

# NAPA VALLEY TRANSPORTATION AUTHORITY (NVTA)

2025 Napa Valley Travel Behavior Study

October 2025



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**LIST OF ABBREVIATIONS**

LBS	Location-Based Services Data
AGPS	Aggregated Global Positioning System Data
CVD	Connected Vehicle Data
O-D	Origin-destination Data
POI	Point of Interest
TAZ	Traffic Analysis Zone
SNABM	Solano-Napa Activity-Based Model
VMT	Vehicle Miles Traveled
NVTA	Napa Valley Transportation Authority
MTC	Metropolitan Transportation Commission
BAC	Bay Area Council
ACS	American Community Survey

## 1.0 EXECUTIVE SUMMARY

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The 2025 Napa Valley Travel Behavior Study builds on data and findings from the previous studies conducted in 2014 and 2020. RSG leveraged its partnerships with data vendors to evaluate alternative sources for the 2025 update and developed a cost-effective data collection plan that utilized multiple sources of data to provide an updated understanding of travel behavior in Napa County. The study utilized new data analytics in combination with previous work to identify demographic and trip making changes to account for post-Covid conditions.

The study utilized data from Replica, which provided a large sample of simulated travel behavior and demographic data for trip making within Napa County, as well as CVD & AGPS from StreetLight, which provided a large sample of more empirical-based vehicle location data to refine inter-county travel. Azira data was obtained to capture visitor trips to Napa County. An online employer survey was also conducted, which provided an invaluable source of in-depth, self-reported travel behavior data specific to workers in Napa County, which complements large datasets of passively collected data where travel behavior data is largely imputed rather than reported by actual travelers.

Due to the voluminous amount of data obtained for this study, it was imperative to develop a creative and meaningful way to present the data and findings. RSG developed an online, interactive data visualizer to accompany an Excel file of detailed data and this report. The visualizer illustrates the vast amounts of travel behavior data collected in a series of dynamic figures, charts, and tables. The visualizer is organized into sections focused around travel behavior categories RSG felt confident in answering using the combination of data sources obtained for the study.

### ***Key Demographic Changes***

The 2025 study showed that the number of Napa County residents, resident workers, and employees decreased roughly 5%, while work from home increased 7% (from 5% to 12% of Napa county resident workers). These changes corresponded to a 6% decrease in imported workers, a 19% decrease in exported workers, and an overall 5% decrease in total Napa County workers (internal, imported, and exported combined).

### ***Key Trip Making Changes***

The 2025 study showed that overall traffic has largely recovered to 2018 levels. Pass-through traffic increased 10% while total inter-Napa County travel (trips that enter and leave Napa County) decreased 12%, with Solano County interactions decreasing by 23% and Sonoma County interactions increasing by 4%. Internal Napa County trips (trips that start and end within Napa County) increased 5%, with trip making at Napa Bel Aire Plaza increasing 23%.

## 2.0 INTRODUCTION & STUDY PURPOSE

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The 2025 Napa Valley Travel Behavior Study builds on data and findings from the previous studies conducted in 2014 and 2020. The 2020 study relied on location-based services (LBS) data which at the time was widely thought of as the best solution to provide passive origin-destination (O-D) data. However, during recent years many LBS data sources were compromised for a variety of legal, technical, consumer-driven, and economic factors. RSG leveraged its partnerships with data vendors to evaluate alternative sources for the 2025 update and developed a cost-effective data collection plan that utilized multiple sources of data to provide an updated understanding of travel behavior in Napa Valley.

The 2025 update focused on establishing a post-pandemic baseline to provide a comparison of pre-and post-pandemic travel behavior in Napa Valley. The updated baseline includes travel by Napa County residents, workers, and visitors along with a measure of Napa County cut-through traffic. The study identifies how many trips per day are generated, where those trips start and end, how many vehicle miles travelled (VMT) are generated by those trips, and the predominant modes and times of travel. The study also looks at seasonal variations, weekday versus weekend travel, and identifies the top 10 trip generators in Napa County.

The resulting data will provide the basis for multiple planning efforts by the Napa Valley Transportation Authority (NVRTA) and agencies within Napa County. The data presented in this study can be used for comparisons to findings from the previous studies, to inform the local travel demand model, in conversations with the community, and to assist in future planning efforts such as the Countywide Transportation Plan and Short-Range Transit Plan. The data is also expected to inform future transit service expansion in Napa County.

The remainder of this report is organized in the following way:

- **Chapter 3.0** summarizes the travel behavior studies conducted in 2014 and 2020.
- **Chapter 4.0** details the study methodology developed to characterize visitor, worker, and resident travel behavior for a post-COVID 2025 baseline condition.
- **Chapter 5.0** summarizes the key data findings from the collection and analysis of the data sources, and describes the comparisons made to data from the 2020 study. This chapter also presents an overview of the online data visualizer developed to illustrate the data findings from the vast amounts of travel behavior data collected and analyzed for this study.
- **Chapter 6.0** presents the conclusions from the 2025 Napa Valley Travel Behavior Study.
- **Chapter 7.0** provides a discussion of data limitations observed by RSG staff for each data source obtained for the 2025 Napa Valley Travel Behavior Study.

## 3.0 PREVIOUS STUDIES

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This chapter provides a brief overview of the two previous travel behavior studies conducted by NVTA. The first study was released in 2014, and the second study was released in 2020.

### 3.1 2014 STUDY

The goal of the 2014 Napa Valley Travel Behavior Study was to gather information on the travel behavior of visitors, residents, and employees who made trips in Napa County. The study largely relied on traditional data collection methods with enhancements to reduce their limitations. Traffic count and license plate data were collected using Miovision scout hardware to perform license plate matching to develop O-D trip tables of observed inter-regional and pass-through trips. Three types of surveys were conducted including a vehicle-intercept mail survey, an online employer survey, and an in-person winery patron survey.

Mobile device O-D data was also obtained but was a new data source for transportation planners and the project team was unsure of its accuracy. It was used alongside the traditional data sources to develop trips tables of travel behavior that could be compared to trips tables from the other sources and local travel demand model. Data from the various sources were then integrated, allowing the unique advantages of the individual methods to be utilized, reducing limitations of the individual data sources.

The 2014 study found that license plate data proved to be expensive and labor-intensive, while mobile device data was emerging as a new tool, offering similar insights at a much lower cost with advantages such as the ability to provide the true origin and destination of trips rather than locations on the roadway where they were observed.

### 3.2 2020 STUDY

The goals of the 2020 Napa Valley Travel Behavior Study were to update the previous 2014 study, to capitalize on new data sources, be more cost-effective, and obtain a more comprehensive dataset of the travel behavior of visitors, residents, employees, and students who made work and non-work trips in Napa County. The 2014 study had a lot of limitations, and the project team evaluated the expanded pool of available data products and developed a data collection plan utilizing a new combination of sources.

The 2020 study relied solely on traffic counts and mobile device data to obtain O-D patterns based on findings from the first study. LBS data had emerged which was far superior to the cellular and GPS data used for the 2014 study. The project team decided not to capture license plate data or conduct surveys due to the expense and labor requirements. The 2020 study obtained a much larger and more representative sample of data and was able to answer questions the 2014 study could not.

## 4.0 STUDY METHODOLOGY

The study methodology presented in this chapter was developed to answer key travel behavior questions to inform NVTA and its member agencies of visitor, worker, and resident travel behavior in Napa County to support regional and local transportation planning and policy decisions today and in the future.

### 4.1 DATA COLLECTION

RSG collected Napa County-specific data from a variety of sources to gain a robust understanding of 2025 travel behavior within Napa County. Data from the various sources were analyzed and combined to identify and quantify vehicle travel demands and the O-D and demographic characteristics of vehicle travelers. The analysis is intended to provide NVTA and the public with an updated and more robust understanding of travel behavior in Napa Valley.

Based on data source changes and volatility in the passive data market, RSG started the 2025 update with a data product evaluation to determine the most appropriate data source(s) to capture the types of trips we know are occurring in Napa County. RSG evaluated data products from multiple data vendors and sources such as location-based services (LBS), connected vehicle data (CVD), and aggregated GPS (AGPS) data. RSG determined that a combination of data products was optimal, to leverage the benefits and fill in the gaps of the individual sources. RSG has found that understanding the strengths and limitations of the individual data sources and then merging them results in a single data product that is bigger than the sum of its parts.

#### Data Collection Plan

RSG designed a data collection plan to establish a new post-COVID baseline of travel behavior data for Napa County for comparison to findings from previous studies. RSG's data collection plan is summarized below.

- RSG utilized **simulated travel pattern data from Replica** to serve as a base of travel behavior and demographic data for resident and worker trip-making within Napa County.
- RSG refined the Replica O-D data using a combination of **CVD and AGPS data from StreetLight**, which provided a large sample (around 25% of the population) of more empirical-based O-D data. The focus of this data analysis was on refining inter-county flows (trips into, out of, and through Napa County) at Napa Valley gateways.
- RSG incorporated **AGPS data from Azira** to provide supplemental information regarding visitors to the Napa Valley.
- RSG refined the Replica-StreetLight-Azira O-D data using new **traffic count data** collected at the same traffic count locations where data was collected for the previous two travel behavior studies. The traffic count data was collected from Thursday,

November 7, 2024 to Sunday, November 10, 2024. Traffic counts play a pivotal role in any travel behavior study as they provide the total directional traffic volume by desired time period at the survey data locations that can be used as a control total to refine and expand travel behavior data collected via other methods.

- RSG conducted an **online employer survey** like the survey conducted for the 2014 study. With input from NVTAs staff, RSG added specific questions to the original survey regarding how respondent travel behavior had changed compared to pre-COVID, including questions about telecommuting habits and intermediate stops. The survey received a total of 702 responses and was conducted in fall 2024.
- RSG utilized other available survey data including Metropolitan Transportation Commission (MTC) work from home data, the Bay Area Council (BAC) Return to Office Survey, and American Community Survey (ACS) data from the United States Census Bureau.

Passive data sources typically represent a sample of the population made up of individuals who are using the smartphone apps that feed movement patterns to data vendors. There are two different statistical methods to address this concern – expansion and weighting. Expansion is the process of multiplying each observation in the data by a factor to adjust up to one or more control totals, while weighting applies factors to correct for biases in the sample. The passive data-derived O-D trip tables served as the starting point due to their large sample size and high level of confidence in the O-D data and were refined using traffic count data to factor the relative trip data to represent a single period of absolute data.

Due to the voluminous amount of data that was obtained by RSG, it was imperative to develop a creative and meaningful way to present the data findings. **RSG developed an online, interactive data visualizer in Tableau** to share in accessible ways the vast amounts of travel behavior data collected in a series of dynamic figures, charts, and tables. The visualizer was organized into sections focused on travel behavior questions that our team confidently answered using the combination of transportation analytics obtained for this study. Where appropriate, RSG integrated data from the 2020 study.

## Sources of Data

### *Replica Simulated Travel Pattern Data*

Replica<sup>1</sup> runs a seasonal, high-fidelity simulation that forecasts the population and its travel patterns for the whole country. The dataset includes trip, population, and worker tables for a typical weekday and typical weekend day for a selected season and region. The tables are broken out geographically into megaregions. Replica relies on raw data from mobility data aggregators but to a much lower degree than passive data vendors like StreetLight and Azira.

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<sup>1</sup> <https://www.replicahq.com/>

They use passive location data as one of many inputs (e.g., traffic counts, land use databases, household travel survey data, census data) to develop synthetic travel behavior models for baseline conditions. These models are very similar to activity-based models (ABMs) like the Solano-Napa Activity-Based Model (SNABM) which create a synthetic population and forecast daily travel activities and O-D patterns for all members of the synthetic households. However, the synthetic models rely on empirical location data from a variety of sources, including LBS, cellular, vehicle in-dash GPS data, and point of interest (POI) aggregates (measure of how many mobile devices are observed at specific venues like parks and shopping malls), to forecast demographics and O-D patterns rather than relying on a destination choice model typically derived from household survey data.

RSG has generally found that these products provide a solid base of travel behavior data that is well-suited for refinement with data from traditional travel behavior surveys and more empirical O-D passive data sources. For the 2025 update, RSG supplemented Replica data with travel behavior data obtained from an employer-focused travel survey, along with more empirical-based passive data from StreetLight and Azira, to provide a more complete capture of inter-county trips and visitors to the region from locations across the United States. Through RSG's evaluation of Replica data we learned that each megaregion and season exist in isolation and that person IDs are unique to each megaregion and do not carry over into other megaregions, resulting in underreporting of longer distance travel and visitation levels for uses known to attract visitors from around the nation.

RSG obtained Replica's Cal-Nev Megaregion simulated travel pattern data for an average weekday in fall 2024, covering trips from within the states of California and Nevada. RSG relied on Replica's "Places" dataset, which includes "Trips" and "People" products, to analyze travel patterns, home/work locations, trip characteristics (including length, time of departure, purpose), and demographics (including age, income, household size, auto ownership). **Figure 1** illustrates the trip densities at the census block group level within the Cal-Nev Megaregion to illustrate the level of coverage provided by Replica. **Figure 2** illustrates the trip densities at the census block group level within Napa County to provide a sense of the disaggregate level of the data provided by Replica.

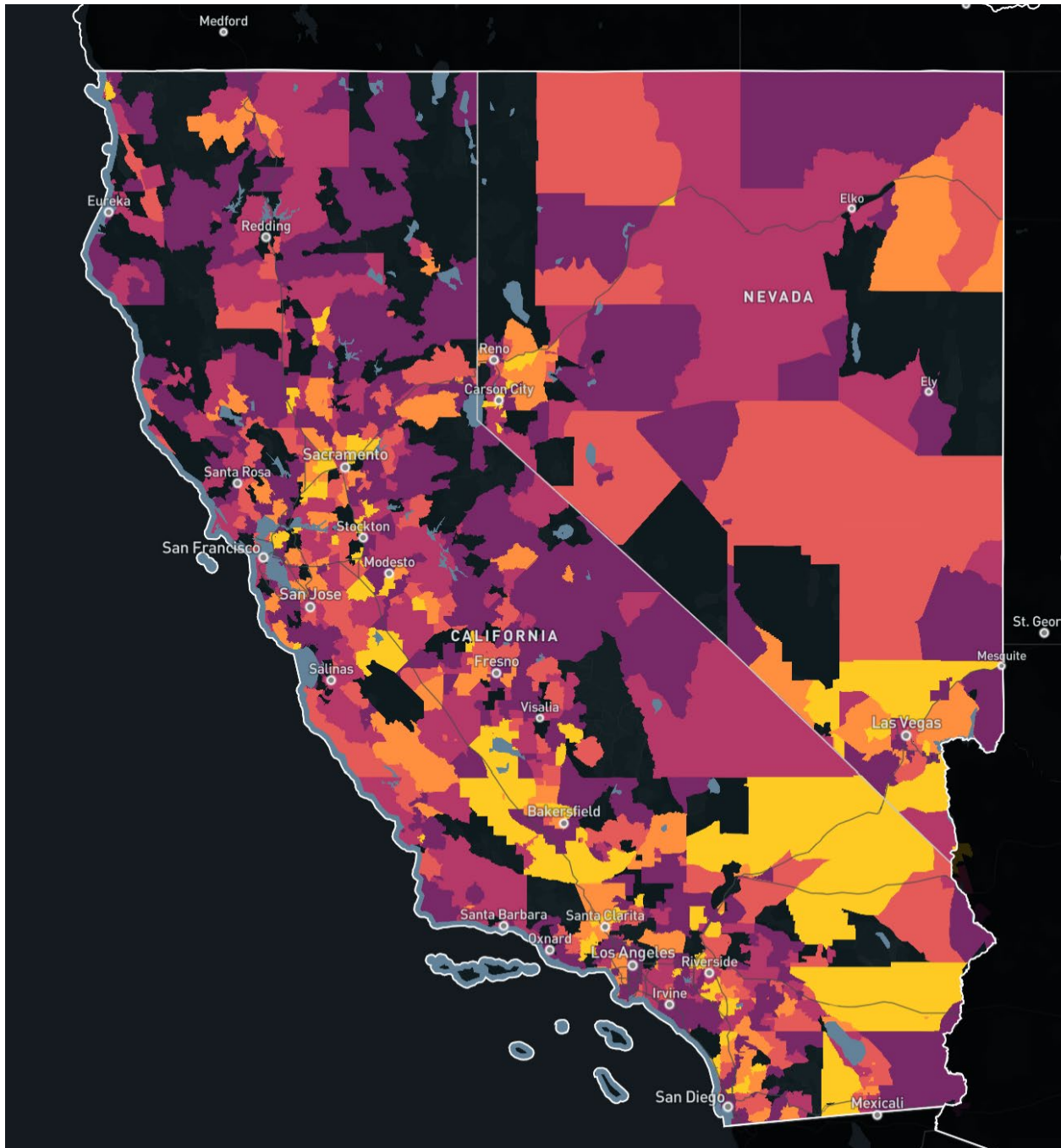


FIGURE 1: REPLICIA'S CALIFORNIA-NEVADA MEGAREGION

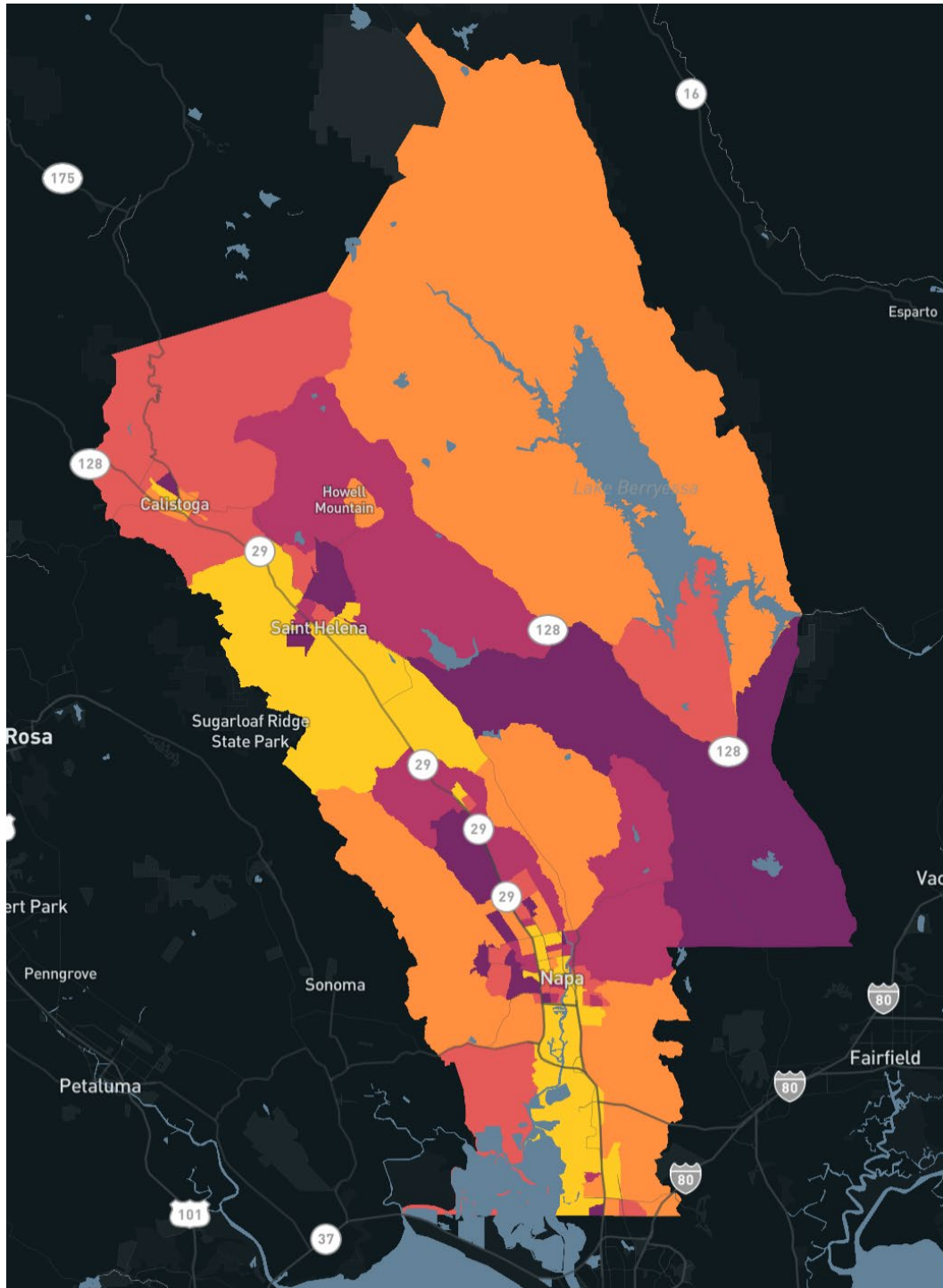


FIGURE 2: CENSUS BLOCK GROUPS IN NAPA COUNTY

### ***Raw Location Data from Passive Data Providers***

Passive data providers like StreetLight<sup>2</sup> and Azira<sup>3</sup> are considered third-party data purchasers who offer a proprietary user data product by applying their algorithms along with an expansion and validation process to raw location data purchased from data aggregators (data aggregators provide a variety of sources such as telco, LBS, CVD, and AGPS for vendors to choose from). Passive data vendors are constantly evaluating data aggregator sources to purchase and incorporate into their data streams and products and were greatly impacted by volatility in the passive data landscape.

Many passive data providers shifted their focus away from LBS data towards more consistent sources such as CVD collected and sold by car manufacturers like General Motors (GM). CVD refers to data generated by vehicles that are equipped with internet connectivity and onboard sensors. This data can include information such as vehicle location, speed, acceleration, fuel type, and other operational parameters. The biggest drawbacks of CVD are that it is limited to vehicular sources of travel, has relatively low sample rates (estimated at 3-5% of vehicles on the road), only provides data for when the car is on, and has likely biases towards higher income persons as connected vehicle features are primarily available in new vehicles manufactured after 2019. It is also important to note connected vehicle features vary widely by manufacturer.

In addition to CVD sources, StreetLight also began purchasing and integrating raw data from AGPS sources in April 2022 due to its large sample size (estimated 20-25% of the population) and high representativeness of the population given virtually all modern phones have a GPS chip. StreetLight's AGPS data is provided by TomTom, which aggregates and processes GPS data from millions of devices to create TomTom Speed Profiles. The biggest drawback to AGPS data is that it is focused on roadway travel rather than points of interest like LBS data.

RSG obtained a combination of CVD and AGPS data products from StreetLight and AGPS data from Azira, which represent more empirical and less simulated data sources than Replica, which are more suitable for capturing the unique travel behavior associated with longer distance inter-county travel and visitors to agritourism areas.

### ***Traffic Count Data***

Traffic count data was collected at the same traffic count locations where data was collected for the previous two travel behavior studies. Traffic count data was collected from Thursday, November 7, 2024 to Sunday, November 10, 2024 at the locations listed below and illustrated in **Figure 3**.

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<sup>2</sup> <https://www.streetlightdata.com/>

<sup>3</sup> <https://www.azira.com/>

### 7 County Gateways

- SR 12 / Jameson Canyon (Solano County)
- SR 29 / American Canyon
- SR 12 / Napa Road (Sonoma County)
- SR 121 / SR 128 (Capell Valley Road)
- SR 29 / Tubbs Lane
- SR 128 (btw. Bennett Lane / Foss Hill Road)
- St. Helena Road / Spring Mountain Road

### 5 Key Roadways / Corridors

- Silverado Trail (Deer Park Road)
- Silverado Trail (Monticello Road – SR-121)
- Soscol Junction (SR 29 / SR 12-121)
- Soscol Avenue (Imola Avenue)
- SR 29 (Yountville – Madison Avenue)

### 39 City of Napa MioVision Intersections

- Coverage along major arterials within the City of Napa including Jefferson St, Lincoln Ave, Soscol Ave, Trancas St

### 4 Key Intersections

- SR 29 & Adams Street (Downtown St. Helena)
- SR 29 / Foothill Blvd & Pine Street (Calistoga)
- 1st Street & Freeway Drive (Downtown Napa)
- Howell Mountain Road (Angwin)

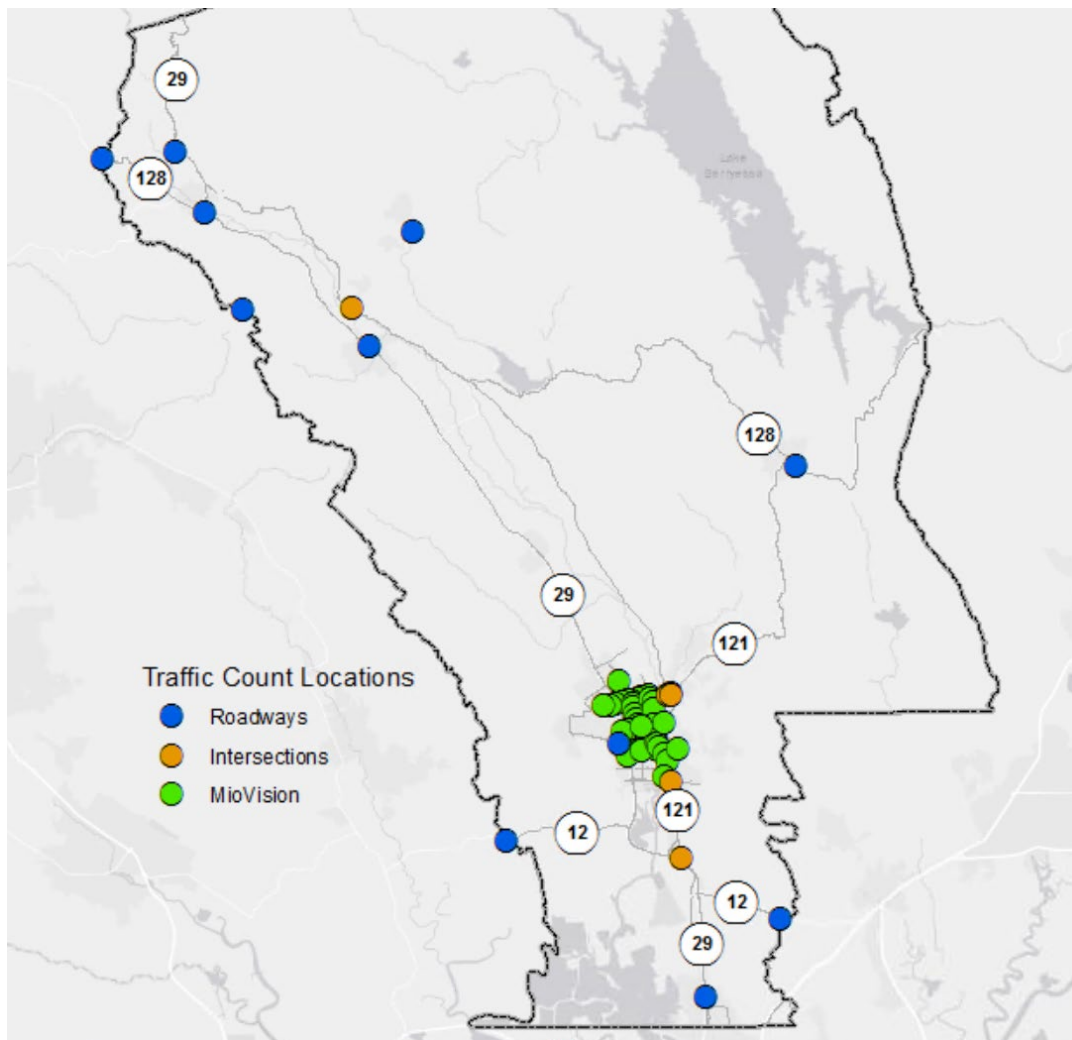


FIGURE 3: TRAFFIC COUNT LOCATIONS

### **Online Employer Survey**

RSG's response to the recent volatility in the passive data landscape was to develop a set of guidelines to help agencies like NVTA ensure sufficient data quality and confidence in the resulting findings. One of these guidelines recommends agencies consider how to utilize other data to perform quality checks, address limitations, and fill in gaps. The most obvious source of data to supplement passive data is survey data. Whereas passive data is relatively inexpensive, relatively "big" and lower in quality, survey data is typically more expensive to collect, relatively smaller in sample, but has much higher quality and affords the opportunity to understand travel behavior choices. User response data is an invaluable source of in-depth, self-reported travel behavior data specific to a region of study, which complements large datasets of passively collected data where travel behavior data is largely imputed rather than reported by actual travelers. Thus, these two data sets support each other well.

RSG performed an online employer survey conducted similar to the 2014 study. The survey was provided to major employers in Napa County via email by NVTA staff. RSG developed draft survey questions that were reviewed, modified, and edited by NVTA staff. Specific questions were added to this study regarding how respondent travel behavior has changed compared to pre-COVID, telecommuting habits, and questions regarding goals and metrics for the upcoming Countywide Transportation Plan.

RSG administered the online employer survey through Alchemer<sup>4</sup>. An incentive was also provided if certain questions were answered and the survey returned by a specific date.

### **Data Analysis Periods**

The 2020 Napa Valley Travel Behavior Study collected data for spring 2018, summer 2018, and fall 2018 seasonal data periods.

The 2025 update collected data for spring 2024, summer 2024, and fall 2024 seasonal data periods to identify demographic and trip making changes that have occurred. Fall 2024 served as the primary study period, representing three months in 2024 when school was in session. All-day data for an average weekday (Tuesday to Thursday) during this three-month period served as the focus of the travel behavior study update and the period for which data from other months, days of the week, and times of day was compared to illustrate temporal differences in travel behavior in Napa County. This also ensured the data was consistent with the Solano-Napa Activity-Based Model (SNABM) outputs as travel demand models are typically developed to forecast an average day when school is in session from a specified year.

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<sup>4</sup> <https://www.alchemer.com/>

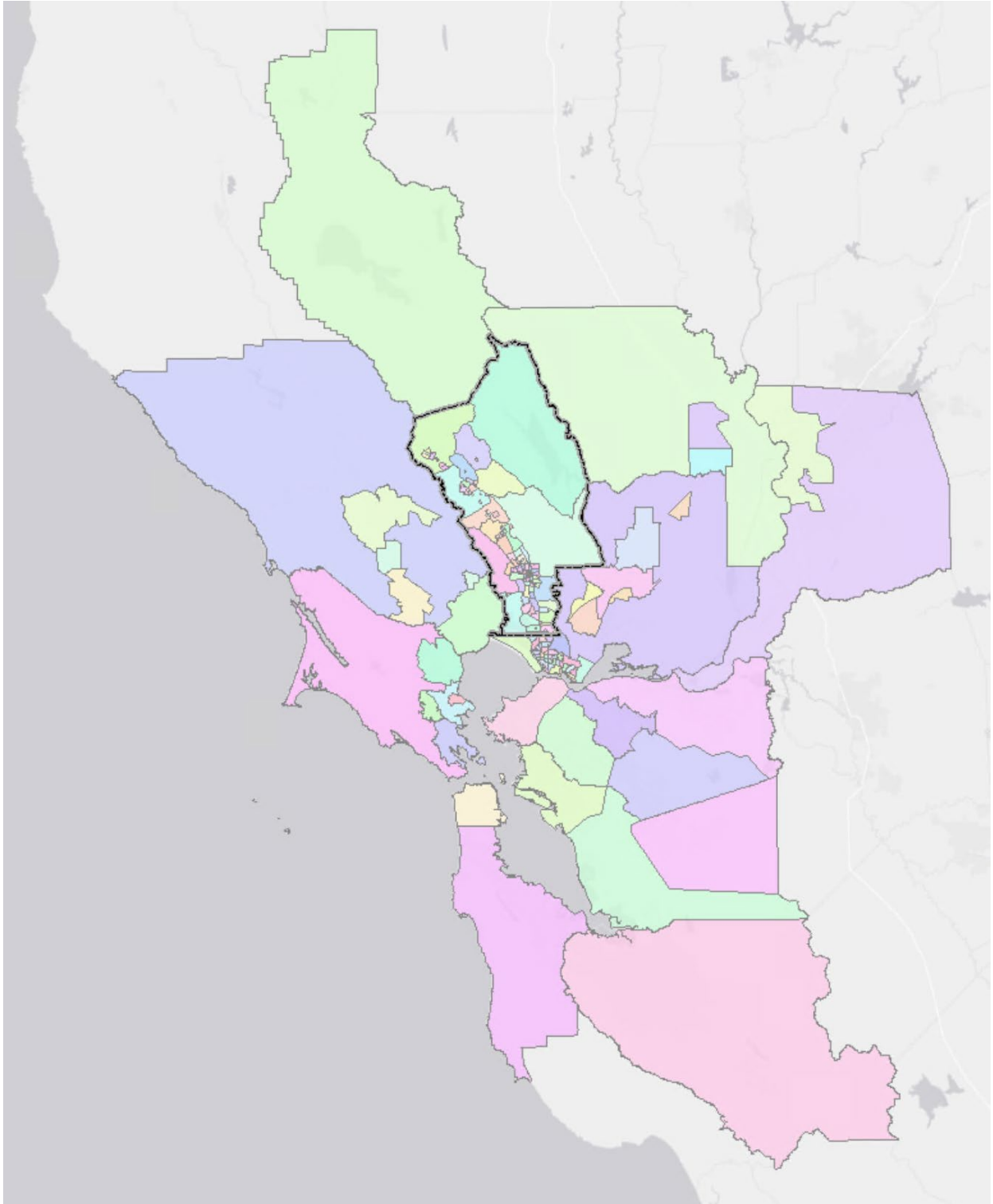
In addition to an average weekday (Tuesday to Thursday) data, seasonal data was also collected for Friday, Saturday, and Sunday days. Daily trip making data was also stratified by the following time periods.

- Overnight/Early AM: 12 – 6 AM
- AM Peak: 6 – 10 AM
- Mid-day: 10 AM – 3 PM
- PM Peak: 3 – 7 PM
- Off-Late: 7 PM – 12 AM

## Zone System

Trip making data from the passive data sources was tagged to a single geographic layer of 216 zones shown in **Figure 4**. The zone system was coordinated with the TAZ system from the Solano-Napa Activity-Based Model (SNABM) for comparison and future/alternative forecasting integration purposes and was designed to capture all trips that interact with Napa County. 129 of the zones are within Napa County, 73 zones are outside Napa County, and 14 zones represent the 7 county gateways by direction.

The zone system map presented in Figure 4 uses a randomized color ramp based on the unique ID associated with each of the 216 zones to help distinguish between zones in the figure. The 2025 Napa Valley Travel Behavior Study online data visualizer discussed in section 4.2 provides an interactive map with zoom and pan capabilities that allows the user to view the boundaries and contents of each zone.



**FIGURE 4: ZONE SYSTEM**

## 4.2 DATA PRESENTATION

Due to the voluminous amount of data obtained by RSG for the 2025 Napa Valley Travel Behavior Study it was imperative to develop a creative and meaningful way to present the data and findings related to the characterization of demographics and trip making travel behavior in Napa County. RSG developed an online, interactive data visualizer to accompany an Excel file of detailed data and this report. The visualizer illustrates the vast amounts of travel behavior data collected in a series of dynamic figures, charts, and tables. The visualizer is organized into sections focused around travel behavior categories RSG felt confident in answering using the combination of data sources obtained for the study.

Below is a hyperlink to the online data visualizer. **Figure 5** provides a screenshot of the table of contents from the online data visualizer.

### [2025 Napa Valley Travel Behavior Study Online Data Visualizer Hyperlink](#)

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FIGURE 5: ONLINE DATA VISUALIZER SCREENSHOT

## 5.0 KEY FINDINGS

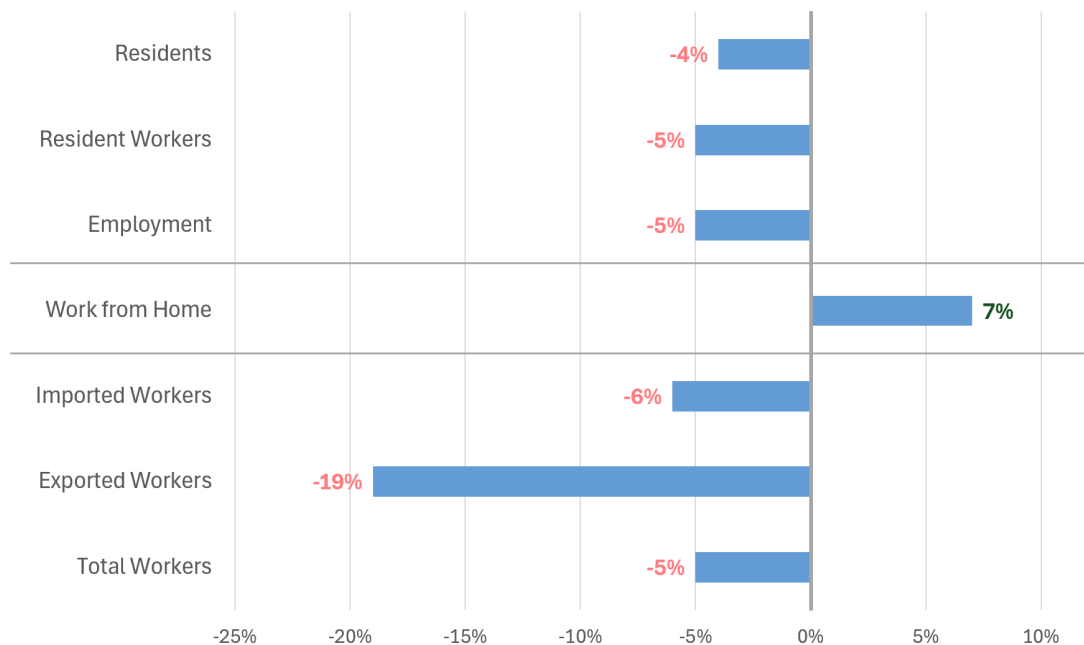
This chapter provides a summary of key findings from the collection and analysis of Replica simulated travel pattern, raw passive location data from StreetLight and Azira, traffic count data, and online employer survey response data sources.

The **fall 2024 weekday all-day period represents our primary data period** and served as the main point of day of week and seasonal comparisons, as well as for comparisons to findings from 2018 study.

### 5.1 DEMOGRAPHIC CHANGES

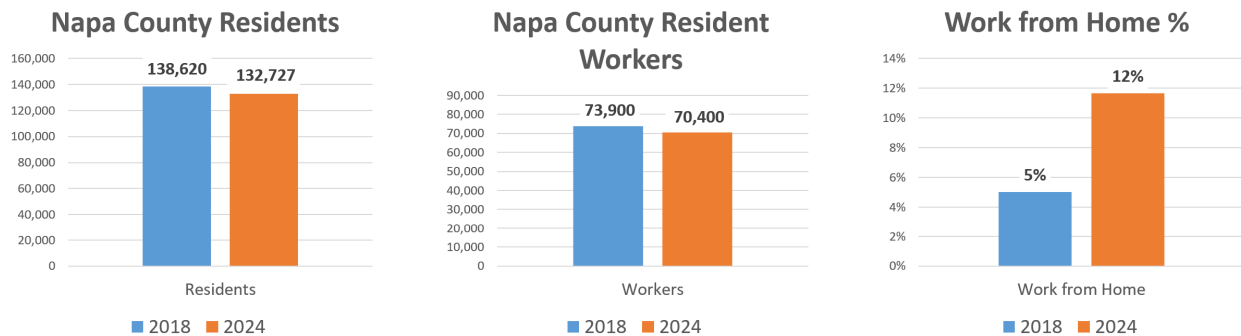
The following section presents key findings from the Napa County demographic analysis conducted for this study. All metrics are associated with the number of persons who live or work in Napa County, not the number of trips they make which are discussed in the next section.

**Figure 6** presents a summary of the demographic changes observed between 2018 and 2024. The number of Napa County residents, resident workers, and employees decreased roughly 5%, while work from home increased 7% (from 5% to 12% of Napa county resident workers). These changes corresponded to a 6% decrease in imported workers, a 19% decrease in exported workers, and an overall 5% decrease in total Napa County workers (internal, imported, and exported combined).



**FIGURE 6: SUMMARY OF DEMOGRAPHIC CHANGES**

**Figure 7** presents a comparison of Napa County residents, resident workers, and work from home percentage between 2018 and 2024. The number of Napa County residents decreased from roughly 138,600 to 132,700, representing a 4% decrease. **The number of Napa County resident workers decreased from roughly 73,900 to 70,400, representing a 5% decrease.** The percentage of Napa County resident workers working from home increased from 5% in 2018 to 12% in 2024. Resident and resident worker populations were obtained from the United States Census Bureau<sup>5</sup>.



**FIGURE 7: NAPA COUNTY DEMOGRAPHICS**

**Figure 8** presents a comparison of where Napa County residents worked in 2018 compared to 2024. Resident commute patterns remain relatively the same except for the countywide work from home percentage, which directly impacted Napa County travel patterns and vehicle miles travelled (VMT) which is discussed in the next section. Resident work locations were obtained from Replica and adjusted using inter-county travel patterns from StreetLight.

Fall Weekday Conditions	Type	2018 Study			2024 Update	
		Work County	Work Trips	Percent	Work Trips	Percent
Internal Work Trip	Napa County		54,100	73%	46,900	67%
	Work from Home		3,700	5%	8,200	12%
Exported Work Trip	Solano County		5,000	7%	4,700	7%
	Sonoma County		2,700	4%	2,900	4%
	Contra Costa County		2,100	3%	2,000	3%
	San Francisco County		2,000	3%	1,700	2%
	Marin County		1,500	2%	1,500	2%
	Alameda County		1,200	2%	1,200	2%
	San Mateo County		600	1%	500	1%
	Santa Clara County		500	1%	400	1%
Sacramento County		500	1%	400	1%	

**FIGURE 8: WHERE NAPA COUNTY RESIDENTS WORK**

<sup>5</sup> <https://www.census.gov/programs-surveys/popest.html>

Figure 9 presents Napa County work locations for workers who live within each jurisdiction in Napa County for fall 2024 conditions.

Napa County Fall 2024 Work Locations by Jurisdiction														
Jurisdiction	Workers	Within Napa County	Outside County											Outside Region
			Lake	Sonoma	Marin	Solano	Yolo	Sacramento	Contra Costa	Alameda	Santa Clara	San Mateo	San Francisco	
American Canyon	11,700	46.7%	0.0%	3.6%	5.9%	18.2%	0.3%	0.4%	9.6%	6.7%	1.3%	2.2%	4.9%	0.2%
Calistoga	2,500	88.2%	0.0%	4.3%	0.0%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	3.8%	0.0%
Napa	42,200	82.5%	0.0%	4.7%	1.6%	5.2%	0.1%	0.7%	1.8%	0.8%	0.3%	0.4%	1.6%	0.4%
St Helena	2,700	85.0%	0.0%	5.3%	0.9%	1.2%	1.4%	2.7%	0.2%	0.0%	0.4%	1.0%	1.8%	0.0%
Angwin	1,300	80.2%	0.6%	3.2%	1.9%	5.4%	0.2%	0.4%	2.2%	1.4%	0.7%	1.1%	2.5%	0.1%
Unincorporated	8,600	80.2%	0.6%	3.2%	1.9%	5.4%	0.2%	0.4%	2.2%	1.4%	0.7%	1.1%	2.5%	0.1%
Yountville	1,400	82.4%	0.0%	1.4%	0.6%	2.8%	0.2%	0.1%	2.0%	1.1%	1.6%	0.3%	5.7%	1.7%
<b>Napa County</b>	<b>70,400</b>	<b>77.0%</b>	<b>0.1%</b>	<b>4.2%</b>	<b>2.2%</b>	<b>6.9%</b>	<b>0.2%</b>	<b>0.6%</b>	<b>2.9%</b>	<b>1.7%</b>	<b>0.5%</b>	<b>0.8%</b>	<b>2.5%</b>	<b>0.4%</b>

FIGURE 9: NAPA COUNTY WORK LOCATIONS BY JURISDICTION

Figure 10 presents a comparison of where Napa County employees lived in 2018 compared to 2024. Employee commute patterns remain relatively the same, but **overall employment decreased by 5%**, which also had a direct impact on Napa County travel patterns and VMT. Employee home locations were obtained from Replica and adjusted using inter-county travel patterns from StreetLight.

Fall Weekday Conditions	Type	Home County	2018 Study		2024 Update	
			Work Trips	Percent	Work Trips	Percent
Internal Work Trip	Napa County		55,200	69%	51,600	68%
	Solano County		12,800	16%	13,100	17%
	Sonoma County		4,800	6%	4,800	6%
	Lake County		1,800	2%	1,500	2%
	Contra Costa County		1,800	2%	1,600	2%
	Marin County		500	1%	500	1%
	San Joaquin County		300	0%	400	1%
	San Francisco County		300	0%	200	0%
	Sacramento County		300	0%	600	1%
	Alameda County		300	0%	300	0%
Exported Work Trip						

FIGURE 10: WHERE NAPA COUNTY EMPLOYEES LIVE

Figure 11 presents a comparison of Napa County imported and exported workers between 2018 and 2024. Napa County imported 2,000 (6%) fewer workers compared to 2018 and exported 5,000 (19%) fewer workers, which resulted in roughly 5,000 (5%) fewer total workers in Napa County.

Fall Weekday Conditions Work Trip Type	2018 Study		2024 Update		Change in	% Change in
	Work Trips	Percent	Work Trips	Percent	Work Trips	Percent
Internal Work Trips	49,000	46%	50,000	50%	1,000	2%
Imported Work Trips	31,000	29%	29,000	29%	-2,000	-6%
Exported Work Trips	26,000	25%	21,000	21%	-5,000	-19%
<b>Total Work Trips</b>	<b>106,000</b>	<b>100%</b>	<b>101,000</b>	<b>100%</b>	<b>-5,000</b>	<b>-5%</b>

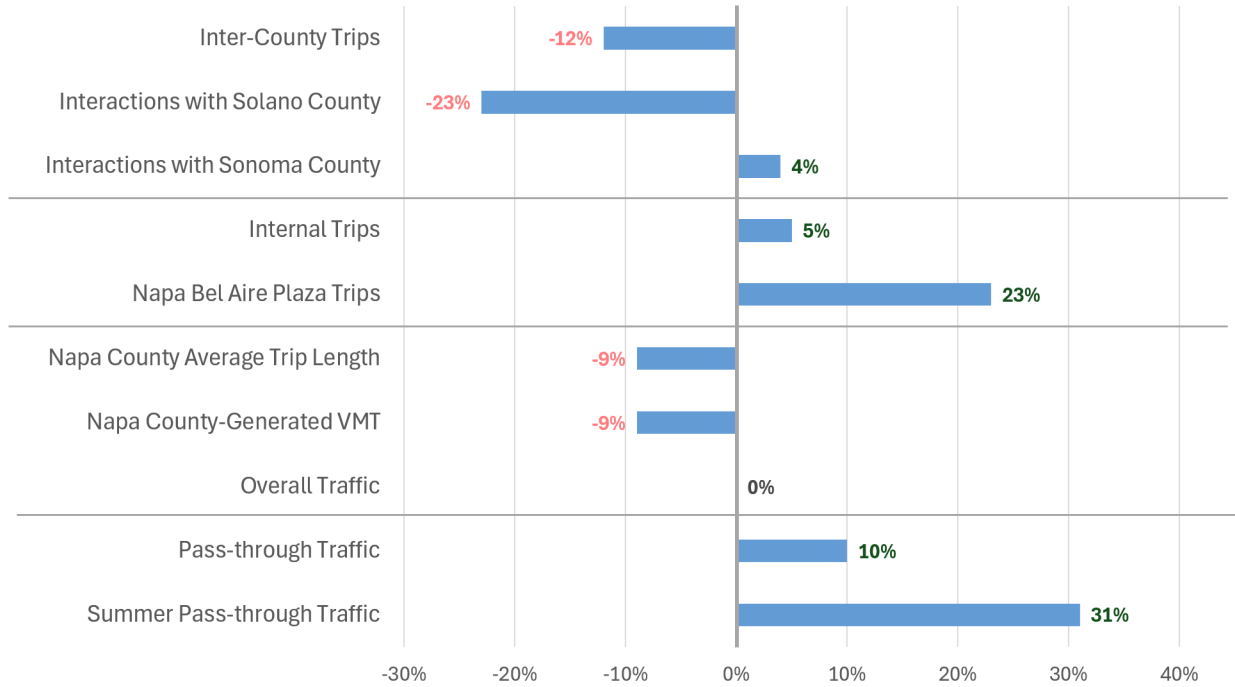
FIGURE 11: IMPORTED VS. EXPORTED WORKERS

## 5.2 TRIP MAKING CHANGES

The following section presents key findings from the Napa County trip making analysis conducted for this study derived from the combination of data sources. All metrics are associated with all types of trips made within Napa County, not just trips generated by residents or workers.

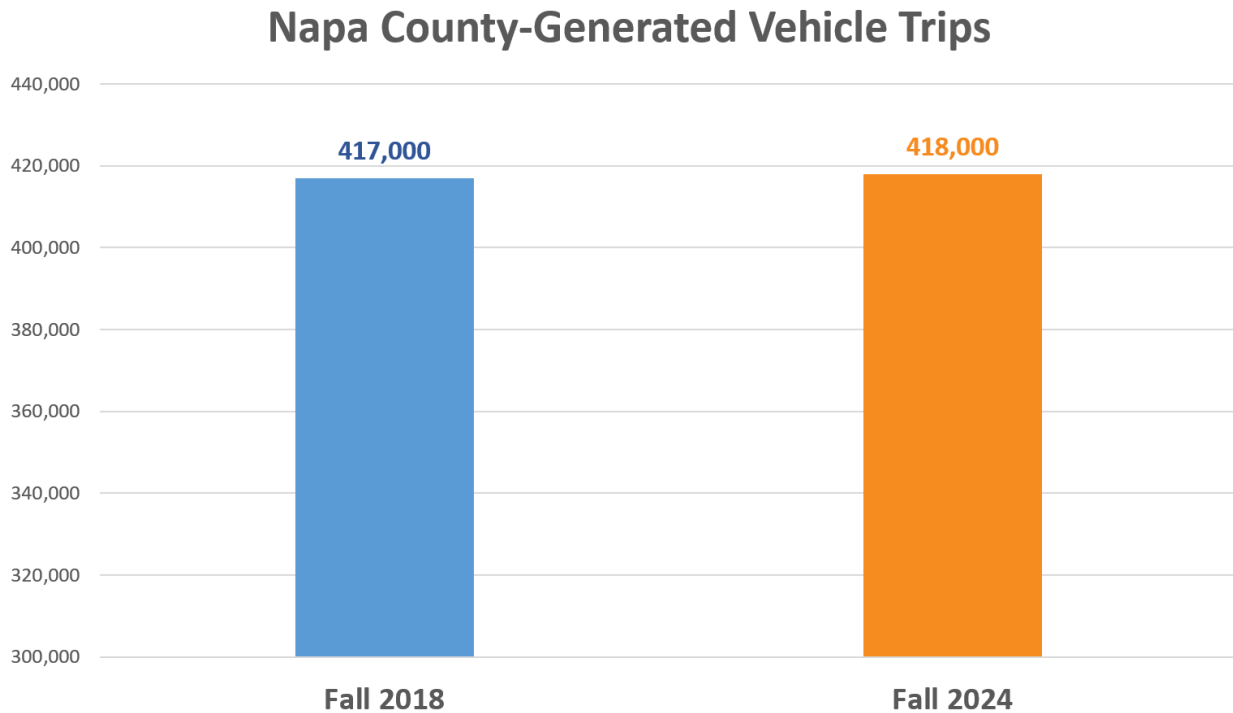
**Figure 12** presents a summary of the trip making changes observed between 2018 and 2024, which were directly impacted by the demographic changes discussed in the previous section. Inter-Napa County travel (trips that enter and leave Napa County) decreased 12%, with Solano County interactions decreasing by 23% and Sonoma County interactions increasing by 4%. Internal Napa County trips (trips that start and end within Napa County) increased 5%, with trip making at Napa Bel Aire Plaza increasing 23%.

**Overall traffic has largely recovered to 2018 levels** as pass-through traffic increased 10%, with summer pass-through traffic increasing by 31%. Internal Napa County trips were on average much shorter than inter-Napa County trips, which resulted in a 9% decrease in average trip lengths and VMT generated by Napa County.



**FIGURE 12: SUMMARY OF TRIP MAKING CHANGES**

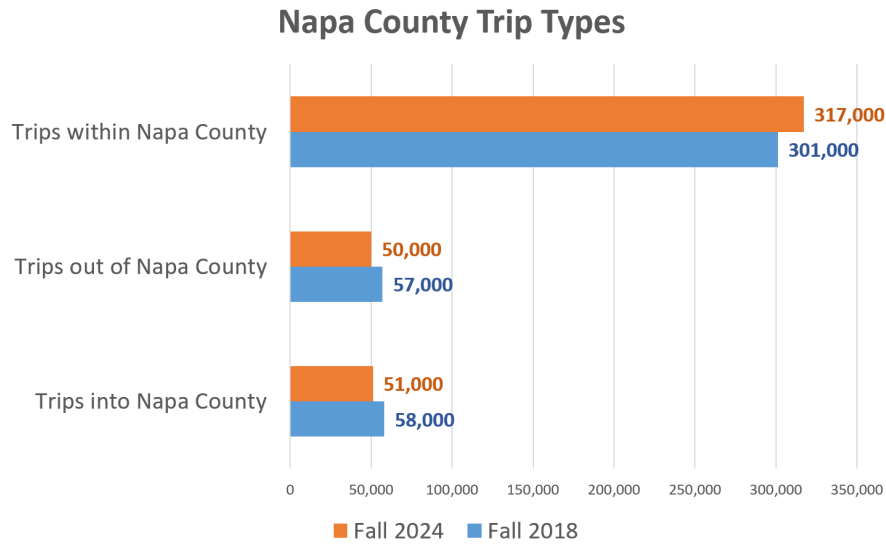
**Figure 13** presents a summary of total Napa County-generated weekday daily vehicle trips between 2018 and 2024. Trips increased from roughly 417,000 to 418,000 or 0.3% increase, indicating that Napa County-generated traffic has returned to 2018 levels. This recovery in travel was substantiated by the roadway segment and intersection traffic counts which were within 1% of weekday daily traffic counts collected at the same locations in 2018.



**FIGURE 13: NAPA COUNTY-GENERATED WEEKDAY DAILY VEHICLE TRIPS**

**Figure 14** presents a comparison of Napa County weekday trip types between 2018 and 2024. Trips within Napa County increased from roughly 301,00 to 317,000 or 5%, while trips out of Napa County decreased from roughly 57,000 to 50,000 or 13% and trips into Napa County decreased from roughly 58,000 to 51,000 or 11%.

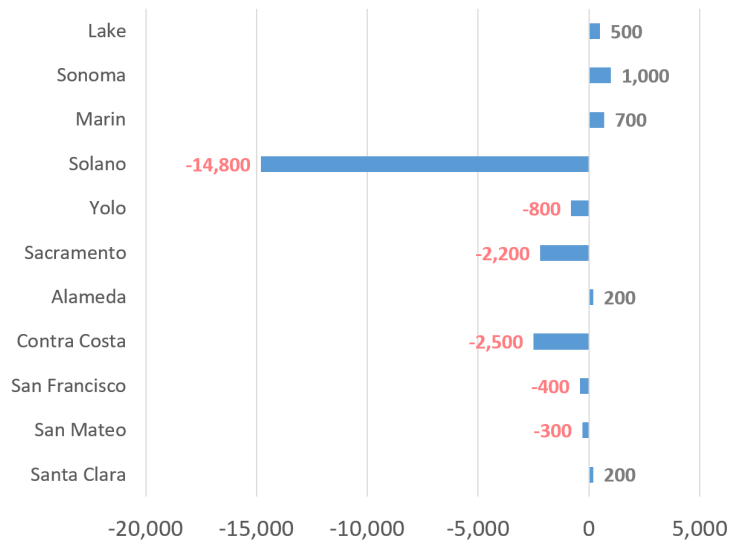
**Travel within Napa County is up around 5%** for daily conditions, as residents who used to leave the county for work now require services within Napa County. A Napa County resident who used to travel to San Francisco for work now may get coffee, go the gym, get lunch, and/or run errands within Napa County rather than in San Francisco. This demand for services has likely increased the demand for service jobs within Napa County while the increased work from home has likely decreased total work-related travel.



**FIGURE 14: NAPA COUNTY WEEKDAY TRIP TYPES**

**Figure 15** presents the change in key inter-Napa County trip movements between 2018 and 2024. Trip interactions with Sonoma County increased 4% while **trip interactions with Solano County decreased 23%**. As shown in Figure 8 and Figure 10, employment-related trips between Napa County and Solano County remained roughly the same, indicating the decrease in trip interactions was for discretionary travel with fewer Solano County residents coming to Napa County for shopping purposes.

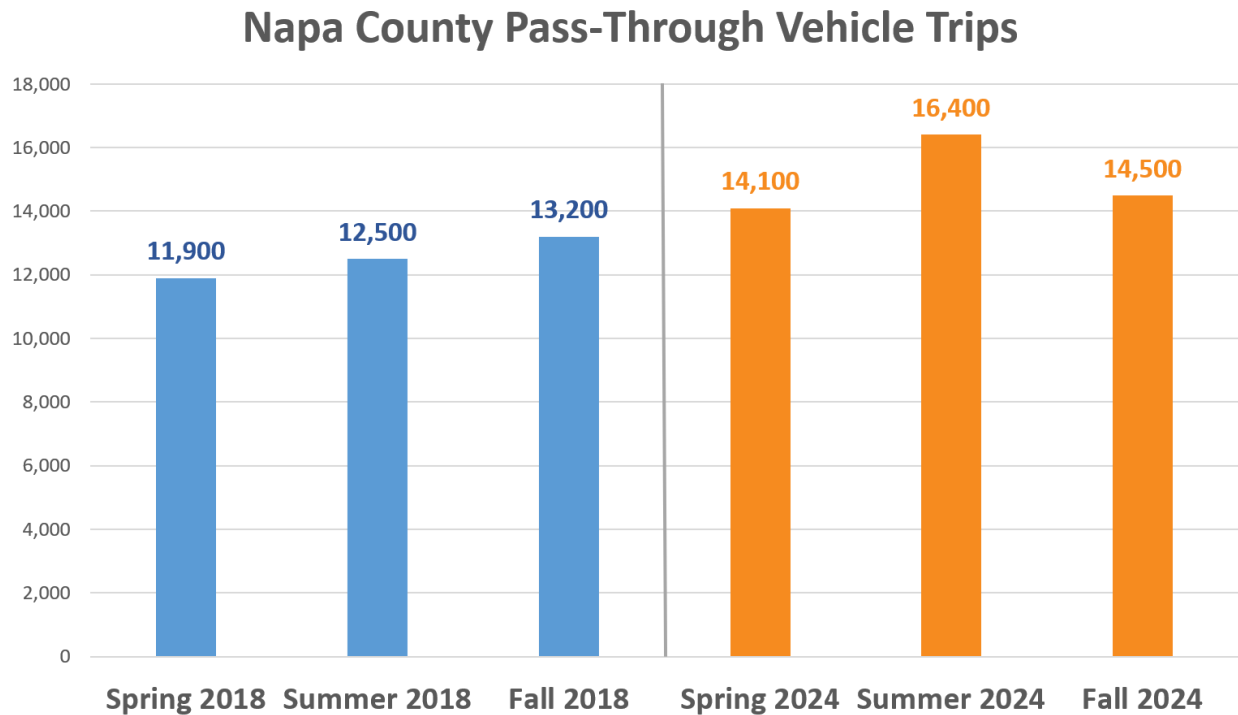
### Change in Key Inter-County Movements (Fall 2018 to Fall 2024)



**FIGURE 15: NAPA COUNTY INTER-COUNTY TRIPS**

**Figure 16** presents the change in Napa County weekday pass-through vehicle trips between 2018 and 2024 for the spring, summer, and fall data periods. Fall pass-through traffic increased from roughly 13,200 to 14,500 or 10%, while Summer became the peak season for Napa County pass-through traffic, increasing from roughly 12,500 to 16,400 or 31% compared to Summer 2018.

Additionally, in fall 2024 **3% of all travel on Napa County roadways was from pass-through traffic**, while 10% of traffic at Soscot Junction was pass-through traffic.



**FIGURE 16: NAPA COUNTY WEEKDAY PASS-THROUGH TRAFFIC**

**Figure 17** presents the change in trip making for Napa County top trip generators between 2018 and 2024. Napa County top trip generators remained relatively the same, with Napa Bel Aire Plaza daily trip making increasing 23% and South Napa Market Place daily trip making increasing 12%.

Previous Rank	Fall Weekday Daily Conditions Selected Trip Generator	2018 Study		2024 Update		
		Trips	Percent	Trips	Percent	Growth
1	Napa Bel Aire Plaza	23,300	7%	28,800	6.9%	23%
2	South Napa Market Place	16,900	5%	18,900	4.5%	12%
3	Downtown Napa	16,100	5%	15,400	3.7%	-4%
4	Napa Junction Plaza (American Canyon)	11,600	3%	9,600	2.3%	-17%
5	Napa Valley College	7,000	2%			
6	Napa Queen Medical	5,000	1%	4,700	1.1%	-5%
7	Napa Oxbow	3,800	1%	2,500	0.6%	-35%
8	Napa Department of State Hospitals	3,600	1%			
9	Napa County Services	2,300	<1%	2,100	0.5%	-9%
10	Saint Helena Hospital	2,000	<1%			
11	Angwin Pacific Union College	1,600	<1%			
12	Yountville VA Hospital	1,100	<1%			
13	Napa County Airport	900	<1%	1,100	0.3%	17%

FIGURE 17: NAPA COUNTY TOP TRIP GENERATORS

Figure 18 presents the change in Napa County VMT generated between 2018 and 2024 for the spring, summer, and fall data periods. Fall VMT decreased from roughly 4,547,000 to 4,116,000 or 9%, with VMT generated from intra-Napa County trips increasing and VMT from inter-Napa County trips decreasing.

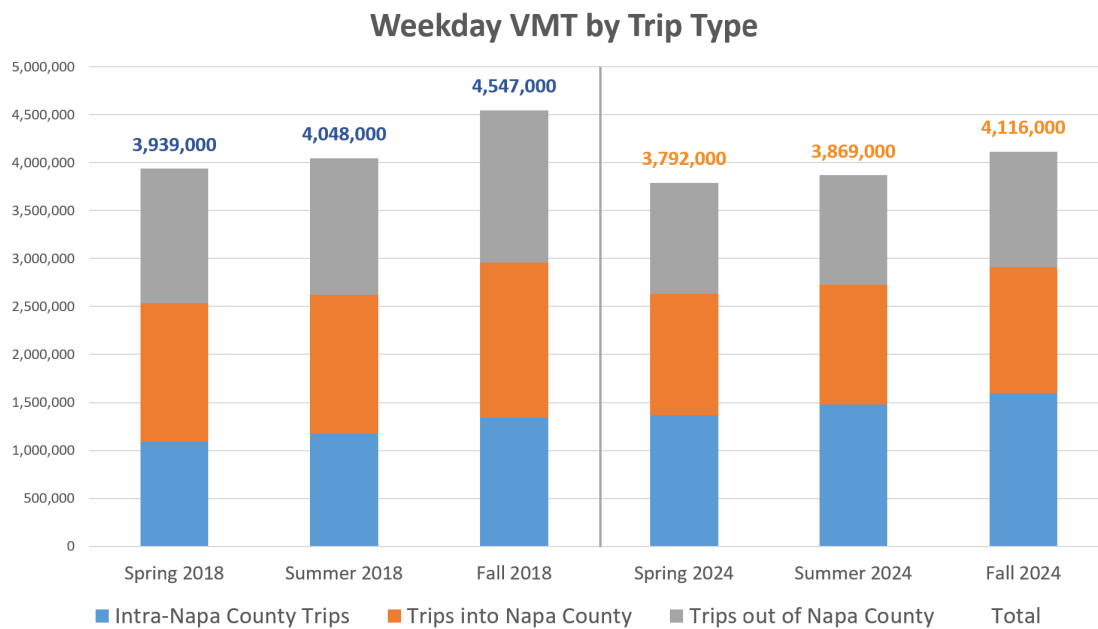
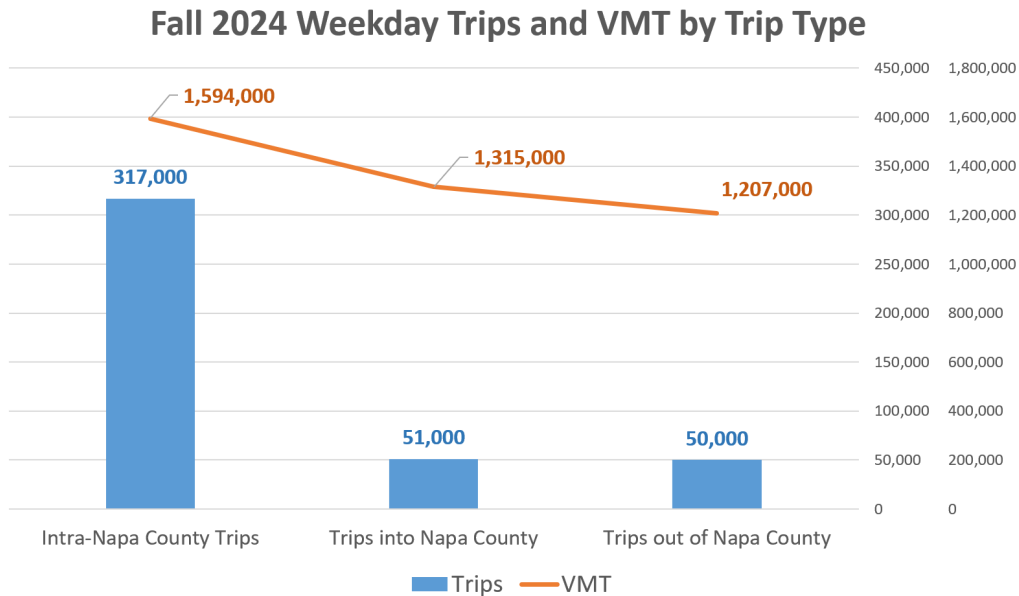


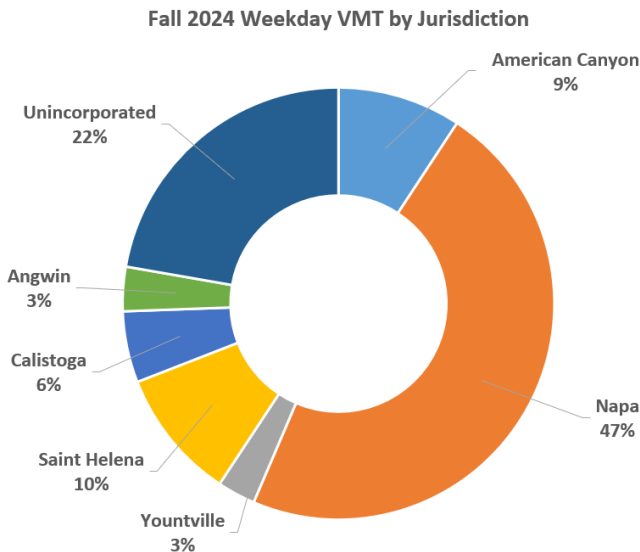
FIGURE 18: NAPA COUNTY VMT GENERATED

**Figure 19** presents the fall 2024 Napa County weekday trips and VMT by trip type. Intra-Napa County Trips generate 76% of trips but only 39% of VMT while inter-Napa County trips generate 24% of Trips but 61% of VMT.



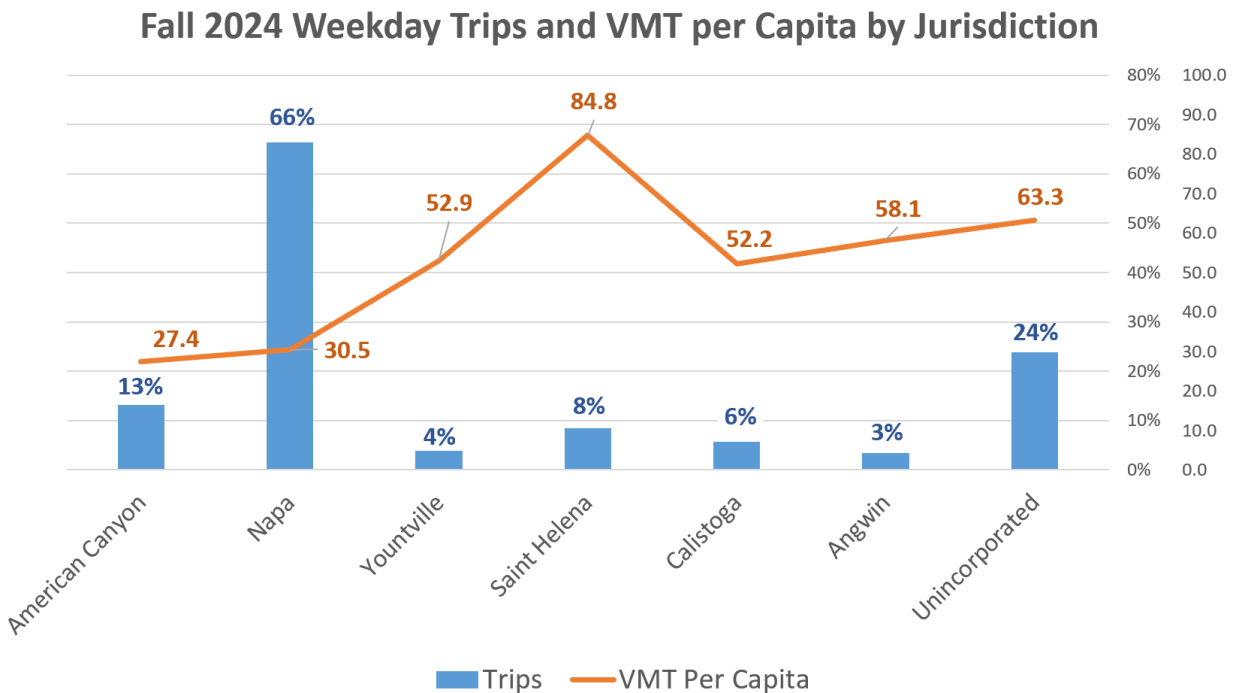
**FIGURE 19: NAPA COUNTY VMT BY TRIP TYPE**

**Figure 20** presents the fall 2024 Napa County weekday VMT generation by jurisdiction. The City of Napa generates 47% of Napa County VMT while the unincorporated areas generate 22% of Napa County VMT.



**FIGURE 20: NAPA COUNTY VMT BY JURISDICTION**

**Figure 21** presents the fall 2024 Napa County weekday trips and VMT per capita by jurisdiction. The City of Napa generates 66% of vehicle trips but has the second lowest VMT per capita at 30.5 miles, the City of Saint Helena generates 8% of vehicle trips but has the highest VMT per capita at 84.8 miles, and unincorporated areas have the second highest VMT per capita at 63.3 miles.



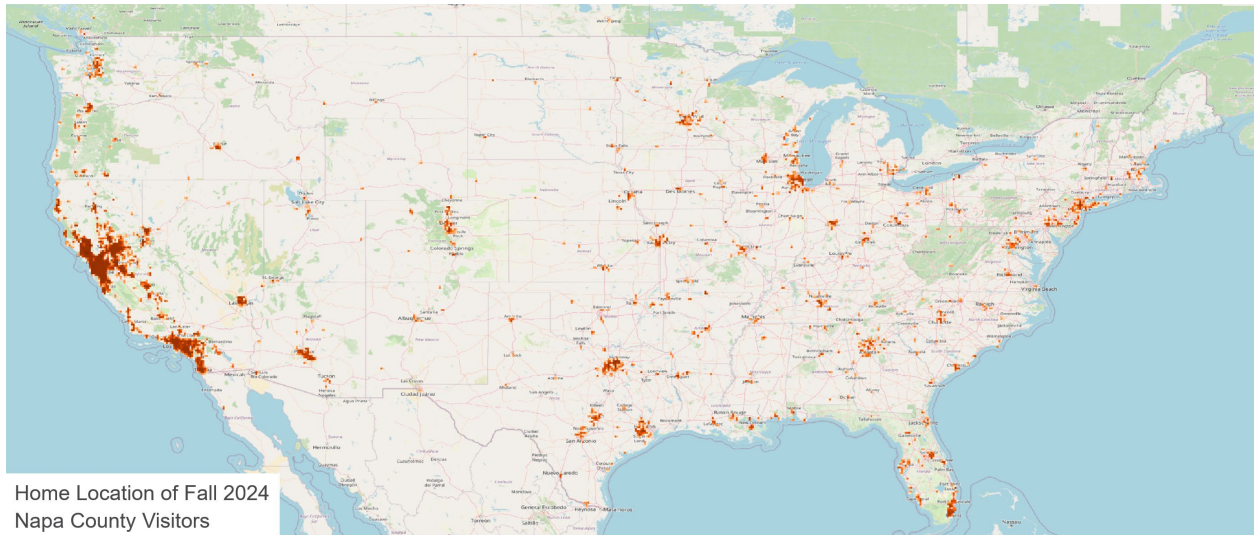
**FIGURE 21: NAPA COUNTY VMT PER CAPITA BY JURISDICTION**

### 5.3 VISITOR TRAVEL

The following section presents key findings from the analysis of visitor-focused AGPS data provided by Azira<sup>6</sup>. All metrics are associated with devices determined to have a home and work location outside of Napa County but visited Napa County in fall 2024.

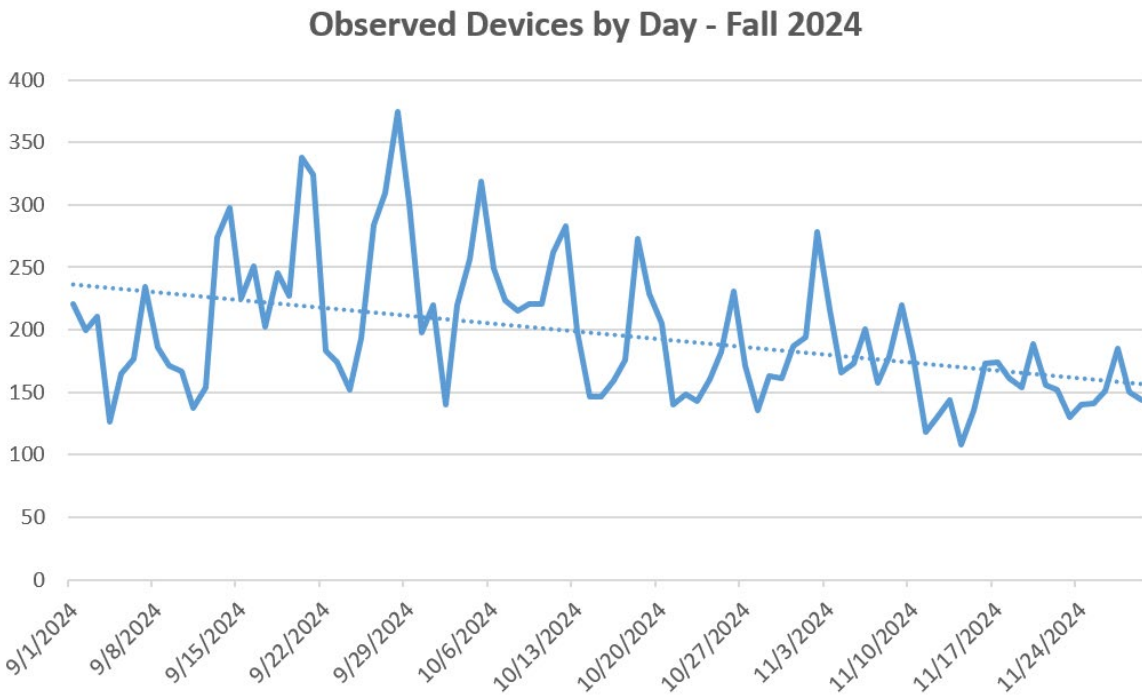
**Figure 22** illustrates the home location attributed to the mobile devices that visited Napa County in fall 2024 as provided by Azira. Visitors were observed from nearly all major metropolitan areas in the United States, indicating that Napa Valley is still a nationwide visitor destination.

<sup>6</sup> <https://www.azira.com/>



**FIGURE 22: NAPA COUNTY VISITOR TRAVEL**

**Figure 23** presents the number of observed devices visiting Napa County by day in fall 2024 as provided by Azira, indicating that visitors to Napa County peak in early Fall and decline through the end of Fall.



**FIGURE 23: NAPA COUNTY VISITOR TRAVEL BY DAY IN FALL 2024**

**Figure 24** presents the percentage of observed devices visiting Napa County by day of week in fall 2024 as provided by Azira, indicating daily visitation to Napa County is highest on Saturdays and lowest on Mondays and Tuesdays.

Day of Week	Compared to Average Day	
Monday	87%	-13%
Tuesday	87%	-13%
Wednesday	88%	-12%
Thursday	93%	-7%
Friday	113%	13%
Saturday	131%	31%
Sunday	104%	4%

**FIGURE 24: NAPA COUNTY VISITOR TRAVEL BY DAY OF WEEK IN FALL 2024**

**Figure 25** presents the number and percentage of observed devices visiting Napa County by visitor type in fall 2024 as provided by Azira, indicating roughly 58% of visitors to Napa County are staying overnight, compared to 42% being day trippers.

October 2024 Data		
Day Trip	56,605	42%
Overnight	76,606	58%
<b>Total Visitors</b>	<b>133,211</b>	<b>100%</b>

**FIGURE 25: NAPA COUNTY VISITORS BY VISITOR TYPE IN FALL 2024**

## 5.4 EMPLOYER SURVEY FINDINGS

The following section presents key findings from the analysis of data collected through the online employer survey, which received a total of 702 responses and was conducted in fall 2024. All metrics in this section are based on survey respondent data specific to Napa County.

The Napa Employer Survey revealed important demographic differences between Napa County employees who live within Napa County versus those who live outside Napa County. **Figure 26** summarizes response data for employees who live outside Napa County and commute in. They tend to have a lower income, larger household size, fewer household vehicles, and more commute passengers (carpool more).

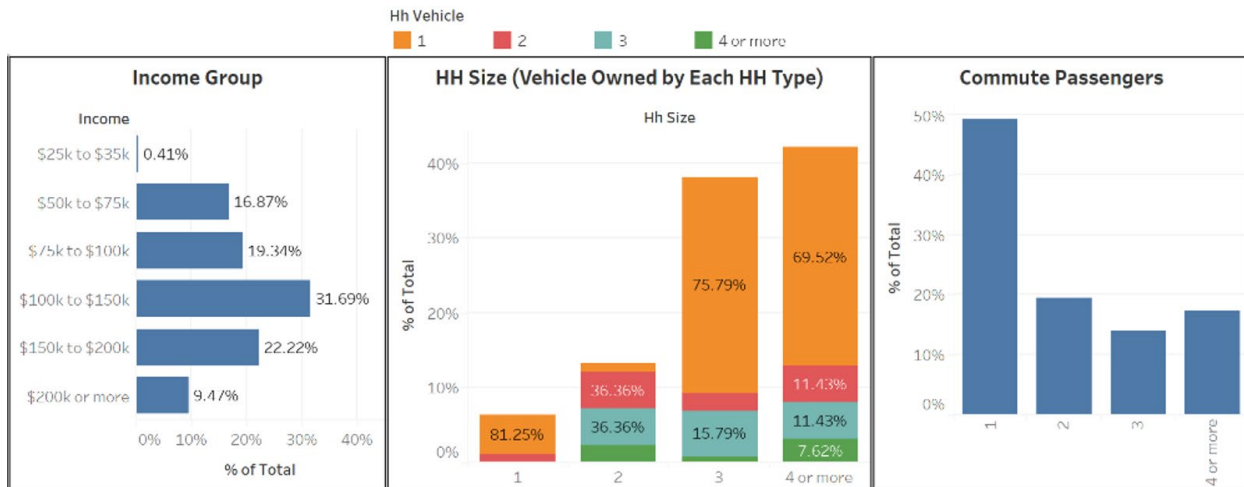


FIGURE 26: SURVEY DATA FOR EMPLOYEES WHO LIVE OUTSIDE AND COMMUTE IN

Figure 27 summarizes response data for employees who live inside Napa County and commute within the county. They have a much higher income, much smaller household size, more household vehicles, and fewer commute passengers (mostly drive alone). This supports the previous study’s findings that a good portion of weekday traffic is from Napa employees who can’t afford to live in Napa County and could likely benefit from affordable housing and carpool programs which would reduce congestion along key commute corridors.

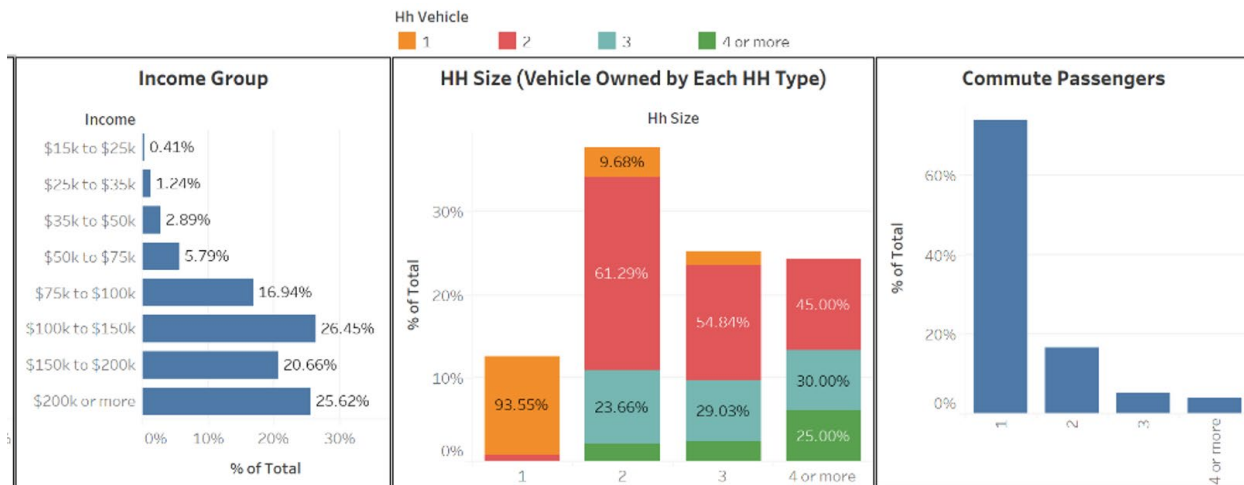


FIGURE 27: SURVEY DATA FOR EMPLOYEES WHO LIVE INSIDE AND COMMUTE WITHIN

## 6.0 CONCLUSIONS

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The 2025 Napa Valley Travel Behavior Study obtained multiple travel behavior data points from multiple data sources, each with their own unique set of strengths and limitations, to leverage the benefits and fill in the gaps of the individual sources. A focus of the study was on capturing and providing supplemental data for visitors given the region's high volumes of tourists and agritourism attractions like wineries that render residential address-driven travel surveys alone insufficient for a complete understanding of visitor travel behavior. The combination of data sources affords NVTA an updated look at not only visitor travel, but all travel within, to, from, and through Napa County for an updated 2024 baseline condition, to support regional and local transportation planning and policy decisions today and in the future.

The 2025 study provides NVTA with several data sets. The resulting data will provide NVTA and its member agencies with the basis for future planning efforts. Such uses may include but are not limited to the refinement of the Solano-Napa Activity-Based Model (SNABM), the Short-Range Transit Plan and the update of the Countywide Transportation Plan. The data put forth in this study is to provide a data set for specific plans or projects that need post-COVID baseline data. The data provides valuable insights on trip types, trip origins and destinations, trip lengths, and top trip generators, which can help identify where alternative transportation investments may be needed.

The study utilized data from Replica, which provided a large sample of simulated travel behavior and demographic data for trip making within Napa County, as well as CVD & AGPS from StreetLight, which provided a large sample of more empirical-based vehicle location data to refine inter-county travel, including pass-through travel. Azira data was also obtained to present a more complete capture of visitors to Napa County from locations within the United States. An online worker survey was also conducted, which provides an invaluable source of in-depth, self-reported travel behavior data specific to workers in Napa County, which complements large datasets of passively collected data where travel behavior data is largely imputed rather than reported by actual travelers.

Due to the voluminous amount of data obtained by RSG for the 2025 Napa Valley Travel Behavior Study, it was imperative to develop a creative and meaningful way to present the data and findings related to the characterization of visitor, worker, and resident travel behavior in Napa County. RSG developed an online, interactive storyboard to illustrate the vast amounts of travel behavior data collected in a series of dynamic figures, charts, and tables. The online visualizer is organized into sections focused around travel behavior categories RSG felt confident in answering using the combination of mobility data analytics obtained for the study.

## 7.0 DATA LIMITATIONS

As discussed in Chapter 4, RSG obtained travel behavior data from a variety of data sources as it was determined through evaluation of individual data sources prior to the study, that a combination of data products was optimal, to leverage the benefits and reduce the limitations of the individual sources. Below is a discussion of data limitations observed by RSG staff for each data source obtained for the 2025 Napa Valley Travel Behavior Study.

### Replica Data

Below is a bulleted summary of Replica data limitations observed by RSG staff. It is important to note that passive data is a data source utilized by Replica to inform the simulation's trip making and trip distribution patterns, the limitations of which are discussed in the next section.

- Upon evaluation of high visitor areas in Napa County, RSG observed that the Replica data didn't tell the full story for the number of trip ends and visitor levels. RSG reached out to Replica staff and learned that each megaregion and season exist in isolation and that person IDs are unique to each megaregion and do not carry over into other megaregions. This would explain why census block groups with uses known to attract visitors from around the nation would be underrepresented in the Replica data and likely underreport true visitation levels & patterns and would need to be refined using an alternative data source.
- Upon evaluation of Napa County gateway and inter-county travel, RSG observed that the Replica data didn't match traffic count data collected at these locations and would need to be refined using an alternative data source.

### Passive Data

Passive data sources represent a more empirical and less simulated data source, which RSG determined to be more suitable for capturing longer distance travel and the unique travel behavior associated with national attractions where high levels of visitors are observed. However, passive data sources, like any data source, have their own set of limitations. Below is a bulleted summary of passive data limitations observed by RSG staff.

- Limitations of passive data are largely due to federal regulations over privacy concerns, sampling rates, and the reliance on computer algorithms, which lead to potential biases in the data.
- Due to privacy concerns and sample rates, the trip values in the origin-destination trip tables provided by passive data providers may be expanded to represent an absolute measure of trips. While numerous data expansion techniques exist, there was little chance of developing a confidently weighted dataset given the lack of knowledge about the population represented in the data (largely due to the effects of privacy efforts).

- Analysis of mobile device data and determination of origin-destination points relies on computer algorithms to determine where a trip starts and ends rather than direct user input like from travel surveys. Current algorithm parameters define the end of a trip and determine a trip's destination if the mobile device travels no more than a specified distance in a specified amount of time (e.g., five meters in five minutes).
- App-based mobile device data has a minimal potential bias towards higher income persons as a majority of the population now owns an app-enabled device and studies have shown that low-income persons are preferring to get their internet from a cell phone as opposed to a residential provider. However, locational information is derived from a combination of cellular, GPS, and Wi-Fi sources, reducing the spatial resolution and accuracy to roughly 20 to 30 meters when compared with GPS data alone which has a spatial resolution of rough 3 to 5 meters.
- App-based mobile device data typically represent persons traveling as the algorithms are currently not sophisticated enough to accurately differentiate mode of travel. For instance, a typical transit trip may consist of a drive trip to a transit station, wait time for a train, stops at stations along the way, and a walk trip to the destination. Auto trips are usually much less complex as people generally drive directly from their origin to their destination.
- Mobile device data has a potential bias towards trips made by persons over the age of 16 due to privacy regulations requiring the non-inclusion of data associated with mobile devices registered to persons under the age of 16.
- Mobile device data has a potential bias towards non-school-related trips made by persons over the age of 16. Home and work location data analysis will ignore school-related trips as the algorithms only track the inferred "home" and "work" location of mobile devices. Origin-destination trip table data analysis may miss school drop-off trips as the algorithms determine a trip to end only when the mobile device has moved less than five meters in five minutes. However, school-related trips associated with students who drive themselves to school will likely be captured as the mobile device will remain relatively stationary while at school.
- Mobile device data has a potential bias towards traditional "9 to 5" workers as the home and work location algorithms assign home and work locations based on where the device is at rest between specified hours (e.g., 10 AM to 3 PM for work location determination and 11 PM to 4 AM for home location determination).

## Traffic Count Data

While traffic count data plays a pivotal role in any travel behavior study, providing a cheap and reliable measure of the absolute magnitude of travel, they are typically collected over a one-week period, but traffic patterns typically vary week to week and month to month and even day to day. Traffic counts also do not provide the origin, destination, or purpose of the vehicle trip or any other trip making or demographic information.

## Travel Survey Data

While travel surveys have traditionally been the primary source of information on both travel behavior and travel patterns, they come with their own set of unique limitations. Below is a bulleted summary of travel survey data limitations observed by RSG staff.

- One of the challenges faced in conducting travel surveys is nonparticipation. While travel surveys traditionally start with a random sample of households or individuals selected for participation, many of the selected individuals simply do not respond.
- Development and implementation of a survey of a sufficient size to be statistically valid can be costly.
- Travel surveys are prone to human error during the data collection process as well as from the survey responders who may misinterpret the questions or forget about trips.
- Underreporting of trips in travel surveys is a well-documented phenomenon, with some studies indicating up to a 30% underreporting of the frequency of trips per day<sup>7</sup>.
- Response rates to travel surveys can vary greatly, increasing the difficulty of survey expansion and potentially leading to unknowable biases in the resulting data.

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<https://www.sciencedirect.com/science/article/pii/S2352146518301571/pdf?md5=846893e8a7b878bf93e911f890db5bca&pid=1-s2.0-S2352146518301571-main.pdf>