

Napa County Travel Behavior Study

NCTPA Board Meeting Presentation

December 17, 2014



Overview

- **Objectives of the Study**
- **Community Advisory Committee**
- **Study Approach**
- **Data Analysis and Integration**
- **Conclusions**



Objectives of the Study

- Gather information on the travel behavior of **visitors, employees, residents, and students** who make **work and non-work trips** in Napa County
 - Numerous studies on where visitors come from but very few on visitor travel patterns within Napa County
 - Very few studies on resident, employee, and student travel patterns within Napa County
 - How much of the congestion is from residents, imported workers, pass-through trips, winery patrons, etc.?
 - Use the information to help expand transit and paratransit services and inform the Travel Demand Model.



Objectives of the Study

- An opportunity to integrate **innovative data collection methods** with **enhancements to traditional methods** to offer an unprecedented look into travel behavior in Napa County
 - The **integration of multiple advanced data collection methods** and technologies no longer lies in the realm of research
 - Maximize the accuracy and geographic scale of the data while providing a broad range of uses for the data
 - A multi-firm team comprised of Fehr & Peers, StreetLight Data, and MioVision was created

Community Advisory Committee

- Fehr & Peers worked with NCTPA staff to convene a Community Advisory Committee
 - Comprised of representatives from business and wine industry groups, major employers, and other community stakeholders
 - We understood the importance of effectively reaching out and engaging members of the community
 - This study will provide the **basis for multiple planning efforts** by NCTPA and planning agencies within the County
 - Data can be used to refine the Napa-Solano Travel Demand Model and update the Countywide Transportation Plan

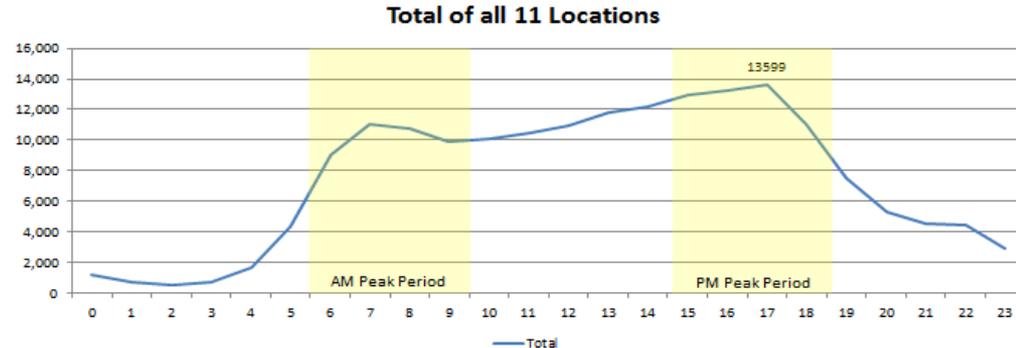
Study Approach

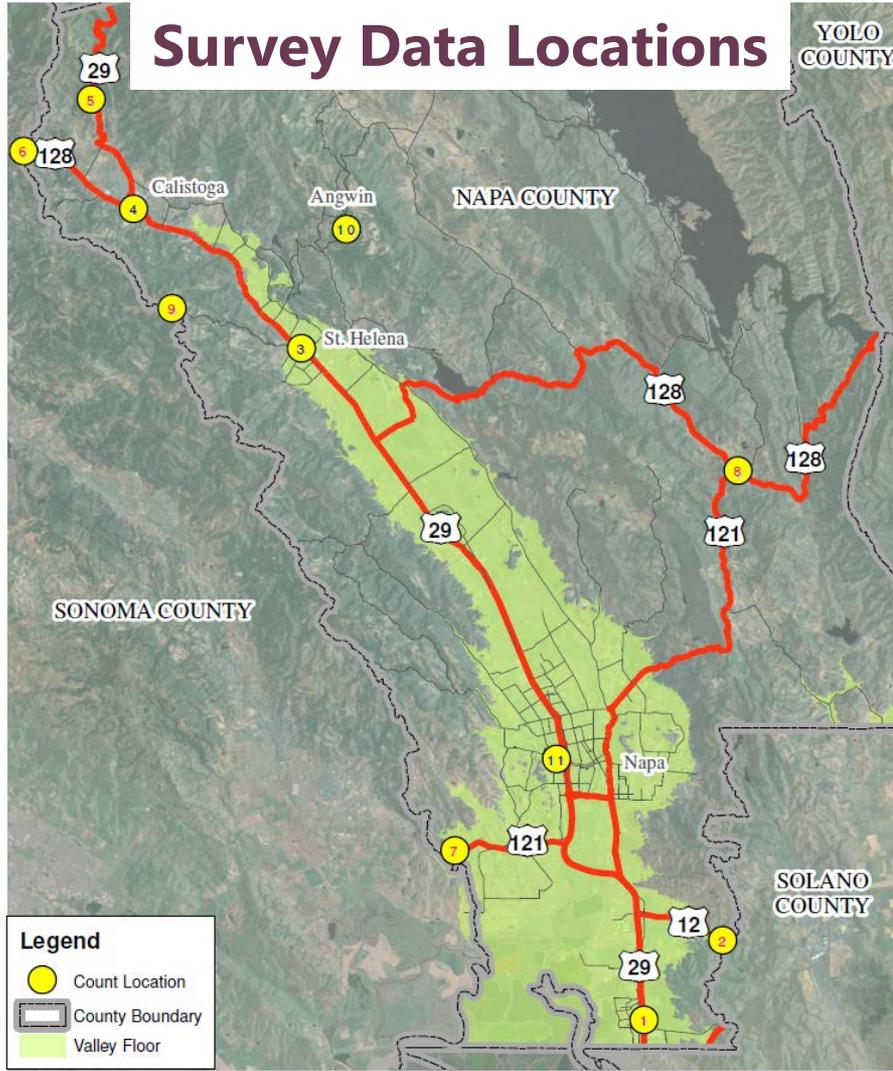
- Utilized and combined the results of **five data collection methods**
 1. Vehicle Classification Counts
 2. Winery Regression Analysis
 3. License Plate Matching
 4. In-Person Winery, Vehicle Intercept, and Online Employer Surveys
 5. Mobile Device Data

Study Approach

1. Vehicle Classification Counts

- Provided the **total traffic volume** that was used as the control total to refine travel data collected from the other methods
- MioVision collected data at **11 survey data locations**
- Including **7 Napa County external gateways** in order to quantify all Napa County inter-regional travel (Napa County internal travel nearly impossible to quantify using traditional methods)
- **181,330 total vehicles** were observed passing through the 11 survey data locations on Friday, October 4, 2013
- 126,736 total vehicles were observed at the 7 external gateways





- 1: SR 29 – North of American Canyon Rd
- 2: SR 12 - Napa/Solano County Line
- 3: SR 29 – Southeast of Adams St in St. Helena
- 4: SR 29 – Southeast of SR 128 in Calistoga
- 5: SR 29 – Napa/Lake County Line
- 6: SR 128 – Sonoma/Napa County Line
- 7: SR 121 – Sonoma/Napa County Line
- 8: SR 128 - East of SR 121
- 9: Spring Mountain Rd - Napa/Sonoma County Line
- 10: Howell Mountain Road - South of Cold Springs Rd
- 11: First St - West of SR 29

Study Approach

1. Vehicle Classification Counts – SR 12 Jameson Canyon Rd Widening Project
 - To determine potential shifts in traffic patterns after the completion of the project, **traffic count data was collected on SR 29 North of American Canyon Road and SR 12 at the Napa/Solano County Line on Friday, October 24, 2014**, more than one full month after the completion of the project.
 - The data was compared to traffic count data collected at the same two locations on Friday, October 4, 2013.
 - Traffic volumes along SR 12 increased by 4,300 daily vehicles (a 14% increase) and traffic volumes along SR 29 decreased by 4,600 vehicles (a 9% decrease), suggesting that **roughly 4,000 vehicles shifted their traffic pattern.**



Study Approach

2. Winery Regression Analysis

- Vehicle trip generation for the existing 434 winery parcels in Napa County was determined based on **simple linear regression analysis**, which relies on data collected at a sample of representative locations to predict data for the remaining locations.
- This method was selected due to the impracticality of and inability to collect driveway counts at all 434 winery parcels.
- Traffic counts were collected at **22 existing Napa County Wineries** over a 7-day period from Thursday, October 23, 2014 to Wednesday, October 29, 2014.



TABLE 5
WINERY REGRESSION COEFFICIENTS

Independent Variable	Average Monday to Wednesday	Thursday	Friday	Saturday	Sunday
Constant	126	102	196	222	100
Annual gallons produced (thousands)	0.20	0.31	0.33	0.35	0.28
Advanced Appointments (binary)	-86	-68	-150	-229	-110
On the Valley Floor (binary)	40	69	59	83	49
R-Squared	0.79	0.82	0.82	0.79	0.86

TABLE 7
ESTIMATED TOTAL DAILY WINERY VEHICLE TRIP GENERATION

Day of the Week	Total Daily Vehicle Trip Generation
Thursday	52,245
Friday	62,217
Saturday	54,713



Study Approach

3. License Plate Matching

- Involves the positioning of cameras at multiple locations to record the license plate of passing vehicles
- MioVision used **high-speed infrared cameras and sophisticated software**
- License plate listings were matched between survey data locations and the purpose of the trip was inferred
 - i.e. entering Napa County at 8 AM and leaving Napa County at 5 PM at the same location is likely an imported work trip
- Was also used to develop a list of unique license plate listings from which a calculated number of **randomly selected owners were surveyed by mail to obtain more detailed trip making information**



TABLE 9
PASSENGER VEHICLE LICENSE PLATE MATCHING DATA

Trip Type	Daily	Early AM (12 AM to 6 AM)	AM 4-Hr (6 AM to 10 AM)	Mid-Day (10 AM to 3 PM)	PM 4-Hr (3 PM to 7 PM)	Late Night (7 PM to 12 AM)
Inbound Trips	45%	55%	51%	45%	40%	46%
Outbound Trips	45%	31%	39%	45%	52%	46%
Pass-Through Trips	9%	14%	10%	10%	8%	8%
Trip Type	Daily	Early AM	AM Peak	Mid-Day	PM Peak	Late Night
Imported Work Trips	25%	37%	31%	17%	28%	22%
Imported Other Trips	16%	7%	12%	23%	14%	16%
Exported Work Trips	16%	20%	20%	12%	17%	18%
Exported Other Trips	11%	4%	8%	14%	10%	9%
One-Way Total	23%	18%	19%	24%	23%	28%
Pass-Through	9%	14%	10%	10%	8%	8%

Study Approach

3. In-Person Winery, Vehicle Intercept, and Online Employer Surveys
 - **Three types of surveys** were conducted
 - In-person survey at 13 wineries on Friday, October 4, 2013
 - 172 surveys were completed with an estimated response rate of 50%
 - Online employer survey sent via email on October 25, 2013
 - 1,444 surveys were completed with a response rate of 7%
 - Vehicle intercept mail survey to vehicles observed on Friday, October 4, 2013
 - 183 surveys were completed with a response rate of 2.2%



Study Approach

4. Mobile Device Data

- Mobile devices such as cell phones and GPS units frequently communicate with the mobile network
- INRIX and StreetLight Data collect and analyze this data while the device is in use to record the **anonymous location** (ensuring user privacy) and **movement of mobile devices** on the roadway network
- StreetLight Data obtained from INRIX movement and usage patterns over a **61-day period from September 1, 2013 to October 31, 2013**

Study Approach

4. Mobile Device Data

- StreetLight Data used sophisticated algorithms to infer the origin and destination of trips as well as the trip purpose (Home Zone and Work Zone)
- Fehr & Peers is able to tag this data to a user-specified geographic layer for seamless integration and **comparison with other sources of data**
 - Started with the Napa Solano Model TAZ system but added wineries, major employers, Napa County Airport, Napa Valley College, etc.
 - Can be very disaggregate (**664 total zones**) and aggregated later
- Results in **origin-destination trip tables** that provide the number of trips for each TAZ to TAZ origin-destination pair by time of day and trip purpose

Study Approach

4. Mobile Device Data

- **206,152 Napa County data samples over the 61-day period (versus 1,800 survey responses)**
- 36% of which were external trips and 9% of which were pass-through trips (matches 9% from license plate matching)
- 55% of samples had both their origin and destination within Napa County (internal trips – almost impossible to measure with traditional methods)
- **45% of samples touched one or more external gateways**
 - Extremely useful statistic as we have a control total of 127,000 vehicles counted at external gateway locations



Data Analysis and Integration

- Using multiple sources of data allows the unique advantages of the individual methods to be utilized, **reducing the following limitations of the data.**
 - Vehicle Classification Counts – no origin or destination, trip making, or demographic information
 - Winery Regression Analysis – only provides trip generation for wineries
 - License Plate Matching – no origin or destination, inferred trip purpose
 - 3 Types of Surveys - **very detailed data for a very small sample of observed trips** (2.2 and 7% response rates unfortunately are normal)
 - Mobile Device Data – inferred origin and destination and trip purpose information for a **very large sample size**

Data Analysis and Integration

- **Started with Mobile Device Data** due to the large sample size and high confidence in origin-destination data
- Data from the other four data collection methods was used to refine the origin-destination trip tables **to represent single days of absolute data**
 - Vehicle Classification Counts – provide control totals
 - Winery Regression Analysis – provides total winery trip generation
 - License Plate Matching – refine trip purpose and trip type
 - Surveys – refine origin and destinations, trip purpose, and trip type
- The resulting trip tables represent **a single meaningful dataset** of all data collected as part of the Napa County Travel Behavior Study



TABLE 14
PERSONAL AUTOMOBILE FINAL ORIGIN-DESTINATION TRIP TABLES SUMMARY

Trip Purpose	Average Monday to Thursday Trips	Friday Trips	Saturday Trips	Monday to Thursday Trip Percent	Friday Trip Percent	Saturday Trip Percent
Total	345,346	362,253	159,541	100%	100%	100%
Internalized	26,369	25,223	8,647	8%	7%	5%
Home-Based Work	60,393	62,932	10,618	17%	17%	7%
Home-Based Other	57,867	58,163	16,015	17%	16%	10%
Non Home-Based	49,803	53,261	6,399	14%	15%	4%
Winery	47,811	56,639	50,273	14%	16%	32%
Imported Trip	66,194	67,963	34,995	19%	19%	22%
Exported Trip	36,909	38,072	32,593	11%	11%	20%
Total Winery Trips (including work trips)	52,070	61,333	54,883	15%	17%	34%
Winery Trips from Winery Regression Analysis	52,245	62,217	54,713	--	--	--
Difference	-175	-883	170	--	--	--
External Trips (including pass-through)	125,490	128,431	88,046	36%	35%	55%
External Trips from Vehicle Classification Counts	--	126,736	--	--	--	--
Difference	--	1,695	--	--	--	--

- Origin-Destination trip data can be aggregated to any desired level to illustrate larger travel patterns such as flows to and from the five major cities in Napa County

Table 17

Daily Average Weekday Vehicle Trips to and from the Five Major Cities in Napa County

Total:		Destination Location							
		Calistoga	St. Helena	Yountville	Napa	American Canyon	Unincorporated County	Winery	External Gateway
356,424									
Origin Location	Calistoga	2,062	444	47	360	95	1,586	544	780
	St. Helena	655	6,450	98	1,896	125	3,948	1,616	801
	Yountville	7	246	870	905	54	1,332	475	303
	Napa	397	1,793	1,018	63,359	2,766	19,801	3,099	17,329
	American Canyon	14	256	118	3,320	6,316	3,814	333	11,367
	Unincorporated County	1,381	4,474	1,106	18,514	3,267	40,469	12,053	21,083
	Winery	665	2,111	497	3,376	962	11,041	3,646	3,993
	External Gateway	1,723	841	270	17,464	12,780	18,803	3,902	11,203

- Origin-Destination trip data can be aggregated to any desired level to illustrate larger travel patterns such as flows to and from the five major cities in Napa County

Table 17

Daily Average Weekday Vehicle Trips to and from the Five Major Cities in Napa County

Total: 356,424		Destination Location							
		Calistoga	St. Helena	Yountville	Napa	American Canyon	Unincorporated County	Winery	External Gateway
Origin Location	Calistoga	1%	0%	0%	0%	0%	0%	0%	0%
	St. Helena	0%	2%	0%	1%	0%	1%	0%	0%
	Yountville	0%	0%	0%	0%	0%	0%	0%	0%
	Napa	0%	1%	0%	18%	1%	6%	1%	5%
	American Canyon	0%	0%	0%	1%	2%	1%	0%	3%
	Unincorporated County	0%	1%	0%	5%	1%	11%	3%	6%
	Winery	0%	1%	0%	1%	0%	3%	1%	1%
	External Gateway	0%	0%	0%	5%	4%	5%	1%	3%



Data Analysis and Integration

- Provides a **substantial amount of observed travel data** for model calibration and validation purposes

Vehicle Type	Daily Mobile Device Trips	Daily 2010 CCTA Model Trips in Napa County
Personal Automobile	345,346	353,521
Commercial Vehicles	16,922	8,731
Total	362,268	362,252



Conclusions

- The Napa County Travel Behavior Study provides NCTPA with several data sets. Data highlights that may be useful for future planning efforts include:
 - From Winery Regression Analysis
 - **Napa County wineries generate an estimated 62,200 vehicle trips on a Friday in October**
 - From License Plate Matching
 - **9% of daily trips at Napa County external gateways are pass-through trips**
 - **52% of Napa County pass-through traffic travels between SR 29 at the Sonoma County Line and SR 12 at the Solano County Line**
 - **41% of daily trips are imported trips and 27% are exported trips**
 - **23% of traffic was one-way (a portion of this is visitors)**
 - **21% of total daily trips into Napa County were “visitor” trips**



Conclusions

- From Surveys
 - **21% of winery patrons were from the Bay Area, 10% were from outside the United States**
 - **35% of winery patrons started their day in Napa County, 23% in San Francisco**
 - **32% of employer survey respondents live and work in the City of Napa**
 - **61% of employer survey respondents use SR 29 to travel to work**
 - **20% of employee survey respondents carpool (this includes taking kids to school)**
 - **43% of employee survey respondents said they would use public transit if service expanded**
 - **21% of vehicle intercept survey trips were said to be made “less than one time per month”**
- From Mobile Device Data
 - **55% of daily trips were internal to Napa County**
 - **9% were passing through Napa County**

