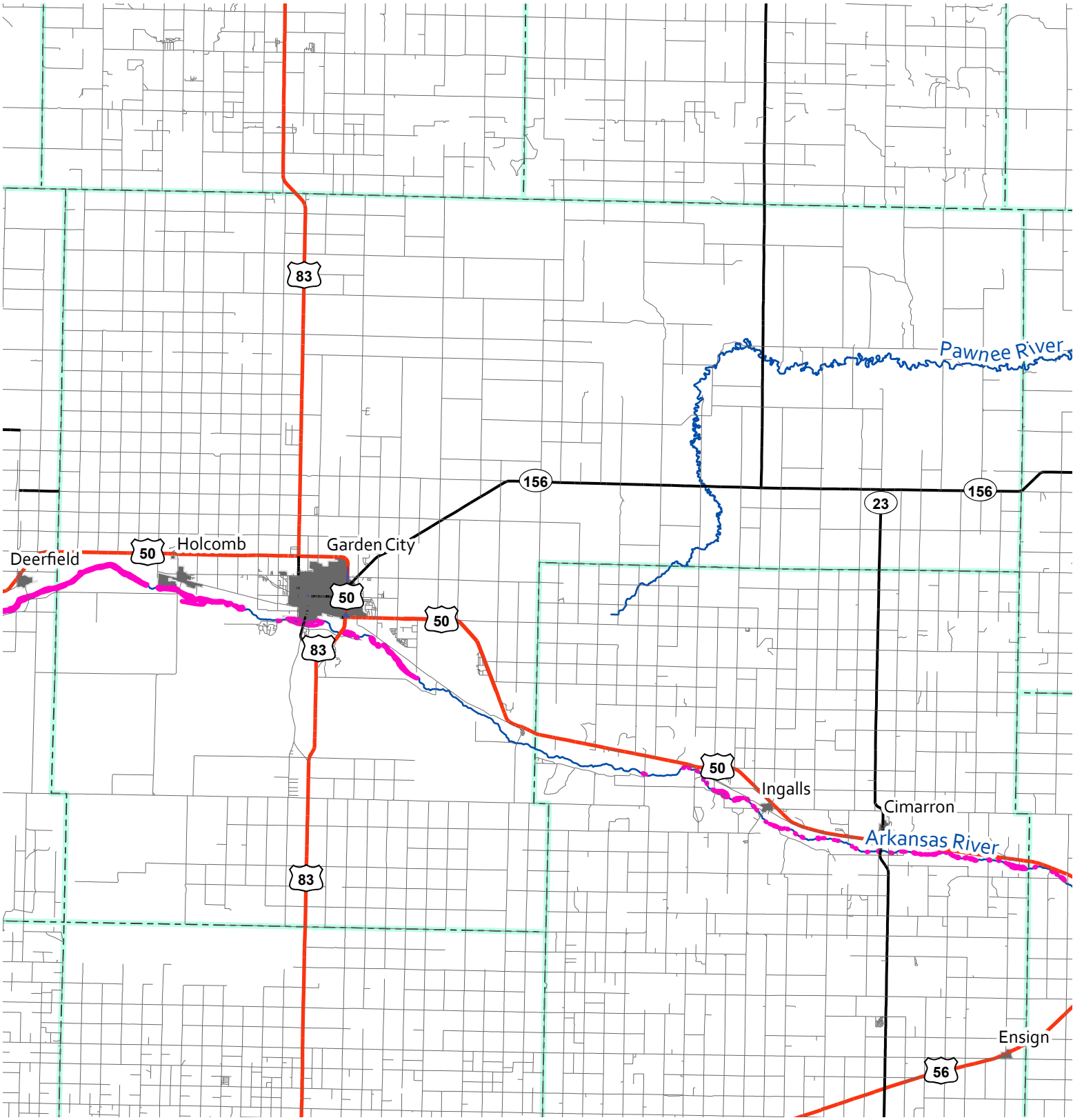
# Ellis County













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|--|--------------------|---|---|
|  | Tamarisk Survey    |  | Transportation System                     |
|  | Reservoir          |  | Primary Limited Access or Interstate      |
|  | River              |  | Primary US and State Highways             |
|  | Incorporated Areas |  | Secondary State and County Highways       |
|  | County             |  | Local, Neighborhood, Rural or City Street |
|  |                    |  | 4WD                                       |
|  |                    |  | On/Off Ramp                               |

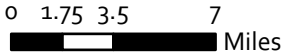


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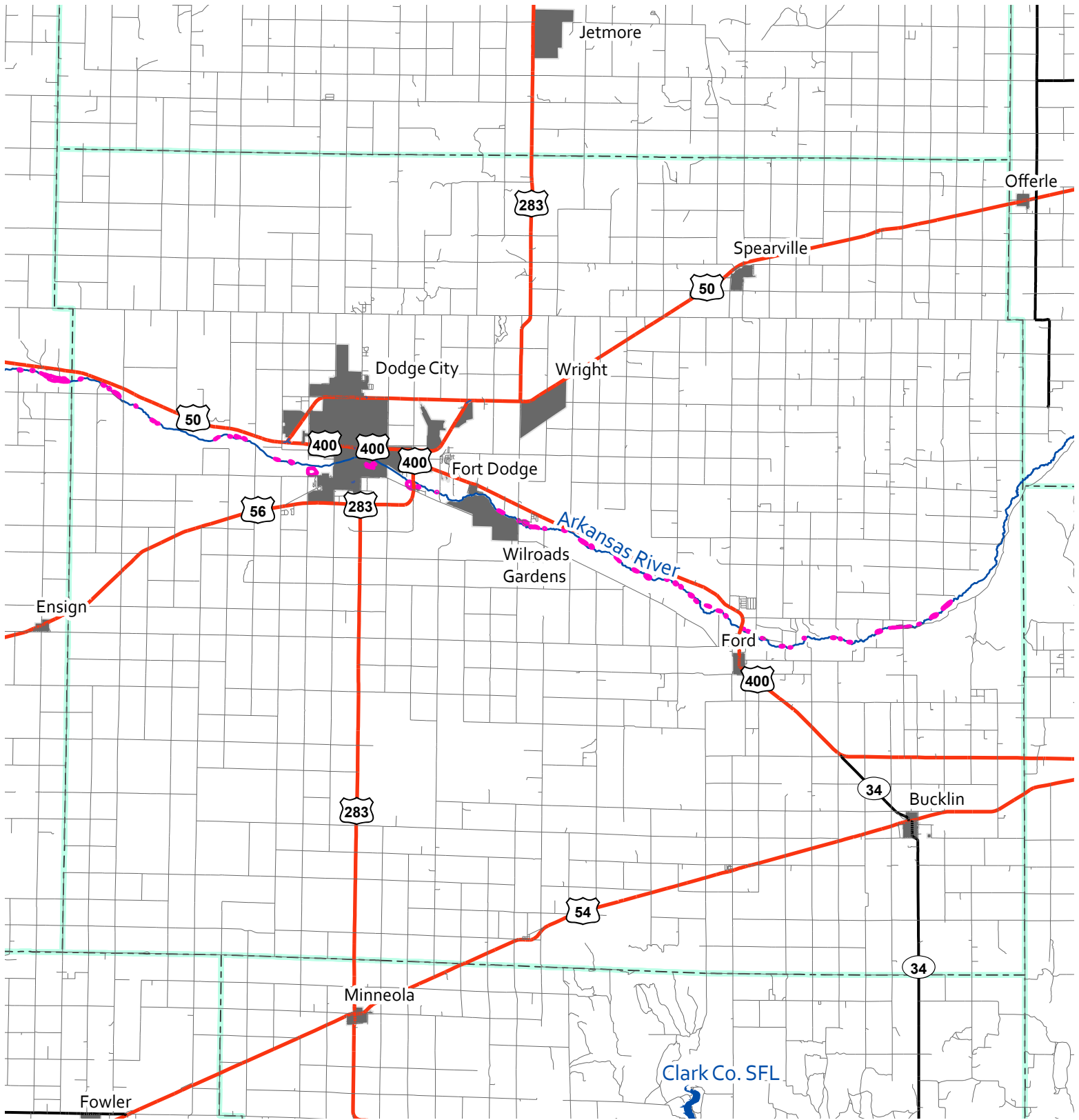




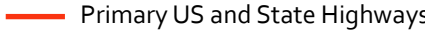

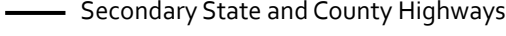

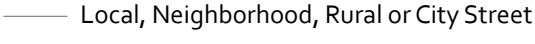

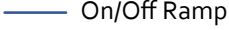
-  Tamarisk Survey
-  Reservoir
-  River
-  Incorporated Areas
-  County

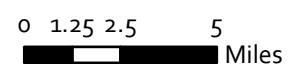
- Transportation System**
-  Primary US and State Highways
  -  Secondary State and County Highways
  -  Local, Neighborhood, Rural or City Street
  -  4WD
  -  On/Off Ramp



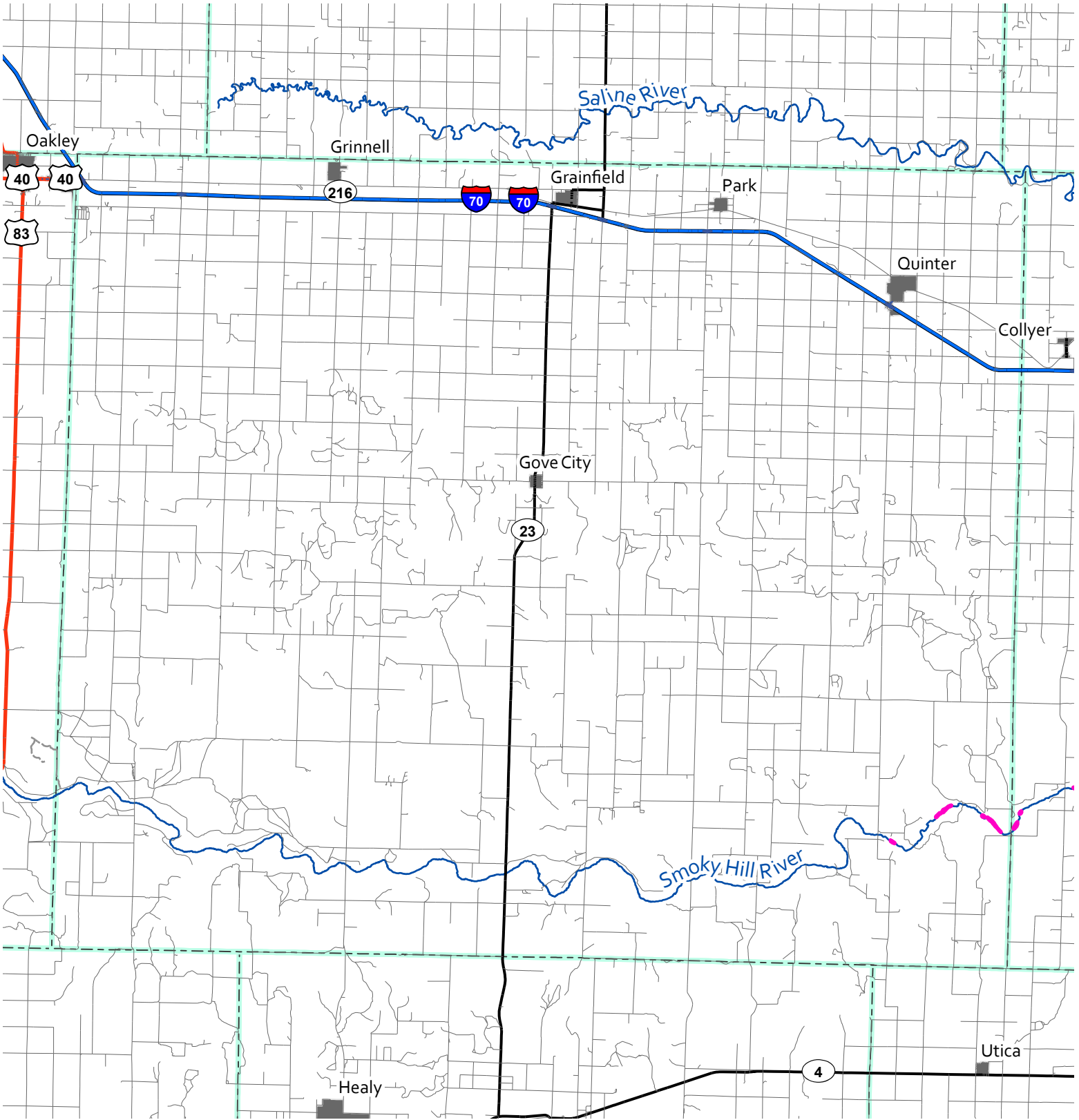
# Ford County














- |  |                    |   |   |
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|  | Tamarisk Survey    | <b>Transportation System</b>  |   |
|  | Reservoir          |  | Primary US and State Highways             |
|  | River              |  | Secondary State and County Highways       |
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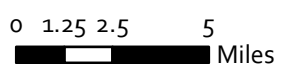
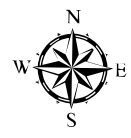


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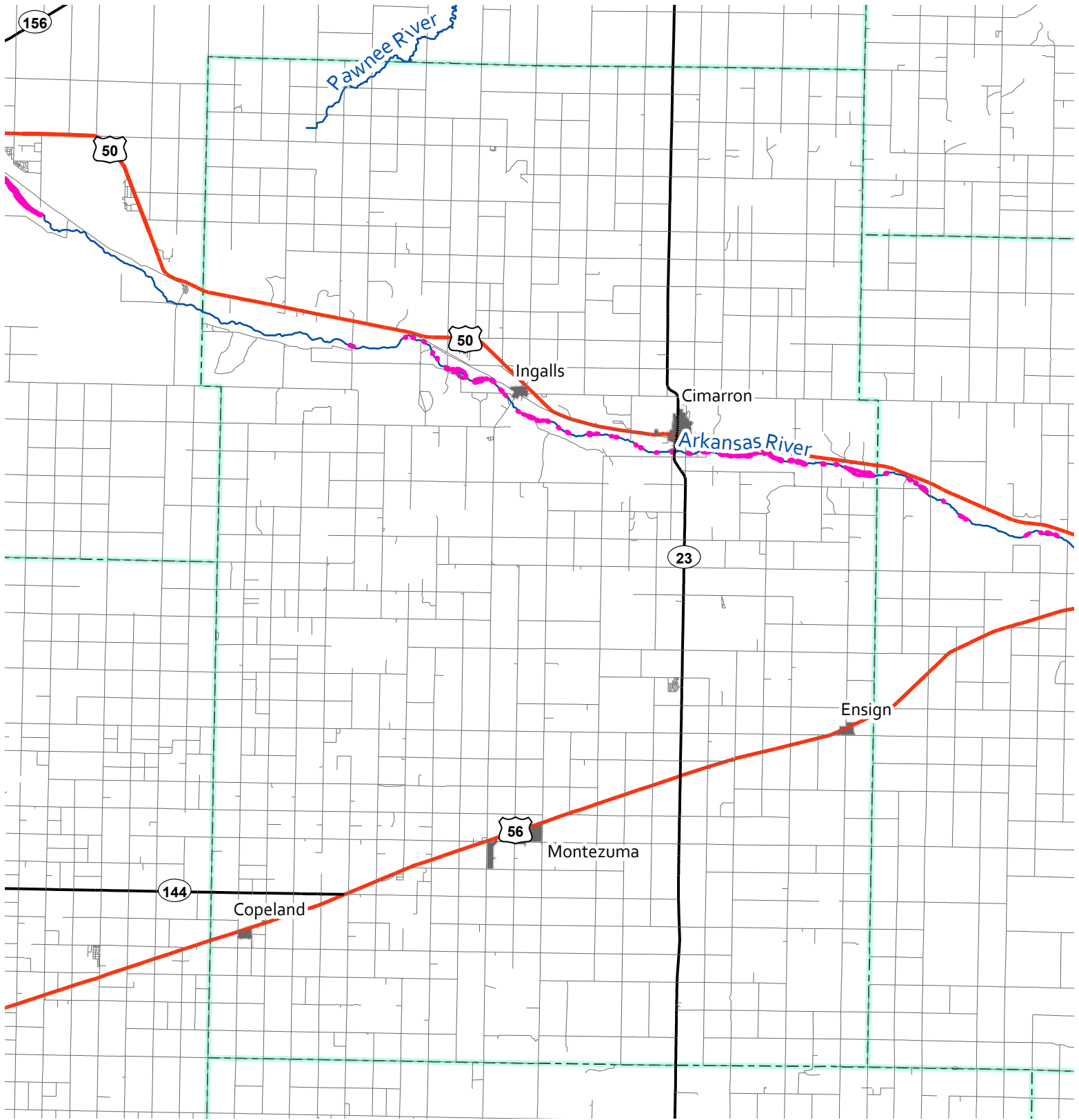
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  -  4WD
  -  On/Off Ramp

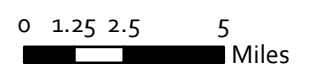




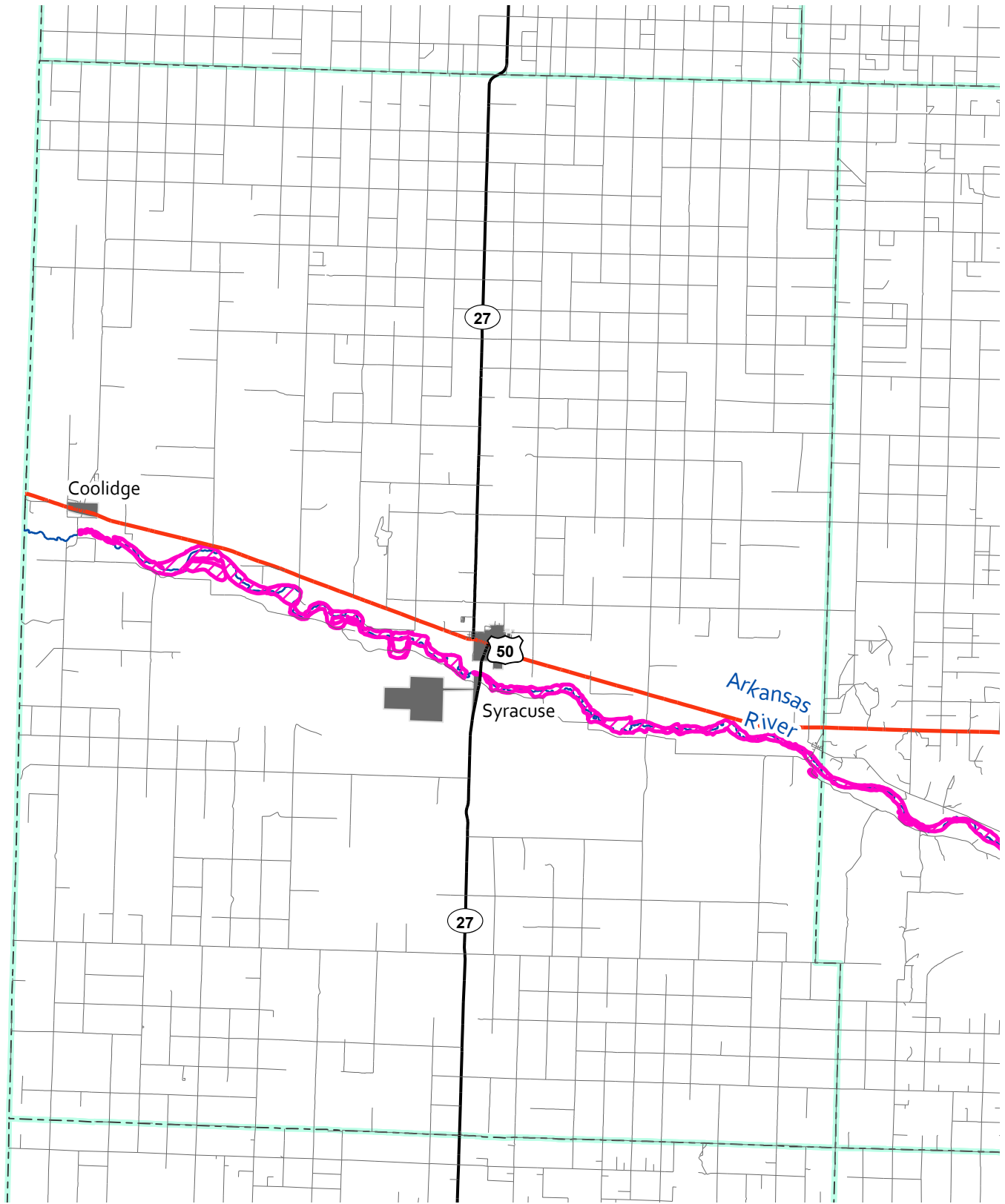
# Gray County












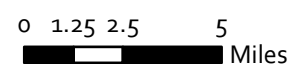
- Tamarisk Survey
- Reservoir
- River
- Incorporated Areas
- County
- Transportation System
- Primary US and State Highways
- Secondary State and County Highways
- Local, Neighborhood, Rural or City Street



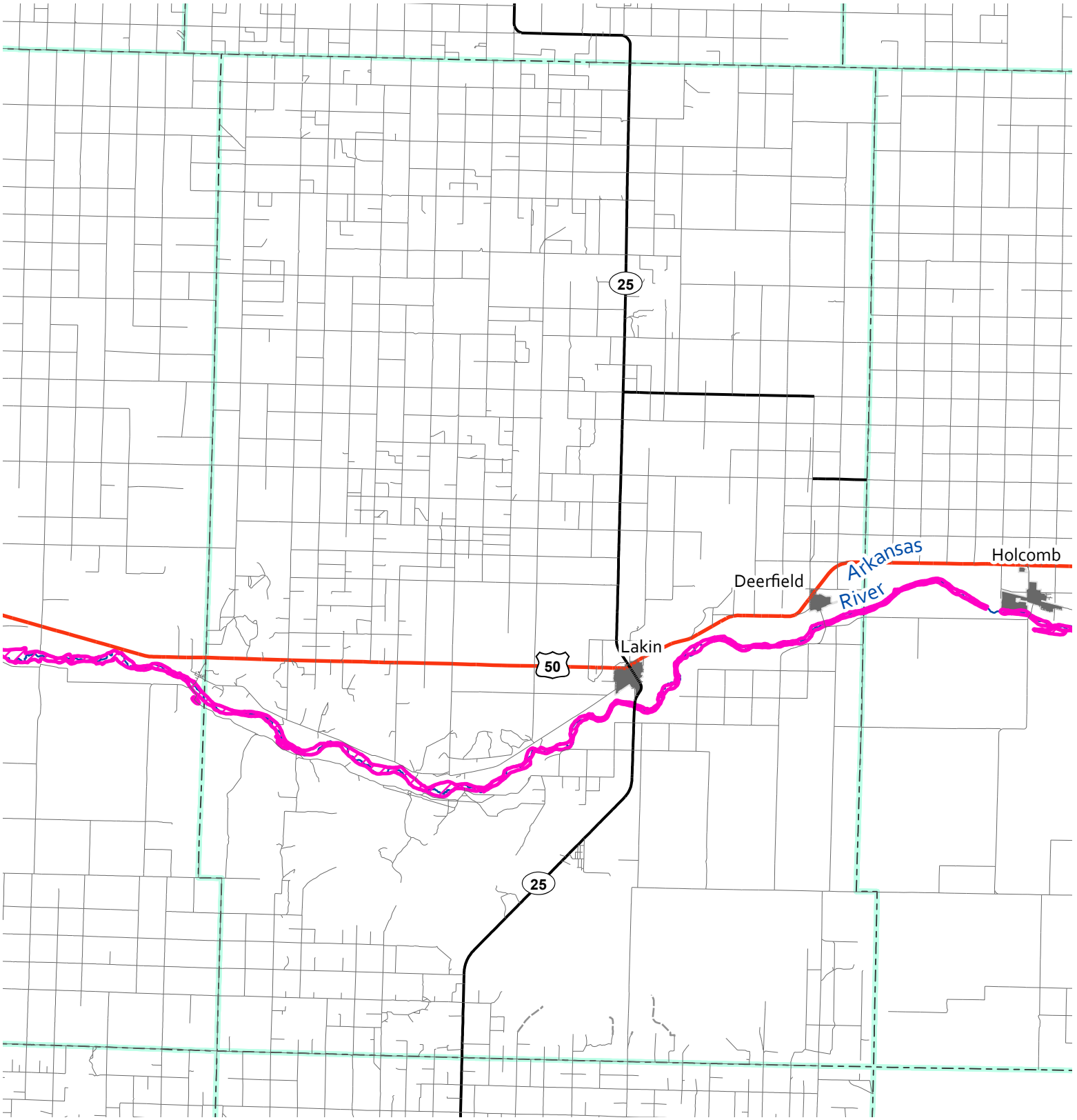
# Hamilton County



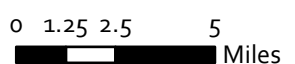
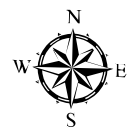
-  Tamarisk Survey
-  Reservoir
-  River
-  Incorporated Areas
-  County
-  Transportation System
-  Primary US and State Highways
-  Secondary State and County Highways
-  Local, Neighborhood, Rural or City Street



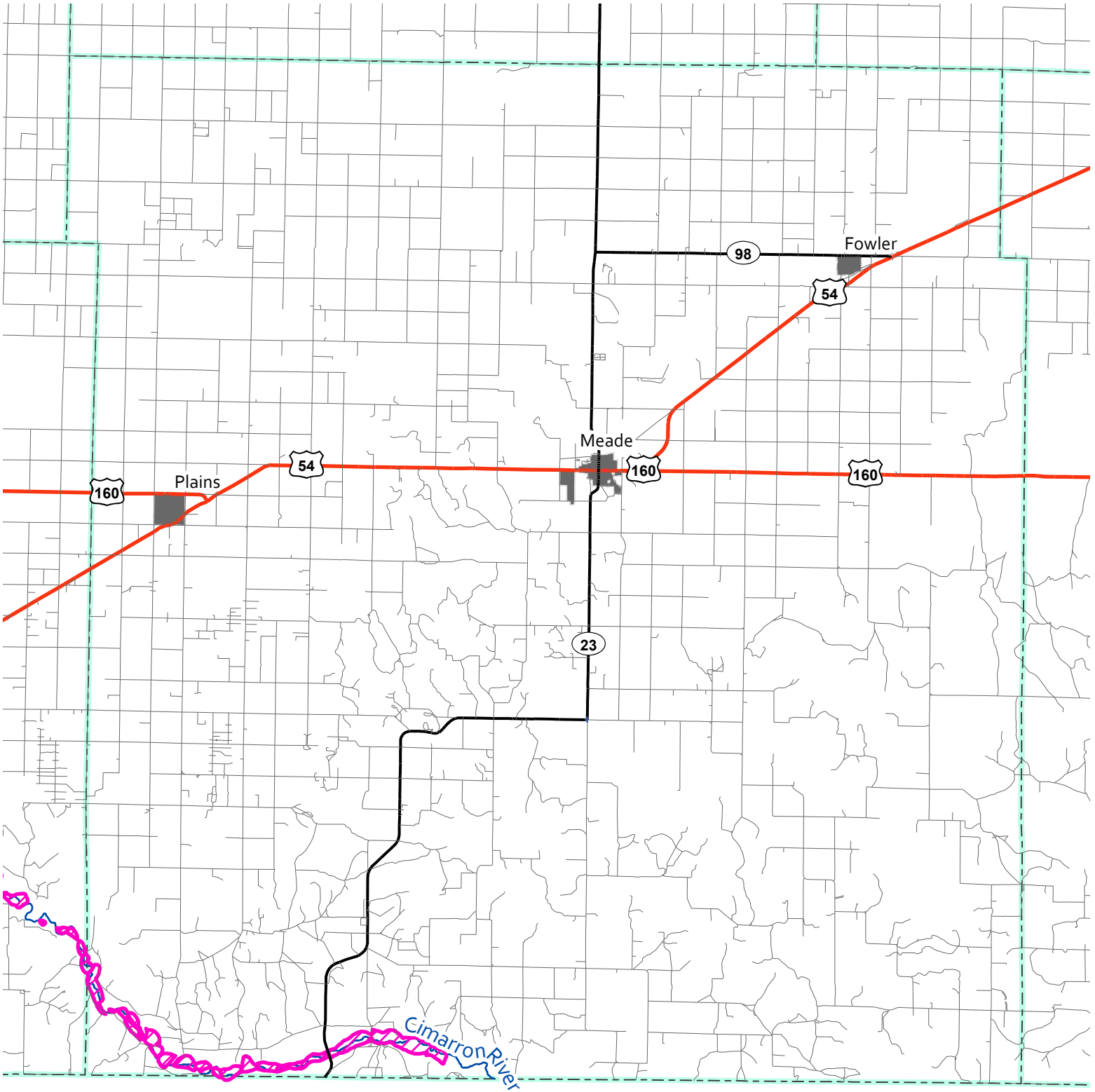
# Kearny County













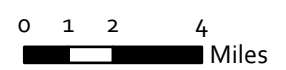
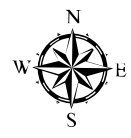
- Tamarisk Survey
- Reservoir
- River
- Incorporated Areas
- County
- Transportation System**
- Primary US and State Highways
- Secondary State and County Highways
- Local, Neighborhood, Rural or City Street
- 4WD



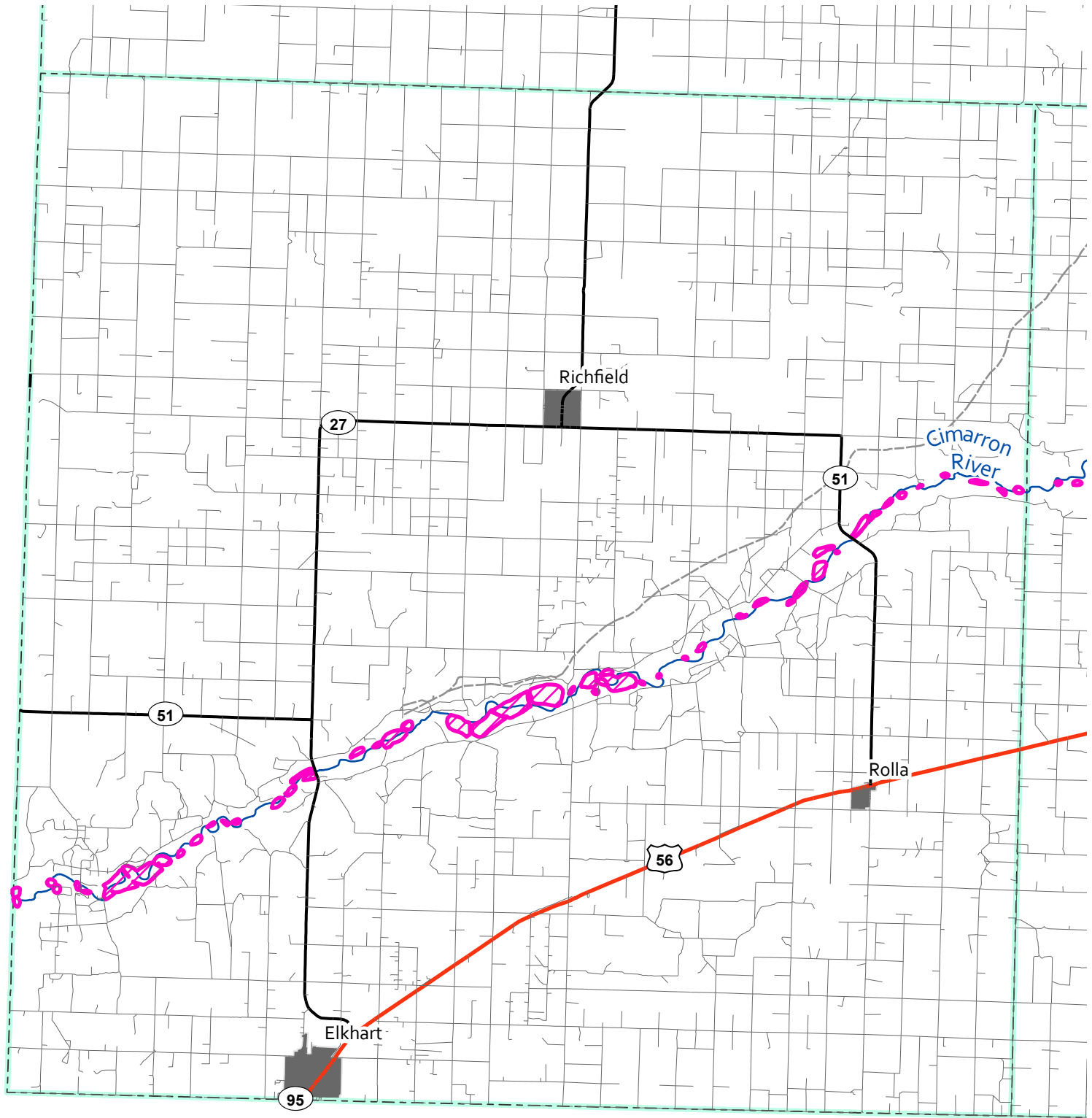
# Meade County












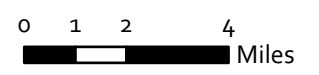
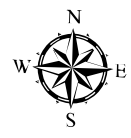
- |  |                    |   |
|--|--------------------|---|
|  | Tamarisk Survey    | <b>Transportation System</b>  |
|  | Reservoir          |  Primary US and State Highways             |
|  | River              |  Secondary State and County Highways       |
|  | Incorporated Areas |  Local, Neighborhood, Rural or City Street |
|  | County             |  4WD                                       |
|  |                    |  On/Off Ramp                               |



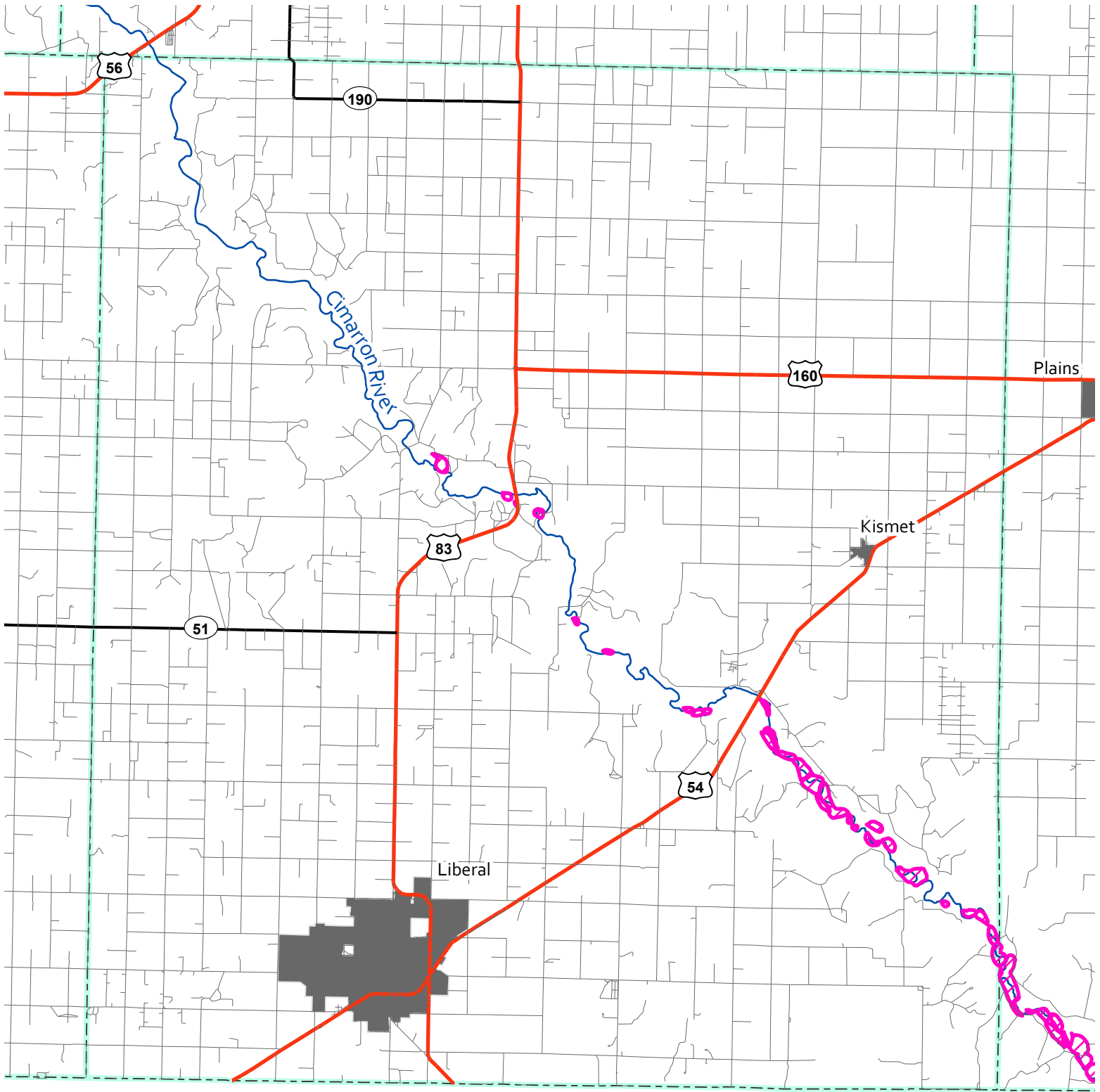
# Morton County



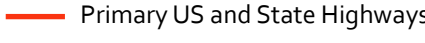



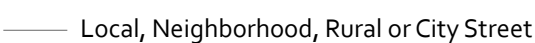

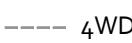


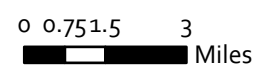
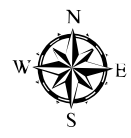
- |  |                    |   |
|--|--------------------|---|
|  | Tamarisk Survey    | <b>Transportation System</b>  |
|  | Reservoir          |  Primary US and State Highways             |
|  | River              |  Secondary State and County Highways       |
|  | Incorporated Areas |  Local, Neighborhood, Rural or City Street |
|  | County             |  4WD                                       |



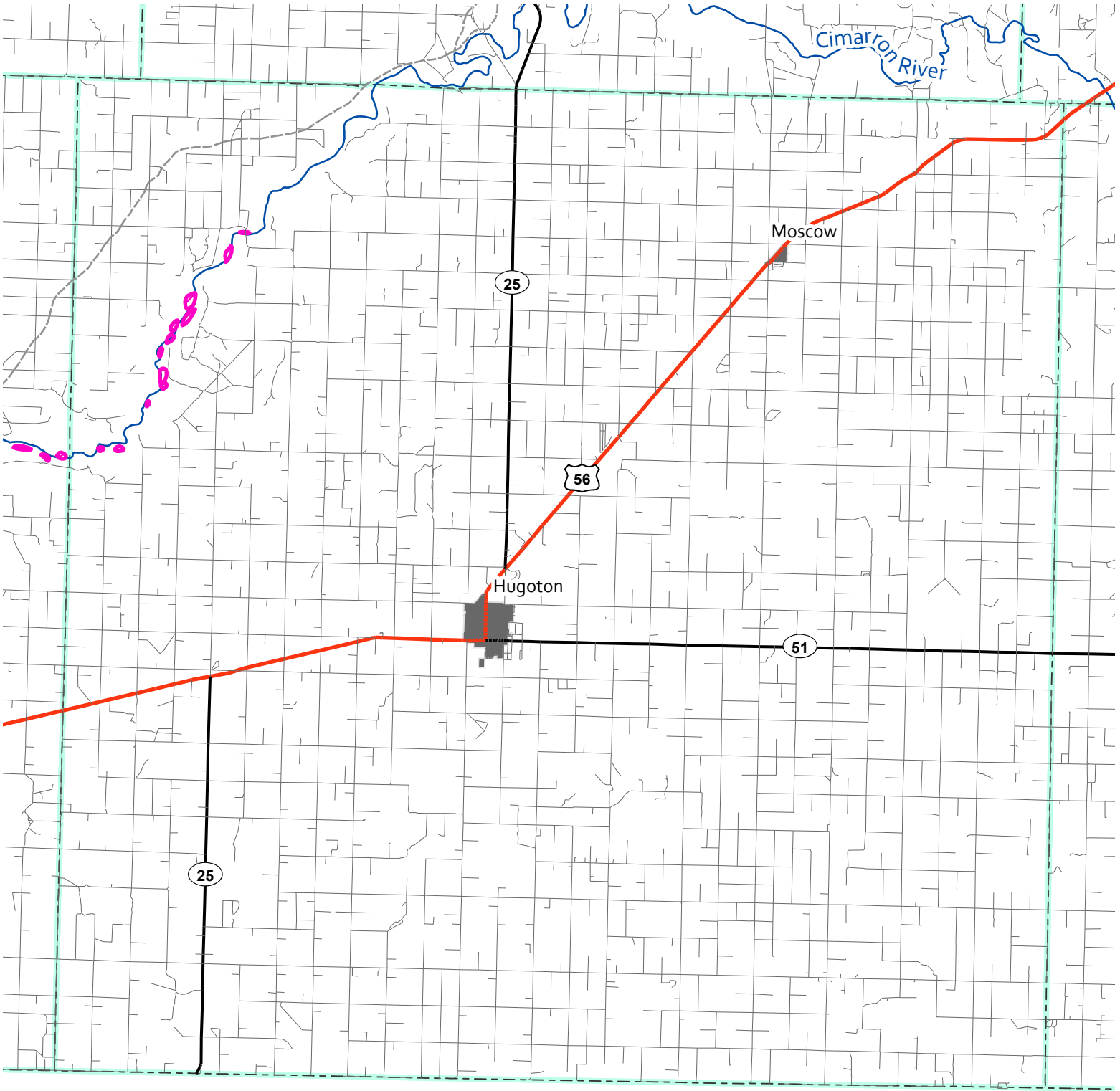
# Seward County












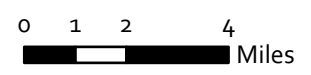
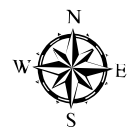
- |  |                    |   |   |
|--|--------------------|---|---|
|  | Tamarisk Survey    | <b>Transportation System</b>  |   |
|  | Reservoir          |  | Primary US and State Highways             |
|  | River              |  | Secondary State and County Highways       |
|  | Incorporated Areas |  | Local, Neighborhood, Rural or City Street |
|  | County             |  | 4WD                                       |



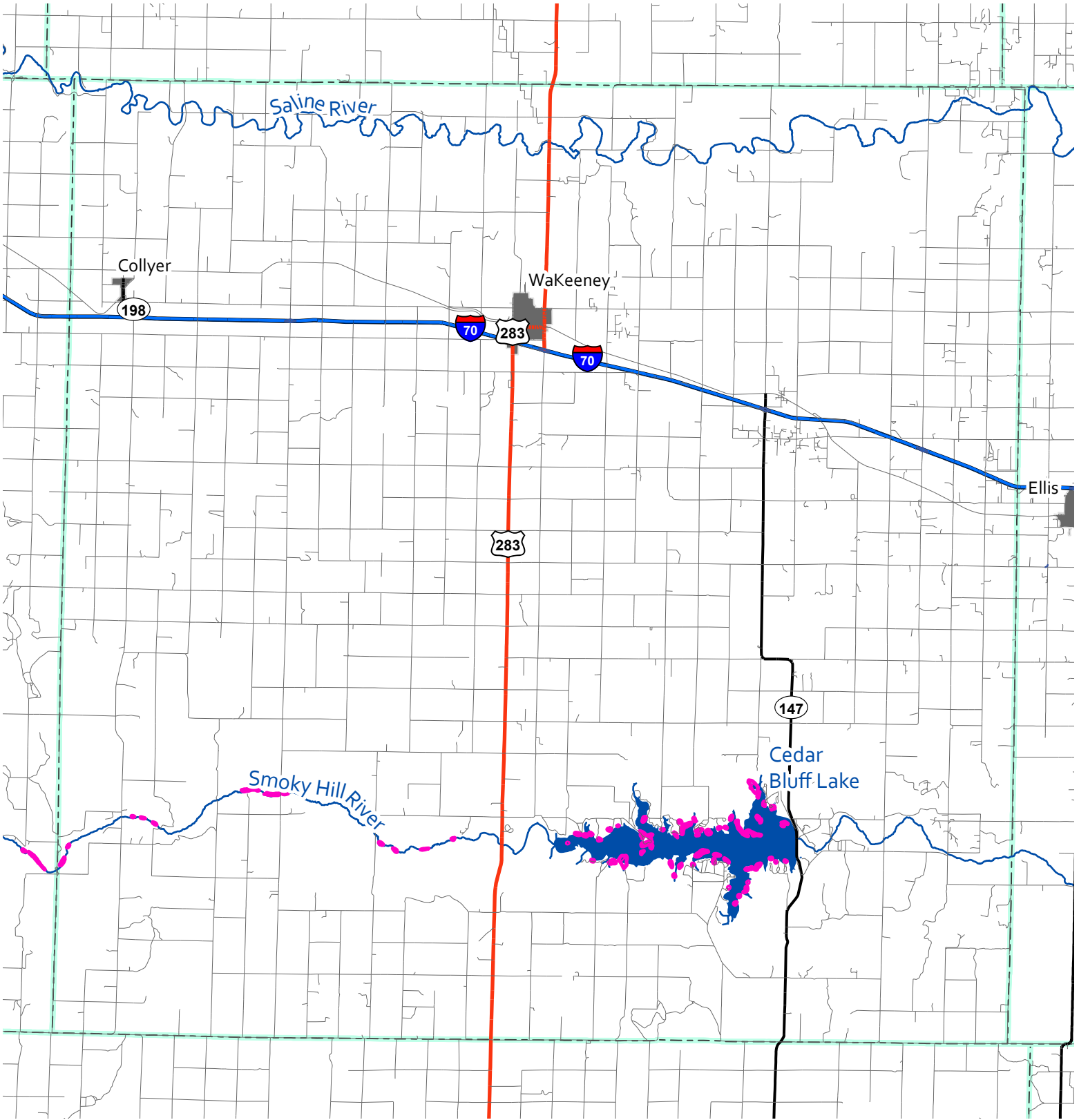
# Stevens County



- |   |   |
|---|---|
|  Tamarisk Survey    | <b>Transportation System</b>  |
|  Reservoir          |  Primary US and State Highways             |
|  River              |  Secondary State and County Highways       |
|  Incorporated Areas |  Local, Neighborhood, Rural or City Street |
|  County             |  4WD                                       |



# Trego County



- Tamarisk Survey
- Reservoir
- River
- Incorporated Areas
- County

- Transportation System
- Primary Limited Access or Interstate
  - Primary US and State Highways
  - Secondary State and County Highways
  - Local, Neighborhood, Rural or City Street
  - On/Off Ramp

