Appendix A -
Demographic Analysis

Demographic Analysis

The following pages include demographic profile summaries of the Greater Egypt regional area. The primary source of demographic data used in this report is the American Community Survey (ACS). It is administered by the U.S. Census Bureau to collect a wide range of demographic data. As of the writing of this report, the 2019 ACS data are the most current information available. The ACS replace the "long form" questionnaires formerly sent to a proportion of household during each decennial census. The ACS generally provides more current data than the decennial census because it is administered on an ongoing basis. The 2019 5-year ACS and 2013 5-year ACS estimates are used in this report. These estimates average data over five consecutive years.

TABLE 1: TOTAL POPULATION

	Total Population (2019)	Total Population (2013)	Percent Change
Franklin County, Illinois	38,923	39,470	-1.4%
Jackson County, Illinois	57,977	60,055	-3.5%
Jefferson County, Illinois	37,985	38,769	-2.0%
Perry County, Illinois	21,251	22,182	-4.2%
Williamson County, Illinois	67,102	66,606	0.7%
Greater Egypt	223,238	227,082	-1.7%
State of Illinois	12,770,631	12,848,554	-0.6%

The population trend in the Greater Egypt area shows an overall decline of 1.7% from 2013 to 2019 and declines in four of the five counties. Compared to Illinois, the Greater Egypt area is losing population at a faster rate.

TABLE 2: GREATER EGYPT AGE BREAKDOWN

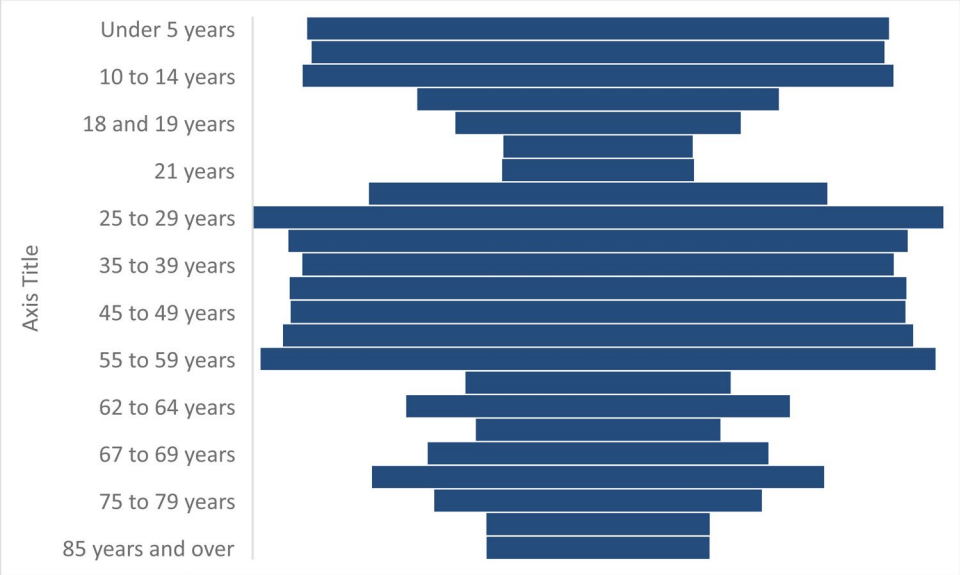


TABLE 3: AGE MIX

	Under 18	% Under 18	18-64	% 18-64	65+	% 65+
Franklin County, Illinois	8,618	22%	22,486	58%	7,819	20%
Jackson County, Illinois	10,646	18%	38,734	67%	8,597	15%
Jefferson County, Illinois	8,442	22%	22,469	59%	7,074	19%
Perry County, Illinois	4,039	19%	13,288	63%	3,924	18%
Williamson County, Illinois	14,682	22%	39,915	59%	12,505	19%
Greater Egypt	46,427	21%	136,892	61%	39,919	18%
State of Illinois	2,891,526	23%	7,936,571	62%	1,942,534	15%

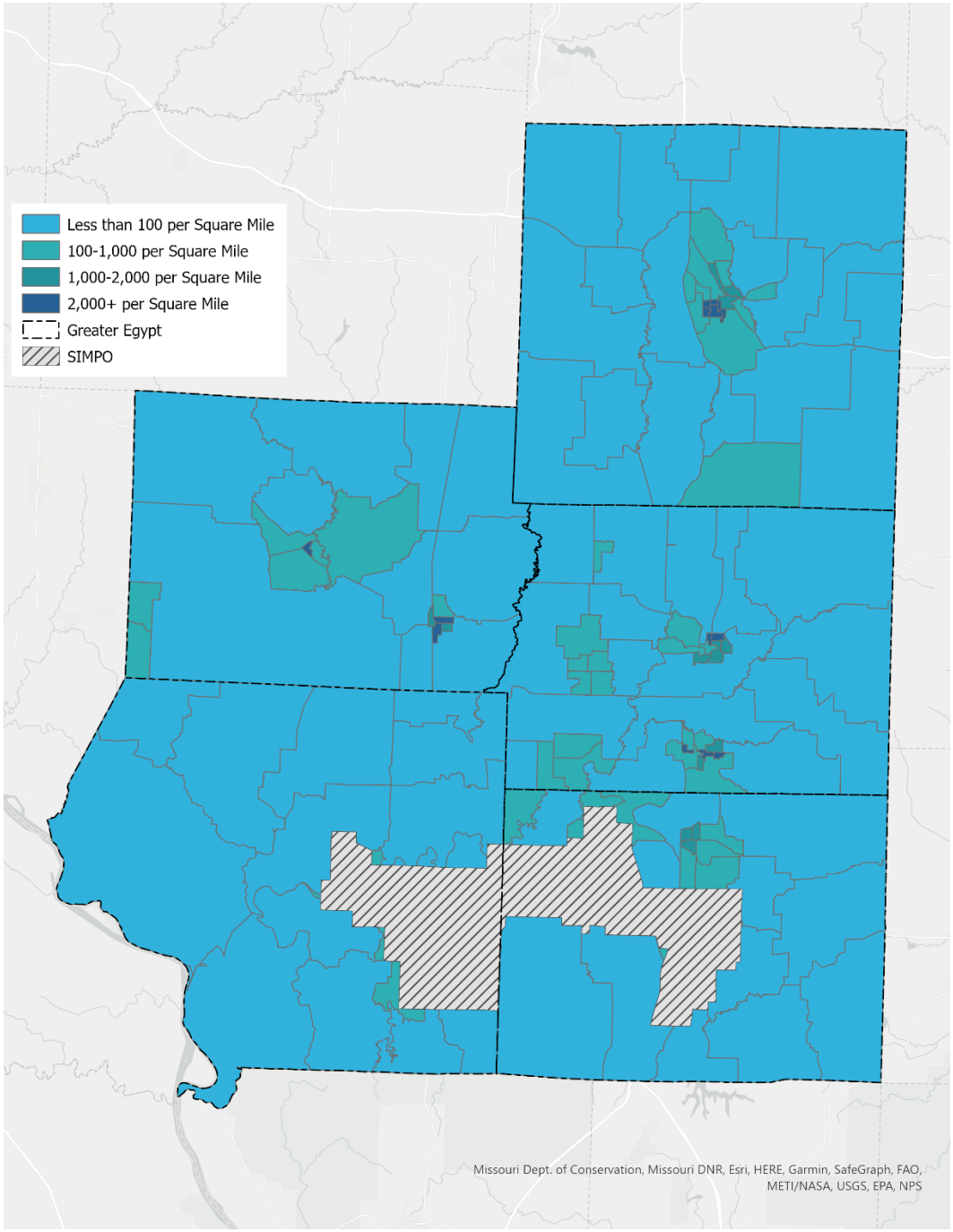
The population age mix for Greater Egypt is similar to Illinois as a whole. However, Greater Egypt already has a larger 65+ population and a large number who will be aging into the retirement population within the next ten years. The aging population combined with overall population decline shows that special consideration should be given to this age group as it relates to their transportation needs.

Furthermore, the population with a disability is significantly higher throughout the five-county area than the state. This again illustrates that consideration must be given to the transportation challenges and needs of the population.

TABLE 4: DISABILITY STATUS

	With a disability	No disability
Franklin County, Illinois	17.68%	82.32%
Jackson County, Illinois	12.24%	87.76%
Jefferson County, Illinois	15.94%	84.06%
Perry County, Illinois	17.11%	82.89%
Williamson County, Illinois	15.59%	84.41%
Greater Egypt	15.14%	84.86%
State of Illinois	9.11%	90.89%

FIGURE 1: POPULATION DENSITY



Racial composition varies both within the Greater Egypt region and compared to the state. The non-white percent of the population is significantly lower in Greater Egypt than in Illinois (12.8% compared to

28.5%). Also of importance is the Black population throughout the region which varies from 15% in Jackson county to less than 1% in Franklin county.

TABLE 5: RACIAL COMPOSITION

	Franklin County, Illinois	**Jackson County, Illinois**	**Jefferson County, Illinois**	**Perry County, Illinois**	**Williamson County, Illinois**	**Greater Egypt**	**State of Illinois**
White alone	96.9%	76.3%	87.3%	88.4%	90.7%	87.2%	71.5%
Black or African American alone	0.9%	15.0%	8.4%	9.1%	4.3%	7.6%	14.2%
American Indian and Alaska Native alone	0.2%	0.3%	0.2%	0.1%	0.2%	0.2%	0.3%
Asian alone	0.5%	3.4%	1.2%	0.7%	1.2%	1.6%	5.5%
Native Hawaiian and Other Pacific Islander alone	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%
Some other race alone	0.3%	1.9%	0.2%	0.3%	1.0%	0.9%	5.9%
Two or more races:	1.1%	3.0%	2.7%	1.5%	2.6%	2.3%	2.6%

FIGURE 2: POPULATION DOT DENSITY BY RACE

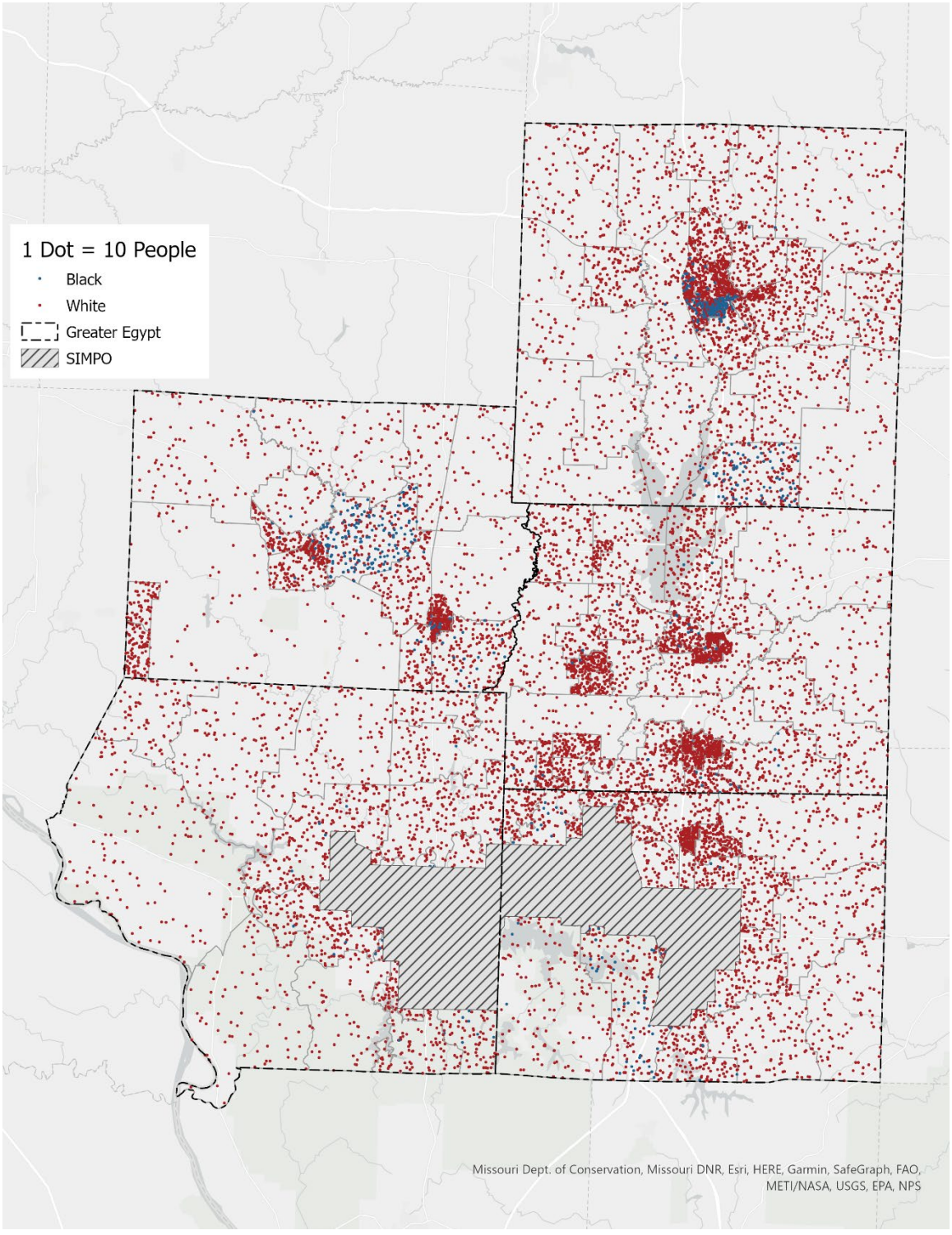


FIGURE 3: NON-WHITE POPULATION

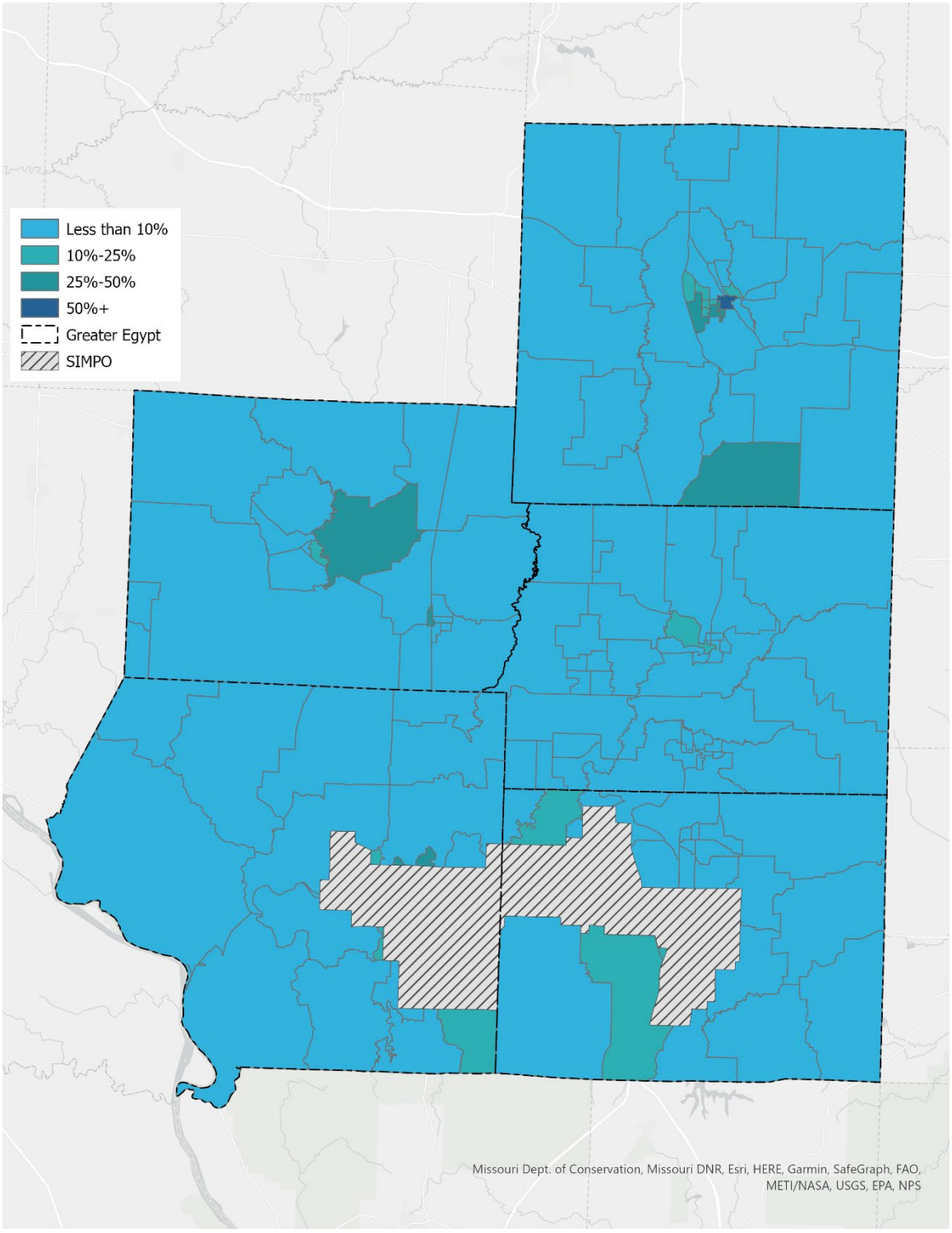


FIGURE 4: NON-WHITE HOT SPOTS

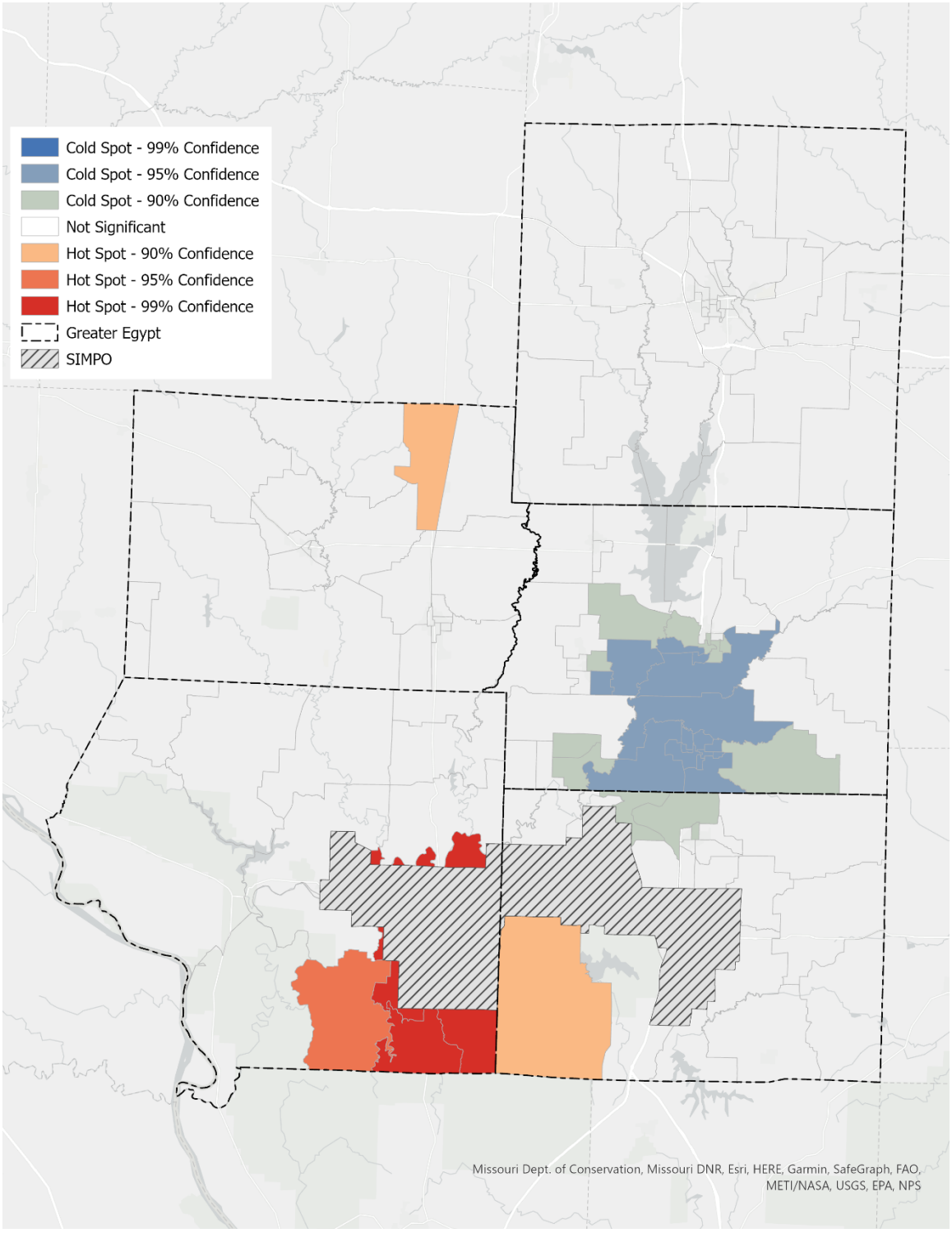


TABLE 6: HOUSEHOLD COMPOSITION & HOUSING TENURE

	Total households	Average household size	Total families	Average family size	Owner-occupied housing units	Renter-occupied housing units
Franklin County, Illinois	16,235	2.37	9,861	3	74.20%	25.80%
Jackson County, Illinois	23,883	2.26	12,278	2.98	51.50%	48.50%
Jefferson County, Illinois	14,985	2.37	9,810	2.93	73.20%	26.80%
Perry County, Illinois	8,433	2.21	5,661	2.65	75.40%	24.60%
Williamson County, Illinois	27,029	2.41	16,953	3.01	70.10%	29.90%
Greater Egypt	90,565		54,563			
State of Illinois	4,866,006	2.54	3,059,067	3.23	66.00%	34.00%

Average household size and average family size is similar throughout the region and compared to all of Illinois. Differences in housing tenure are significant though. In four of five counties, the percent of owner-occupied housing units surpasses the percent for Illinois. However, owner-occupied housing rates are significantly lower in Jackson County.

TABLE 7: LABOR FORCE PARTICIPATION & EMPLOYMENT

	Franklin County, Illinois	Jackson County, Illinois	Jefferson County, Illinois	Perry County, Illinois	Williamson County, Illinois	Greater Egypt	State of Illinois
Total:	22,265	38,387	20,580	10,795	38,350	130,377	7,695,978
In the labor force:	71.1%	67.0%	77.8%	74.7%	75.3%	72.5%	79.6%
Employed:	93.1%	91.5%	92.9%	94.2%	94.6%	93.2%	95.2%
Unemployed:	6.9%	8.5%	7.1%	5.8%	5.4%	6.8%	4.8%
Not in labor force:	28.9%	33.0%	22.2%	25.3%	24.7%	27.5%	20.4%

Comparing the region to all of Illinois, labor participation is lower (72.5% compared to 79.6%) and the unemployment rate is higher (6.8% compared to 4.8%). Labor participation and unemployment in Jackson County show a much more challenging job market.

TABLE 8: INDUSTRY MIX

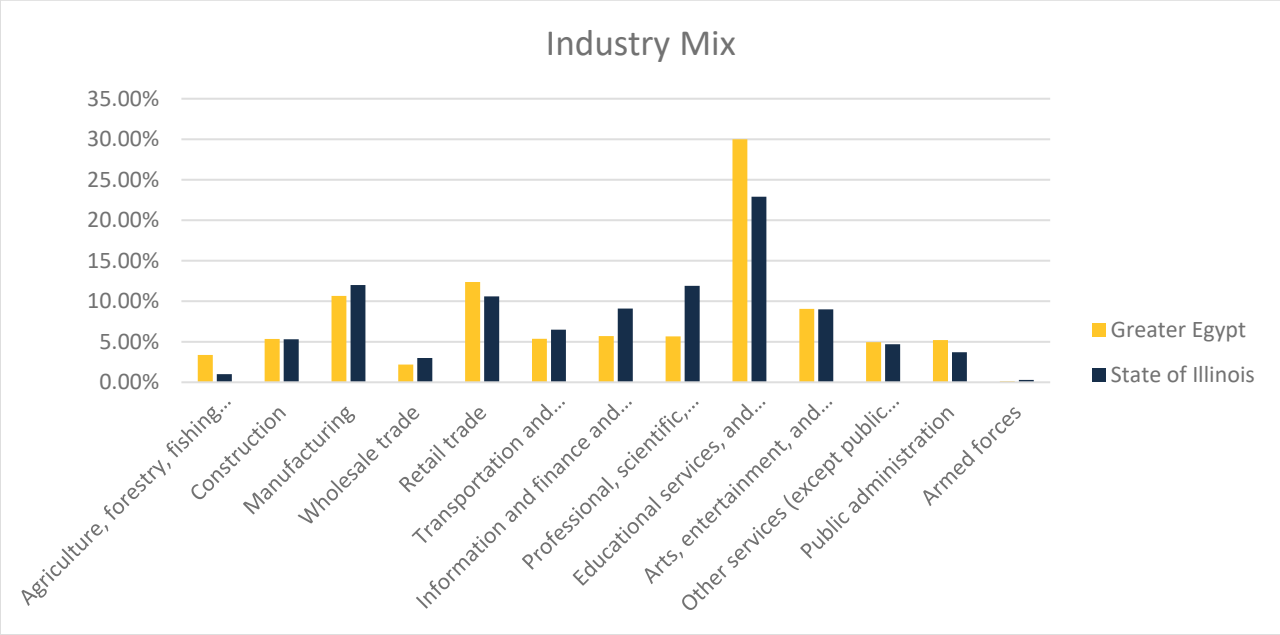


TABLE 9: INCOME

	$1 to $9,999 or loss	$10,000 to $14,999	$15,000 to $24,999	$25,000 to $34,999	$35,000 to $49,999	$50,000 to $64,999	$65,000 to $74,999	$75,000 or more
Franklin County, Illinois	14.20%	10.30%	16.70%	13.40%	16.60%	12.50%	4.60%	11.80%
Jackson County, Illinois	21.60%	11.20%	17.60%	11.50%	15.00%	8.60%	3.70%	10.80%
Jefferson County, Illinois	13.40%	8.20%	15.00%	16.00%	18.30%	12.20%	4.30%	12.50%
Perry County, Illinois	12.60%	6.60%	15.50%	15.70%	15.40%	18.30%	5.10%	10.70%
Williamson County, Illinois	12.60%	7.30%	15.60%	14.10%	16.50%	14.40%	4.90%	14.70%
Greater Egypt	15.37%	8.92%	16.20%	13.76%	16.33%	12.52%	4.45%	12.46%
State of Illinois	11.40%	6.10%	13%	13.10%	15.20%	12.70%	5.10%	23.30%

TABLE 10: POVERTY STATUS

	Below 100 percent of the poverty level	100 to 149 percent of the poverty level	At or above 150 percent of the poverty level
Franklin County, Illinois	9.50%	9.40%	81.20%
Jackson County, Illinois	19.60%	9.60%	70.80%
Jefferson County, Illinois	8.30%	6.80%	84.90%
Perry County, Illinois	8.20%	5.30%	86.50%
Williamson County, Illinois	6.60%	6.60%	86.80%
Greater Egypt	10.93%	7.78%	81.31%
State of Illinois	5.60%	5.30%	89.10%

Poverty levels are significantly higher in the region that in all of Illinois (10.93% compared to 5.6%). The poverty level in Jackson County is a notable outlier at 19.6%.

FIGURE 5: HOUSEHOLD INCOME

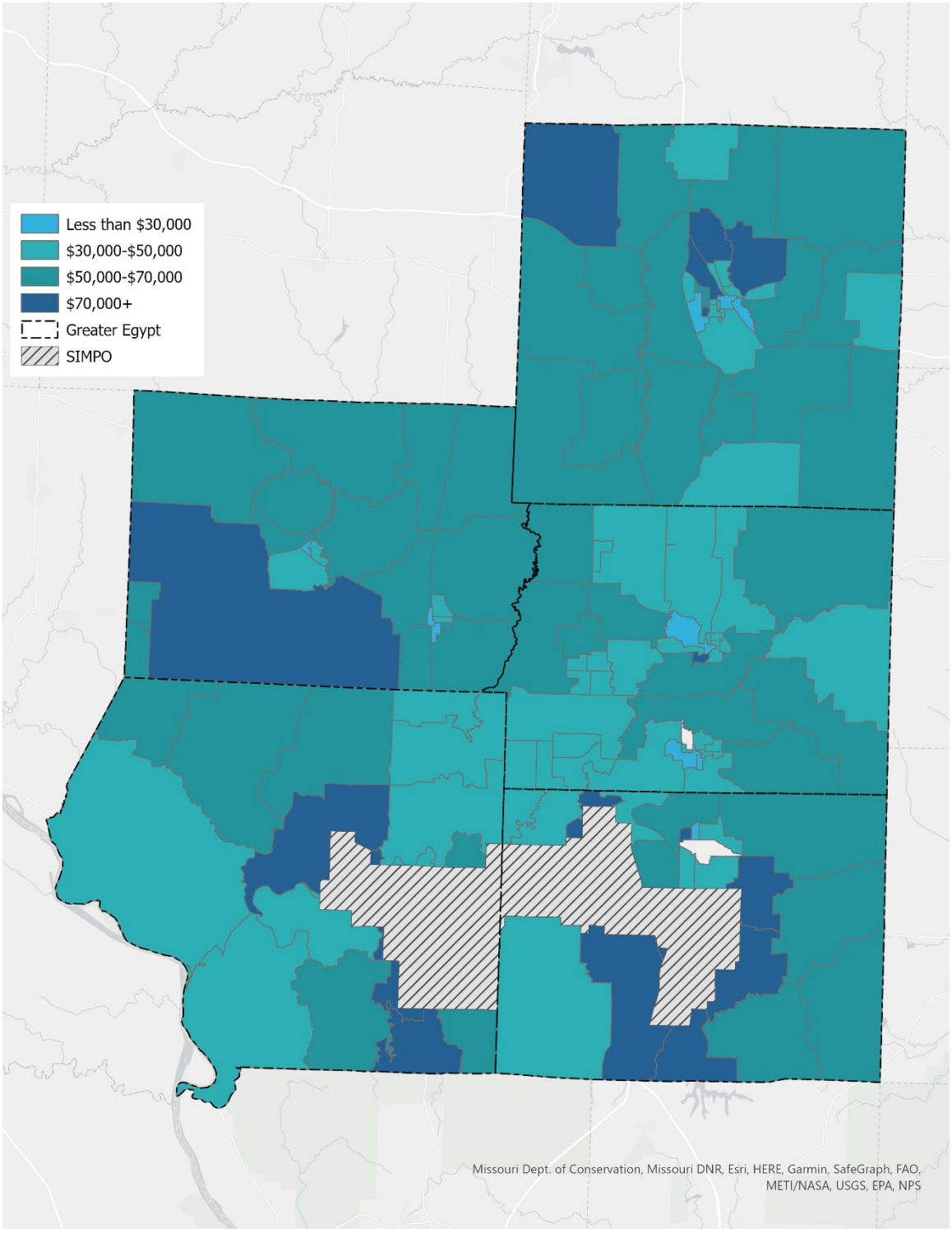


FIGURE 6: HOUSEHOLD INCOME HOT SPOTS

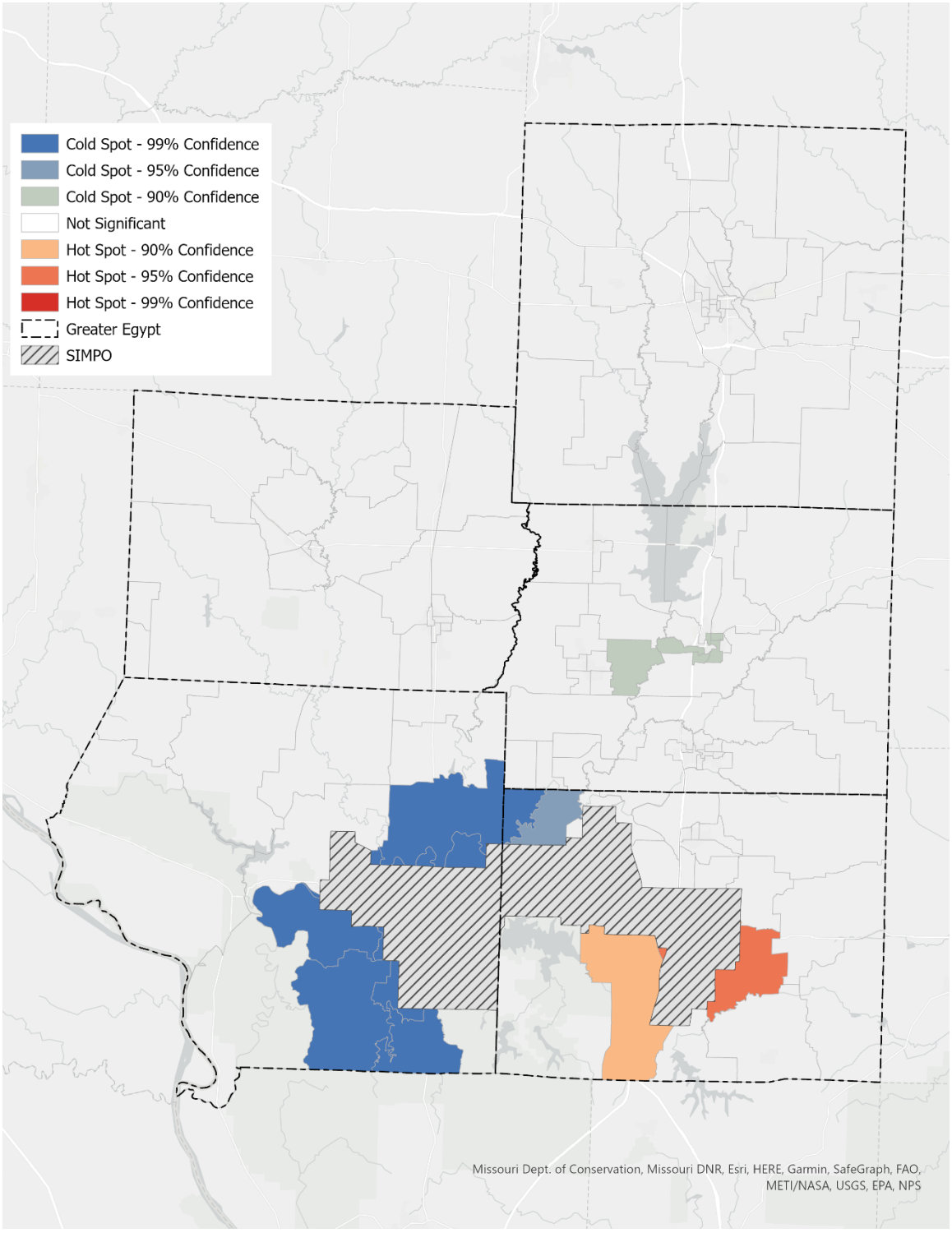
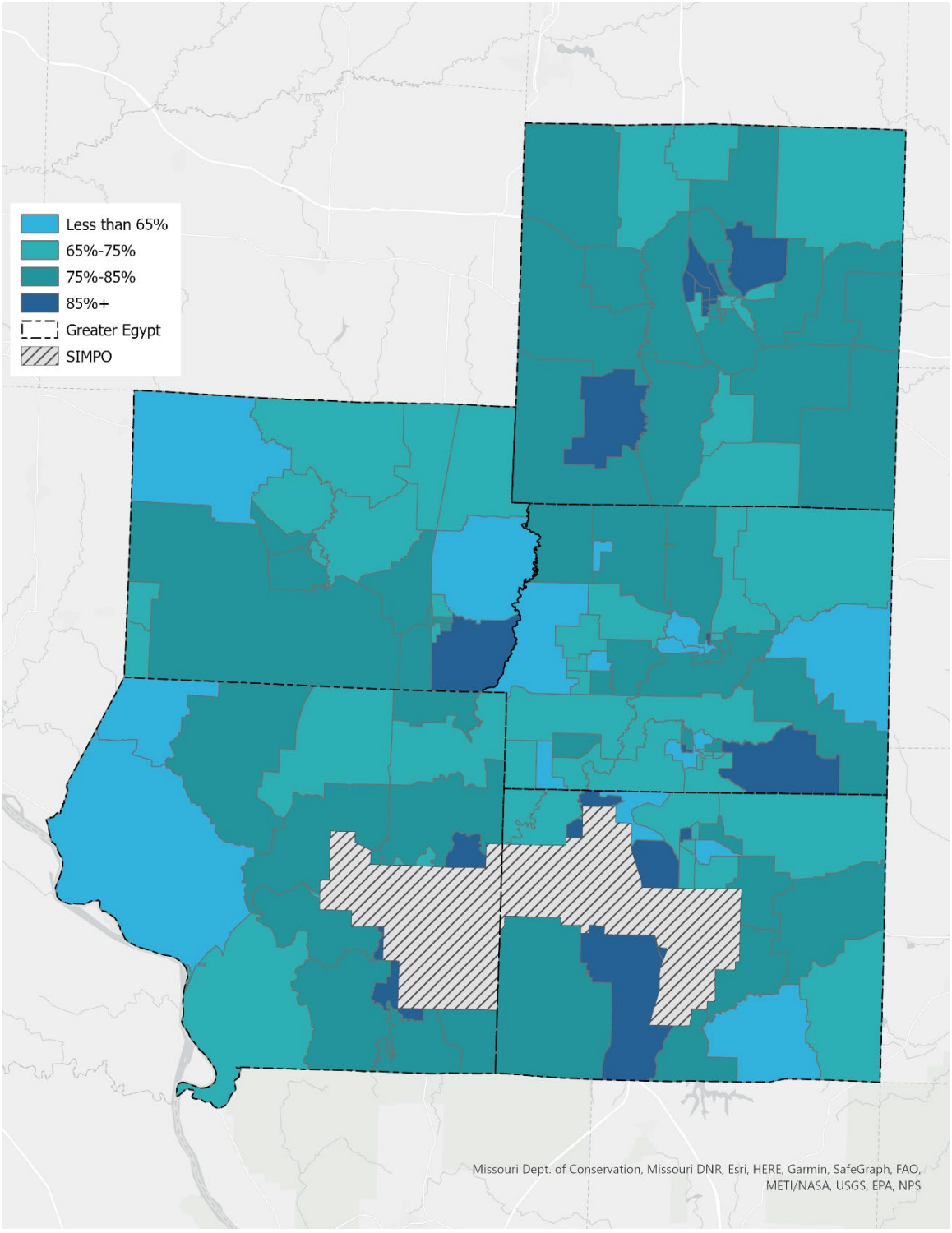


TABLE 11: VEHICLES PER HOUSEHOLD

	No vehicle available	1 vehicle available	2 vehicles available	3 or more vehicles available
Franklin County, Illinois	2.70%	19.50%	39.60%	38.30%
Jackson County, Illinois	5.20%	29.00%	36.10%	29.70%
Jefferson County, Illinois	2.90%	20.50%	40.10%	36.50%
Perry County, Illinois	2.90%	13.60%	38.10%	45.40%
Williamson County, Illinois	2.40%	18.20%	46.40%	33.00%
Greater Egypt	3.31%	21.24%	40.75%	34.71%
State of Illinois	5.20%	22.90%	40.90%	31%

FIGURE 7: HOUSEHOLDS WITH BROADBAND ACCESS



Appendix B -
Transportation Analysis

Transportation Analysis

The Greater Egypt region is home to a vast transportation network that provides connections to school, work, services, and recreation. The transportation network also provides businesses and shippers with connections to bring their products to market. This network connects the five-county region and numerous municipalities and population centers. Figure 1 shows the incorporated areas within Greater Egypt and figure 2 shows the urban areas in the region.

FIGURE 1: GREATER EGYPT INCORPORATED AREAS

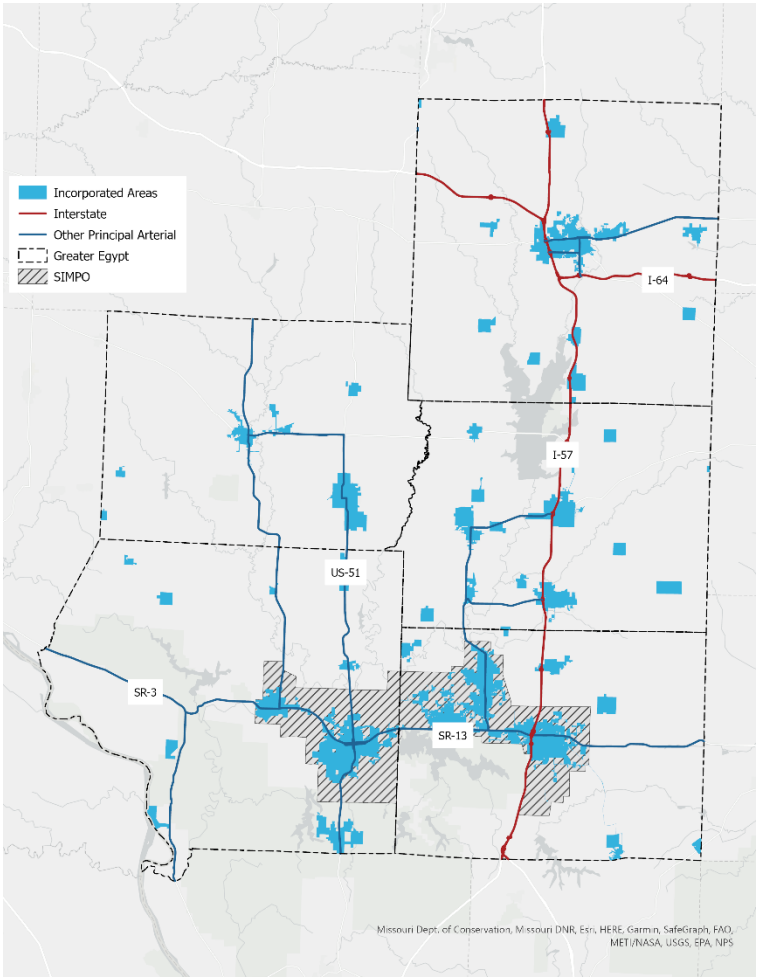
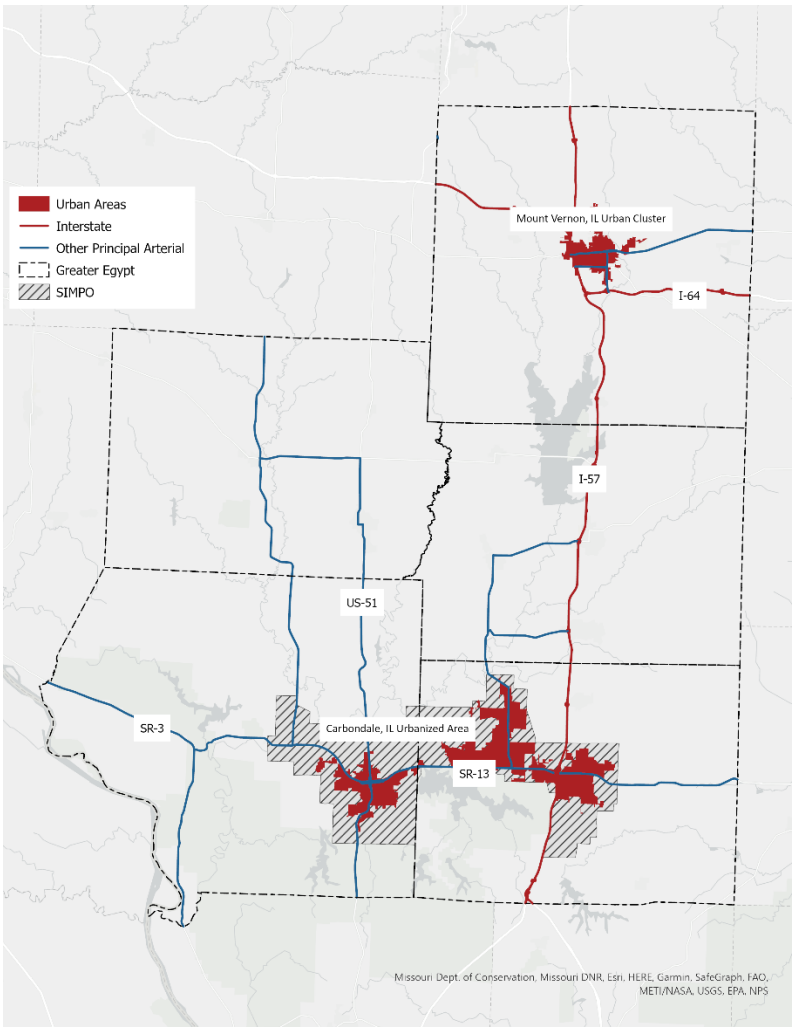


FIGURE 2: GREATER EGYPT URBAN AREAS



The FAST Act

The Fixing America's Surface Transportation (FAST) Act was signed into Law on December 2, 2015. This Act serves as funding for transportation projects and programs in the United States. The FAST Act provides long-term funding for surface transportation. Prior to the FAST Act, MAP 21 served as the funding and authorization bill which governed the transportation spending in the United States.

For more than 100 years, the government has been providing the states with highways funding. Most funds are apportioned to the states by formula. The implementation of those funds is left primarily to state departments of transportation. In addition to the funding provided by the government, the states are required to provide matching funds. Until the 1950s, each federal dollar had to be matched by an identical amount of state and local money. The federal share is now 80% for non-Interstate System road projects and 90% for Interstate System projects. Third, generally, federal money can be spent only on designated federal-aid highways, which make up roughly a quarter of U.S. public roads.

The National Highway System

The National Highway System (NHS) consists of roadways important to the nation's economy, defense, and mobility. All principal arterial routes that are not currently on the NHS before October 1, 2012, will

automatically be added to the NHS provided the principal arterials connect to the NHS in a onetime addition. There will be no restrictions on maximum NHS mileage. The National Highway System includes the following subsystems of roadways (note that a specific highway route may be on more than one subsystem):

Interstate: The Eisenhower Interstate System of highways retains its separate identity within the NHS.

Other Principal Arterials: Highways in rural and urban areas that provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.

Strategic Highway Network (STRAHNET): A highway network important to the United States' strategic defense policy, providing defense access, continuity, and emergency capabilities for defense purposes.

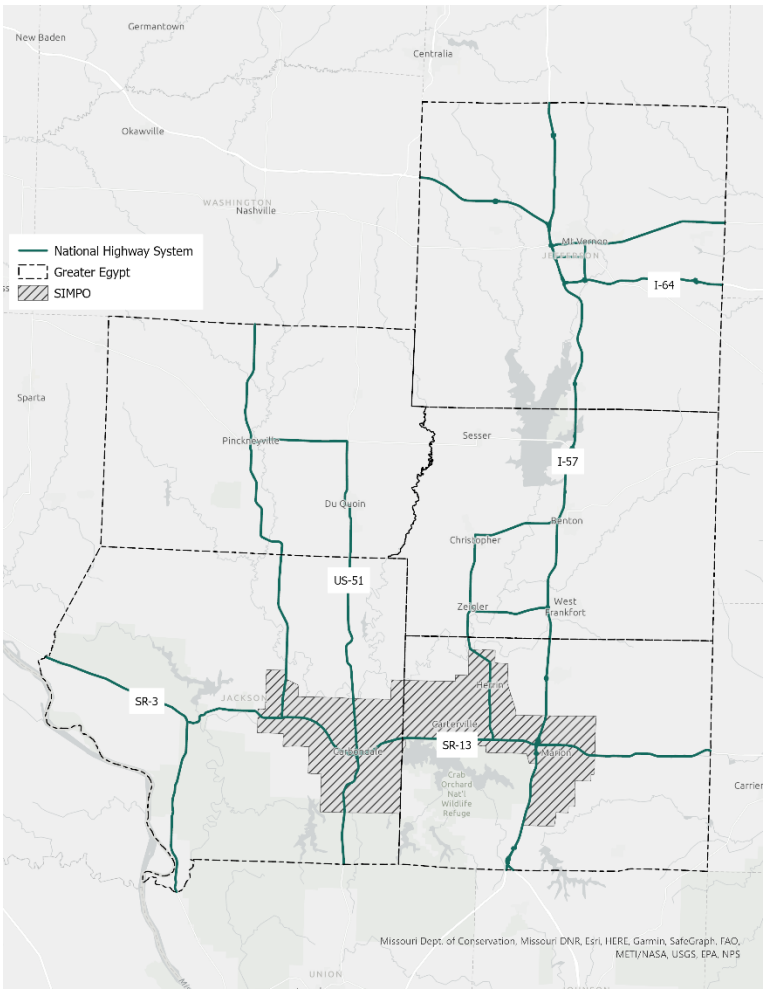
Major Strategic Highway Network Connectors: Highways that provide access between major military installations and highways that are part of the Strategic Highway Network.

Inter-modal Connectors: These highways provide access between major inter-modal facilities and the other four subsystems making up the National Highway System.

NHS routes within the region are listed below and shown in figure 3.

- Interstates
    - I-57
    - I-64
- US Routes
    - US-51
- State Routes
    - SR-3
    - SR-13
    - SR-14
    - SR-15
    - SR-37
    - SR-127
    - SR-148
    - SR-149
- Other
    - Veterans Memorial Drive (Mount Vernon)

FIGURE 3: NATIONAL HIGHWAY SYSTEM ROUTES



Functional Classification

The Federal Highway Administration (FHWA) recommends grouping the roadway network into a hierarchical functional classification system based on the characteristics of the roadway, as well as the service the roadway is intended to provide. As a first step, roadways are typically identified by whether the road is urban or rural. Then, the roadways are further classified in the following categories:

Interstate – This is the highest classification of Arterials and were designed and constructed with ability and long-distance travel in mind. Roadways in this functional classification category are officially designated as Interstates by the Secretary of Transportation, and all routes that comprise the Dwight D. Eisenhower National System of Interstate and Defense Highways belong to the Interstate functional classification category and are considered Principal Arterials. Greater Egypt is served by two interstate highways, I-57 and I-64. I-57 travels south with connections to Memphis, TN and Nashville, TN and north to Chicago, IL. I-64 travels west to St. Louis, MO and East to Louisville, KY.

Freeway/Expressway - The roads in this classification have directional travel lanes and are usually separated by some type of physical barrier, and their access and egress points are limited to on- and off-ramp locations or a very limited number of at-grade intersections. Like Interstates, these

roadways are designed and constructed to maximize their mobility function, and abutting land uses are not directly served by them.

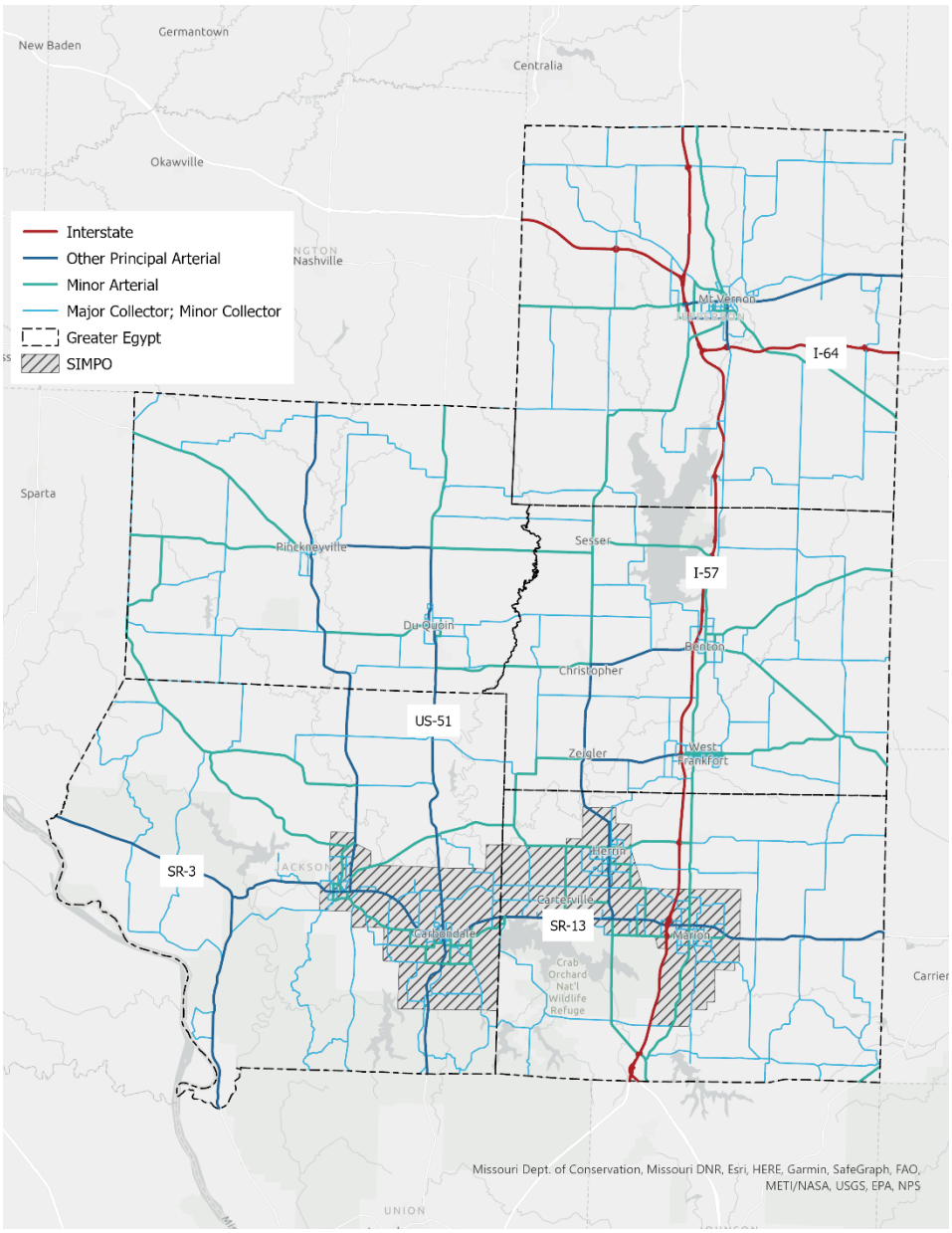
Principal Arterial – The roads in this classification serve major centers of metropolitan areas, provide a high degree of mobility, and can also provide mobility through rural areas. Unlike their access-controlled counterparts, abutting land uses can be served directly. Principal arterials in the region include SR-13 traveling through the Carbondale, IL Urbanized Area; US-51 connecting Carbondale, IL to more rural area in Jackson and Perry counties; and SR-148 which connects SR-13 in Williamson County and I-57 in Franklin County.

Minor Arterial - The roads in this classification provide service for trips of moderate length, serve geographic areas that are smaller than their higher Arterial counterparts and offer connectivity to the higher Arterial system. There are numerous minor arterials in the region that provide access to the interstates and principal arterials. Minor arterials include SR-37, portions of SR-148, and SR-4.

Major Collector - Collectors serve a critical role in the roadway network by gathering traffic from Local Roads and funneling them to the Arterial network. In rural areas such as Greater Egypt, major collectors provide the key link from residential areas to arterials in order to reach destinations like work, school, and commercial centers.

Minor Collector and Local Road - The roads in this classification account for the largest percentage of all roadways in terms of mileage. They are not intended for use in long distance travel, except at the origin or destination end of the trip, due to their provision of direct access to abutting land.

FIGURE 4: FUNCTIONAL CLASSIFICATION



Traffic

The traffic volume experienced on the roadway network varies based on the functional class. I-57 and I-64 see the most total daily volumes followed by SR-13 and US-51. Traffic volume data are collected by both state and local agencies on most roadways with a functional class of major collector and above. Figure 5 shows the Annual Average Daily Traffic (AADT) for roadways with the Greater Egypt region.

FIGURE 5: AADT

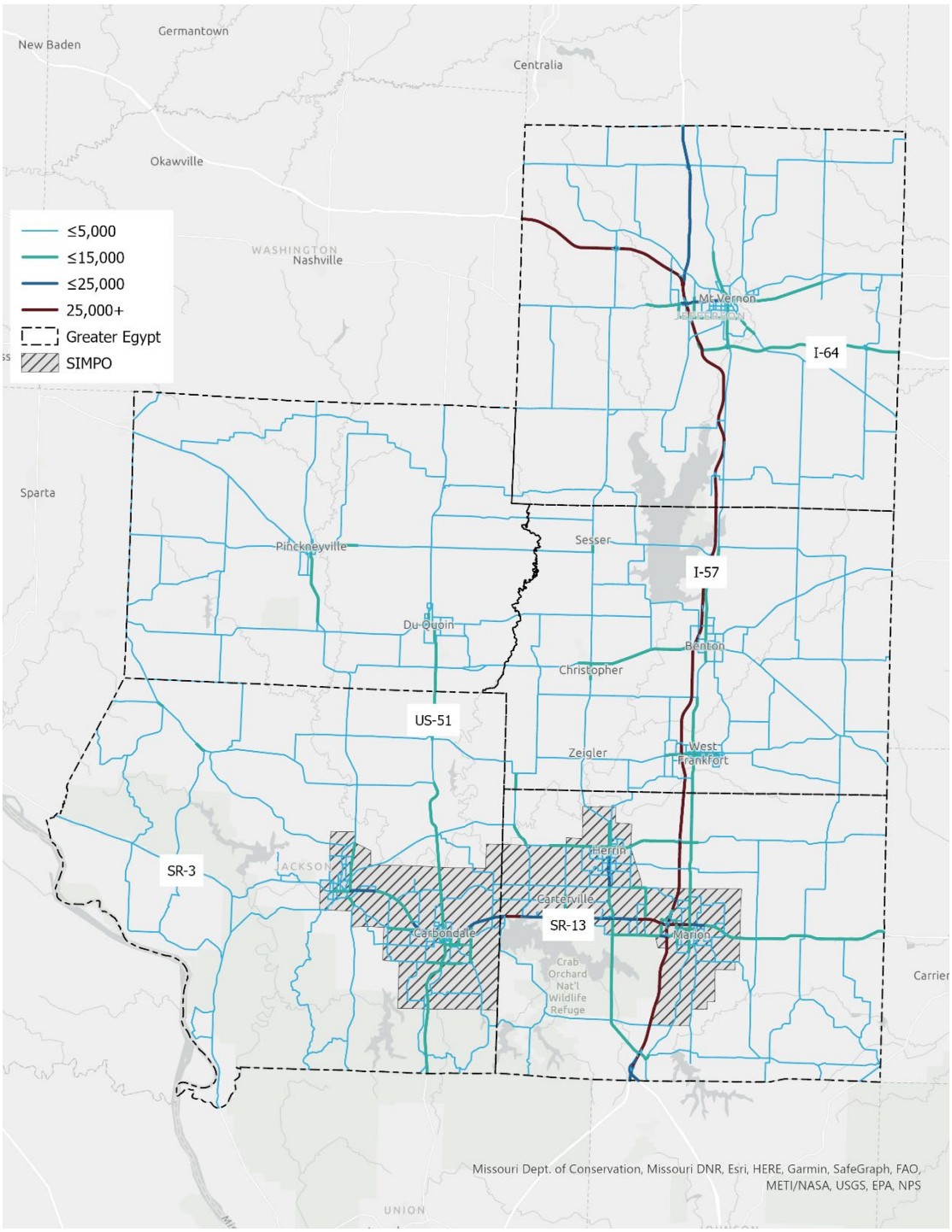
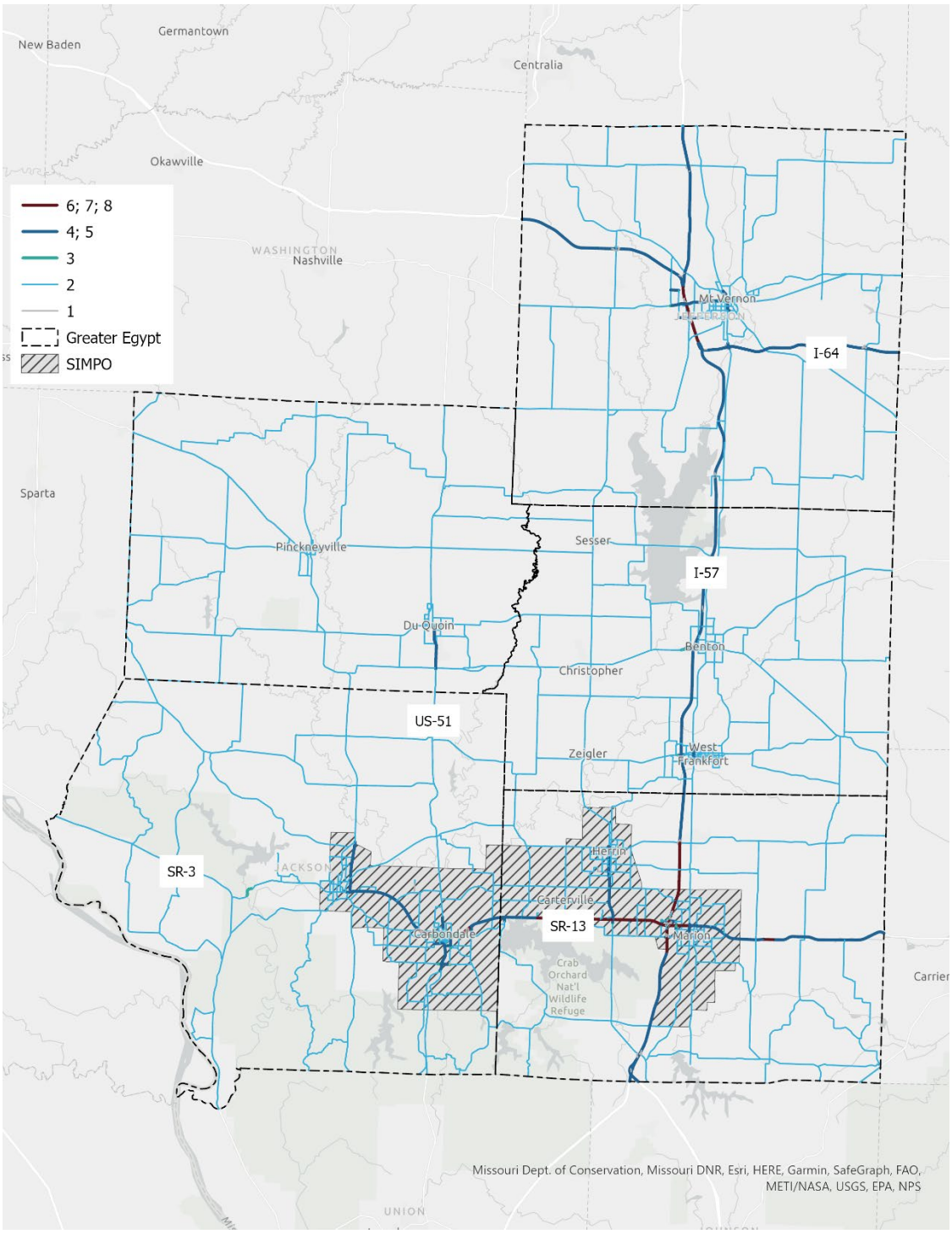


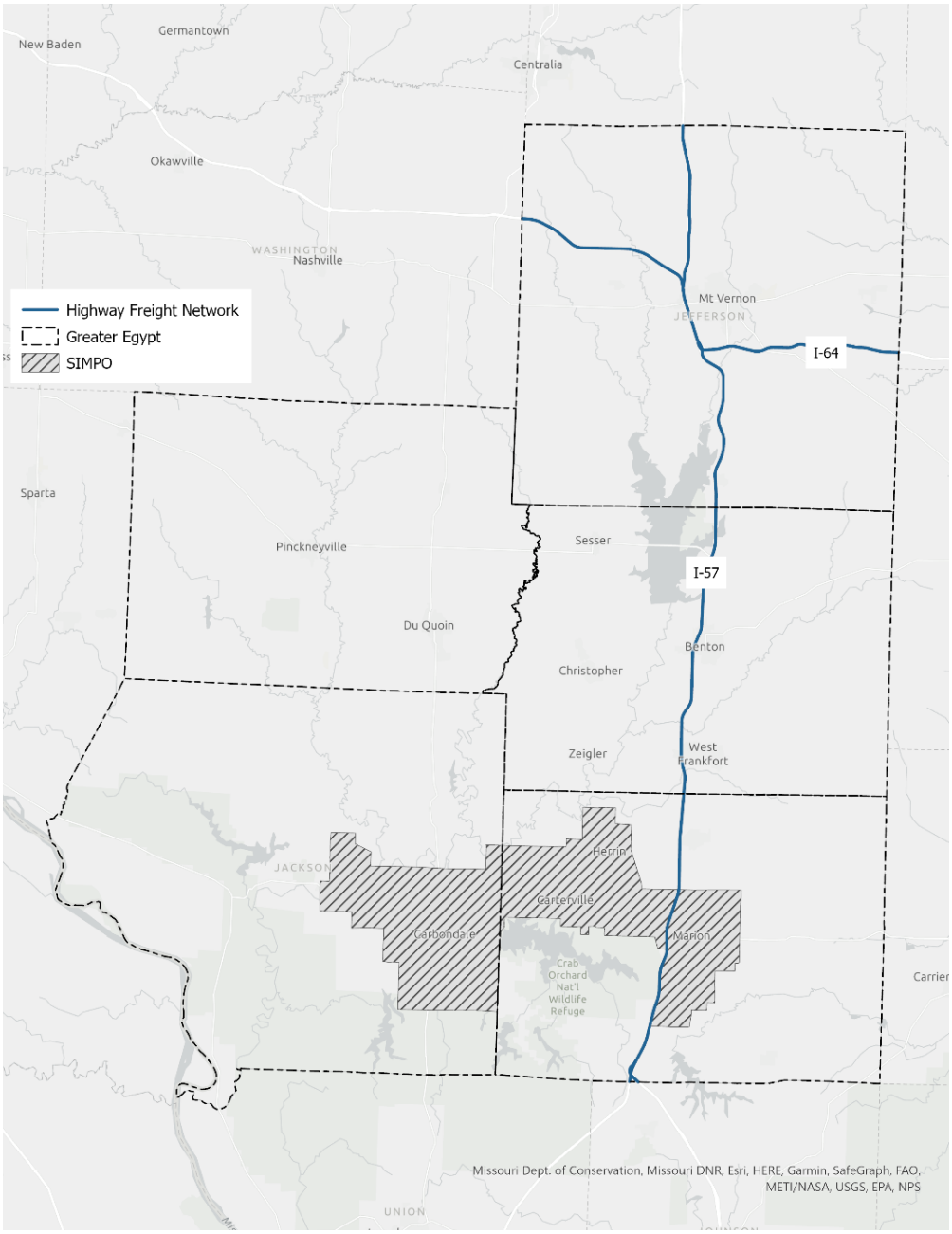
FIGURE 6: NUMBER OF LANES



Freight

Freight plays a critical role in any transportation system. Particularly in rural areas where raw materials originate, the freight system has an outsize role in the economy, environment, and quality of life. Greater Egypt has two major corridors on the National Highway Freight Network (NHFN), I-64 and I-57, as seen in figure 7. Both corridors are significant to freight flows at a greater regional and national level. I-64 provides access to markets and rail connections in St. Louis, MO, Louisville, KY, and Cincinnati, OH. I-57 provides access to both Chicago, IL and Memphis, TN, two critical access points for all modes of freight.

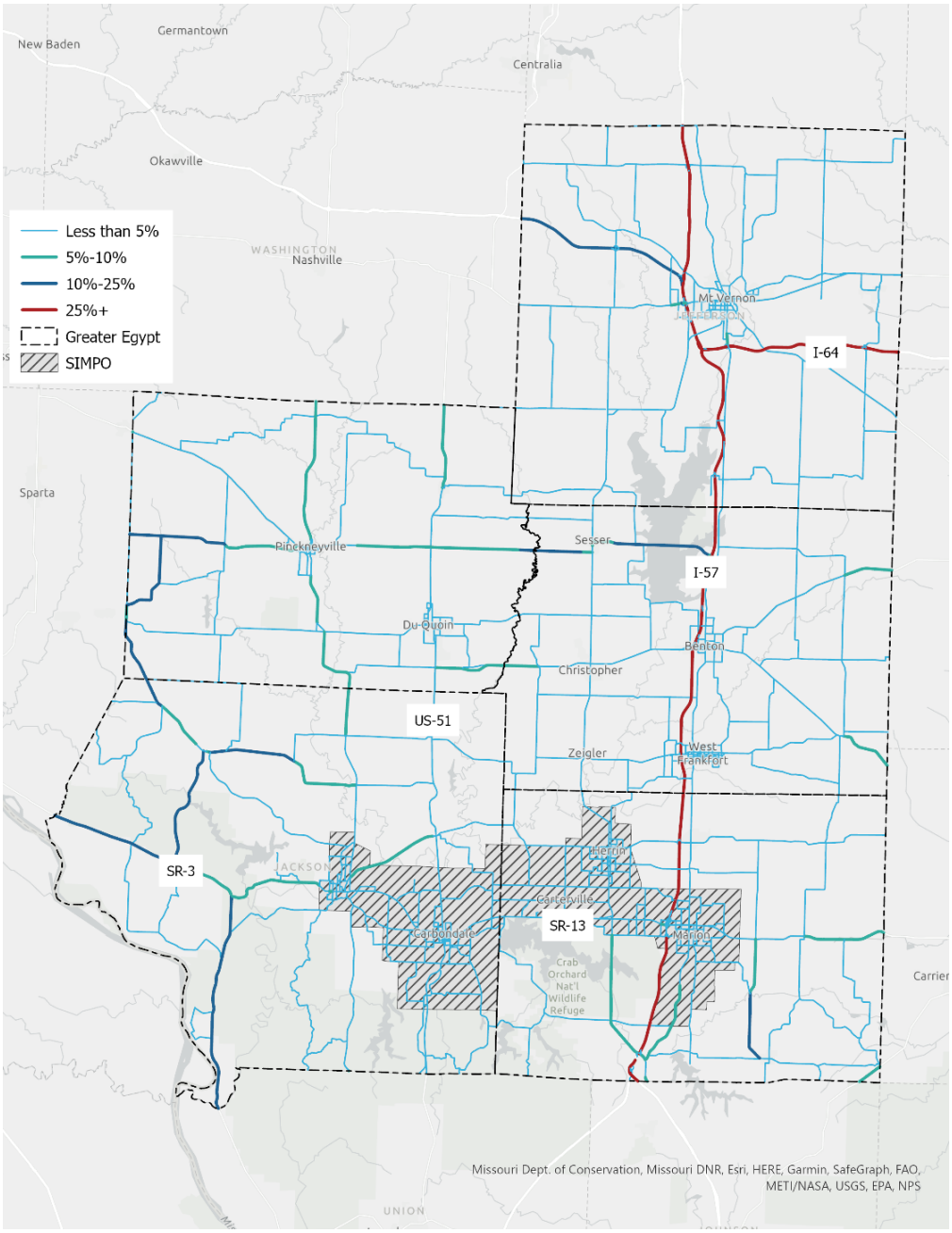
FIGURE 7: FREIGHT NETWORK



In addition to the NHFN, there are many other regionally important freight routes. SR-154, SR-151, and SR-3 all experience truck volumes in excess of 10 percent of total AADT and are good examples of the

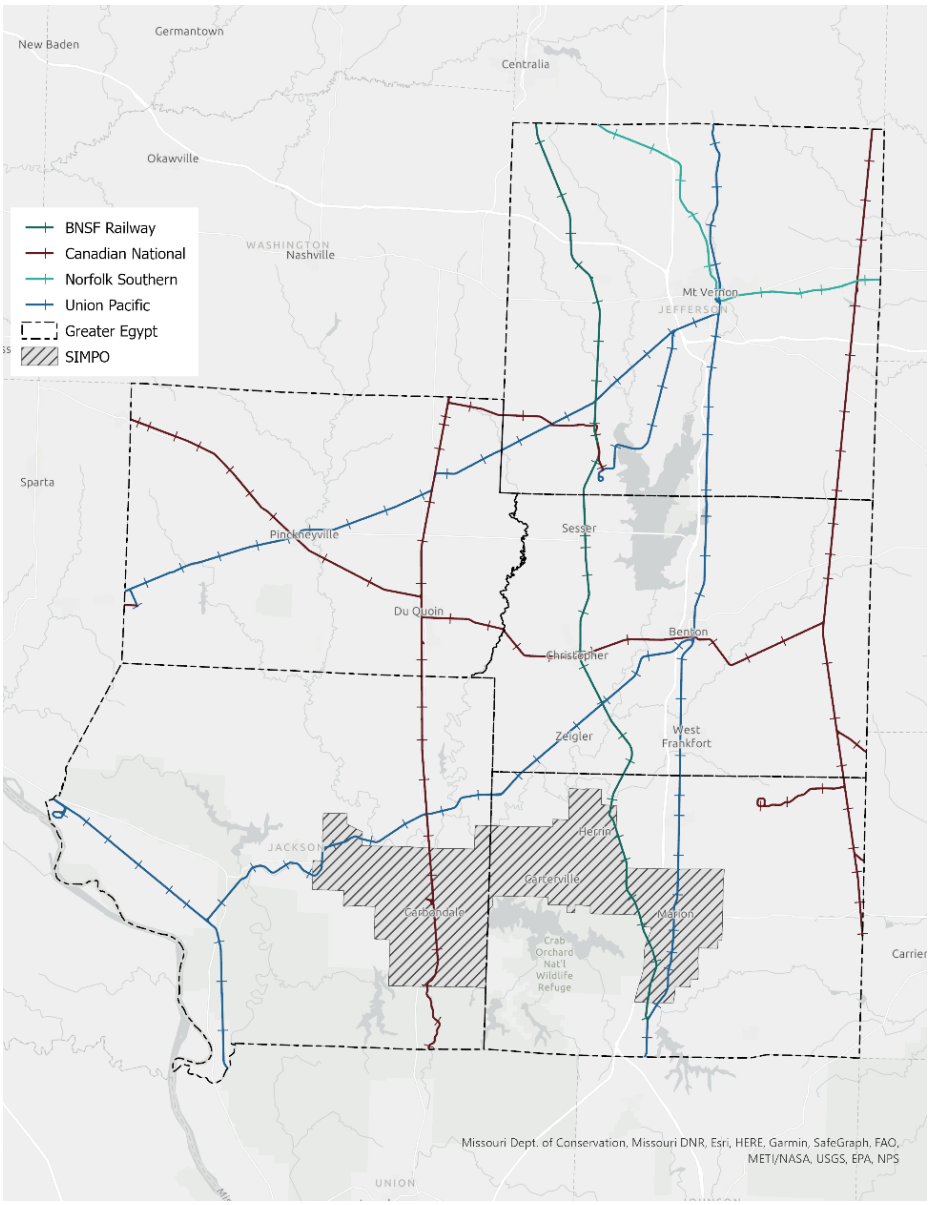
importance of freight infrastructure in rural areas. These routes all have low AADT (less than 5,000), but the high relative truck volumes indicate that residents and shippers rely on these routes for goods delivery and market access. Truck volume, as a percentage of AADT, is shown in figure 8.

FIGURE 8: TRUCK VOLUME



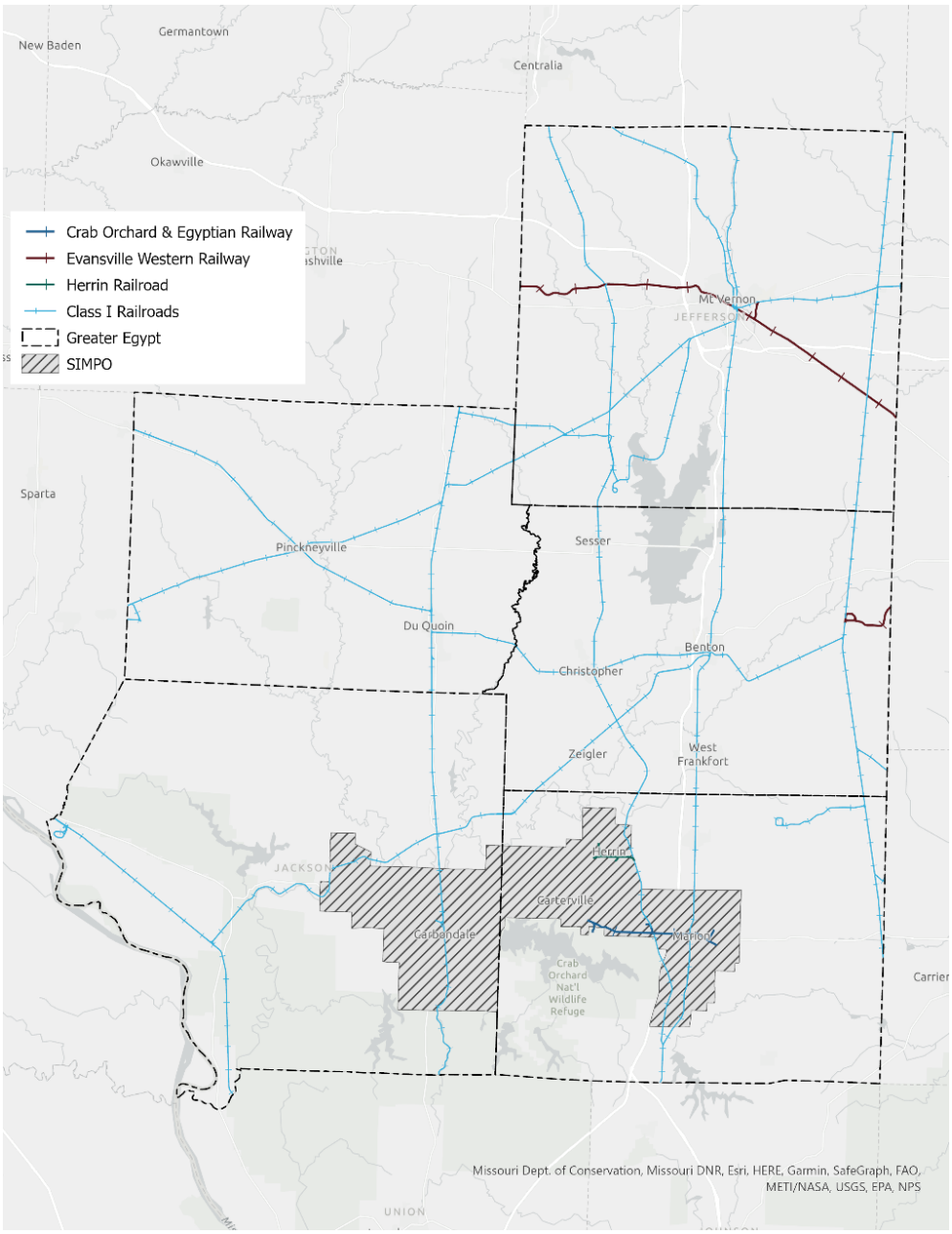
Illinois is at the center of the American railroad network. Greater Egypt is home to four (of seven) class I railroads. Class I railroads are the largest and most profitable railroads and operate throughout multiple states, and sometimes countries (US and Canada). These major railroads provide access to the rail centers of St. Louis, Chicago, and Memphis as well as ports and intermodal facilities along the Mississippi and Ohio River systems. Class one railroads in Greater Egypt are shown in figure 9.

FIGURE 9: CLASS I RAILROADS



In the 1980s, large rail carriers began to sell or abandon less profitable lines. These less profitable lines, shortlines, provide service to directly rural areas and interchanges with class I railroads. This access is important to rural areas because rural economies are reliant on heavy freight and rural communities are disproportionally burdened by truck freight transportation (safety and air quality). Rail freight is a safer and more environmentally friendly mode of freight transport than truck. Shortlines, therefore, offer a vital service for rural communities and provide shippers access to the class I rail network. Shortline railroads typically ship goods such as agricultural products and waste and provide transloading services. Shortline railroads are shown on Figure 10.

FIGURE 10: SHORTLINE RAILROADS



Public Transportation

The Greater Egypt region is served by various public transportation agencies. Passenger rail service is provided by Amtrak with connections to Chicago and Memphis. Three local/regional public transportation systems also serve the area: Jackson County Mass Transit District, Rides Mass Transit District, and South-Central Illinois Mass Transit District.

Various types of public transportation systems operate throughout the region. Public transportation in rural areas must meet the needs of residents who may live in more remote communities without the population density to support traditional forms of public transit.

Intercity Passenger Rail – Passenger rail service that serves long distances with limited stops.

Fixed Route Bus – Bus service that operates along a predetermined route and predetermined schedule.

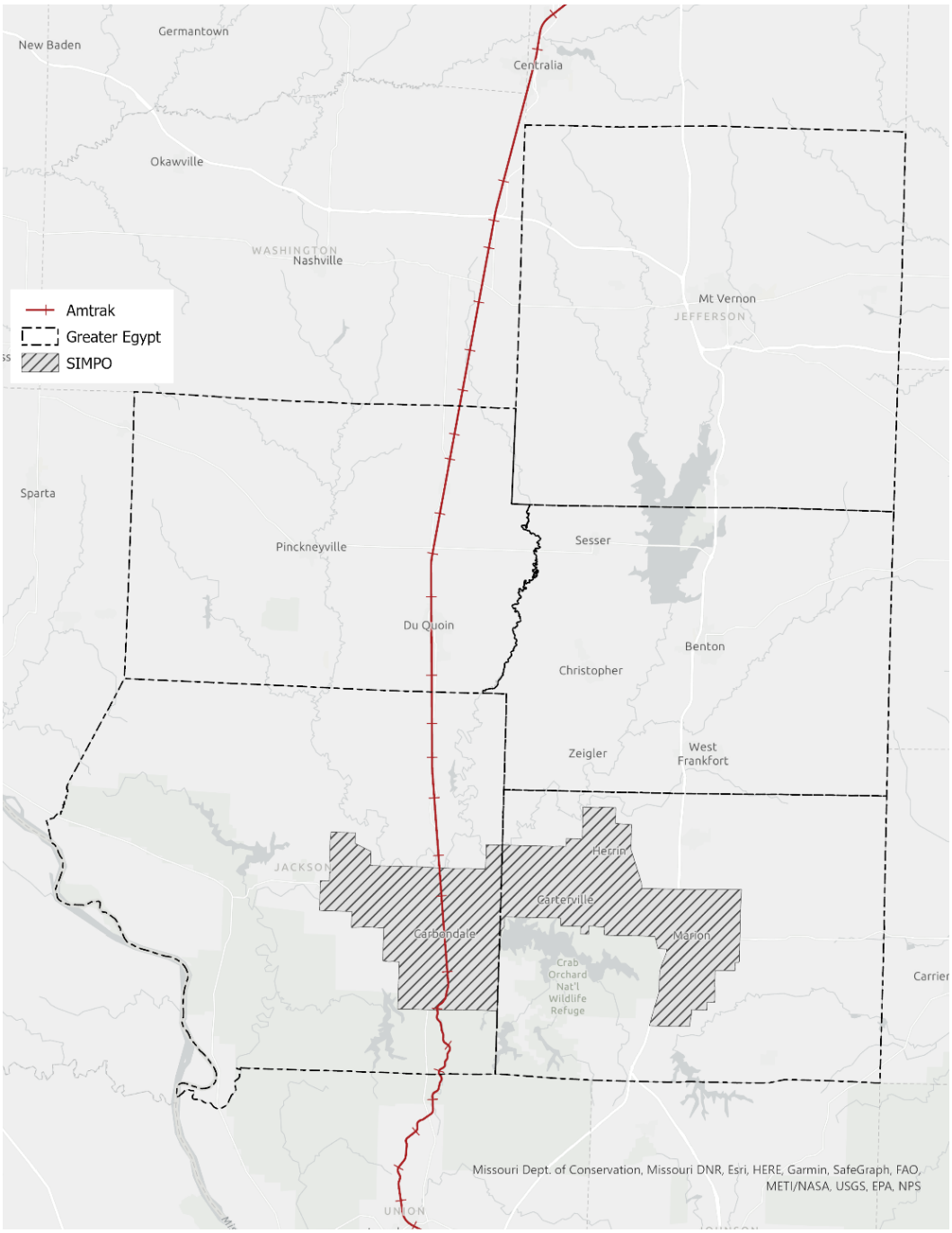
Flex Route – Service that operates predetermined schedules but may deviate from determined routes to serve specific locations.

Demand Response – Service that operates flexible schedules dependent on passenger requests.

Passenger Rail Service (Amtrak)

In addition to freight rail, the region is also home to Amtrak passenger rail service. Regional and national service routes operate. The Illini Service route provides daily service from Carbondale to Chicago with a stop in Du Quoin as well. The City of New Orleans route provides 3x/week service from Chicago to Memphis to New Orleans with a stop in Carbondale. The Amtrak operated lines are shown in figure 11.

FIGURE 11: AMTRAK PASSENGER RAIL SERVICE



Jackson County Mass Transit District

Jackson County Mass Transit District (JCMTD) is a municipal corporation created by the Jackson County Board in 1992 and has been in operation since 2002. JCMTD is a general public mass transportation system that operates flex route and demand response service within Jackson County. JCMTD operates three point-deviated routes within Carbondale and two point-deviated routes between Carbondale and Murphysboro.

TABLE 1: JCMTD SERVICE

Year	Annual Unlinked Trips (UPT)	Annual Passenger Miles (PMT)	Average Weekday Unlinked Trips
2019	93,691	731,337	346

TABLE 2: JCMTD OPERATING EXPENSES

Expense	Amount	Percent
Labor	$998,576	72.6%
Materials and Supplies	$180,880	13.2%
Purchased Transportation	$0	0.0%
Other Operating Expenses	$195,098	14.2%
Total Operating Expenses	**$1,374,554**	**100.0%**

Rides Mass Transit District

Rides Mass Transit District (RMTD) is the largest rural public transit provide in Illinois and operates throughout an 18-county service area in southern Illinois. In Greater Egypt, RMTD provides flex route service in Williamson County and a fixed route service (Saluki Express) in Carbondale.

TABLE 3: RMTD SERVICE

Year	Annual Unlinked Trips (UPT)	Annual Passenger Miles (PMT)	Average Weekday Unlinked Trips
2019	1,119,285	11,688,946	4,147

TABLE 4: RMTD OPERATING EXPENSES

Expense	Amount	Percent
Labor	$13,077,963	76.7%
Materials and Supplies	$2,300,027	13.5%
Purchased Transportation	$0	0.0%
Other Operating Expenses	$1,669,324	9.8%
Total Operating Expenses	**$17,047,314**	**100.0%**

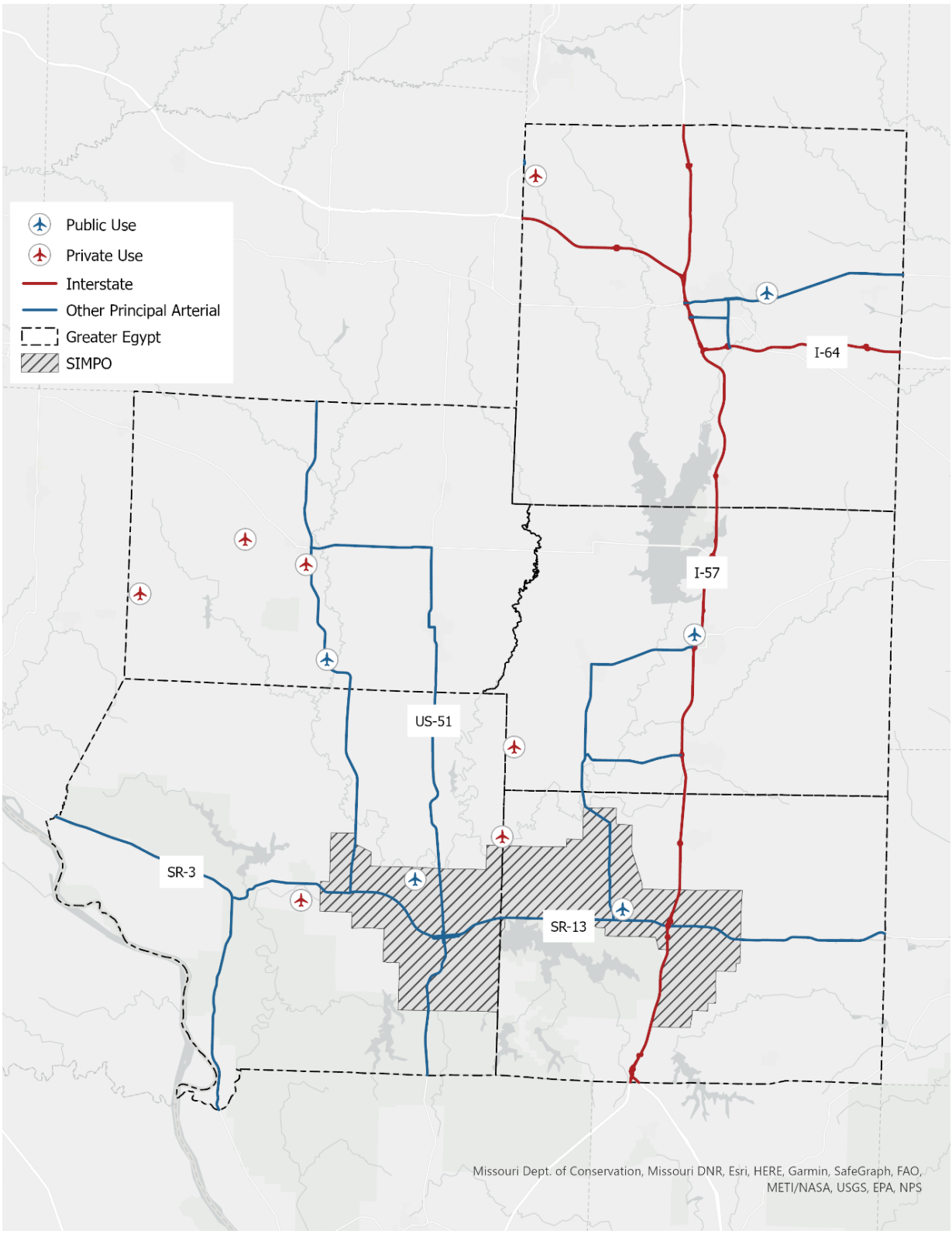
South Central Illinois Mass Transit District

South Central Illinois Mass Transit District (SCT) is the public transportation system serving the counties of Marion, Jefferson, Clinton, Washington, Franklin, and Perry. SCT provides flex route and demand response service. SCT is the only transit provider in Greater Egypt that operates exclusively outside of the urban area.

Air Transportation

There are 12 airports within Greater Egypt, 10 of which are outside of the SIMPO area. The airports in Greater Egypt provide commercial service for small aircraft, flight training, research, emergency flight service, and economic development opportunities.

Three public use airports located in the rural area include: Benton Municipal Airport, Mt. Vernon Outland Airport, and Pinckneyville-Du Quoin Airport.


Public Use
Private Use
Interstate
Other Principal Arterial
Greater Egypt
SIMPO
I-64
I-57
US-51
SR-3
SR-13
Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

Bicycle and Pedestrian Facilities

Active transportation facilities are vital for a balanced, sustainable, and healthy multi-modal transportation system. As stated by the FHWA, it is federal policy to promote the increased use, and safety of, bicycling and walking as transportation modes. Whether to promote recreation, fitness, or functional transportation, investments in active transportation can improve communities in a variety of ways:

- Reducing vehicle miles traveled
    - Improving air quality
    - Decreasing personal transportation costs
    - Reducing roadway maintenance costs
- Supporting small businesses and local economic activity
- Improving quality of life and transportation choices
- Supporting more equitable transportation investments

Currently, the region lacks an accessible and connected bicycle and pedestrian network. Primary, dedicated active transportation facilities include:

- Rend Lake Bike Trail
- Perkins Ave. (Veterans Memorial Park to S. 10th St.) bike lane in Mt. Vernon
- S. 34th St. (Broadway St. to Veterans Memorial Dr.) bike lane in Mt. Vernon

It is critical to incorporate the needs of cyclists and pedestrians into future roadway projects to ensure that people of all ages, abilities, and preferences have the same opportunity to travel throughout their community.

Safety

Analyzing existing traffic crash patterns is the first step towards understanding the underlying factors of safety issues. Crash data provided by IDOT from the years 2016 to 2020 were used for analysis to provide up-to-date assessments of the safety conditions within the boundaries of Greater Egypt. From the data, the following was revealed:

- 24,537 total crashes reported from 2016 to 2020.
- Crashes on trending slightly down (assuming 2020 was an outlier because of the pandemic's effect on traffic volumes).
- Injury crashes accounted for nearly a quarter of all crashes (22.4%), with 7,775 total injuries; fatal crashes accounted for less than 1% of all crashes, but with 194 total fatalities.
- Bicycles or pedestrian were involved in 260 crashes resulting in 241 injuries and 23 fatalities.

During the four-period of 2016-2019, Greater Egypt averaged 5,315 crashes per year. In 2020, there was a dramatic drop in crashes to 3,277, most likely a direct result of the Covid-19 pandemic and the stay-at-home orders, social distancing requirements, and job losses.

FIGURE 12: NUMBER OF CRASHES PER YEAR

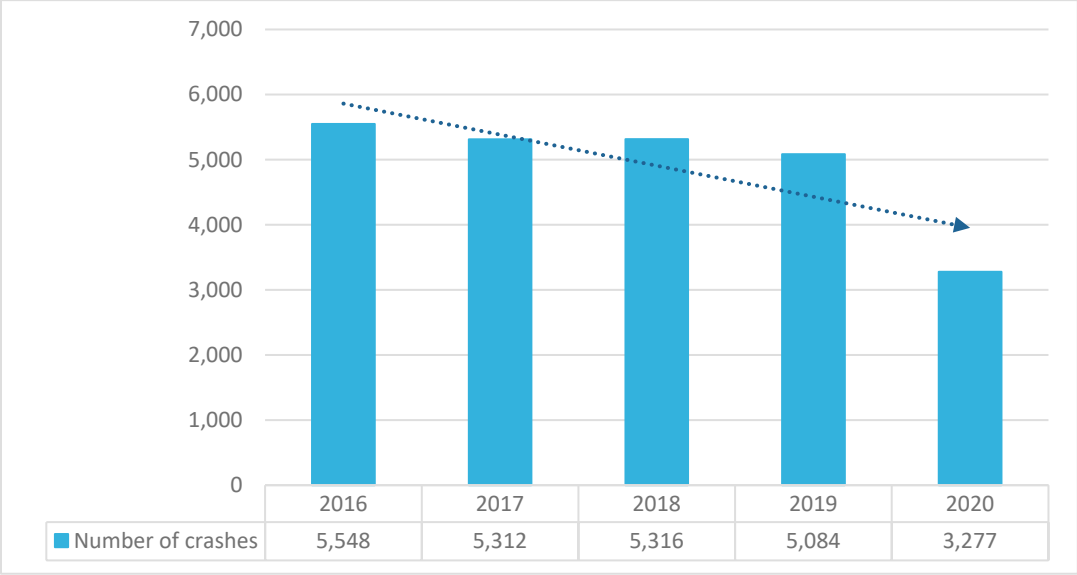
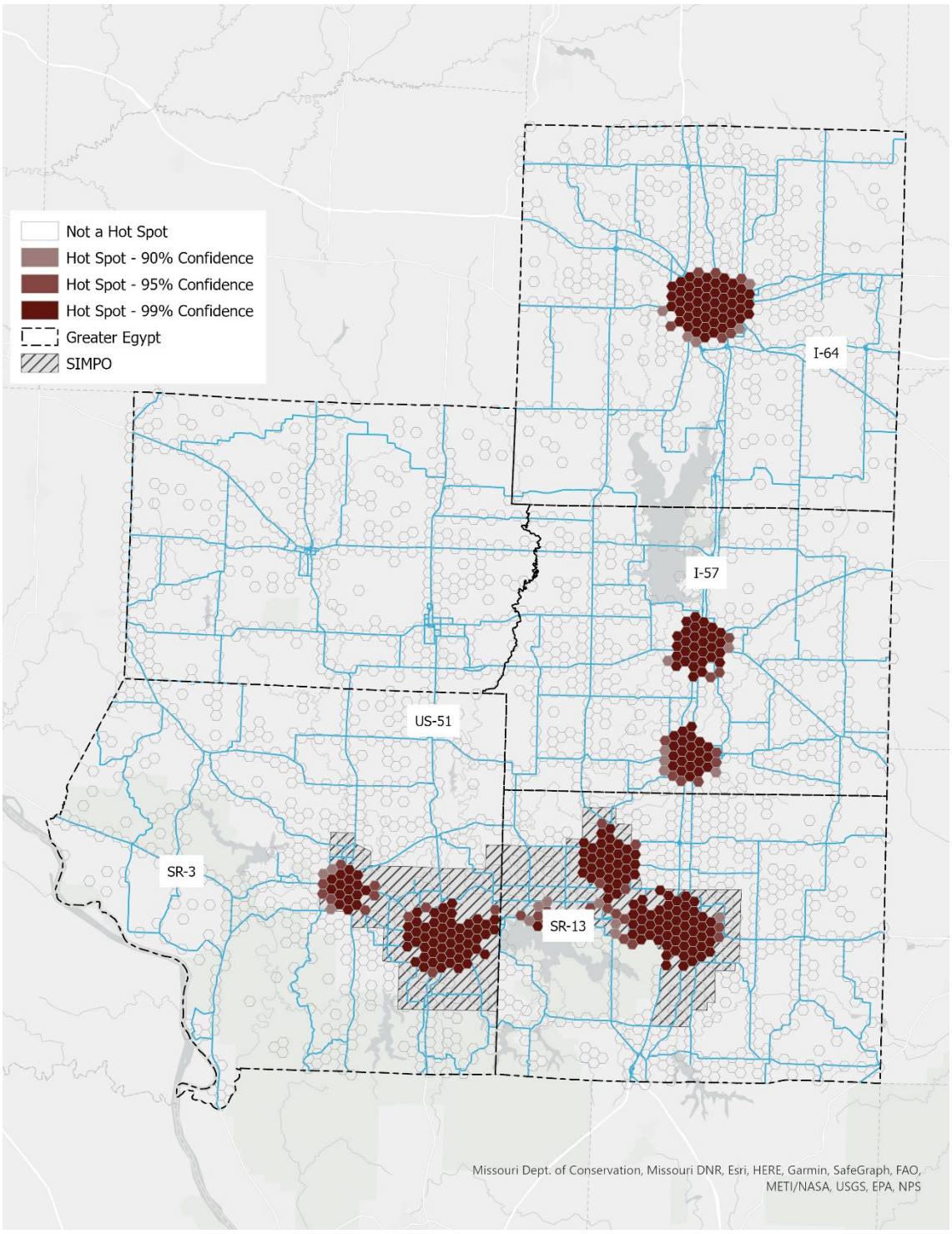


Figure 13 displays total crashes as a hot spot map indicating where crashes are clustering within the region. Often, crash hot spots trend alongside total population or traffic volume. So, while the hot spot map effectively illustrates where lots of crashes are happening, it does not show where crashes are happening at higher frequency relative to their traffic and functional classification.

FIGURE 13: CRASH HOT SPOTS



A more thorough analysis of crashes looks at average crash rates in the region. For this analysis, GIS was used to identify crashes along roadways with functional classes of Interstate, Principal Arterial, and Other Minor Arterials. In Illinois, segment crash rates are calculated as follows:

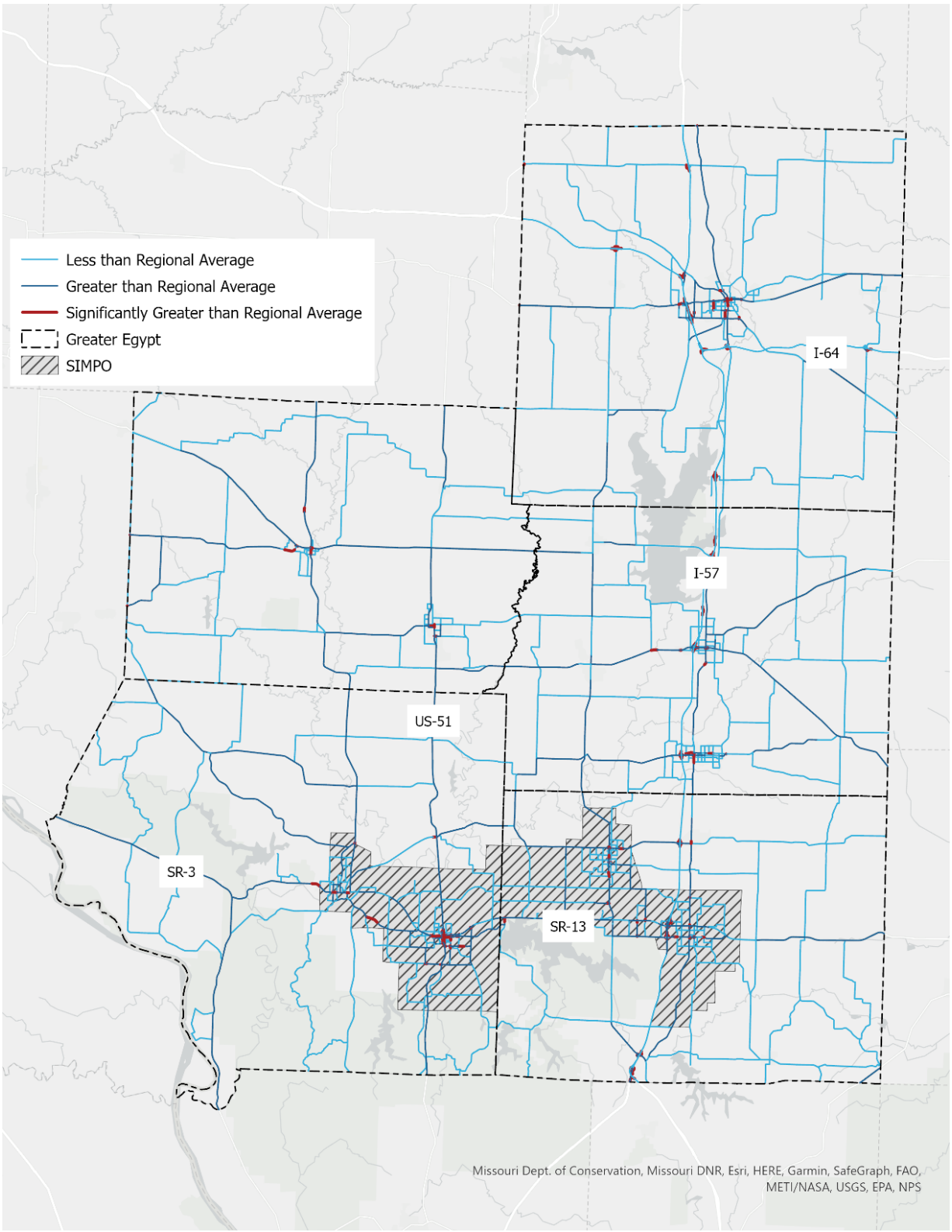
"[Σ(number of crashes) x 100,000,000] / [(Σ(segment length x ADT) x number of crash years x 365]"

Observed crash rates along segments were then compared to IDOT average regional crash rates per functional class. Figure 14 shows how crash rates compare to the regional average and is a good starting point to identifying crash problem areas.

Notes on crash rate analysis:

- Intersection crashes were not included in the regional analysis; separate crash rates are calculated for intersections, but appropriate intersection data was not available.
- Segments were combined where possible (same number of lanes, functional class, AADT), but some segments were still too short in length. These short segments may have higher crash rates and should be viewed within the context of surrounding roadways (highway ramps for example show higher crash rates).
- Roadways with AADT of zero were omitted from the analysis.

FIGURE 14: CRASH RATES



Franklin County

SR149 and SR37 in West Frankfort

SR14 and SR37 through Benton

I57 and SR154 interchange

Jackson County

SR51 through Carbondale

Murphysboro Rd between Murphysboro and Carbondale

SR127 and Ava Rd

Jefferson County

SR37 and SR15 through Mt. Vernon

Perry County

SR127 through Pickney

SR13/SR154 through Pickney

US51 south of the SR154

Williamson County

SR13 near Crab Orchard Lake

I57 interchanges at SR13 and Main St. in Marion

SR37 between Johnson City and Marion

Appendix C -
Environmental Analysis

Environmental Analysis

It is critical to consider the natural environment when accounting for the short- and long-term impacts of transportation decisions. In connection with new approaches to how communities maintain and enhance the livability of our region, the FAST ACT reconfirms the need to enhance the performance of transportation systems while protecting and enhancing the natural environment as one of its primary goals for the nation. Managing environmental resources as a group of strategic assets that are crucial to municipal goals, important to ecosystem health, and beneficial to the region is key to successful regional management.

Key environmental assets may be described as follows:

Clean air: essential to both human and ecosystem health.

Rivers and water bodies: provide drinking water, recreation, and act as natural pollution filters.

Biodiversity: essential for food, material, and improved quality of life, and also increases the region's resilience.

Forests: serve as watersheds, habitats, carbon sinks, leisure amenities, and tourist destinations. If managed sustainably, forests are also a source of energy and building materials.

Wetlands: filter and process stormwater and waste as well as acting as a nursery for aquatic life.

The natural environment provides the region with several ecosystem services which are fundamental to livability. In considering environmental resources, these benefits may be managed and increased by planning transportation networks in a way which preserves, unifies, and invests in these natural systems.

Land Cover

In order to track preservation of natural systems over time, land cover acreage should be mapped every five years in order to track environmental maintenance efforts. Wetlands greatly assist in retaining storm water during times of heavy precipitation and work to reduce the effects of regional flooding in addition to providing habitat for specific types of vegetation and animal species not found in other environments. **Table 1** shows the acreage associated with each land cover type identified in the region. **Figure 2, Figure 3, and Figure 4** show where Wetlands, Forestlands, and Agricultural lands are located throughout the five-county region. Information on land cover was obtained from the 2016 U.S. Geological Survey (USGS) National Land Cover Database (NLCD).

When investing in transportation infrastructure, it is critically important to preserve ecological systems. Recommendations to protect and preserve natural systems include:

- Dense development practices
- Reduced minimum lot sizes
- Reduced or eliminated minimum parking requirements
- Purse enhancements within existing ROW whenever possible
- Identify and track local critical ecological systems
- Track newly developed land to ensure development does not outpace population or job growth

TABLE 1: NLCD LAND COVER CLASSIFICATION

NLCD Class Code	NLCD Land Cover Classification	Percent	Square Miles
11		3.95%	99.02
21	Developed, Open Space	4.54%	113.80
22	Developed, Low Intensity	3.29%	82.66
23	Developed, Medium Intensity	0.70%	17.63
24	Developed, High Intensity	0.16%	4.14
31	Barren Land	0.11%	2.77
41	Deciduous Forest	25.93%	650.49
42	Evergreen Forest	0.12%	3.05
43	Mixed Forest	3.82%	95.72
52	Shrub/Scrub	0.06%	1.62
71	Herbaceous	0.83%	20.77
81	Hay/Pasture	17.25%	432.87
82	Cultivated Crops	34.48%	865.09
90	Woody Wetlands	4.41%	110.65
95	Emergent Herbaceous Wetlands	0.35%	8.72
Total		**100.00%**	**2,509**

FIGURE 1: LAND COVER DISTRIBUTION

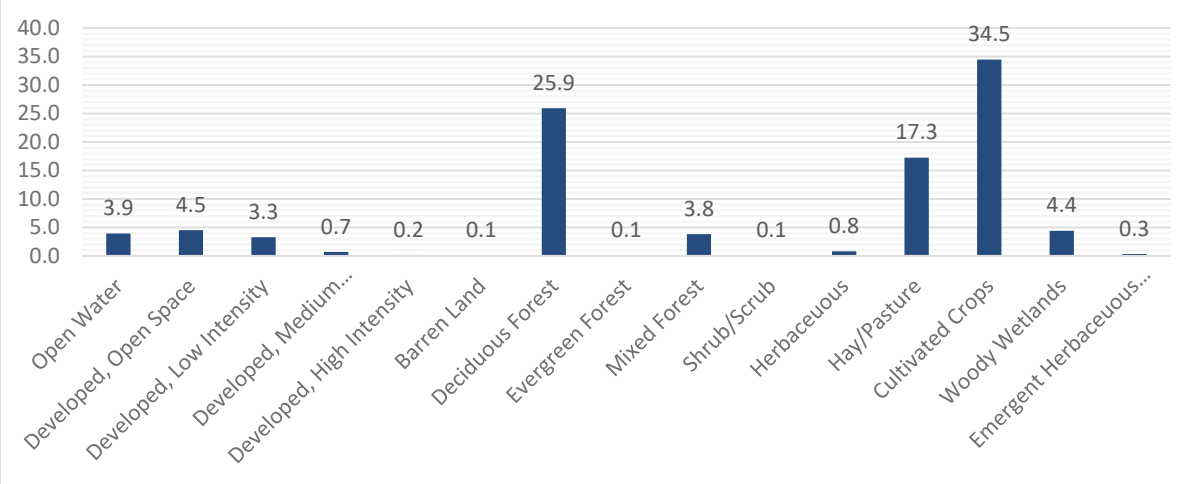


FIGURE 2: OPEN WATER AND WETLANDS

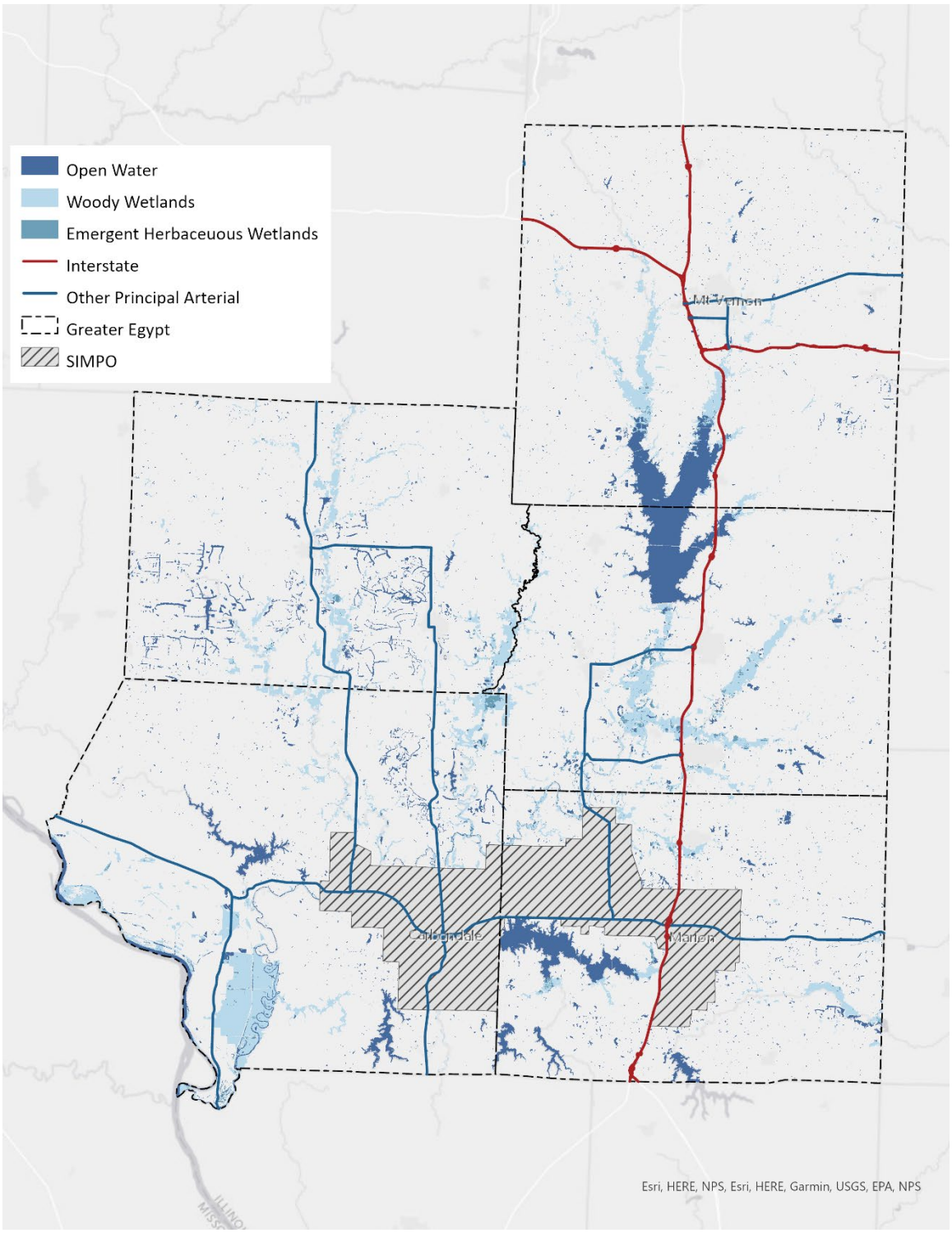


FIGURE 3: FORESTS, GRASSLANDS, AND OPEN LAND

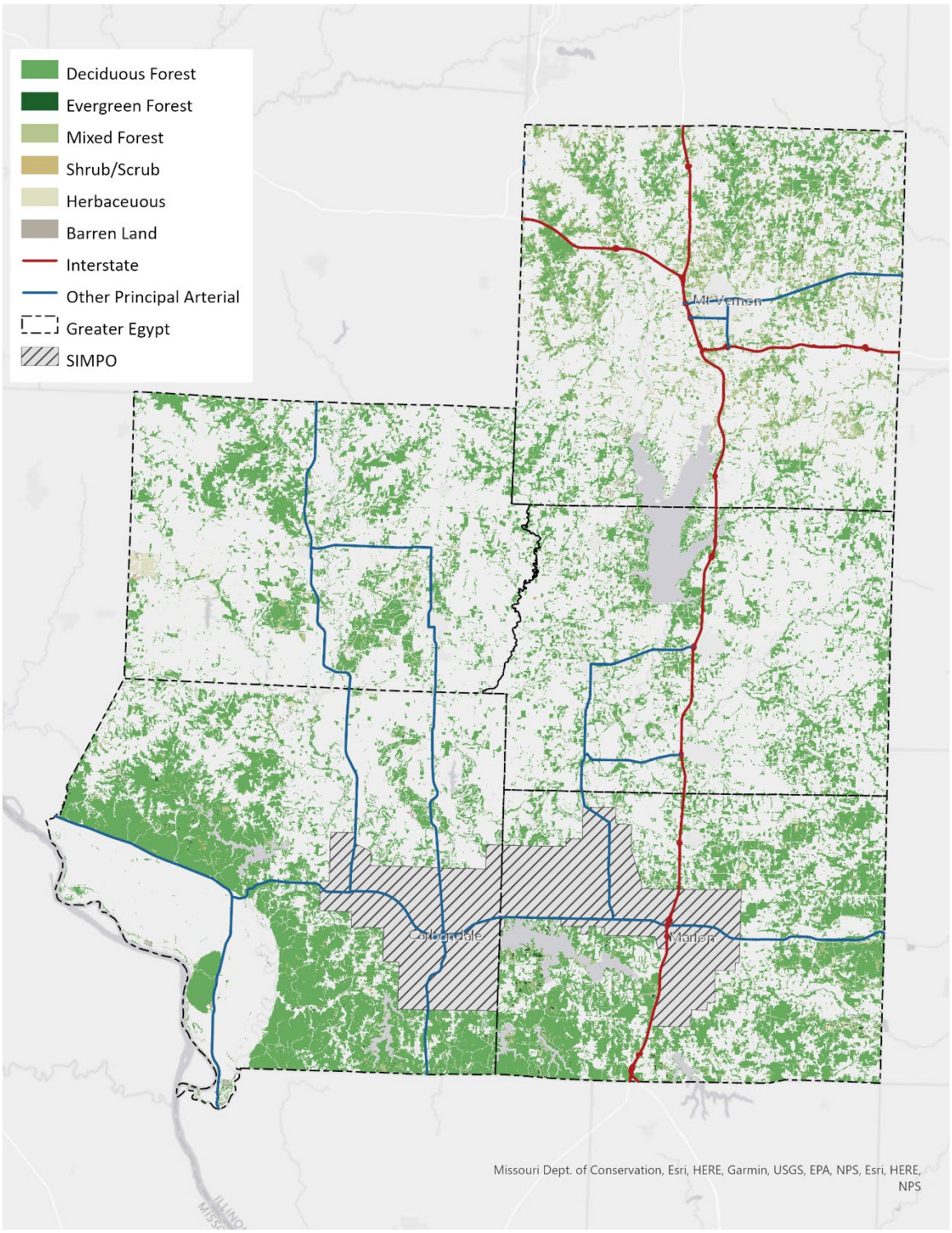


FIGURE 4: AGRICULTURAL LAND

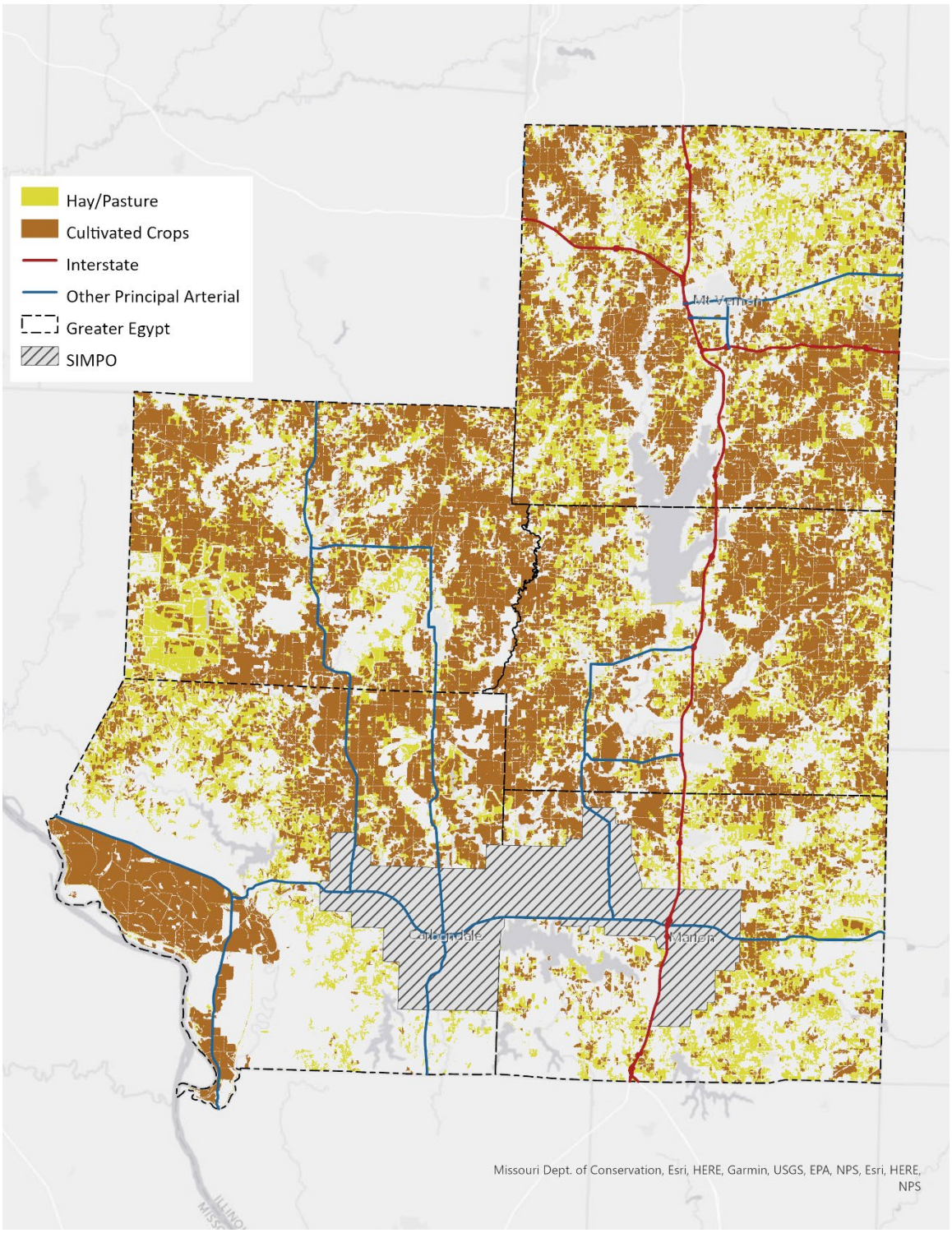
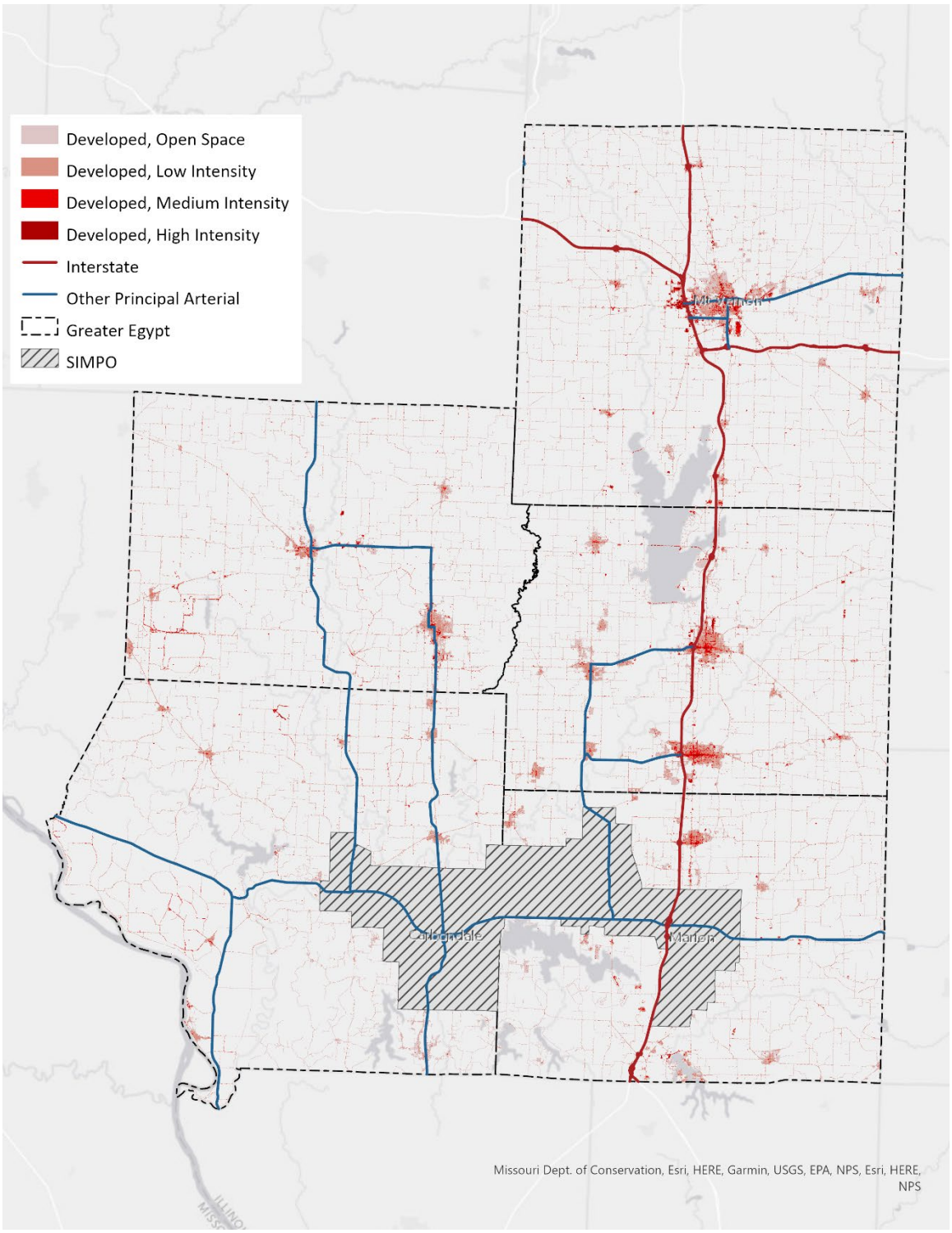


FIGURE 5: DEVELOPED LAND



Threatened and Endangered Species

As of December 2020, there are 84 threatened or endangered species throughout Greater Egypt. These species often rely on sensitive natural areas like grasslands, woodlands, and wetlands for survival. A full list of threatened and endangered species is in **Table 2**.

TABLE 2: THREATENED AND ENDANGERED SPECIES

Number	County	Name	Federal Status	State Status
1.	Franklin	False Bugbane		Endangered
2.	Franklin; Jackson	Little Blue Heron		Endangered
3.	Franklin; Jackson	River Redhorse		Threatened
4.	Franklin; Jackson; Jefferson; Perry; Williamson	Northern Long-Eared Myotis	Threatened	Threatened
5.	Franklin; Jackson; Jefferson; Perry; Williamson	Indiana Bat	Endangered	Endangered
6.	Franklin; Jackson	Spotted Pondweed		Endangered
7.	Franklin; Jefferson	River Cooter		Endangered
8.	Franklin; Jackson	Dull Meadow Beauty		Endangered
9.	Franklin; Jackson; Williamson	Spring Ladies' Tresses		Endangered
10.	Franklin; Jefferson; Perry	Ornate Box Turtle		Threatened
11.	Franklin; Williamson	Green Trillium		Endangered
12.	Franklin; Jefferson	Piping Plover	Endangered	
13.	Jackson	Black Cohosh		Endangered
14.	Jackson	Western Sand Darter		Endangered
15.	Jackson; Williamson	Chuck-Will's-Widow		Threatened
16.	Jackson	Smooth Softshell		Threatened
17.	Jackson; Williamson	Bradley's Spleenwort		Endangered
18.	Jackson	Winged Sedge		Endangered
19.	Jackson	Arkansas Sedge		Endangered
20.	Jackson	Swollen Sedge		Endangered
21.	Jackson; Williamson	Bellows Beak Sedge		Endangered
22.	Jackson	Plantain-Leaved Sedge		Endangered
23.	Jackson	Drooping Sedge		Threatened
24.	Jackson	Willdenow's Sedge		Threatened
25.	Jackson	Rafinesque's Big-Eared Bat		Endangered
26.	Jackson; Perry; Williamson	Timber Rattlesnake		Threatened
27.	Jackson	Crystal Darter		Endangered
28.	Jackson	Cynosciadium		Endangered
29.	Jackson; Williamson	French's Shootingstar		Threatened
30.	Jackson	Snowy Egret		Endangered
31.	Jackson	Bigclaw Crayfish		Endangered
32.	Jackson	Cluster Fescue		Threatened
33.	Jackson	Spring Cavefish		Threatened
34.	Jackson; Perry	Common Gallinule		Endangered

Number	County	Name	Federal Status	State Status
35.	Jackson	Eastern Narrowmouth Toad		Threatened
36.	Jackson	Arkansas Mannagrass		Endangered
37.	Jackson	Silverbell Tree		Endangered
38.	Jackson	Crested Coralroot Orchid		Endangered
39.	Jackson	Cliff Clubmoss		Threatened
40.	Jackson	One-Flowered Hydrolea		Endangered
41.	Jackson	Bird-Voiced Treefrog		Threatened
42.	Jackson	American Orpine		Threatened
43.	Jackson; Perry; Williamson	Least Bittern		Threatened
44.	Jackson; Jefferson; Perry	Loggerhead Shrike		Endangered
45.	Jackson	Swainson's Warbler		Endangered
46.	Jackson	Red Honeysuckle		Endangered
47.	Jackson	Yellow Honeysuckle		Endangered
48.	Jackson	Sturgeon Chub		Endangered
49.	Jackson; Williamson	Climbing Milkweed		Endangered
50.	Jackson	Virginia Bunchflower		Endangered
51.	Jackson	Squirting Cucumber		Threatened
52.	Jackson	Gray Bat	Endangered	Endangered
53.	Jackson	Bigeye Shiner		Endangered
54.	Jackson	Illinois Wood Sorrel		Threatened
55.	Jackson; Williamson	Shortleaf Pine		Endangered
56.	Jackson	Heart-Leaved Plantain		Endangered
57.	Jackson	Grove Bluegrass		Endangered
58.	Jackson	Mock Bishop's Weed		Endangered
59.	Jackson	Rock Chestnut Oak		Threatened
60.	Jackson; Perry	Harvey's Buttercup		Threatened
61.	Jackson	Southern Grape Fern		Endangered
62.	Jackson; Williamson	Carolina Whipgrass		Endangered
63.	Jackson	Cerulean Warbler		Threatened
64.	Jackson	Grass-Leaved Lily		Threatened
65.	Jackson	Hairy Synandra		Threatened
66.	Jackson	Grass		Endangered
67.	Jackson	Buffalo Clover		Threatened
68.	Jackson	Nettle		Threatened
69.	Jackson	Pallid Sturgeon	Endangered	
70.	Jefferson	Cypress Minnow		Endangered
71.	Jefferson	Pugnose Shiner		Endangered
72.	Jefferson	Osprey		Threatened
73.	Perry	Short-Eared Owl		Endangered
74.	Perry	American Bittern		Endangered
75.	Perry	Opaque Oval Sedge		Endangered

Number	County	Name	Federal Status	State Status
76.	Perry; Williamson	Northern Harrier		Endangered
77.	Perry	Tubercled Orchid		Threatened
78.	Perry	King Rail		Endangered
79.	Williamson	Upland Sandpiper		Endangered
80.	Williamson	Eryngo		Endangered
81.	Williamson	Indiana Crayfish		Endangered
82.	Williamson	Butternut		Endangered
83.	Williamson	Least Brook Lamprey		Threatened
84.	Williamson	Yellow-Crowned Night Heron		Endangered
85.	Williamson	Dull Meadow Beauty		Endangered
86.	Williamson	Bewick's Wren		Endangered

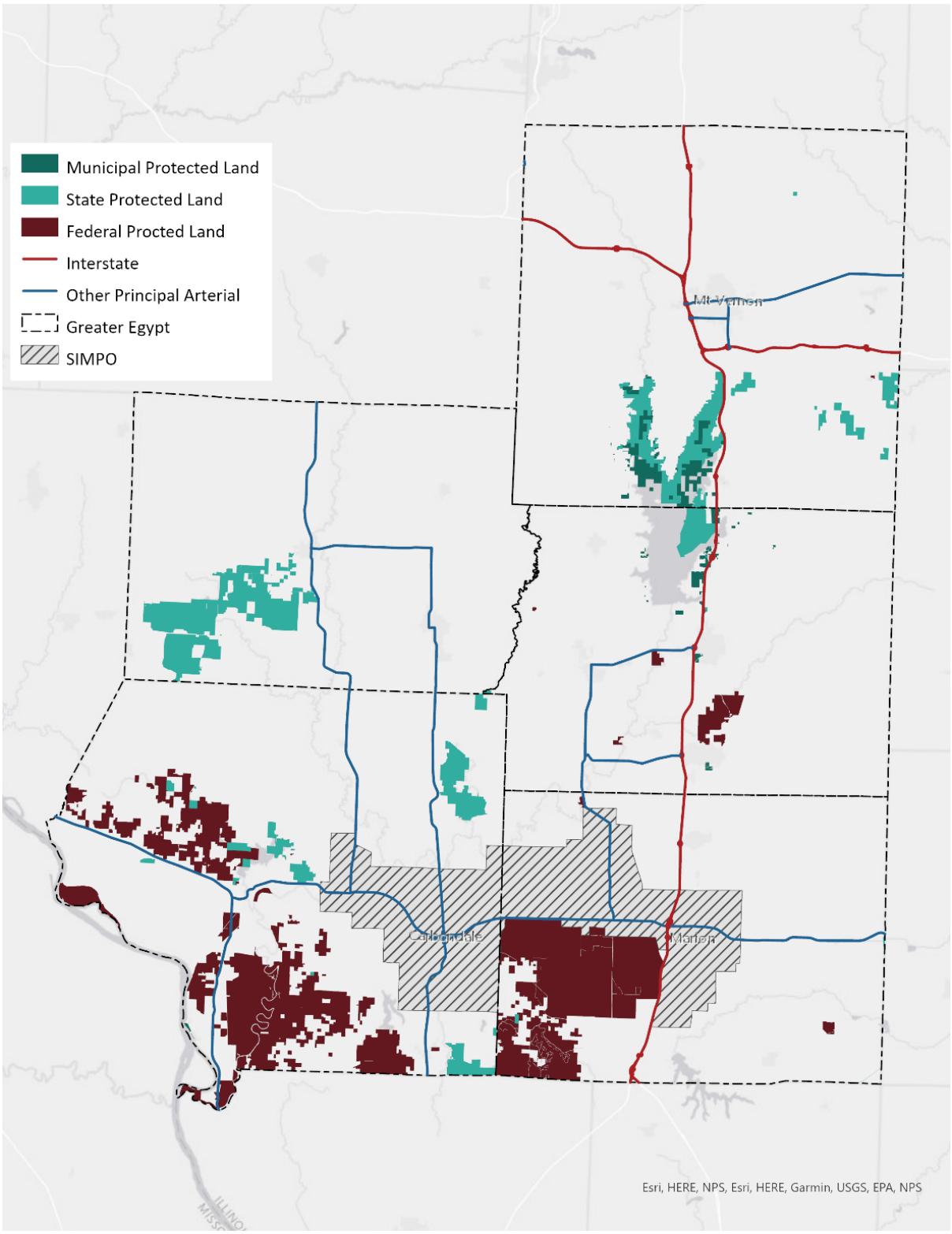
Protected Land

In 1986, the Illinois Department of Natural Resources (DNR) established the Illinois Natural Heritage Database. The database is a central location of information on important natural features within the state. The database in continuously updated and field surveys are conducted to verify locations, evaluate conditions, and verify high priority locations. Currently, there are 30 state protected areas within the region. In addition to state protection, there are numerous municipal and non-governmental organization (NGO) protected lands. Finally, there multiple federal government protected lands in the form of conservation easements, wildlife refuges, and a national park. **Figure 6** shows all protected lands in Greater Egypt.

Recommendations to ensure the protection of certain land includes:

- Preserve the boundaries of existing public lands; expand these boundaries where and when possible
- Establish conservation easements to protect private land from certain kinds of development that may be particularly harmful to important natural systems

FIGURE 6: PROTECTED LAND



Historic Resources

In addition to natural resources, cultural and historic resources should also be considered, and steps should be taken to minimize damage, destruction, or removal of these features. **Table 3** and **Figure 7** show landmarks on the National Register of Historic places. **Figure 8** shows the historic rural residences in the region.

TABLE 3: NATIONAL REGISTER OF HISTORIC PLACES

Resource Name	County
Allen, Willis, House	Williamson
Appellate Court, 5th District	Jefferson
Franklin County Jail	Franklin
Fuller, R. Buckminster, and Anne Hewlett Dome Home	Jackson
Giant City Stone Fort Site	Jackson
Goddard Chapel	Williamson
Grange Hall	Jackson
Hamilton, Robert W., House	Jackson
Hennessy, Cornelius, Building	Jackson
Hull, William H., House	Jackson
Illinois Central Railroad Passenger Depot	Jackson
Judd, C. H., House	Jefferson
Liberty Theater	Jackson
Mobile and Ohio Railroad Depot	Jackson
Murphysboro Elks Lodge	Jackson
Perry County Jail	Perry
Reef House	Jackson
Riverside Park Bandshell	Jackson
Sesser Opera House	Franklin
Stotlar, Ed. M., House	Williamson
West Frankfort City Hall	Franklin
Williamson County Jail	Williamson

FIGURE 7: NATIONAL REGISTER OF HISTORIC PLACES

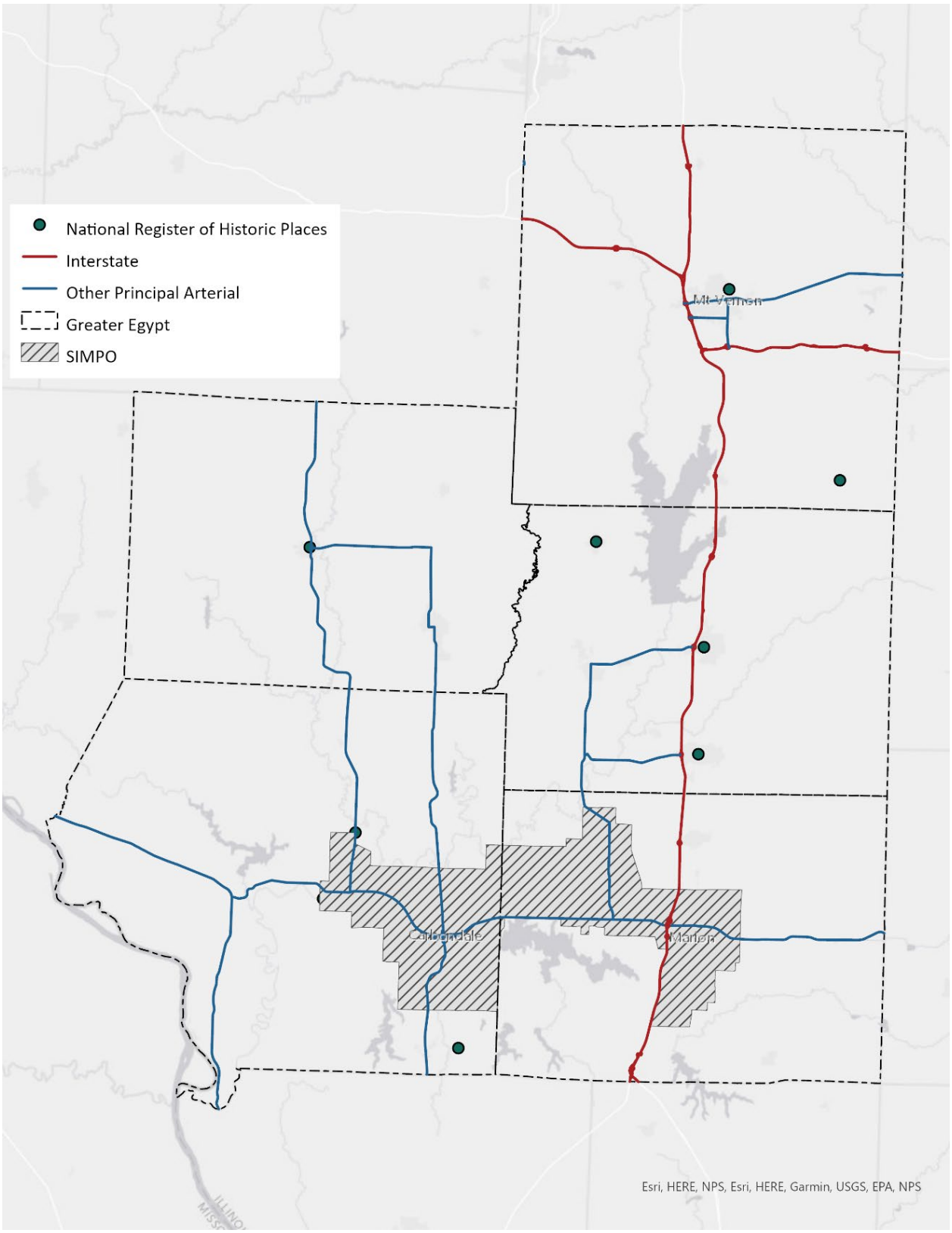
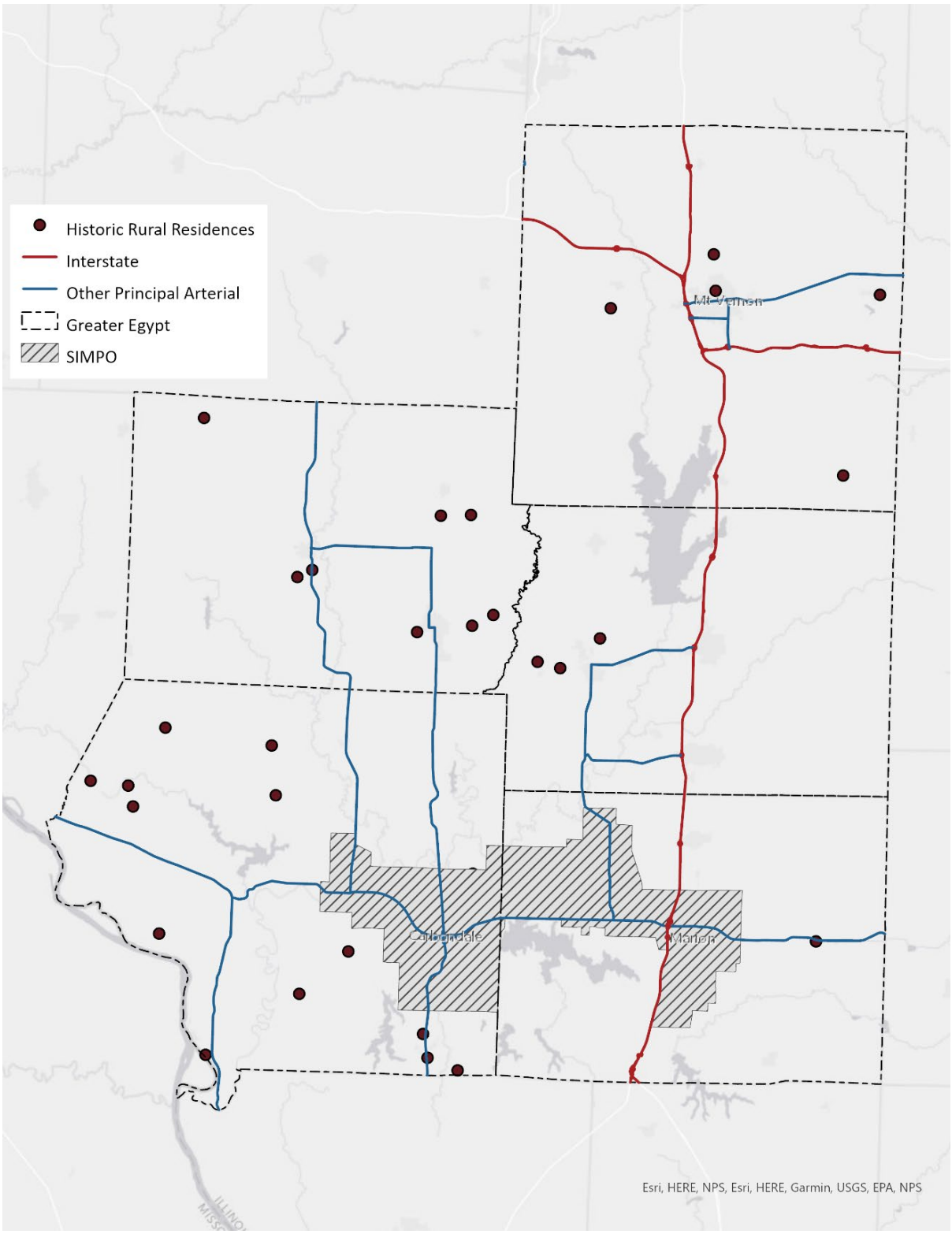


FIGURE 8: HISTORIC RURAL RESIDENCES



National Environmental Policy Act (NEPA)

When a transportation improvement project is designed, many residents believe that the bulldozers will arrive tomorrow. In contrast, the LRTP is often viewed as part of the distant and uncertain future. Linking long range planning and environmental review can help overcome this public confusion and focus stakeholder engagement as well as save time and money. The National Environmental Policy Act (NEPA) is a federal law that promotes the enhancement and preservation of the environment. NEPA requires federal agencies, or other agencies using federal money, to review the environmental impacts of their actions. Since many transportation investments rely on federal money, NEPA is a typical step within project delivery. NEPA requires project review against a host of federal statutes such as: Clean Air Act, Clean Water Act, Endangered Species Act, Section 106 of the National Historic Preservation Act, and other state and local environmental protection laws.

Linking planning and NEPA is sometimes perceived as requiring additional work of staff and resource agencies where resources are limited. This demand is often magnified by a lack of understanding of the individual agency processes and requirements. Collaboration, either through formal agreement or informal working relationships, can improve these challenges over time. The NEPA process requires strong documentation; therefore, one essential requirement is for good, standardized documentation of information (data, decisions, and analysis) that are to be passed between the LRTP and NEPA in order to avoid revisiting decisions made in planning.

Air Quality

Air quality and transportation are intimately connected through United States Environmental Protection Agency (EPA) regulation. The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. The current standards are shown in **Table 4.** Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m3).

Currently, the Greater Egypt region meets State and Federal air quality standards and air quality in the region rated as good on most days. In 2019, Illinois deployed 145 instruments at 64 monitoring sites throughout the state. None of the monitors were located within the region however, monitors were placed nearby in Hamilton and Randolph counties for ozone and particulate matter (PM2.5). Both of the nearby monitors showed design values for ozone and PM2.5 within the National Ambient Air Quality Standards.

Although the region is within national air quality standards, it's important to consider the relationship between air quality and transportation. Recommendations to maintain air quality include:

- Regularly optimize signal timings to reduce unnecessary congestion
- Encourage the use of non-motorized transportation such as walking or bicycling
- Encourage and direct investment of a robust electric vehicle charging station network

TABLE 4: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8 Hours	9 ppm	Not to be exceeded more than once per year
		1 Hour	35 ppm	

Lead (Pb)		Primary and secondary	Rolling 3-month average	0.15 µg/ m3	Not to be exceeded
Nitrogen Dioxide (NO2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and secondary	1 year	53 ppb	Annual Mean
Ozone (O3)		Primary and Secondary	8 Hours	0.070ppm	Annual fourth-highest daily maximum 8 hours concentrations, averaged over 3 years
Particle Pollution	**PM 2.5**	Primary	1 year	12.0 µg/m3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 µg/m3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 µg/m3	98th percentile, averaged over 3 years
	PM 10	Primary and Secondary	24 hours	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hour	0.5 ppm	Not to be exceeded more than once per years

Water Quality

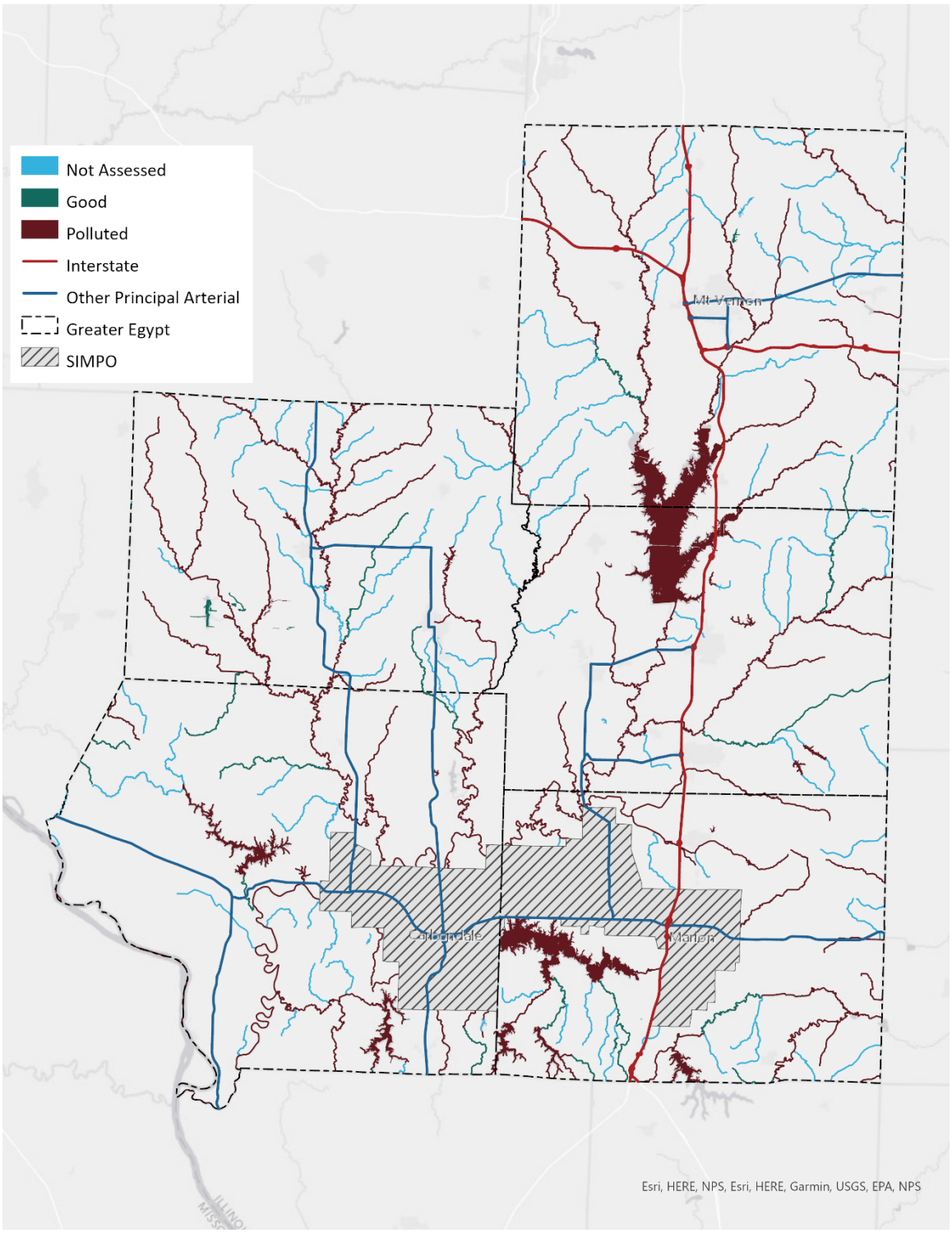
While air pollution is the most visible and studied environmental consequence of transportation systems, water pollution and wetlands issues are also of crucial importance in the transportation and environment nexus. Fuel, particle, and salt-laden runoff from streets, highways, and storage facilities results in damage to public water supplies, ponds, lakes and surface streams, roadside soil, vegetation and trees, and infrastructure and vehicles. The role of wetlands in water purification, management of surface water runoff, and wetlands as habitat preserves for numerous species are all being closely studied.

Roadways tend to bisect watersheds. Water quality impacts attributed to erosion, sedimentation, and polluted runoff associated with highway construction, operation, and maintenance may be limited to the adjacent streams. But in the watershed downstream, the impact from the road may also contribute to other forms of water pollution. Watersheds are therefore both directly and indirectly impacted by transportation. It is for this reason that a watershed approach has become the most widely accepted direction of study of most water and transportation research.

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole-body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

The EPA Assessment, Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS) is an online system and database for information about water quality. **Figure 9** shows the assessed and polluted waters in the region. Many of the region's waterways are currently polluted, many are identified in the 303(d) list, and many are subject to TMDLs. Primary water bodies including Rend Lake, Crab Orchard Lake, and Kinkaid Lake are on the 303(d) list and have TMDLs. The main causes of poor water quality for these lakes are concentrations of mercury and high turbidity.

FIGURE 9: WATER QUALITY & IMPAIRED WATERS



According to the EPA, transportation affects water quality directly in four ways: 1) road construction and maintenance, including the creation of impervious surfaces can adversely affect water quality due to faster rates of runoff, lower groundwater recharge rates, and increased erosion; 2) pollutants such as vehicle exhaust, oil, and dirt, and deicing chemicals, are deposited to roadways and other impervious

surfaces; 3) leaking underground storage tanks release petroleum to groundwater; and 4) oil spills, especially in the marine sector, affect the water quality of inland waterways and coastal areas.

One method of lessening the impact of stormwater is through green infrastructure. Green infrastructures are strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations.

Using green infrastructure techniques in the transportation system has many benefits. For example, a road built through the heart of a historically wet area can experience flooding and can deplete the ability for that area to absorb and filter stormwater. A community can effectively build a transportation system while maintaining the vital roles that ecosystems play in community health and wellbeing by considering the functions of natural systems while planning for transportation infrastructure.

There are many ways to integrate green infrastructure into roadway projects. Examples of green infrastructure include:

- The use of vegetative bioswales and wetland retention to filter and absorb stormwater from the road system
- Planting of street trees
- The use of porous pavement

The concept and associated technology of green infrastructure has been evolving for decades, and engineers and scientists are becoming more and more confident in the applicability and effectiveness of these technologies.

Other recommended methods to reduce water pollution from transportation projects include:

- Ensuring the quality of stormwater runoff is protected while roadways in Greater Egypt are constructed, operated, and maintained
- Promoting innovative control measures (i.e., best management practices)
- Reducing the amount of herbicides and chemical agents used for road maintenance
- Managing natural habitat to compensate for lost systems, such as planting native vegetation in swales
- Providing effective water quality education to staff
- Facilitating cooperation between watershed groups, other Water Quality Program managers, businesses, and the public
- Developing a Stormwater Management Program to reduce pollutants in stormwater from area roadways and facilities.