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EMPLOYEE TRAVEL IN YOSEMITE NATIONAL PARK

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Abstract

This report describes employee travel in Yosemite National Park. More specifically, it describes the travel undertaken by employees as it relates to their roles as employees. Thus, commuting to work, personal stops made in conjunction with commute trips, trips made to complete work-related responsibilities, and personal trips made during a work shift are addressed. Travel undertaken by employees-as-private citizens, for example, travel on their days off and trips made after returning home at the end of workday, are not addressed. In addition to work-related travel this report provides a description of employees, their home and work locations and work hours, and opinions of potential alternative commute modes.

The primary data source is a survey of employees. The timeframe was the summer of 1999. Employees of Yosemite Concession Services Corporation were surveyed in August; employees of the Park Service and of the “park partners” were surveyed in September. The park partners include the Yosemite Association, Yosemite Institute, U.S. Post Office, U.S. District Court, The Ansel Adams Gallery, and the medical/dental clinic.

As the employment and residence location of employees has a strong effect on work-related travel, this report is organized around locations. After a general description of the sample and population estimates, we look at employee travel in Yosemite Valley, El Portal, Wawona, Tuolumne Meadows. For each, we describe differences in work travel between those people who both live and work at each location, and those who commute from some distance away. As one would expect, those who live near their workplace have brief commute trips, which many accomplish by walking or cycling. Those who commute from some distance typically spend 45 minutes commuting each way; most do so by driving alone or in carpools.

Carpooling was the preferred commute travel mode of most people who currently drive alone to work. Just over half of Yosemite employees commute to work by driving alone at least sometimes; about one-third commute exclusively by driving alone. We had expected that among those employees who drive alone to work, their preferred options to driving alone would be shaped by where they worked. However, it appears that current experience with alternatives to driving alone is more important. For example, someone who already carpools occasionally is most likely to list carpooling as their preferred alternative.

Among those who ever drive alone, only one-fourth adamantly refuse to consider alternatives. The most frequently cited single reason that people were unwilling to consider alternatives to driving alone is the need to fulfill personal, familial, and social obligations either on the way to work, or more typically, after work. This reason is both the first most likely response and the most likely response when added across all three possible responses. Other common responses related to this idea are “Independence, convenience of own car” and “Unable or unwilling to rely on coordinating with others.” In aggregate though, work schedules are an even more frequently cited reason for not considering an alternative to driving alone. A combined 44% stated that either their work shift was too early or too late, or that their work hours were too variable to allow them to use an alternate to driving alone.

We conduct two analyses of commute travel along the State Route 140/El Portal Road. This route connects the town of Mariposa, the Midpines area, the Park Service Administrative Area in El Portal, and Yosemite Valley. First, we estimate the potential size of the user group for a commuter bus service. The estimate—which amounts to some 360 employees per

weekday—is derived from a set of assumptions regarding workplace and residence location, as well as daily and seasonal work time patterns. These people represent 17% of the current employees at El Portal or in Yosemite Valley. The single assumption which excludes the most people is the assumption that people who both live and work at the same place are not part of a commuter bus market. 35% of the employees at El Portal also reside there; 62% of employees in Yosemite Valley currently reside there.

Second, we estimate the portion of traffic on State Route 140/El Portal Road that is due to Yosemite employee commute travel. Depending on the direction of travel, the location along the road, and assumptions about the precise commute trip mode shares on any given day, the estimates are on the order of 10 to 20% of daily traffic.

Commute travel is highly concentrated in time. The percentage of eastbound traffic at El Portal during the peak morning commute hour of 7:00 to 8:00 that is due to Yosemite employees is estimated to about 75%. During the peak afternoon commute hour of 17:00 to 18:00, the percentage of westbound traffic at El Portal that is due to Yosemite employees is estimated to be between 34 and 41%.

The afternoon employee peak commute time corresponds to the beginning of the visitor peak traffic flow leaving Yosemite Valley. This correspondence in time of employee and visitor traffic on this road, coupled with the physical impediment to traffic flow represented by the roadway configuration at the Arch Rock Entrance Station, leads to congested traffic at this location in the early evening.

Park planning alternatives which remove employee housing from Yosemite Valley may increase employee travel on roads leading to, and entering, the park, but will also increase potential transit populations. The largest share of current employee commute traffic moves along SR140/El Portal Road. Increases in employee traffic along this route may not impact visitor experience if that increase occurs at the same time as, or earlier than, the current morning Yosemite employee commute. Increasing employee traffic during the exiting afternoon/evening commute period appears likely to exacerbate an existing traffic congestion problem. Policies and programs to promote transit use—among employees and visitors—can facilitate the elimination of afternoon traffic queues at Arch Rock.

Introduction

As part of the traffic, travel, and visitor experience studies conducted in Yosemite National Park during the summer of 1999, the Institute of Transportation Studies at the University of California, Davis undertook a survey of employees working in the park. This survey provides a description of employees, their home and work locations and work hours, current commute travel modes, trips made for work, trips made in conjunction with commuting, and opinions of potential alternative commute travel modes. This study does not cover travel made by employees as private citizens.

We distinguish travel *to work* from travel *for work* as follows. Travel *to work* refers to the commute trip between home and workplace. The *workplace* is defined as the place at which an employee works, or the place to which the employee usually first reports before traveling to the various sites they may visit in the course of their work day. Travel *for work* is any travel undertaken to complete job responsibilities, other than commuting between home and workplace. Examples of travel for work include: travel through campgrounds to collect fees; travel to attend a meeting in El Portal if the workplace is in Yosemite Valley or some other part of the park; travel to public hearings in towns around the park; travel to deliver linens to lodging facilities; travel to deliver materials to the recycling center; travel to patrol the park—anything that takes an employee away from his or her workplace as part of their job.

There are two major employers in the park. They are the National Park Service (NPS) and Yosemite Concession Services Corporation (YCS). In addition, there are a number of park partners who employ a relatively small number of people. Park partners include the Yosemite Association, Yosemite Institute, U.S. Post Office, U.S. District Court, The Ansel Adams Gallery, and the medical/dental clinic. Counts of the number of summer employees, by employer, as well as a breakdown of the number of returned questionnaires are shown in Table 1. (A lesser number of people are employed, by all employers, during the winter.)

Questionnaires were distributed to all YCS employees in August and to all employees of the NPS and park partners in September. The total number of questionnaires returned was 961, as shown in Table 1. The total sample will be referred to simply as “Yosemite employees.” The questions are included as Appendix A of this report.

The general spatial distribution of employee work locations is shown in Table 2 for NPS and YCS employees. Park partner employees are not shown in Table 2 as almost all park partner employees work in Yosemite Valley, though a few do work in El Portal and other locations.

The major employment centers are Yosemite Valley, El Portal, the Wawona/Mariposa Grove area, and Tuolumne Meadows. As the most popular scenic attractions are located in, or typically viewed from, Yosemite Valley, both NPS and YCS have large numbers of employees and facilities in the Valley. From Table 2 we calculate that about half of all NPS employees and three-fourths of YCS employees work in Yosemite Valley. NPS administrative and maintenance facilities are located in El Portal. About 30% of NPS employees work place in El Portal. A relatively small number of employees work at a number of other places throughout the park.

Table 1: Number of Yosemite Employees and Survey Sample Size, 1999

Employer	Summer	Sample Size ¹
The Ansel Adams Gallery	16	—
Medical Clinic/Dental	38	—
U.S. District Court	6	—
Yosemite Association	60	—
Yosemite Institute	49	—
U.S. Post Office	15	—
Total park partner	184	62
National Park Service	872	444
Yosemite Concession Service	1,750	455
Total Yosemite Employees	2,756	961

1. Sub-sample sizes are not shown for each park partner since relatively few people work for any one of them. Response rates for individual park partners are therefore not particularly meaningful since one more, or one less, person would dramatically change the response rate, without materially affecting the (low) statistical significance of any conclusions we might draw about any single park partner.

Table 2: Approximate Spatial Distribution of NPS and YCS Employees, Summer only

Location	NPS	YCS
Yosemite Valley	427	1,378
El Portal	263	8
Wawona/Mariposa Grove	66	130
Tuolumne Meadows	—	125
Other ¹	116	109
Total	872	1,750

Source: Draft Merced Wild and Scenic River Comprehensive Management Plan/EIS. pp. III-214.

Note 1. Includes Tuolumne Meadows.

Based on the total Yosemite employee counts in Table 1 and the number of returned questionnaires, we calculate that 35% of all Yosemite employees returned their questionnaire. Among NPS employees, 54% responded; among YCS employees, 27%; and among park partners, 34%. We assume that these figures can be treated as response rates. To the best of our knowledge, all employees were given a questionnaire. YCS distributed questionnaires to its employees; NPS distributed questionnaires to its employees and to the park partners.

Describing the Sample of Respondents and Estimating Characteristics of the Population of Yosemite Employees

In this section we provide a description of the sample of Yosemite employees who responded to the questionnaire and estimate characteristics of the total population of Yosemite employees. Throughout this report, we will refer to results limited strictly to the survey respondents as “sample” results, e.g., sample counts or sample data; inferences regarding all Yosemite employees will be referred to as “population” estimates.

The sample description is presented to provide the reader with a basic orientation as to who is in the sample and to explore ways in which we believe the survey respondents might differ, as a group, from the group of all employees. Where comparative information is available, or reasonable arguments can be made, this information is also used to assess whether the sample is representative of all NPS, YCS, and park partner employees.

We do find, as discussed below in the section on daily, weekly and seasonal work patterns, that this sample likely under-represents summer seasonal YCS employees. The ramifications of this are different depending on the types of questions one is trying to answer. The State Route 140/El Portal Road commute analysis presented later is relatively unaffected. Currently, most summer seasonal YCS employees live in Yosemite Valley near their employment location and therefore do not commute along this corridor. On the other hand, if one is trying to count all employee commute trips in Yosemite Valley, then results from this sample must be adjusted to reflect the known bias in the sample.

Weighting the Sample to Estimate the Population

In order to move beyond a simple description of the sample to make appropriate inferences about the entire population of Yosemite employees we need to create a system of weights to apply to the sample data. The weights account for differences in response rates between different sub-samples. Two sources of such differences were introduced by the questionnaire distribution process. These are differences by employer and by employment location.

The weights to convert results based on the sample of respondents to estimates of the whole population are summarized in Table 3. The weights are calculated by taking the ratio of the known percentage of each combination of employer and employment location to the observed percentage of employees by employer and employment location in the sample. A single weight was developed for employees at workplace locations other than Yosemite Valley, El Portal, Wawona or Tuolumne Meadows, as well as for employees who report their workplace location is variable. There are few employees in either category, and the use of a single weight has no substantive effect on the results reported below.

Table 3: Sample Weights

Employer	Workplace				
	El Portal	Tuolumne Meadows	Wawona	Yosemite Valley	Other, or Variable, Locations
NPS	1.852	1.471	1.277	2.791	1.117
YCS	8.000	8.333	2.955	2.519	1.117
park partner	0.882	1.000	2.500	4.548	1.117

Many estimated measures of the population of Yosemite employees are similar to the distribution of the same measures in the sample of survey respondents. For some measures though, the population estimates lead to very different conclusions than if we had relied on the sample only. We highlight the similarities and differences throughout this report. In general, the population estimates that differ most are related to spatial distribution and differences between employees of different employers. These are exactly the types of effects that the weights are intended to produce. That is, the weights redistribute the data according to the employer and the workplace of the respondents, based on differences in response rates that are plausibly related to how the questionnaires were distributed.

Socio-Economic and Demographic Description

Gender

The sample is composed of 44% women and 56% men. This split is similar among both NPS and YCS respondents. Park partner employees who responded to the questionnaire are more likely to be women than are the employees of the two major employers—across all park partners, 61% of respondents are women.

The population estimate of the gender split for the whole population of Yosemite employees is not substantively different from the sample split. We estimate that across the population of Yosemite employees, 44% are women and 56% are men. The gender split among NPS employees is estimated to be 41% women, 59% men. For YCS, the population split is estimated to be 44/56; for park partners, 56/44.

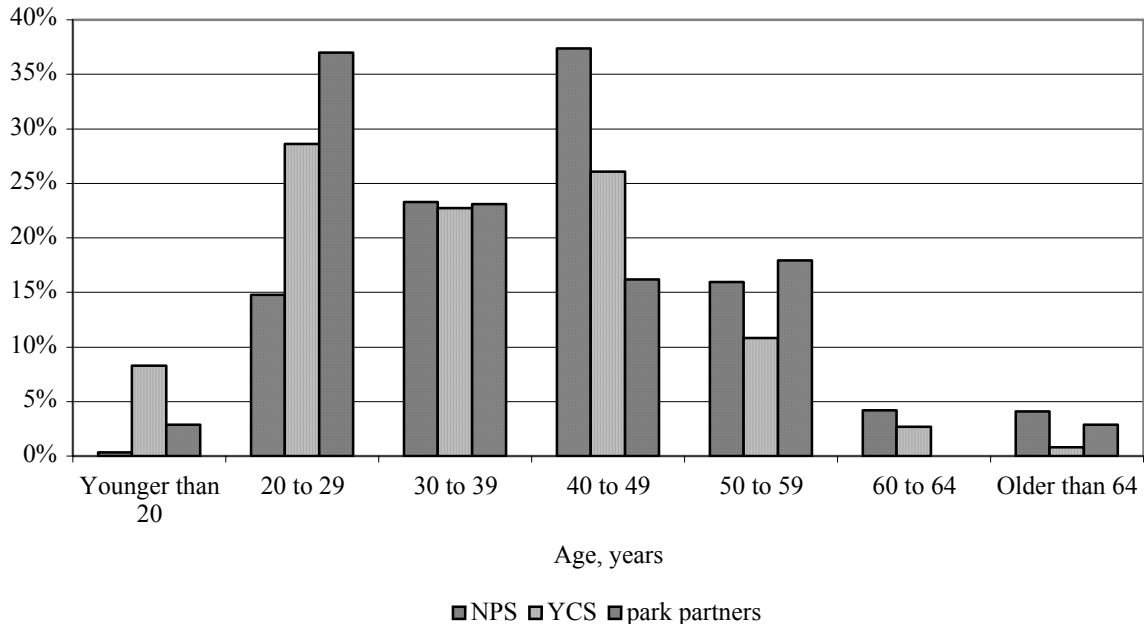
Age

The sample data and population estimates for the age distribution of the Yosemite employees are provided in Table 4. The population estimate of the age distribution is plotted in Figure 1 as a percent of employees in each age category. YCS and park partner employees are more likely to be young than are NPS employees, they are twice as likely to be younger than 30 as are NPS employee. The age distribution of NPS employees rises to a peak in the years of 40 to 49, then declines. A similar distribution holds for employees of the park partners—the single most likely age category is 40 to 49 years, though the distribution is skewed toward younger employees. The single most likely age category for YCS employees is 20 to 29.

Table 4: Age Distribution of NPS and YCS Employees

Age	Sample Count			Population Estimate		
	NPS	YCS	Park partners	NPS	YCS	Park partners
Younger than 20	2	39	1	3	129	5
20 to 29	69	126	27	127	428	64
30 to 39	100	102	14	200	340	40
40 to 49	160	111	7	321	390	28
50 to 59	69	49	10	137	162	31
60 to 64	18	15	0	36	40	0
Older than 64	17	5	1	35	12	5
Total	435	447	60	859	1501	173

Figure 1: Population Estimates of Yosemite Employees in each Age Category, Percent



We note that since age above 60 years is divided into two categories, readers may wonder if we have under-represented older workers in the description just given. However, even combining the two highest categories, there is a small proportion of people in the oldest age category. In fact, YCS employees are still more likely to be younger than 20 (a category which itself is shorter than it appears since realistically employees cannot be much younger than 20) than they are to be older than 60.

Employment Duration

Within the sample of respondents, employment duration ranges from two weeks (0.042 years) to 45 years. Both the mean duration of employment for the sample and the estimated

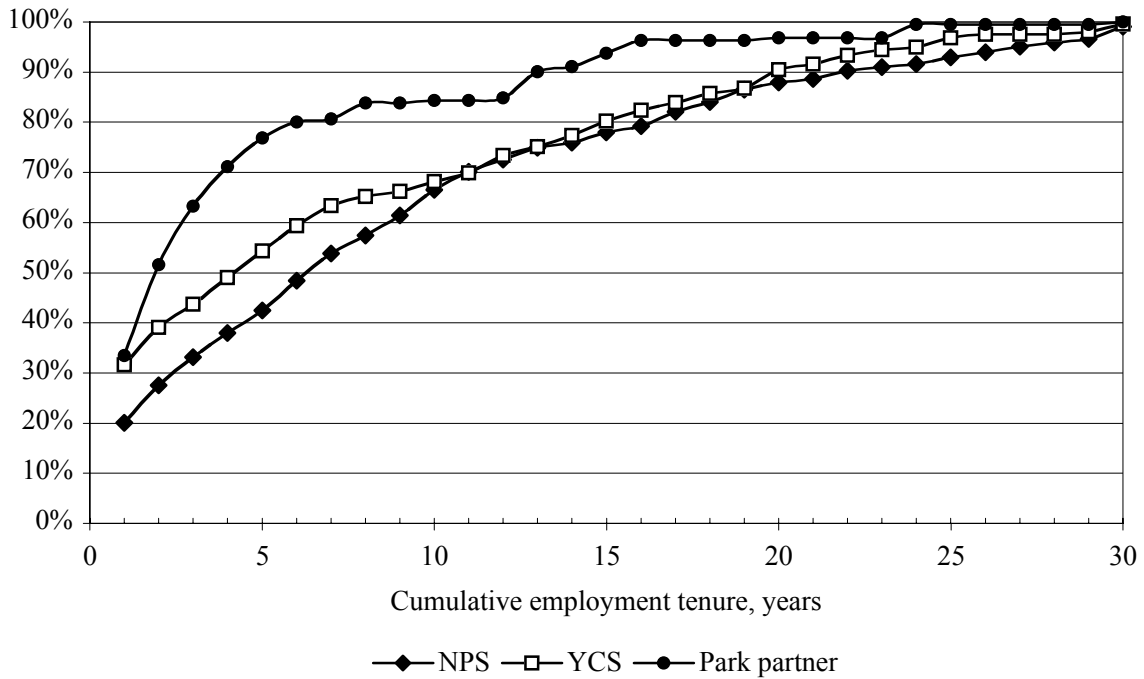
mean of the population are 7.8 years. However, the median for both is only 5 years. Since the mean is larger than the median, we know the mean is skewed upwards by a relatively few employees with long employment duration. Since these results for the sample and the population are nearly identical, we will discuss only our estimates of the population's employment duration further.

There are differences in employment duration between employers. Among NPS employees, mean employment duration is estimated to be 8.95 years; among YCS employees, 7.57 years; and among park partner employees, 4.44 years. This difference is statistically significant at better than the 5% level, i.e., there is less than a 5% probability that this difference is due to chance alone. The differences in median length of employment are: NPS, 6.00 years; YCS, 4.33; and park partners, 2.00. The causes for these differences can be seen in Figure 2.

The figure illustrates cumulative employment duration, shown as the percent of employees who have been employed for no more than each year amount of time. That is, the "year one" data point is the percentage of employees who have been employed by NPS, YCS, or a park partner for one year or less. The "year two" data point is the percentage of employees who have been employed for two years or less, including all those who have been employed for one year or less. The data provided in Table 5 show the percentage of employees whose employment duration is within specific time frames, i.e., one would sum the data in Table 5 (up to any given year) to obtain Figure 2.

We see that YCS employees and the park partners are far more likely to have short employment histories with their current employer than are employees of the Park Service. Over 30% of YCS and park partner employees report they have been employed by their current employer for less than one year. In contrast, only 20% of NPS employees have been employed by the Park Service for one year or less. If we breakdown the first year further, and look at employees with employment duration of 3 months or less, only 10% of NPS employees do, while 16% of YCS employees do.

Figure 2: Cumulative Employment Duration, Percent by Years of Employment



Park partners are much more likely to have shorter employment duration—77% of park partner employees have been employed for 5 years or less. Only 42% of NPS employees have been employed for 5 years or less, and 55% of YCS employees.

Employment duration for YCS and NPS employees are different up until about 11 to 12 years employment. There are a higher percentage of YCS employees whose employment duration is shorter than NPS employees up to this point. However, 70% of both groups of employees have employment duration of 11 to 12 years or less, and above this time, the two distributions are essentially identical. Almost all the difference in the mean and median values of employment duration between NPS and YCS employees can be explained by the much higher percentage of YCS employees who have been employed for one year or less.

Table 5: Employment Duration in Years, Population Estimate, Percent

Employment duration	NPS	YCS	Park partner
1 year or less	20%	32%	33%
1 to 2 years	7%	8%	18%
2 to 3	6%	5%	12%
3 to 4	5%	5%	8%
4 to 5	4%	5%	6%
5 to 6	6%	5%	3%
6 to 7	5%	4%	1%
7 to 8	4%	2%	3%
8 to 9	4%	1%	0%
9 to 10	5%	2%	1%
10 to 11	4%	2%	0%
11 to 12	2%	3%	1%
12 to 13	2%	2%	5%
13 to 14	1%	2%	1%
14 to 15	2%	3%	3%
15 to 16	1%	2%	3%
16 to 17	3%	2%	0%
17 to 18	2%	2%	0%
18 to 19	2%	1%	0%
19 to 20	1%	4%	1%
20 to 21	1%	1%	0%
21 to 22	2%	2%	0%
22 to 23	1%	1%	0%
23 to 24	1%	0%	3%
24 to 25	1%	2%	0%
25 to 26	1%	1%	0%
26 to 27	1%	0%	0%
27 to 28	1%	0%	0%
28 to 29	1%	0%	0%
More than 29 years	2%	2%	1%

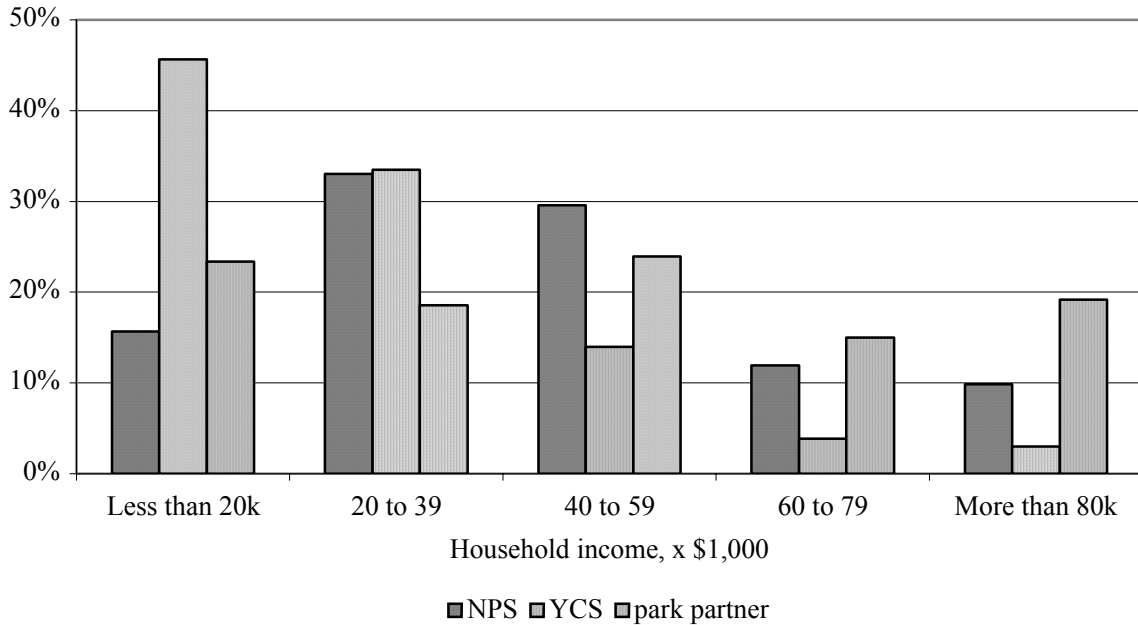
Household Income

As was the case with employment duration, there is little difference between the sample results and the population estimates, so we proceed to discuss the population estimates. The sample count data and the estimated population distribution are given in Table 6. The household income distribution, as the percent of people in each category by employer, is shown in Figure 3. In general, the only effect of weighting the data is to slightly shift the income distribution downward. For the sample we measure that 30.7% of respondents had household incomes less than \$20,000; for the population, we estimate 33.9%. Averaged overall employees, we estimate more than half (56.2%) live in households earning less than \$39,000. People living in households earning less than \$20k per year, are typically younger people who have short employment duration.

Table 6: Household Income Distribution by Employer

Household Income, dollars	Observed Sample			Estimated Population		
	NPS	YCS	Park partners	NPS	YCS	Park partners
0 to 19,000	70	185	12	126	638	39
20,000 to 39,000	137	139	12	266	468	31
40,000 to 59,000	122	59	8	238	195	40
60,000 to 79,000	47	17	10	96	54	25
80,000 +	34	14	16	19	42	32
Total	410	414	58	745	1,397	167

Figure 3: Estimated Population Income Distribution, Percent in each Income Category



Whether employees work for NPS, YCS, or a park partner does affect their likely household income. While not quite half of NPS (48.7%) and park partner (42.1) employees live in households earning less than \$40,000 per year, nearly 4 out of 5 (79.2%) of YCS employees do so. This is primarily because of the much larger percentage of YCS employees who have short employment duration as compared to NPS employees.

Employer and Workplace Location

The sample distributions are different than the population estimates for the distribution of employees by employer. Respondents are distributed as 46% NPS, 48% YCS, and 6% park partner employees. However, the estimated population distribution by employer is 34% NPS, 59% YCS, and 7% park partner.

The population estimates of workplace location are also different from the sample. The majority of respondents—58%—work in Yosemite Valley; the estimate of the total population of Yosemite employees who work in the Valley is 70%. The next largest employment location is El Portal (17% sample, 11% population), followed by Wawona (10% sample, 8% population), and Tuolumne Meadows (5% sample, 7% sample). The remaining 10% of the sample and 4% of the population have workplaces spread throughout the park. No other location is represented by more than 2% of respondents or 1% of the population.

The spatial distribution of employees of different employers is affected by estimating the distribution of the population—by design of the weights. Both the sample and the population estimates indicate that NPS employees are the most likely employees to work outside Yosemite Valley. But the sample result is 64%, while the population estimate is that the workplace of 51% of NPS employees is located outside the Valley. While 37% of the sample of park partner employees and 20% of the sample of YCS employees work outside the Valley the population estimates are 19% and 20% respectively. The “out-of-Valley” NPS employees are primarily working at El Portal, Wawona, and Tuolumne Meadows; “out-of-Valley” YCS employees are primarily located at Wawona and Tuolumne Meadows; and “out-of-Valley” park partner employees are primarily at El Portal and Crane Flat.

Daily, Hourly, and Seasonal Work Patterns

The estimated population distribution of daily and hourly work patterns is nearly identical to the sample distribution. Therefore we focus on the population estimates of daily and hourly works schedules. As we will show, this is not the case for seasonal employment patterns.

A Monday to Friday, 9 to 5 work week is not typical of summer employment in Yosemite National Park. While many Yosemite employees do work a Monday to Friday workweek, they are not in the majority. Thirty-five percent of the sample reports that they work Monday through Friday; the population estimate is that 33% of all Yosemite employees work Monday to Friday. These people are disproportionately more likely to be NPS employees. While NPS employees are estimated to represent 34% of all Yosemite employees, they represent 49% of employees who work Monday to Friday. While YCS employees are estimated to represent 59% of all employees, they represent only 43% of employees who work Monday to Friday.

The distribution of work start and end times are shown in Figures 4 and 5. In Figure 4, we see that many respondents start work between 7:00AM and 8:30AM. In fact, we estimate that 65% of Yosemite employees start work during this time interval. Reported work start times range from 2:30AM to 11:00PM.

Figure 4: Estimated Distribution of Work Start Times for the Population of Yosemite Employees in 24-hour clock time, Percent

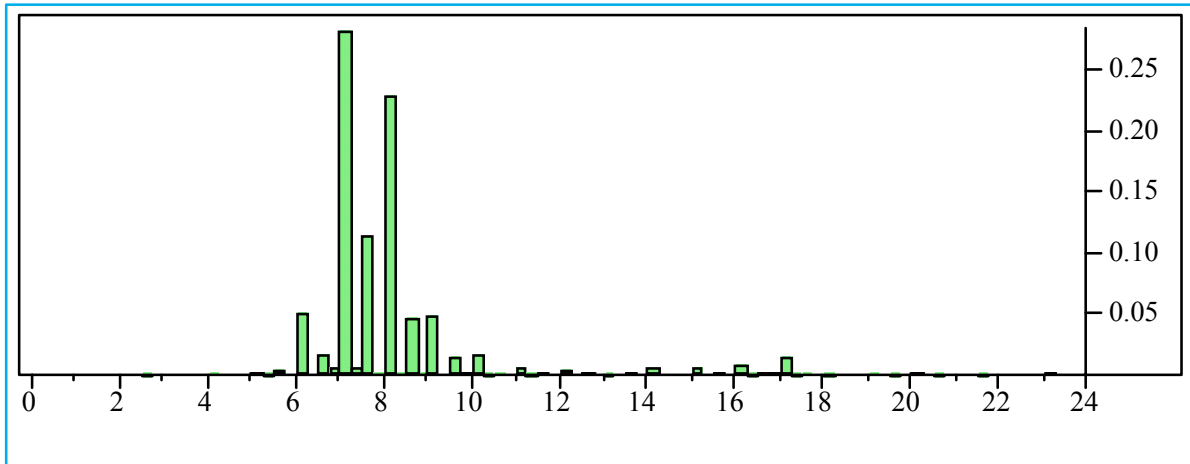
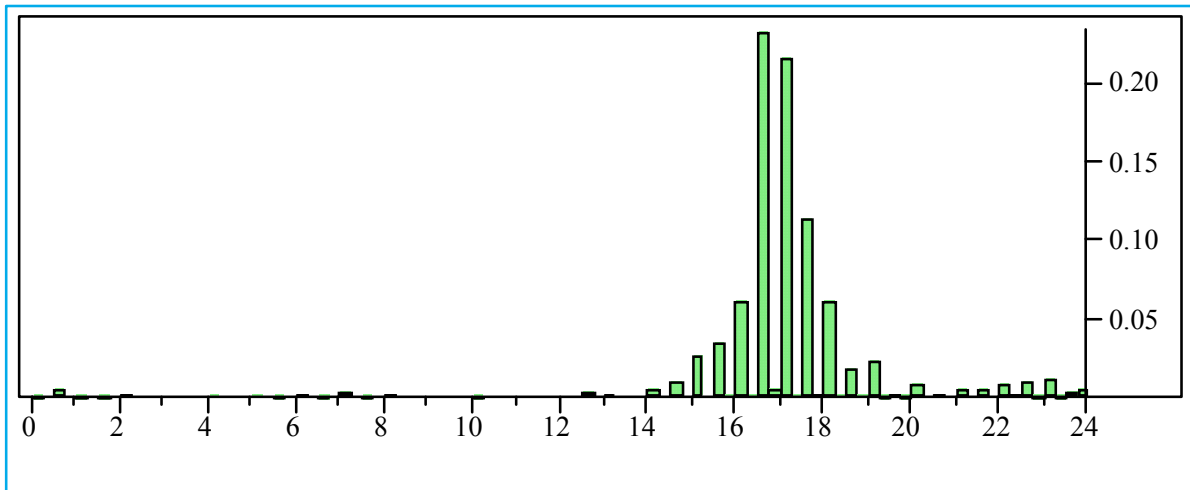


Figure 5: Estimated Distribution of Work End Times for the Population of Yosemite Employees in 24-hour clock time, Percent



In Figure 5, we see that most Yosemite employees end work between 16:00 and 17:30. This time period defines the inter-quartile distance of the distribution. That is, it is the interval between the 25th and 75th percentile—50% of the sample ends work during this time interval, 25% end work sooner, and 25% end work later. Reported work end times span the whole 24-hour day.

The distribution of seasonal employees poses some problems for this analysis. Only 193 respondents (20%) indicate they are seasonal employees. Almost all of these (98%) indicated they were seasonal summer employees, as we would expect from the time frame in which the survey was conducted. Most of the seasonal employees (59%) were NPS employees; only 36% were YCS employees. When we estimate the proportion of the Yosemite employee population who are seasonal employees, our estimate declines to 17%. Further, the

population estimates indicate that 23% of NPS employees are seasonal and only 14% of YCS employees are seasonal summer employees.

We believe this represents a shortfall in the percentage of the estimated employee population that should be seasonal summer YCS employees. This shortfall might be explained by the fact that the questionnaires were distributed to YCS employees near the end of the seasonal summer YCS employment period. Some such employees may have already departed the park and those departing soon after the questionnaires were distributed may have been less likely to complete and return a questionnaire. As we noted in the introduction to this section, this shortfall does not invalidate all possible analyses. It does mean that we believe our estimates of the number of employees working and living in Yosemite Valley are too low.

Residence Location

The estimated distribution of residence locations of all Yosemite employees is summarized in Table 7. The distributions for each employer are shown separately. Respondents' residences are concentrated in a few locations. We estimate almost three-fourths (74%) of Yosemite employees live in either Yosemite Valley (46%), El Portal (17%), or the town of Mariposa (11%). An additional 15% of employees live in either Tuolumne Meadows (6%), Midpines (5%), or Wawona (4%). Most of the remaining 11% of employees are scattered in the other small towns and rural areas bordering the western boundary of the park.

An estimated 83% of the employees who reside in Yosemite Valley are YCS employees. However, in keeping with the relative absence of YCS summer seasonal employees in the sample discussed above, we expect the true distribution of summer YCS employee residences may be even more highly concentrated in Yosemite Valley.

Commute Trip Time and Distance

The estimated commute trip time and distance distributions are shown in Figure 6 and 7; statistics are given in Table 8. The estimated population distributions and the measured distributions of the sample are identical. The trip duration and trip distance distributions are skewed toward commutes that are brief in duration and short in distance. Half of Yosemite employees spend 15 minutes or less commuting to work, and travel 2 miles or less. The mean commute trip duration is 26.56 minutes and the mean commute trip distance is 14.76 miles.

Table 7: Estimated Population Distribution of Residence Location of Yosemite Employees by Employer

Location	NPS	YCS	Park partner	Total
Yosemite Valley	157	963	46	1166
El Portal	261	109	58	428
Mariposa	166	103	9	278
Tuolumne Meadows	46	100	0	146
All Other	42	68	31	141
Midpines	61	44	17	123
Wawona	45	60	5	110
Other park	52	24	7	82
Oakhurst	20	30	1	51
Groveland	17	2	0	19

Figure 6: Estimated Distribution of One-Way Commute Time in minutes, Percent

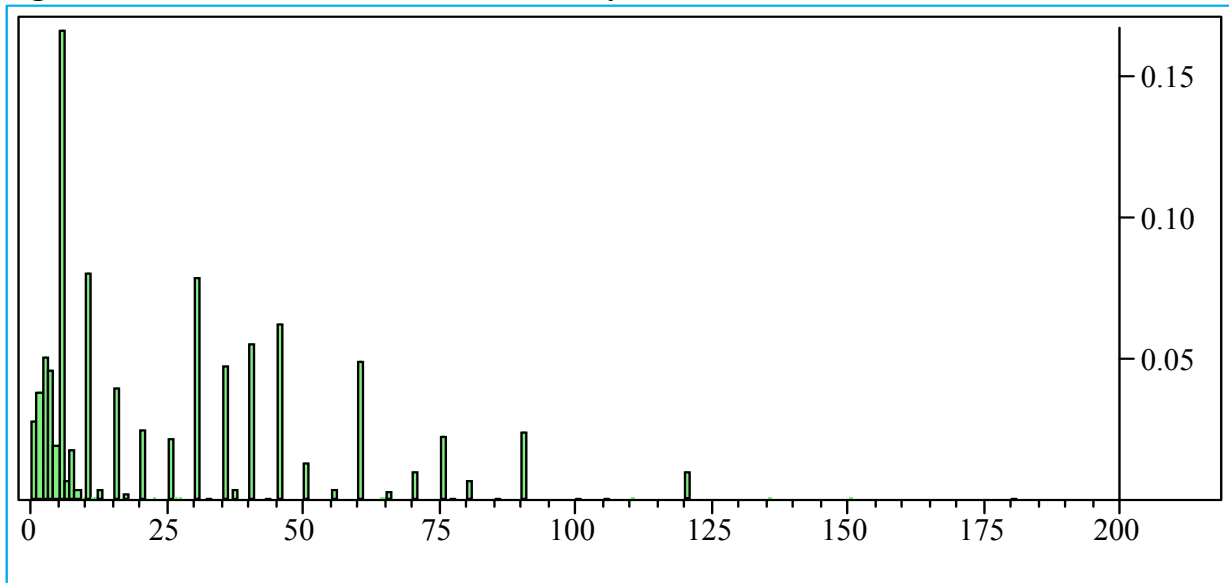


Figure 7: Estimated Distribution of One-way Commute Distance in miles, Percent

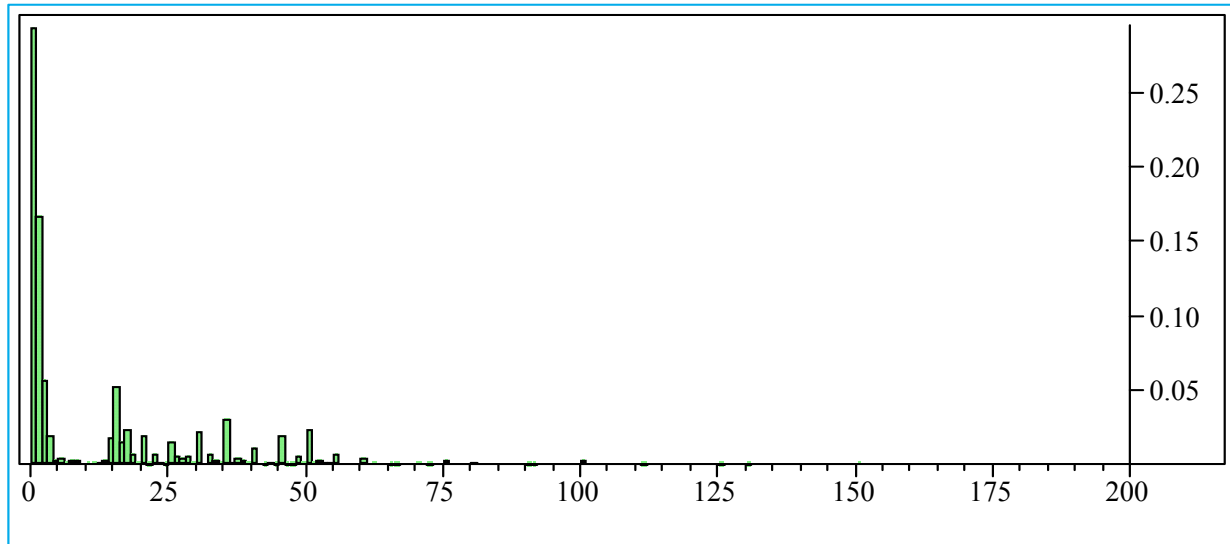


Table 8: Statistics for the Estimated One-Way Commute Time and Distance Distributions

Quantiles		Commute Time, minutes	Commute Distance, miles
maximum	100.0%	195.0	189.0
	90.0%	63.6	45.0
quartile	75.0%	40.0	25.0
median	50.0%	15.0	2.0
quartile	25.0%	5.0	0.5
	10.0%	2.0	0.0
minimum	0.0%	0.0	0.0
Moments			
Mean		26.55	14.76
Std Deviation		49.52	20.78
Std Error Mean		0.98	0.67
N		960	961
Sum Weights		2567	2569

Note: Quantiles are interpreted as that percentage of the sample that has a particular value or less. For example, the upper quartile (the 75th percentile) of commute times is 40 minutes, meaning that 75% of the people in the sample take 40 minutes or less to commute between home and work.

“N” is the sample size, “Sum Weights” is the estimated population size after the weights are applied.

The means are larger than the medians because there are a small number of people with very long commutes. Many of these people “commute” to work at the start of their work week, stay near their workplace, then commute home at the end of the week. While this is not typical commute behavior, we retain these people in the charts and statistics shown here. In fact, at each major employment location, there are two distinct groups of people—those who live close to their workplace and those who commute from some distance away. We will look

at these two types of commuters in the later sections that examine the four major employment locales.

Commute Travel Modes

Employees were asked to tell us all the travel modes they used to commute to work. The incidence of use of any single mode is summarized in Table 9; the use of multiple modes is summarized in Table 10. In some cases, multiple modes may be used to complete any single commute trip, or different modes may be used from day to day. The data shown are the estimated data for the population. The differences between the sample measures and the population estimates are 1) a slight reduction in the mode share of walking in the population estimates in Table 9, and 2) we estimate that more people only cycle to work than only carpool in Table 10 (this order is reversed in the sample data). The first difference, again, is consistent with our belief that summer seasonal YCS employees who are likely to live and work in the Valley (and thus are more likely to walk to work) are under-represented.

Table 9: Estimated Commute Travel Mode Shares for Yosemite Employees

Mode	Number	Percent¹
Drive alone	1,335	52
Walk	654	25
Car or Van pool	504	20
Bicycle	441	17
Transit	215	8
Other	16	1

1. Totals more than 100% because multiple responses allowed.

The most commonly used mode of travel to work was driving alone in the employee’s own vehicle. Over half of Yosemite employees report that driving alone in their own vehicle is a mode they typically use. Reflecting the fact reported above regarding the large number of employees who have very short commute distances (and thus live and work at locations close to each other), 25% report they walk to work, and 17% ride a bike.

Comparing Table 9 to Table 10, while we estimate 52% of Yosemite employees drive alone sometimes, 35% commute to work only by driving alone. Combining driving alone with carpooling is more common than only carpooling. While most people who walk to work only walk, some may also drive alone, ride a bicycle, or take transit. Transit riders in general show the greatest variety in their travel modes to work, combining transit use with all other modes. While 8% of employees take transit to work, only 3% take only transit.

Table 10: Estimated Commute Travel Mode Shares, including Users of Single and Multiple Modes

Mode[s]	Count	Percent
Only Drive alone	833	35
Only Walk	600	25
Drive alone and Car/vanpool	237	10
Only Bicycle	185	8
Only Car/vanpool	175	7
Drive alone and walk	80	3
Bike and walk	72	3
Only Transit	67	3
Drive alone and bike	55	2
Transit, Drive alone, and Car/vanpool	32	1
Transit and walk	24	1
Transit and Car/vanpool	15	1
Transit and Drive alone	11	~0
Transit and Bicycle	3	~0

Based on population estimates, the most frequently cited transit service is the Yosemite Valley shuttle bus—63% of transit users report they use the shuttle. VIA is used by 22% of transit riders, and the remaining transit riders use a Midpines commuter bus service operated by YCS. This service is used by both NPS and YCS employees.

Few Yosemite employees commute to work in a vehicle provided by their employer. Only 6% of people who ever drive to work report they do so in a vehicle provide by their employer. Similarly, only 3% of the people who ever carpool report that the vehicle they carpool in is provided by their employer, and only 6% of people who ever ride a bicycle to work do so on a bicycle provided by their employer.

Employee Parking

Among those employees who either drive alone or car/vanpool to work, most indicate they park wherever they are able. Only a few indicate they have a parking space reserved especially for them. However, many do park in a location that they indicate is reserved for employees in general. The population estimates of the percentages of people who park in different types of locations are identical to the percentages measured by the sample. Among those who drive alone to work, 56% state they park wherever they are able; 41% indicate they park in a space or lot reserved for employees in general; 3% they have a space reserved for them in particular.

Car-pooling or van pooling to work does not currently convey any advantages in terms of reserved parking. Among those who carpool or vanpool, 56% state they park wherever they are able, 39% park in a space or lot reserved for employees, and 5% park in a space reserved for one of the carpool or vanpool members.

Most—62%—of the people who ride a bicycle to work indicate they park it in a bike rack near their workplace; 16% park their bicycle inside their workplace; the remaining 22% park their bicycle wherever they are able.

Trips made in Conjunction with Commuting and Trips to Complete Errands During the Day

Many employees make stops for other personal, familial, and social/recreation activities in conjunction with their commute trips. An estimated 57% of employees make such stops during their commute trips. Among those who do make such stops, they tend to do so many days a week. The mean number of days per week on which stops are made to complete other activities is estimated to be 2.9; the median number of days is 3. One of five of these people state they make such stops everyday they commute.

While most employees do occasionally make trips to accomplish personal errands during their work shift, it is not a large majority. Data on the incidence of trips to accomplish personal errands are summarized in Table 11. Fifty-six percent of employees are estimated to make trips to accomplish personal business and errands during their work shift. Within this group, just over half—53%—make such trips at least a couple days a week, if not everyday. The rest make such trips about once a week or once a month. Most of these trips are made by bicycle (42%), though a nearly equal share of such trips (39%) are made by walking. Thirteen percent are made on bicycle, and the remaining 7% are made by bus.

Table 11: Estimated Incidence of Trip Making to Accomplish Personal Business and Errands

Level	Count	Percent
0. Never	1,109	44
1. Once a month	302	12
2. About once a week	352	14
3. A couple of times a week	500	17
4. Everyday	238	10

Travel for Work

As we described in the Introduction, travel *for work* consists of those trips employees must undertake in the course of completing their work responsibilities which are in addition to travel between their home and workplace. Most Yosemite employees—an estimated 57%—make trips for work. Among those who do travel for work, 61% report that they make such trips on a daily basis; 16%, weekly; and, 23% monthly. Whether an employee makes trips for

work depends on for whom they work. An estimated 81% of NPS employees make trips for work; barely half as many (42%) of YCS employees do so.

The travel modes used to make these trips for work are summarized in Table 12. Most people who make trips for work report doing so by motor vehicle. In contrast to commute trips, most employees who travel for work indicate that employer-provided vehicles are available to them for these trips. Three-fourths of employees who make trips for work report an employer-provided vehicle is available to them to make such trips; most of the other one-fourth report using their own vehicle.

Travel for work generates several vehicle trips in and out of the Valley. We estimate there are 920 employees both work in Yosemite Valley and make trips for work. Of these, most travel out of the Valley for at least some of their trips for work. Only 38% never travel out of the Valley on their trips for work; 27% do so on a monthly basis; 24% weekly; and, 13% daily. We estimate there are 442 employees who both make trips for work and do not work in Yosemite Valley. Among this group, 18% never travel to the Valley for work; 42% travel to the Valley for work on a monthly basis; 16%, on a weekly basis; and, 18% do so more than once a week.

Table 12: Travel for Work Modes

Mode	Estimated number of employees who travel for work	Estimated percent of employees who travel for work ¹
Employer-provided vehicle	1,062	76
Own car or truck	379	27
Walk	326	23
Bicycle	163	12
Yosemite Valley shuttle	133	10

1. Totals more than 100% because multiple responses allowed.

Regardless of where in the park they work, of the 1,402 employees we estimate travel for work, 56% never travel for work to destinations outside the park. Thirty percent travel for work to destinations outside the park about once a month; 9% do so at least once a week.

Commute Travel Mode Alternatives

Employees who commute to work by driving alone were asked whether they would consider using other travel modes to commute to work. Anyone who ever commuted by driving alone—even if they sometimes already use other modes—was asked to respond. As shown above in Table 9, 1,335 employees are estimated to drive alone (as at least one of the modes they use to travel to work).

Most such employees indicate they would be willing to consider commute alternatives: 35% definitely would be willing; 25% would probably consider alternatives. Only 24% of the employees who indicate that driving alone is one of the modes they use to commute to work

would definitely not be willing to consider alternative modes; 15% probably would not. Those people who say they would consider an alternative travel mode are asked which alternative mode they would most likely consider. We estimate that 47% would consider carpooling and vanpooling; transit is the likely alternative by 29%; bicycling or walking is the likely alternative of 24%.

Analysis

In this and following sections, we conduct more detailed analyses. In particular, several aspects of commute travel mode and the alternatives people are willing to consider are related to workplace and residence location. The ability of many employees to act on commute alternatives is likely related not only to these location issues, but also patterns of daily, weekly, and seasonal employment. Issues such as these are explored.

Employee Travel in Yosemite Valley

Commute Trips of Employees who both Live and Work in Yosemite Valley

We first examine employees who both live and work in Yosemite Valley. Both the observed number of people (from the sample) and the estimated number of such people are shown in Table 13. While the survey counted 335 people who both live and work in Yosemite Valley during August and September 1999, we estimate the actual number is likely more than three times greater. Based on these estimates, YCS employs approximately 920 persons who both live and work in Yosemite Valley during the summer. There are approximately 140 NPS and 45 park partner employees who both live and work in the Valley during the summer.

The estimate of the number of YCS employees who both live and work in the Valley are too low when compared to other counts of YCS peak summer employment. According to data provide in planning documents for the Park, YCS provides about 1,167 employee beds in Yosemite Valley during the peak season.¹ The estimates in Table 13 may however be a reasonably accurate representation of the residence/employment location of YCS employees at the time of the survey. YCS employment peaks in the last week of July and first week of August. The questionnaire was not distributed until the second week of August. Thus, not all beds may be filled even at peak and some YCS summer seasonal employees would have already left their employer by the time the survey was conducted. During periods of lower visitation, such as winter, YCS currently provides about 800 employee beds in the Valley.

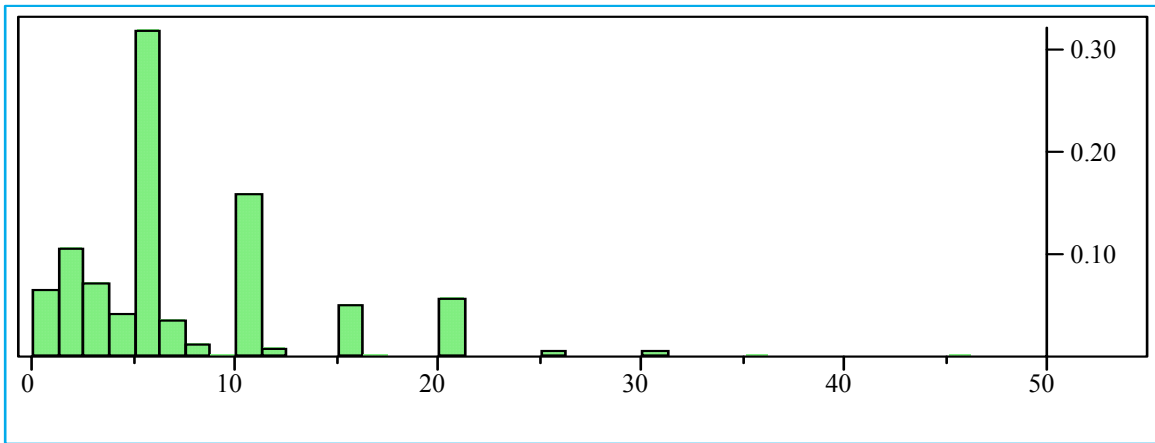
As expected, people who both live and work in Yosemite Valley have commute trips that are short in duration and distance. The distribution of commute trip duration is plotted in Figure 8 and described by the statistics in Table 14. Statistics for the distribution of commute distance are shown in Table 15. In both tables, the reported statistics are based on the weighted data. The “N” is the observed sample size. The “Sum Weights” is the estimate of total employees after the weights are applied.

¹ The bed counts are taken from the Draft Merced Wild and Scenic River Comprehensive Management Plan/EIS, pp. III-215.

Table 13: Number of Employees who both Live and Work in Yosemite Valley

Employer	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
NPS	51	15.2	142	12.8
YCS	274	81.8	921	83.0
park partner	10	3.0	45	4.1
Total	335		1109	

Figure 8: Commute Trip Duration, in Minutes, for Employees who both Live and Work in Yosemite Valley, Percent



The longest commute trip duration among employees who both live and work in Yosemite Valley is 45 minutes, but most report brief commutes. Half the sample reports it takes five minutes or less to travel to work (50th percentile (median) = 5.00); three-fourths report it takes them 15 minutes or less. The mean commute trip duration is skewed upward from the median by a few people—the mean is just a bit over seven minutes. The longest one-way commute distance is four miles. Half the sample reports their commute distance is one-half mile or less. The mean commute distance is three-quarters of a mile.

Table 14: Statistics of the Distribution of Commute Trip Duration, in Minutes, of Employees who both Live and Work in Yosemite Valley.

Quantiles		Minutes
maximum	100.0%	45.00
	90.0%	15.00
quartile	75.0%	10.00
median	50.0%	5.00
quartile	25.0%	3.00
	10.0%	2.00
minimum	0.0%	0.00
Moments		
Mean		7.40
Standard Deviation		11.40
Standard Error Mean		0.35
N		329.00
Sum Weights		1087.95

Table 15: Statistics of the Commute Trip Length, in Miles, of Employees who both Live and Work in Yosemite Valley.

Quantiles		Miles
maximum	100.0%	4.00
	90.0%	2.00
quartile	75.0%	1.00
median	50.0%	0.50
quartile	25.0%	0.10
	10.0%	0.00
minimum	0.0%	0.00
Moments		
Mean		0.77
Standard Deviation		1.44
Standard Error Mean		0.04
N		329.00
Sum Weights		1087.95

As we would expect from the generally very short commute trip distances, walk and bicycle are the most frequently used commute modes. The data shown in Table 16 show that nearly half (46.2% of the weighted count) list walking as their sole mode of commuting to work; another 13.5% list it as one of their commute modes. Seventeen percent list bicycle as their sole commute mode; another 4% list it as one of their commute modes (not counting those already counted as either walking or cycling). While it is not surprising that relatively few

drive to work, it is somewhat surprising that only about 7.5% of employees who both live and work in Yosemite Valley use transit, either solely or in addition to other modes.

Table 16: Commute Mode Distribution of Employees who both Live and Work in Yosemite Valley.

Mode[s]	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
Walk only	138	47	451	46.2
Bicycle only	50	17	168	17.1
Drive alone only	38	13	125	12.8
Bike and walk	19	7	61	6.2
Drive alone and walk	13	4	46	4.7
Transit only	12	4	40	4.1
Drive alone and bike	11	4	36	3.7
Transit and walk	7	2	24	2.4
Drive alone and Car/vanpool	4	1	13	1.3
Car/vanpool only	1	0	3	0.3
Transit and Bicycle	1	0	3	0.3
Transit and Carpool	1	0	3	0.3
Transit and Drive alone	1	0	3	0.3
Total	292		1021.8	

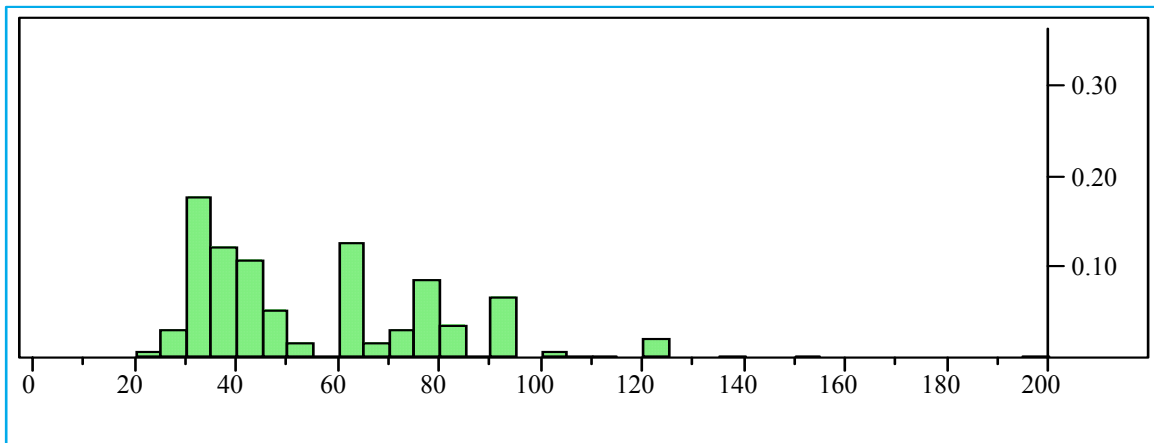
Commute Trips of People Who Work in, but Reside outside, Yosemite Valley

Both the observed (sample) and the estimated number of such employees are shown in Table 17. About one-fifth the sample works in the Valley, but resides outside the Valley. There are an estimated 299 YCS employees in Yosemite Valley who live outside the Valley, 285 such NPS employees, and 96 such park partner employees. The distribution of their commute trip duration is plotted in Figure 9 and described by the statistics in Table 18. Statistics for the distribution of commute distance are shown in Table 19. In both tables, the reported statistics are based on the weighted data.

Table 17: Number of Employees who Work in Yosemite Valley, but Live Outside the Valley

Employer	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
NPS	102	48	285	41.9
YCS	89	42	299	44.0
park partner	22	10	96	14.1
Total	335		679	

Figure 9: Commute Trip Duration, in minutes, for Employees who Work in, but Reside outside, Yosemite Valley, Percent



The longest reported commute trip duration is over three hours. Some employees maintain permanent residences far from the Valley, stay in the Valley during their work-week, then “commute” home on weekends. While these people are not “commuters” in the usual sense, we retain them here simply so that such behavior is represented in this report.²

We estimate that half the employees who commute to jobs in Yosemite Valley take 45 minutes or less to travel to work (median = 45 minutes); the mean commute trip duration is skewed upwards to 56 minutes by the relatively few people with very long commute trip times. The longest reported one-way commute distance is 189 miles, but 90% of employees who work in Yosemite Valley, but live outside the Valley, are estimated to commute distances of 45 miles or less. The mean estimated commute distance is 35 miles.

² The effect of such a few extreme outliers is to inflate the value of the estimates of means and standard deviations. Another reason that the mean and standard deviation are poor measures of commute time and distance is that for every employment center, commute times and distances are distributed in a bi-modal or multi-modal fashion. That is, they will show two or more distinct peaks, rather than a uniform shape. Such multi-modal distributions typically are not well described by measures like the mean. For these reasons, we provide the quantiles, e.g., the median.

Table 18: Statistics of the Distribution of Commute Trip Duration, in Minutes, of Employees who Work in, but Reside outside, Yosemite Valley

Quantiles		Minutes
maximum	100.0%	195.00
	90.0%	90.00
quartile	75.0%	75.00
median	50.0%	45.00
quartile	25.0%	35.00
	10.0%	20.00
minimum	0.0%	20.00
Moments		
Mean		56.30
Standard Deviation		50.16
Standard Error Mean		2.00
N		198
Sum Weights		631.03

Table 19: Statistics of the Commute Trip Length, in Miles, of Employees who Work in, but Reside outside, Yosemite Valley

Quantiles		Miles
maximum	100.0%	189.00
	90.0%	55.00
quartile	75.0%	50.00
median	50.0%	23.50
quartile	25.0%	15.00
	10.0%	14.00
minimum	0.0%	11.70
Moments		
Mean		34.97
Standard Deviation		45.52
Standard Error Mean		1.81
N		198
Sum Weights		631.03

Both commute trip duration and distance distributions are “lumpy” or multi-modal rather than smooth. This is consistent with the actual distribution of potential residence locations,

which are concentrated in and around El Portal, Midpines, and Mariposa. In fact, nearly 80% of this group report they reside in one of these three places (El Portal, 43.4%; Midpines, 11.3%; and, Mariposa, 23.8%).

The long commute trips preclude the use of walking and cycling as commute modes. All commuters in this group commute by motorized modes, and most by only driving alone. The data on commute modes is shown in Table 20. Over half of employees who work in Yosemite Valley, but reside elsewhere—52%—commute to work only by driving alone; another 29% list driving alone as one of their commute modes. Among those who combine driving alone with other modes of travel, carpooling is the most frequent other choice.

Table 20: Commute Mode Distribution of Employees who Work in, but Reside Outside, Yosemite Valley.

Mode[s]	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
Drive alone only	100	51.8	317	51.6
Drive alone and Car/vanpool	47	24.4	147	24.0
Car/vanpool	28	14.5	89	14.5
Transit, Drive alone, and Carpool	8	4.1	26	4.3
Transit	4	2.0	14	2.3
Transit and Carpool	3	1.6	10	1.6
Transit and Drive alone	2	1.0	6	0.9
Drive alone and bike	1	0.5	5	0.7
Bicycle	0	0	0	0
Bike and walk	0	0	0	0
Drive alone and walk	0	0	0	0
Transit and Bicycle	0	0	0	0
Transit and walk	0	0	0	0
Walk	0	0	0	0
Total	193		614	

Total Employee Light-Duty Vehicle Movements in Yosemite Valley

Based on the responses to questions regarding commute travel, personal errands, and travel for work, we can calculate an index of the number of light-duty vehicle (LDV—cars and trucks) trips by employees into and around Yosemite Valley. The index is proportional to the number of people per day making trips in LDVs to, and within, Yosemite Valley. We cannot calculate the actual number of trips because we do not have data on the incidence per day of some trip types.

The components of the index are as follows:

Employees who both live and work in Yosemite Valley;

- Commute trips
- Trips made in conjunction with commute trips

- Trips to accomplish personal business during the work shift

Employees who live outside Yosemite Valley but work in Yosemite Valley;

- Commute trips
- Trips made in conjunction with commute trips
- Trips to accomplish personal business during the work shift

Trips for work by all employees in Yosemite Valley; and

Trips for work made to Yosemite Valley by employees who work outside the Valley

Commute trips are weighted singly (that is we don't multiply by two to account for both the morning and evening trip). At this point, we assume that trips for personal errands, trips for non-commute stops made during the commute trip, and trips for work are each made once on any day that such a trip or stop is made. The index does not count any trips by employees that are not in some fashion connected to their employment. For example, we have no data on trips that employees who live in the Valley make on days they are not working. The results are weighted according to the weights from Table 3.

The index is summarized in Table 17. Based on the available data and the assumptions discussed above and presented in the table, commuting to work is the single largest category of LDV trip, but still appears to account for less than half of all the motor vehicle trips made by Yosemite employees in Yosemite Valley. The index for commute trips made by LDV is between 582 and 645. While most of these trips are made by employees commuting into the Valley, as much as 36% of LDV commute trips are made by employees who both live and work in Yosemite Valley. Still, it appears that employees who both live and work in the Valley make about half as many trips by LDV to commute, to make personal trips associated with commuting, and to run personal errands during the day, as do employees who commute from outside the Valley.

The index for personal errands and trips made in conjunction with the commute trip sums to about 300. As noted below the table though, it is likely that the number of such trips to destinations in the Valley is much lower.

While employees who both live and work in the Valley are less likely to commute to work by LDV, they are as likely to make trips for work by LDV. In total, there are approximately 406 people who work in Yosemite Valley making trips for work by LDV on any given day. Some of these people make only one such trip a day, others (such as law enforcement officers) make trips throughout the day. Despite supplementary data collection efforts, we were unable to obtain estimates of daily trips for work for a large enough sample of Valley employees to provide a more accurate estimate of the daily number of LDV trips for work.

The calculation of the daily index relies on a uniform distribution of trips. That is, all respondents who indicate they make trips of a certain type once a week or once a month, are assumed to make those trips uniformly throughout the week or month. Thus, if 50 people make a personal errand trip once per week, we assume that results in an average of 10 such trips a day. It may be that for some trip types the trips are not uniformly distributed. That is, most employees reporting making a trip once a month may in fact all be making that trip on

the same day. In the extreme (and implausible) case that all employees make all types of trips on the same day, the total index increases from a maximum value of 1,445 to 1,986.

Table 21: Index of Daily Employee-Related LDV Movements in Yosemite Valley

Light-Duty Vehicle Trip Type	Index of Daily Trips
Total for Employees who both live and work in Yosemite Valley	309
Commuter trips ¹	208
Trips made in conjunction with commute trips	65
Trips to accomplish personal business during the work shift	36
Total for Employees who live outside Yosemite Valley but work in Yosemite Valley²	550 to 655
Commuter trips ^{1, 2}	374 to 437
Trips made in conjunction with commute trips ^{2, 3}	143 to 174
Trips to accomplish personal business during the work shift ²	33 to 44
Total Employees making trips for work among those who work in the Valley	406
Total Employees making Trips for Work to Yosemite Valley among those who work outside Yosemite Valley⁴	42 to 75
Total Index	1,307 to 1,445

1. All carpools are assumed to be made up of exactly two people.

2. Range depends on assumptions about how often people who both drive alone and carpool to work chose to do either. The greater the incidence of carpooling, the smaller the number of vehicle trips.

3. It is likely that most, if not all, of the trips made in conjunction with commuting by people who live outside the Valley are made to locations outside the Valley. For example, if they stop to buy groceries, it seems plausible that those people who live in Mariposa would stop at a grocery store in Mariposa, not at a store in the Valley. Contrary to this, the trip estimates shown here assume all stops made in conjunction with commuting are made in the Valley. Thus this row in particular represents an upper boundary on the number of LDV trips made for this purpose.

4. Range depends on how often employees who make trips for work to Yosemite Valley “more than once a week” actually make such trips. The lower number is based on two trips per week, the upper number is based on three trips per week.

Commuter Travel to El Portal, Wawona, and Tuolumne Meadows

Here we examine the commute travel to El Portal, Wawona, and Tuolumne Meadows. No location other than Yosemite Valley, El Portal, Wawona, or Tuolumne Meadows accounts for more than 1% of total employment. Because of the small sample sizes at even the three locations reported here, we repeat our caution that the estimated total counts must be regarded as approximations. However, several consistent trends are observed. Since these trends are also in accordance with what we know about the distribution of potential residence locations and available commute options at each location, our confidence in the results in this section is increased.

El Portal

El Portal is the second largest employment and residential center in the park. The observed (sample) and estimated numbers of employees by employer at El Portal are shown in Table 22. The workforce employed here is predominately made up of NPS employees—we estimate that 92% of the employees at El Portal work for NPS.

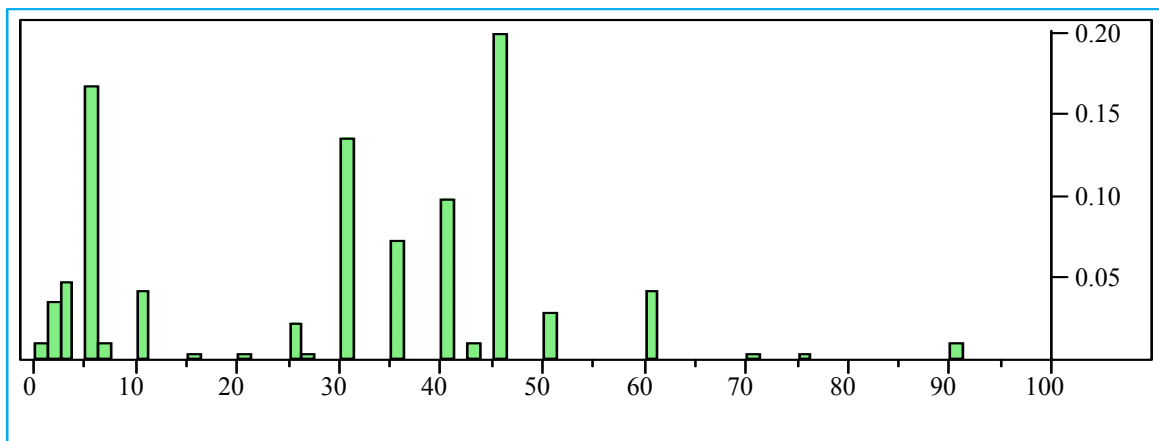
Table 22: Number of Employees who Work at El Portal

Employer	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
NPS	142	0.89	263	92.0
park partner	17	0.11	15	5.2
YCS	1	0.01	8	2.8
Total	160		286	

Most of the employees at El Portal live elsewhere. Thirty-five percent do live in El Portal, but most live in Mariposa (38%) or Midpines (15%). Only 3% commute down from Yosemite Valley; another 4% commute from Wawona or other parts of the park. The remainder commute for towns further west than Mariposa along State Routes 140 or 49.

This split between employees living nearby in El Portal versus further away in other locations is reflected in the commute trip duration and distance data. The distribution of commute trip duration in Figure 10 shows distinct peaks (or “modes”). These correspond to residences located in El Portal, Midpines, and Mariposa. Those people living in El Portal report the duration of their commute trips is 10 minutes or less; those living near Midpines and Mariposa report their commute trips take 30 to 45 minutes.

Figure 10: Commute Trip Duration, in minutes, for Employees who Work in El Portal, Percent



The distinction between “local” and “long-distance” commuters can be seen in the large difference in the value of the median commute duration and the 25th percentile commute duration in Table 23 and commute distance in Table 24. For example, 25% of employees (25th percentile, or “lower quartile”) at El Portal report commute trip duration of only 5 minutes or less. In order to include half the employees (50th percentile), we must jump up to a commute trip duration of 30 minutes. The gap between the lower quartile commute distance and the median commute distance is from 1.5 miles to 22.5.miles.

The data on commute travel modes for employees at El Portal are shown in Table 25. Despite the fact over one-third of employees at El Portal report their residence is also at El Portal, only 8% report they commute to work by walking or cycling. This is in contrast to Yosemite Valley, where two-thirds of people who both live and work in the Valley report they commute to work by walking or cycling.

This difference can be seen in the distributions of commute trip duration and distance between the Yosemite Valley and El Portal. The median commute trip duration of people who both live and work in El Portal is about the same as for those people who both live and work in Yosemite Valley (median_{El Portal} = median_{Yosemite Valley} = 5.0 minutes; mean_{El Portal} = 5.4 minutes, mean_{Yosemite Valley} = 7.2 minutes). However, the people at El Portal are traveling twice as far in this amount of time as are those in Yosemite Valley (median_{El Portal} = 1.0 miles, median_{Yosemite Valley} = 0.5 miles; mean_{El Portal} = 1.5 miles, mean_{Yosemite Valley} = 0.8 miles). The choice of higher speed modes is likely dictated by the fact that the residential areas of El Portal are farther from employment locations than is the case in Yosemite Valley. Also, while the Valley floor is level, there is a hill to climb to the residential facilities at El Portal that may serve as a barrier to cycling and walking.

Table 23: Statistics of the Distribution of Commute Trip Duration of Employees who Work in El Portal.

Quantiles		Minutes
maximum	100.0%	90.00
	90.0%	50.00
quartile	75.0%	45.00
median	50.0%	30.00
quartile	25.0%	5.00
	10.0%	3.00
minimum	0.0%	1.00
Moments		
Mean		28.51
Standard Deviation		26.27
Standard Error Mean		1.56
N		159
Sum Weights		284.13

Table 24: Statistics of the Commute Trip Length, in miles, of Employees who Work in El Portal

Quantiles		Miles
maximum	100.0%	91.00
	90.0%	35.90
quartile	75.0%	32.00
median	50.0%	22.50
quartile	25.0%	1.50
	10.0%	1.00
minimum	0.0%	0.00
Moments		
Mean		19.31
Standard Deviation		22.14
Standard Error Mean		1.31
N		160
Sum Weights		285.98

Faster, motorized travel modes are the dominate commute travel modes to El Portal. Most employees at El Portal commute to work only by driving alone (59%). Another 37% commute by some combination of carpooling, driving alone, and transit. However, transit use is very limited. Only 6% of the people working at El Portal report ever using transit to commute to work. All together, driving alone and carpooling are the modes used by 90% of employees who work at El Portal.

Table 25: Commute Mode Distribution of Employees who Work at El Portal.

Mode[s]	Unweighted Sample		Estimated Population	
	Count	Percent	Count	Percent
Drive alone only	93	60.4	172	62.2
Car/vanpool only	23	14.9	42	15.1
Drive alone and Car/vanpool	21	13.6	36	13.0
Walk only	6	3.9	9	3.3
Bicycle only	2	1.3	4	1.3
Drive alone and walk	2	1.3	4	1.3
Drive alone and bike	2	1.3	3	1.0
Transit only	2	1.3	3	1.0
Bike and walk	1	0.6	2	0.7
Transit and Drive alone	1	0.6	2	0.7
Transit, Drive alone, and Carpool	1	0.6	1	0.3
Transit and Bicycle	0	0	0	0
Transit and Carpool	0	0	0	0
Transit and walk	0	0	0	0
Total	154		276	

Wawona

Wawona is the third largest employment center. According to the estimated population counts in Table 26, there are approximately 250 Yosemite employees working at Wawona. Two-thirds of these employees work for YCS (66.7%); most of the remainder work for the Park Service (30.8%); and the remaining few (2.6%) work for a park partner. We note that for Yosemite Valley and El Portal, the original sample reproduced the correct distribution of the population of employees by employer. Wawona is the first place we observe that weighting the sample produces a substantially different picture of employment. The original sample indicates a nearly 50/50 split in employment between NPS and YCS. The population estimates reproduce the known distribution, which is approximately a 33/66 NPS/YCS split.

Table 26: Number of Employees who Work at Wawona

Employer	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
NPS	47	50.5	60	30.8
park partner	2	2.2	5	2.6
YCS	44	47.3	130	66.7
Total	93		195	

The distribution of commute trip duration (shown in Figure 11 and summarized in Table 27) and commute trip distance (summarized in Table 28) show a sharp distinction in the commute travel times and distance between those who live at Wawona and those who live elsewhere. This is seen in the large difference in values of the median (50th percentile) and the upper quartile (75th percentile). Half the employees at Wawona report commute trip duration of 15 minutes or less. In order to include 75% of employees, we have to jump up to 45 minutes. Half the sample reports their commute distance is 3 miles or less. The 75th percentile jumps up to 26 miles. On average, those who live and work at Wawona commute a distance of 1.3 miles and travel for just over 8 minutes. Those who work at Wawona but live elsewhere commute an average of 29.3 miles, and travel an average of 47 minutes.

As at El Portal, commute travel to Wawona is dominated by automobile based travel modes. The commute mode data in Table 29 show that 59% of employees in Wawona commute to work only by driving alone. Including those other employees who either only carpool or both drive alone and carpool, a total of 82.6% of employees at Wawona commute by automobile. Those people with shorter commute distances do walk or cycle to work. A total of 12.2% percent of employees walk, cycle, or both. Wawona commuters do not have transit options.

Figure 11: Commute Trip Duration, in Minutes, for Employees who Work in Wawona, Percent

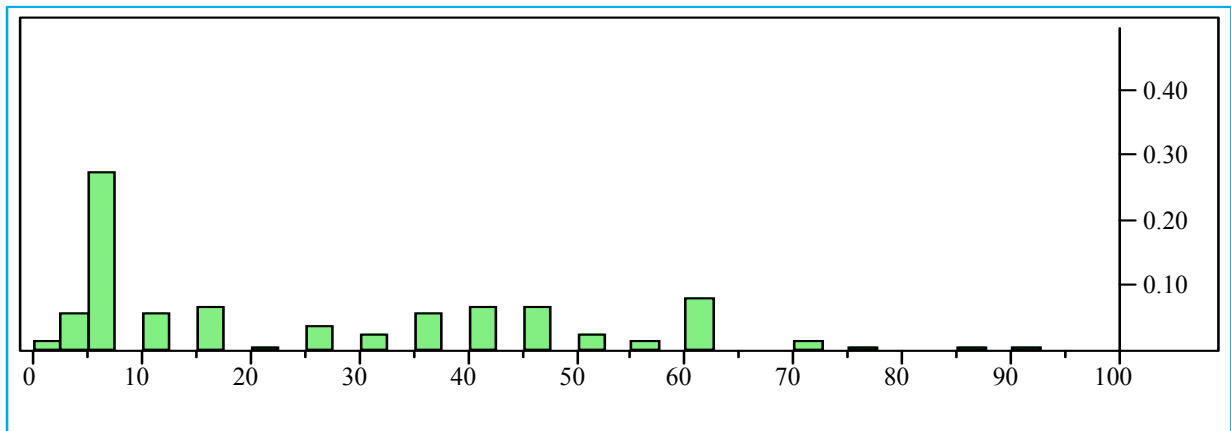


Table 27: Statistics of the Distribution of Commute Trip Duration, in Minutes, of Employees who Work in Wawona.

Quantiles		minutes
maximum	100.0%	90
	90.0%	60
quartile	75.0%	45
median	50.0%	15
quartile	25.0%	5
	10.0%	5
minimum	0.0%	0
Moments		
Mean		28.61
Standard Deviation		34.03
Standard Error Mean		2.433
N		
Sum Weights		195.04

Table 28: Statistics of the Commute Trip Length, in Miles, of Employees who Work in Wawona

Quantiles		miles
maximum	100.0%	75
	90.0%	42
quartile	75.0%	26
median	50.0%	3
quartile	25.0%	1
	10.0%	0
minimum	0.0%	0
Moments		
Mean		16.12
Standard Deviation		26.40
Standard Error Mean		1.89
N		93
Sum Weights		195.04

Table 29: Commute Mode Distribution of Employees who Work at Wawona.

Mode[s]	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
Drive alone only	54	64.3	103	59.0
Drive alone and Car/vanpool	9	10.7	24	13.8
Car/vanpool only	6	7.1	17	9.8
Walk only	4	4.8	12	6.7
Bicycle only	4	4.8	8	4.8
Drive alone and walk	4	4.8	7	3.8
Drive alone and bike	2	2.4	4	2.4
Bike and walk	1	1.2	1	0.7
Transit only	0	0	0	0
Transit and Bicycle	0	0	0	0
Transit and Carpool	0	0	0	0
Transit and Drive alone	0	0	0	0
Transit and walk	0	0	0	0
Transit, Drive alone, and Carpool	0	0	0	0
Total	84		177	

Tuolumne Meadows

Tuolumne Meadows is the fourth largest employment center in the park. The sample counts and weighted estimates of employees for each employer are shown in Table 30. The distribution of employees by employer at Tuolumne Meadows based on the population estimates is very different from the sample profile—even more so than at Wawona. The population estimates correctly reproduce the known distribution of employees by employer, with the exception that there is no way for the weighted data to represent park partner employees since no park partner employee from Tuolumne Meadows returned a questionnaire. This discrepancy has little impact on the results though, since there are so few park partners employed at Tuolumne Meadows. Counts provided by the partners indicate there are only 5 such employees.

Table 30: Number of Employees who Work at Tuolumne Meadows

Employer	Observed Sample		Estimated Population	
	Count	Percent	Count	Percent
NPS	34	69.4	50	28.6
park partner	0	0.0	0 ¹	0.0
YCS	15	30.6	125	71.4
Total	49		175	

1. The count of park partner employees provided by partners themselves is 5. The weighted estimate must be zero since the number of returned questionnaires from park partner employees at Tuolumne Meadows was zero.

The commute trip duration distribution for people working at Tuolumne Meadows is shown in Figure 12 and summarized in Table 31. Their commute trip distance distribution is summarized in Table 32. The distribution of commute trip duration and distance at Tuolumne Meadows is similar in general to the other locations, if more strongly skewed towards both very short and very long commutes times and distances. Half this group reports it takes them two minutes or less to commute to work; three-fourths report it takes 16 minutes or less. Half the group reports their commute to work is one-tenth of a mile or less. In addition to working at Tuolumne Meadows, these people all live there.

Among the 25% of employees who live more than 1.25 miles from work and take longer than 16 minutes to commute, all live in Yosemite Valley, El Portal, Midpines, or Mariposa. They live up to 100 miles from Tuolumne Meadows and can travel for as long as two hours to reach their workplace.

For distributions that are this strongly bi-modal, the mean values are particularly misleading. While the mean commute trip duration shown in Table 31 is approximately 25 minutes, we see from Figure 12 that almost no one actually has a 25 minute commute—most commute trips to Tuolumne Meadows take either much shorter or much longer.

Figure 12: Commute Trip Duration, in minutes, for Employees who Work in Tuolumne Meadows, Percent

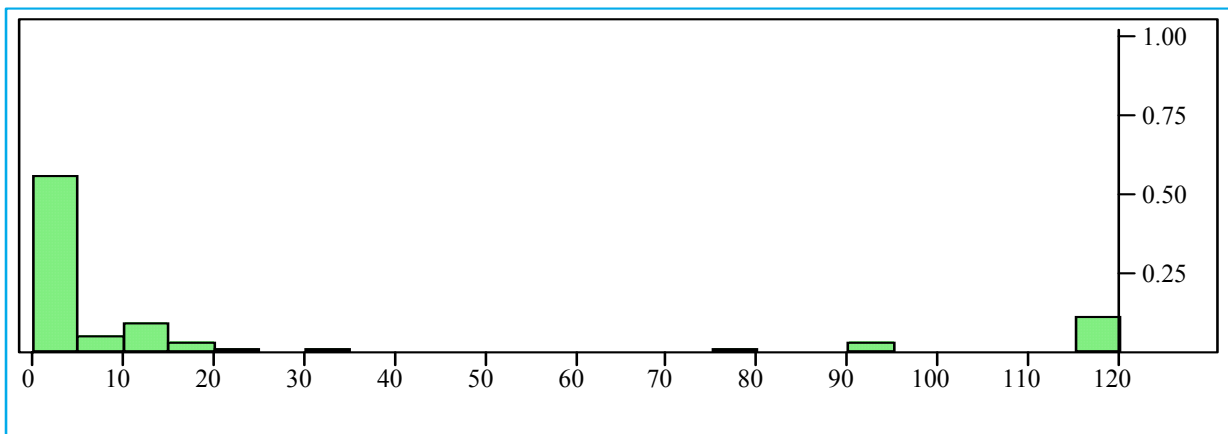


Table 31: Statistics of the Distribution of Commute Trip Duration, in Minutes, of Employees who Work in Tuolumne Meadows.

Quantiles		minutes
maximum	100.0%	120
	90.0%	120
quartile	75.0%	16
median	50.0%	2
quartile	25.0%	1
	10.0%	0
minimum	0.0%	0
Moments		
Mean		23.62
Standard Deviation		81.65
Standard Error Mean		6.17
N		49
Sum Weights		175.00

Table 32: Statistics of the Commute Trip Length, in Miles, of Employees who Work in Tuolumne Meadows.

Quantiles		miles
maximum	100.0%	100.00
	90.0%	75.00
quartile	75.0%	1.25
median	50.0%	0.10
quartile	25.0%	0.00
	10.0%	0.00
minimum	0.0%	0.00
Moments		
Mean		9.57
Standard Deviation		49.77
Standard Error Mean		3.76
N		49
Sum Weights		175.00

Because most employees at Tuolumne Meadows have short commutes, we observe a high portion of commutes made by walking and cycling. The commute mode data are shown below in Table 33. About 61% of employees at Tuolumne Meadows commute to work by

walking, cycling, or both—the vast majority of these by walking. Most long distance commutes to Tuolumne Meadows are made solely by driving alone, though a few long distance commuters combine car pooling with driving alone. There appear to be few employees who combine use the shuttle between Yosemite Valley and Tuolumne Meadows with driving. (This shuttle is not intended primarily for employees, but for tourists.)

Table 33: Commute Mode Distribution of Employees who Work at Tuolumne Meadows.

Mode[s]	Unweighted Observed		Estimated Population	
	Count	Percent	Count	Percent
Walk only	24	53.3	90	58.0
Drive alone only	9	20.0	27	17.4
Drive alone and walk	5	11.1	21	13.6
Drive alone and Car/vanpool	1	2.2	8	5.4
Bike and walk	2	4.4	3	1.9
Bicycle only	1	2.2	1	0.6
Car/vanpool only	1	2.2	1	0.6
Drive alone and bike	1	2.2	1	0.6
Transit, Drive alone, and Carpool	1	2.2	1	0.6
Transit only	0	0	0	0
Transit and Bicycle	0	0	0	0
Transit and Carpool	0	0	0	0
Transit and Drive alone	0	0	0	0
Transit and walk	0	0	0	0
Total	45		155	

Employee Commute Alternatives

The current use of different commute travel modes by the respondents, including alternatives to driving alone, has been described in the section above in which we describe the sample. Here, we further examine the responses to alternative commute modes of those people who currently commute to work by driving alone. People who ever commute by driving alone account for about 52% of Yosemite employees; 35% of Yosemite employees commute to work only by driving alone. We asked the sub-set of people ever drive alone to work whether they are willing to consider alternative travel modes. Their responses are summarized in Table 34.

Only 24.3% of those who ever drive alone to work adamantly refuse to consider alternatives to driving alone. If we exclude those people who already use other modes in addition to driving alone, we see that there is slightly more resistance to alternatives among those who

only drive alone to work. The percentage of who will not consider any alternatives is higher among those who only drive alone to work—28.5%. Still, even among those who only drive alone to work, 60% are favorably inclined to consider alternatives to driving alone to work.

Table 34: Willingness of Employees who Drive Alone to Consider Alternative Modes

Response	Observed Sample	Percent	Estimated Population	Percent
No, I would definitely not consider alternatives to driving alone	117	23.3	298	24.3
Probably no	77	15.3	194	15.8
Possibly yes.	125	24.9	302	24.6
Yes, I would definitely consider an alternative to driving alone	184	36.6	434	35.4
Total	503		1228	

Reasons why Drive-alone Commuters will not Consider Alternative Commute Modes

We proceed by presenting the reasons why some people who drive alone are resistant to commute mode alternatives. We then turn our attention to those who say they are willing to consider alternatives. We present the types of alternatives they are willing to consider and what might be done to encourage them to actually begin to use these alternatives.

Those 117 people who both drive alone to work and state they would not consider commute mode alternatives were asked to provide up to three reasons why they felt committed to driving alone to work. Their responses are summarized in Table 37. These responses are not weighted.

The most frequently cited reason that people were unwilling to consider alternatives to driving alone is the need to fulfill personal, familial, and social obligations either on the way to work, or more typically, after work. This reason is both the first most likely response and the most likely response when added across all three possible responses. Other common responses related to this idea are “Independence, convenience of own car” and “Unable or unwilling to rely on coordinating with others.”

In aggregate though, work schedules are an even more frequently cited reason for not considering an alternative to driving alone. A combined 44% stated that either their work shift was too early or too late, or that their work hours were too variable to allow them to use an alternate to driving alone.

A fairly large number of people who commute solely by driving alone (but a small number of all Yosemite employees) state that their particular vehicle was assigned to them, and that their job responsibilities included such things as emergency response and patrol duties. Some of these people report that they are essentially on duty the moment they enter their vehicle.

Other than the fixed schedule of transit and carpooling (which is implied in many responses), other perceived characteristics of some alternatives, for example travel time and cost, are cited by very few people as reasons why they prefer to drive alone.

Table 35: Reasons Why Alternative Commute Travel Modes Would Not be Considered, number of people providing each reason.

Reason	First Reason	Second Reason	Third Reason	Total
Personal, family obligations after work	17	12	12	41
Work shift (too late, too early)	14	10	4	28
Work schedule varies	16	6	4	26
Vehicle assignment—ranger vehicle, patrol vehicle, etc.	11	11	1	23
Independence, convenience of own car	6	7	8	21
No one with whom to carpool	6	7	3	16
Time to myself	8	4	2	14
Unable/unwilling to rely on coordinating with others	2	2	4	8
Alternatives to driving take too long	5	1	1	7
Preferred alternative not available—no bus service, no bike paths, etc.	0	4	3	7
Safety (personal safety, drive due to darkness)	4	0	2	6
Weather	1	2	2	5
Residence too far from work	3	0	1	4
My vehicle is too small	1	2	0	3
Too much stuff, or specific equipment or tools to transport	1	2	0	3
Alternatives too expensive	1	0	1	2

Preferred Commute Alternatives among those Who Would Consider An Alternative

Here we examine those people who commute to work by driving alone at least sometimes and who would consider an alternative to driving alone.

The travel mode cited by most of these people as their preferred alternative to driving alone is carpool/vanpool. As shown in Table 36, nearly half (47%) of those who showed an inclination to consider an alternative to driving alone chose carpool or vanpool as the alternative they are most likely to consider.

Table 36: Preferred Alternative Commute Travel Mode

Preferred Alternative Travel Mode	Count (Sample)	Percent	Estimate (Population)	Percent
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Carpool or vanpool	175	47.7	413	47.0
Bus	106	28.9	252	28.7
Bicycle	62	16.9	153	17.4
Walk	24	6.5	61	7.0
Total	367		879	

Since some of these people already use other modes (in addition to driving alone) to travel to work, we compare these people to those who only drive alone. The cross-classification of preferred alternative commute travel mode by current modes is shown in Table 37.

It appears as if current experience with alternatives to driving alone shape the preferred commute alternative for all alternatives except possibly transit. Among those who already use a bike or walk, in addition to driving alone, 53% choose bike or walk as their preferred commute alternative. Carpooling is the favored alternative to driving alone of 68% of those who already carpool.

It is difficult to draw any conclusions about the preferred alternative of those who already use transit, in part because there are so few such people. The available data suggests that among those who currently commute by either driving alone or transit, carpooling is most frequently cited as the preferred alternative. However, people with experience with driving alone, transit and carpooling, overwhelmingly choose transit as their preferred alternative.

Among those who currently only drive alone, carpooling or vanpooling is the most frequently cited preferred alternative. But, these alternatives are not runaway favorites. Forty-five percent of those who now only drive alone cite carpooling or vanpooling as their preferred alternative; 32% cite transit; and 23%, walking or cycling.

Table 37: Preferred Alternative Mode by Current Commute Travel Modes

Current Commute Mode[s] Count Row Percentage	Most Preferred Alternative Mode			Total
	Bike or Walk	Car or Vanpool	Transit	
Drive alone, only	126 22.60	251 44.97	181 32.44	558
Drive alone, and bike or walk	44 52.71	28 33.81	11 13.48	83
Drive alone and Car/vanpool	10 5.18	127 67.98	50 26.84	187
Drive Alone and Transit	3 31.13	6 51.71	2 17.16	11
Drive alone, and Transit or Car/Vanpool	0 0.00	3 18.33	12 81.67	15
Total	183	414	257	853

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	110.661	<.0001
Pearson	110.861	<.0001

Some of the variation in whether people choose motorized or non-motorized alternatives is explained by where they currently live and work. As shown in Table 38, people who live and work in different places are far more likely to suggest motorized modes—and automobile based modes in particular—as their most favored alternative to commuting by driving alone. Of the estimated 622 people who drive alone to work (and possibly use other modes), who would consider an alternative to driving alone, and who live and work in different places, 60% choose carpooling as their preferred alternative, 36% choose transit, and 5% choose walking or cycling. Some of those in this situation who say they would like to walk or bike are not in a position to do so without a change in work or housing locations. Among those who both live and work at El Portal, Yosemite Valley, or Wawona, the preferred alternative of most is walking or cycling.

In general, it is possible to estimate a single model that contains more than one explanatory variable, i.e., we could estimate a model that expresses the preferred commute alternative as a function of both current commute modes and workplace/residence location. As a practical matter though, there are too few transit riders for us to estimate a valid model. Based on Tables 37 and 38, we conclude that current conditions—commute travel modes, residence location, and workplace location—are important determinants of people’s preferred alternative to driving alone. We are unable to determine which—location or mode—matters most, and certainly, the two are related. For example, employees at Wawona cannot have experience with transit, and those who live and work at the same location prefer to walk or ride a bike. Overall, it appears as if most Yosemite employees who now drive alone to work

are willing to consider alternative travel modes, even if they now commute exclusively by driving alone.

Table 38: Preferred Alternative Mode by Residence and Workplace Location

Residence/Workplace	Preferred Alternative to Driving Alone			Total
	Bike or Walk	Car/Vanpool	Transit	
Count				
Row %				
Different Places	30 4.76%	371 59.67%	221 35.57%	622
El Portal	39 57.52%	12 17.78%	17 24.71%	67
Tuolumne Meadows	3 18.75%	10 62.49%	3 18.75%	16
Wawona	26 67.08%	4 10.97%	8 21.95%	39
Yosemite Valley	133 76.19%	25 14.17%	17 9.64%	174
Total	230	422	266	918

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	458.573	<.0001
Pearson	459.926	<.0001

Among those who already use some mode in addition to driving alone, their current alternate mode is chosen by most as their preferred alternative. Carpool and vanpool are the most frequently chosen preferred alternatives. This choice may reflect a desire to maintain as much flexibility as possible. We note that we found no difference in the distribution of preferred alternatives by employment location. We anticipated that we might have found differences based on the fact that transit is a realistic option only at El Portal and Yosemite Valley.

What Would Encourage Use of Alternative Commute Travel Modes?

For the alternative commute travel mode they indicated they were most likely to consider, respondents were asked what would encourage them to actually use that alternative. The data are summarized in Table 39. These responses are not weighted.

A guaranteed ride home in the event of an emergency or last minute change in work schedule was cited by two-thirds of all people who selected carpooling or vanpooling as their preferred alternative to driving alone. About 40% wanted help identifying people with whom to carpool or vanpool. Concern over scheduling constraints implied in these two answers, and made explicit in the third most frequent response—a change of work hours—far outweighed comparative travel costs between driving alone and carpooling or vanpooling.

The fixed schedule and routes of transit service were the foremost concerns of people willing to consider transit. More frequent buses (72%) and stops located close to home (49%) and work (38%) were the things most commonly cited as features that would encourage transit use. Potential transit riders indicate they also would like to see low fares. A third of potential bus riders said a guaranteed ride home would encourage them to take transit to work.

The most commonly cited factors that would encourage potential bike riders were infrastructure for bicycles—more paths (32%), more secure place to lock bikes (29%) and shower and locker facilities (24%).

Change of work hours, a guaranteed ride home, and a vehicle available for trips for work were the three most commonly cited factors that would encourage walking to work among those who stated that walking would be their preferred alternative to driving alone.

Table 39: What would encourage use of commute alternatives, count.

Carpooling and Vanpooling, total number:		175
•	Guaranteed ride home in the event of emergency or last minute change in work schedule	117
•	Assistance finding people with whom to carpool or vanpool	74
•	Change of work hours	33
•	Analysis of travel costs that showed whether carpooling saved me money	29
•	A vehicle available to me to make trips for work during the day	19
•	Preferential parking	15
•	Change of work days	10
•	Childcare facilities near workplace	10
Transit, total number:		106
•	More frequent bus service	76
•	Bus stop near home	52
•	Reduced fares	41
•	Bus stop near work	40
•	Guaranteed ride home	36
•	Information on routes and schedules	20
•	Analysis showing whether transit would save me money	9
•	A vehicle available to make trips for work during the day	7
•	Change to work hours (to coordinate with bus schedule)	6
•	Childcare near work	3
•	Fee to park automobile at work	1
•	Change work days	1
•	Residence location moved from Yosemite Valley, but workplace remained	1
Bicycle, total number:		62
•	Bike paths or routes connecting residence to workplace	20
•	Secure place to lock bicycle at workplace	18
•	Showers and lockers at workplace	15
•	Guaranteed ride home	10
•	Capability to put bicycle on bus for part of trip	9
•	Vehicle available to me to make trips for work	9
•	Change to work hours (daylight)	6
•	Bicycle repair facility at workplace	5
•	Seminars on safe riding	2
•	Analysis showing cost savings	2
•	Change to work days	1
•	Childcare facility near workplace	1
Walk, total number:		24
•	Change to work hours	4
•	Guaranteed ride home	4
•	Vehicle available for trips for work	4
•	Childcare facilities near work	2
•	Showers and lockers at workplace	1

State Route 140/El Portal Road Analyses

In the next two sections, we present analyses of Yosemite employee travel along the State Route (SR) 140 and El Portal Road corridor.³ First, we perform a “constraints analysis” to identify the potential number of riders of an employee commute bus service. In a constraints analysis, a set of restrictive assumptions are applied to eliminate items that are unlikely to belong to a desired sub-set. In this case, we apply a series of assumptions in logical steps to exclude Yosemite employees who are unlikely to be able to use a commute bus service on SR140/El Portal Road. Those employees not excluded by the constraints could use such a service. Whether they would, will depend on the specific design, e.g., schedule and stops, of the system and other factors, e.g., whether any prospective bus rider must also make stops in conjunction with their commute trip to engage in other activities. Second, we estimate the proportion of traffic on this road that is due to Yosemite employee commute trips.

Yosemite Employee Commuter Bus “Constraints” Analysis

In this section we estimate the potential transit riders among Yosemite employees who commute along SR 140/El Portal Road for people working in the park. We initially focus on the results from our sample while we describe our constraining assumptions. We then estimate the total potential commute bus riders, we calculate an estimated total number based on the weights from Table 3 above.

Assumptions about potential commute bus users

Potential commute bus riders are assumed to meet the following conditions. First, they currently commute along SR 140/El Portal Road. Thus, they work in Yosemite Valley, in El Portal, or at the Arch Rock Entrance Station. They live along either SR 140/El Portal Road or SR 49 north or south of the town of Mariposa. Second, they have work hours that are both fairly regular from day to day, and fit within a timeframe in which many other Yosemite employees commute.

The effects of progressively applying these assumptions are summarized in Table 40. We do this in order to show how each assumption, in progression, defines potential bus ridership. We start with the location assumption since we believe it is the most restrictive. That is, someone with irregular work hours might ride a bus on a day their schedule matches the bus schedule, but we assume they will not drive out of their way to do so.

³ At the park boundary, SR 140 ceases to be a state highway and becomes a federal lands highway. Outside the park, the road is SR 140, inside the park it is known as El Portal Road.

Table 40: Sequential Derivation of Estimate of Potential Number of Commute Bus Users

	Number	Percent
Total Sample Size	961	100
Live and work along SR 140/El Portal Road	661	69
Do not live and work at same location	270	28
Work relatively fixed schedules	237	25
Both start work between 7:00 and 8:30, and end work between 16:30 and 17:30	161	17
Permanent employees	131	14

Workplace and Residence Location

Assumption 1. We first select people who live and work along the SR 140/El Portal Road corridor. These 661 people make up 69% of the sample. The distributions of their workplace and residence locations are shown in Table 41.

Assumption 2. Next, we assume that since many of these people both live and work in either El Portal or Yosemite Valley, they are not part of the potential market for a commuter bus service, and they are excluded from further analysis. This reduces the number of people in our sub-set to 270. The distribution of people who both live and work in El Portal or Yosemite Valley, as well as those who live and work in different places is shown in Table 42. The residence and workplace locations of the 270 persons who do not both live and work in El Portal or Yosemite Valley are shown in Table 43.

We see in Table 43 that very few people who live in Yosemite Valley commute out of the Valley on a regular basis—only 3% of our sample of Yosemite employees do so. A similarly small number of people live further away from the park than the town of Mariposa—only 3% of the sample lives in Catheys Valley, Merced, Mt. Bullion, Bootjack, or Ponderosa Basin.

The residence and workplace location data in Table 43 is cross-classified in Table 44 to show the locations between which people are commuting. All locations further from the park than Mariposa are collapsed into a single category (“beyond Mariposa”) based on the small number of people who commute to the park from these locations. Also, those people reporting the Arch Rock Entrance Station is their workplace are included either with the Yosemite Valley employees (if their residence is outside the park) or the El Portal employees (if their residence is in Yosemite Valley).

Table 41: Workplace and Residence Locations of those Yosemite Employees who both Live and Work along SR 140/El Portal Road.

Workplace Location	Count	Percent	Residence Location	Count	Percent
Yosemite Valley	505	76	Yosemite Valley	343	52
Arch Rock Entrance	7	1	El Portal	150	23
El Portal	149	23	Incline	1	0
			Indian Flat	1	0
			Midpines	46	7
			Mariposa	108	16
			Catheys Valley	3	0
			Merced	1	0
			Mt. Bullion	1	0
			Bootjack	6	1
			Ponderosa Basin	1	0
Total	661	~100		661	~100

Table 42: Number of People who Live and Work in the Same or Different Places.

Both live and work in Yosemite Valley	335
Both live and work in El Portal	56
Live and work in Different Places	270

Table 43: Residence and Workplace Locations of those Yosemite Employees who both Live and Work along SR 140/El Portal Road, but not at the Same Location.

Workplace Location	Number	Percent	Residence Locations	Number	Percent
Yosemite Valley	170	63	Yosemite Valley	8	3
Arch Rock Entrance	7	3	El Portal	94	35
El Portal	93	34	Incline	1	0
			Indian Flat	1	0
			Midpines	46	17
			Mariposa	108	40
			Catheys Valley	3	1
			Merced	1	0
			Mt. Bullion	1	0
			Bootjack	6	2
			Ponderosa Basin	1	0
Total	270	~100		270	~100

Table 44: Residence by Workplace Locations.

Residence	Workplace ¹		Total
	El Portal	Yosemite Valley	
Beyond Mariposa ²	5	8	13
Mariposa	59	49	108
Midpines	24	23	47
El Portal	0	94	94
Yosemite Valley	8	0	8
Total	96	174	270

1. People working at Arch Rock are classified as working at El Portal if they live in Yosemite Valley. They are classified as working in Yosemite Valley if they live in El Portal.

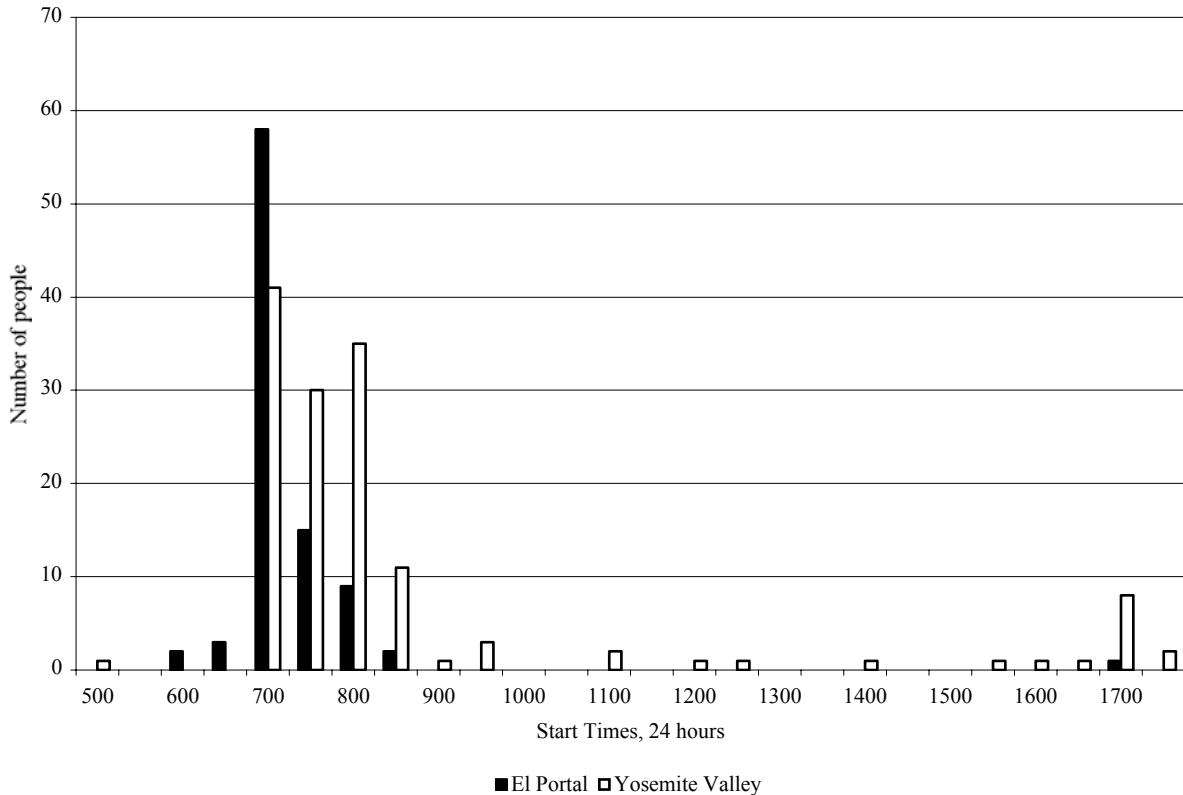
2. Locations classified as being beyond Mariposa are Catheys Valley, Merced, Mt. Bullion, Bootjack and Ponderosa Basin.

The largest number of commuters traveling between any two points is the group of 94 people who commute from El Portal to Yosemite Valley. The total number of people commuting from the town of Mariposa is larger, but their work locations are split between El Portal and Yosemite Valley.

Assumption 3. Among this sub-set of 270 people, 33 of them indicate they have no fixed worked schedule. Twenty-six of these people state their work hours vary from day-to-day; 7 state their hours vary from week-to-week. In particular, all the employees at the Arch Rock Entrance Station indicate their work hours are variable on a day to day basis. So, while their workplace lies directly on SR 140/El Portal Road, their use of a bus service might be sporadic. If we eliminate all people with variable work hours from further consideration, then 237 people are left as potential commute bus users. The distribution of the time of day of work start and end times for 230 of these 237 people are shown in Figures 13 and 14. (Either the start or end time is missing for seven respondents.)

Assumption 4. Most employees (in the sub-set selected so far) at both El Portal and Yosemite Valley start work between 7:00 and 8:30. Most of these employees end work between 16:30 and 17:30. It would be expensive (per rider) to provide bus-based transit service to anyone who starts or ends work outside these times. If we select only those people who both start and end their work shifts within the morning and evening periods just defined, then our sample of potential commute bus users is 161 people, or 17% of the total sample of respondents.

Figure 13: Distribution of Work Start Times among Potential Commute Bus Riders



Permanent and Seasonal Employees

The sample defined so far as the potential market for an employee commute bus service is made up of a disproportionately large percentage of permanent employees. Across the whole sample, approximately two-thirds of respondents indicated they were permanent employees. Within this potential commute bus market, 81% are permanent employees. This increase is due primarily to the exclusion of people who live and work at the same location from the potential commute bus market. That is, seasonal employees are much more likely than permanent employees to live and work at the same location, in particular Yosemite Valley.

Estimating the Total Number of Potential Commute Bus Riders

Applying the appropriate weight to each of the 161 people left in our sub-sample, we estimate that 399 Yosemite employees are in the potential SR140/El Portal Road commute bus user group.

Assumption 5. Not every employee commutes to work every day. If we multiply each employee by the proportion of weekdays per week they commute to work, we can estimate daily, weekday, commute trips.

This final calculation results in an estimate of 361 riders per weekday. The distribution of these people by employer is shown in Table 45. This amounts to approximately 17% of the total number of employees currently working at El Portal or in Yosemite Valley.

Figure 14: Distribution of Work End Times among Potential Commute Bus Riders

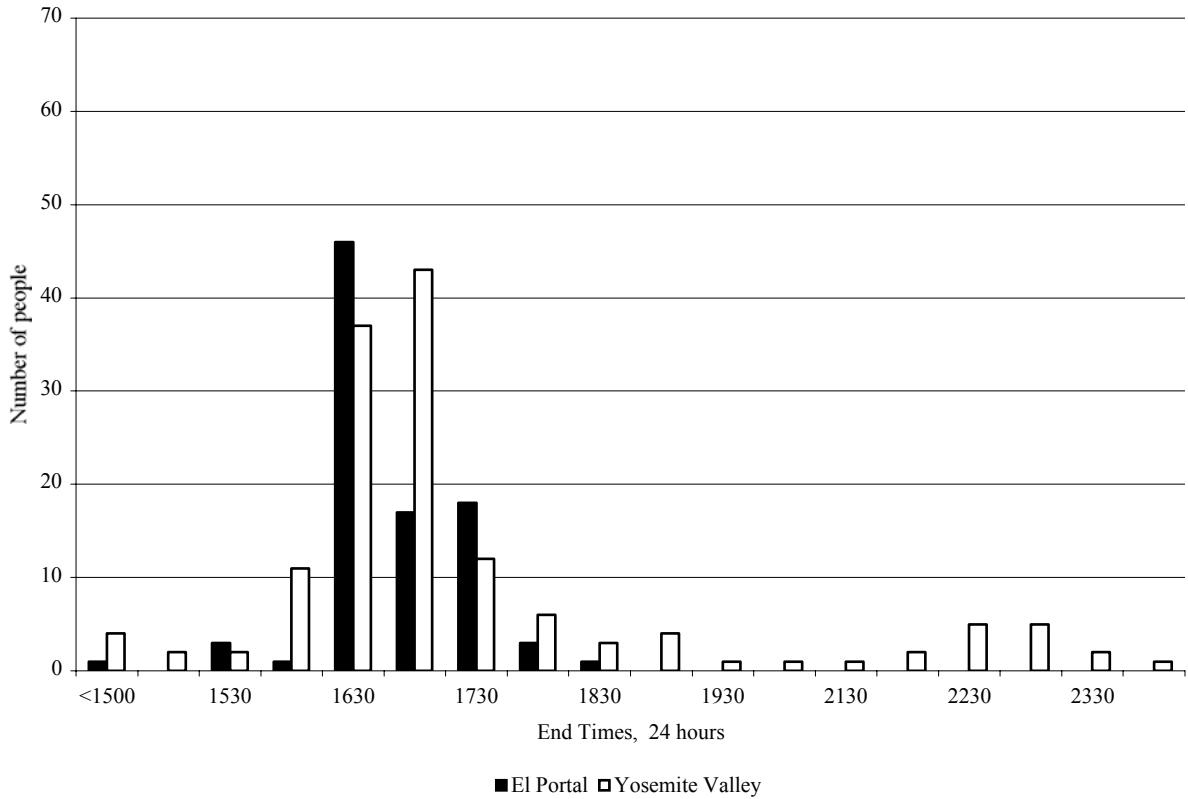


Table 45: Potential SR140/El Portal Road Commute Bus Riders by Employer

	Total potential riders		Potential riders per weekday	
	Number	Percent	Number	Percent
NPS	283	71.0%	256	71.0%
YCS	87	21.9%	79	21.8%
park partners	28	7.0%	26	7.2%
Total	399	~100%	361	~100%

The distribution of workplace, work start time, and residence location is shown in Table 46. This table can be used to judge when and where people might board a bus for their morning commute. The distribution of workplace, work end time, and residence is shown in Table 47. That table can be used to judge when and where people might board a bus for their evening commute.

The data in Tables 46 and 47 suggest that buses running on half-hour headways during the morning and evening commute periods could accommodate the schedules of many Yosemite

employees who work at El Portal and in Yosemite Valley. There are a few employees who state they start or end work on quarter-hours. It is not known how much flexibility these people have to arrive at, or leave from, work a few minutes earlier or later so as to catch a bus departing near the half-hour or hour. Further, because many people arrive and depart El Portal and Yosemite Valley at the same time, it may be desirable to have separate bus arrivals and departures at the same time at both locations, that is, one bus arriving (or departing) El Portal at the same time another bus is arriving (or departing) Yosemite Valley.

Finally, we reiterate that a constraint analysis of the type performed here simply removes some people from further consideration based on a set of assumptions. Those 399 employees who we estimate remain in our sample may have reasons other than residence and workplace location or work hours for not choosing transit. Conversely, some people might be willing and able to negotiate relatively small changes in their working hours in order to become commute transit riders.

Table 46: Workplace, Work Start Time and Residence Location

Workplace	Work Start Time	Residence	Observed Counts	Population Estimates
El Portal	700	Midpines	10	17.4
El Portal	700	Mariposa	39	67.8
El Portal	700	beyond Mariposa	2	3.3
El Portal	730	Midpines	6	9.3
El Portal	730	Mariposa	5	8.3
El Portal	730	beyond Mariposa	1	1.9
El Portal	800	Midpines	1	1.9
El Portal	800	Mariposa	6	8.2
El Portal	800	beyond Mariposa	1	1.9
El Portal	830	Midpines	2	1.6
Yosemite Valley	700	El Portal	10	23.2
Yosemite Valley	700	Midpines	5	11.7
Yosemite Valley	700	Mariposa	11	27.4
Yosemite Valley	700	beyond Mariposa	1	2.8
Yosemite Valley	715	El Portal	1	2.8
Yosemite Valley	730	El Portal	13	35.2
Yosemite Valley	730	Midpines	3	10.1
Yosemite Valley	730	Mariposa	4	12.2
Yosemite Valley	730	beyond Mariposa	1	3.4
Yosemite Valley	745	El Portal	1	3.4
Yosemite Valley	745	Mariposa	1	2.0
Yosemite Valley	800	El Portal	16	43.3
Yosemite Valley	800	Mariposa	11	31.4
Yosemite Valley	800	beyond Mariposa	1	3.4
Yosemite Valley	830	El Portal	6	16.6
Yosemite Valley	830	Midpines	2	6.1
Yosemite Valley	830	Mariposa	1	4.5
Total			161	361.1

Locations “beyond Mariposa” are Catheys Valley, Merced, Mt. Bullion, Bootjack, and Ponderosa Basin.

Table 47: Workplace, Work End Time, and Residence Location

Workplace	Work End Time	Residence	Observed Counts	Population Estimates
El Portal	1630	Midpines	8	14.4
El Portal	1630	Mariposa	32	56.2
El Portal	1630	beyond Mariposa	2	3.7
El Portal	1645	Mariposa	1	1.9
El Portal	1700	Midpines	8	10.8
El Portal	1700	Mariposa	5	8.3
El Portal	1700	beyond Mariposa	1	1.9
El Portal	1730	Midpines	3	4.8
El Portal	1730	Mariposa	12	17.9
El Portal	1730	beyond Mariposa	1	1.5
Yosemite Valley	1630	El Portal	12	26.6
Yosemite Valley	1630	Midpines	6	17.4
Yosemite Valley	1630	Mariposa	15	39.9
Yosemite Valley	1630	beyond Mariposa	3	9.5
Yosemite Valley	1645	El Portal	1	3.4
Yosemite Valley	1645	Mariposa	1	2.0
Yosemite Valley	1700	El Portal	30	82.4
Yosemite Valley	1700	Midpines	3	8.3
Yosemite Valley	1700	Mariposa	7	21.0
Yosemite Valley	1715	Mariposa	1	4.5
Yosemite Valley	1730	El Portal	4	12.3
Yosemite Valley	1730	Midpines	1	2.2
Yosemite Valley	1730	Mariposa	4	10.0
Total			161	360.9

Locations “beyond Mariposa” are Catheys Valley, Merced, Mt. Bullion, Bootjack, and Ponderosa Basin.

Current SR 140/El Portal Road Commuters and their Assessment of Commute Travel Alternatives

In this section, we describe some of the characteristics of the 161 respondents who now represent our “potential commuter transit market” according to the assumptions outlined in

the previous sections. Data on employer and work location are summarized in Table 48.⁴ (This discussion was presented for all survey respondents in the prior section on Employee Commute Alternatives.)

Table 48: Employer and Work Location, Percent of each Sub-set Working at each Location, percent

	Potential Commuter Transit Market as defined by this analysis (n = 161)		Sample of all employees who work at El Portal, Arch Rock, or Yosemite Valley (n = 711)	
	Workplace			
Employer	El Portal	Yosemite Valley	El Portal	Yosemite Valley
NPS	94.5%	65.8%	90.5%	28.0%
park partner	5.5%	5.7%	8.9%	5.7%
YCS	0.0%	29.6%	0.6%	66.4%

NPS employees are somewhat more likely to be included in the commute bus ridership estimate because they are more likely than YCS employees to both work at El Portal and to live and work at different locations. That is, comparing the columns for El Portal in Table 48, it is clear that the reason so much of the potential transit market to El Portal is made up of NPS employees is that virtually all employees at El Portal work for the Park Service. In the case of Yosemite Valley, YCS employees are not a large part of the commute transit ridership estimate because they are more likely to already be living in Yosemite Valley.

Few of the potential commute bus users (5%) said they currently take transit to work. Those who do say they use either VIA or the YCS-operated Midpines commuter service. The other 95% of the potential market drive alone (47%), carpool (25%), or both (23%).

Among those who do not use transit to commute to work, nearly two-thirds stated they definitely (35%) or probably (30%) would consider an alternative to their current commute mode. However, only 38% indicated that a bus service would be their preferred alternative. Most people indicated that carpooling (either at all for those who drive alone, or carpooling more often for those who already carpool) would be their preferred alternative.

Among those who indicated that transit was the alternative they preferred, the most desired features of such a service were frequent buses, stops near home and work, low fares and a guaranteed ride home in the event of an emergency or last minute change in work departure time. Responses to this question are summarized in Table 49. Changes at the workplace, for example, changes to work hours or work days, the provision of daycare at or near work, paid parking at work, and employer-provided vehicles in the event of the need to make trips for work, do not appear to be productive strategies to encourage transit use—at least among the small number of people who answered this question.

⁴ All data in this section represent the unweighted sample.

Table 49: What would cause those interested in a bus to work to use it?

	Number (out of 41 respondents)
Frequent bus service	28
Bus stop near workplace	20
Bus stop near home	19
Guaranteed ride home	15
Reduced fare for riding bus	14
Information on bus routes and schedules	9
Changes in work hours	3
Childcare facilities at or near work	2
Vehicle available to make trips for work	2
Travel cost analysis	2
Paid parking at work	1
Changes in work days	0

Yosemite Employee Traffic on SR 140 and El Portal Road

In this section, we identify the employee commute traffic along SR 140 and El Portal Road, and compare this to both the total amount of traffic and the time of day distribution of park visitor traffic. Employee commute traffic levels and time of day distribution are estimated from the employee commute survey data. Estimates of total traffic come from the California State Department of Transportation (Caltrans). Time of day distribution of Yosemite visitor traffic is estimated from employee visitor data collected by ITS-Davis⁵ and by the consultant to the Yosemite Area Regional Transportation Strategy (YARTS).⁶

Total traffic on SR 140 and El Portal Road

Estimates of the peak month average daily traffic (ADT) and annual ADT for all traffic counter locations on state highways are available from a Caltrans web site.⁷ Data are not currently available from the Park Service for El Portal Road. In the vicinity of Yosemite National Park along SR 140, Caltrans counts traffic at Briceburg Station, the intersection of SR 140 and Foresta Road, the intersection of SR 140 and a local road also named “El Portal

⁵ Kurani, K.S, T. Turrentine, L. Dantas and P.P. Jovanis. (1997) *Yosemite Area Traveler Information (YATI) System User, Institutional, and System Performance Evaluations for the July 1996 to June 1997 Field Operational Test*. Report to the Merced County Area Governments and the YATI Management Board. Institute of Transportation Studies, University of California: Davis, California. Report Number UCD-ITS-RR-97-14.

⁶ Nelson\Nygaard (1998) *Working Paper III-2 Summer Data Collection. Yosemite Area Regional Strategy Major Investment Study*. Report to the Yosemite Area Regional Transportation Strategy Management Board.

⁷ <http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/>

Road,⁸ and at the park boundary. Data for 1999 are not yet available on the Caltrans web site. Therefore, data from the peak month of 1998 will be used as an estimate of the traffic level that corresponds to the period of employee data collection, i.e., August and September 1999. The Caltrans data are shown in Table 50. For counts along SR 140 in the vicinity of the park, the peak month is likely to be either July or August given the known seasonal distribution of tourist travel to the park.

The counter at Briceburg Station (postmile 34.07) will count all employee traffic between Midpines (and all communities further west) and both El Portal and Yosemite Valley. It will also capture tourist traffic headed to the park, service traffic headed to the park, as well as some local travel that will not end, or did not originate, in the park. In addition to other traffic on the road, the counters at Foresta Road (postmile 4.17) and El Portal Road (postmile 50.32) will capture employees who work at the Park Service administration facilities in El Portal as well as those who live in the Park Service residential facilities in El Portal and work in Yosemite Valley.

Table 50 : Estimated Traffic on SR 140 near the Yosemite National Park Boundary, Caltrans data from 1998.

SR 140 Postmile ¹	Description	West Peak Month ADT ²	West Annual ADT	East Peak Month ADT	East Annual ADT
34.07	Briceburg Sta.	2,450	1,800	2,200	1,600
48.17	Foresta Road	2,200	1,600	2,250	1,600
50.32	El Portal Road	2,250	1,600	2,700	1,900
51.80	Park Boundary	3,750	2,650	— ³	— ³

1. Postmile 0.00 is at the Merced/Mariposa County line.

2. ADT—average daily traffic

3. Data is not collected in the east-bound direction (entering the park) at this counter.

Finally, the counter at the park boundary (postmile 51.80) will count all vehicles—employee, visitor, and service—leaving the park. Caltrans does not count vehicles entering the park at this point. Between Briceburg Station and the park boundary there is almost no opportunity for traffic to leave SR140. That is, any vehicle passing either the Briceburg Station or El Portal Road counter must either pass the other counter too, or turn around and pass back through the original counter. Only Foresta Road offers a bypass, and it is a very unlikely route for either employee or visitor traffic.

The counter at Briceburg Station will be used to estimate total traffic on SR 140 for purposes of comparing Yosemite employee commute traffic between El Portal and Midpines, Mariposa, and the other communities along SR 140 and 49. The counter at the intersection of

⁸ This local road should not be confused with the main highway. The intersection of SR 140 and the local El Portal Road is at postmile 50.32 on SR 140. The counter at the park boundary (where SR 140 changes name to El Portal Road) is located at postmile 51.80.

SR 140 and the local road named “El Portal Road” at postmile 50.32 will be used to estimate total traffic on SR 140/El Portal Road between El Portal and Yosemite Valley.

Yosemite Employee Commute Traffic on SR140/El Portal Road

The estimation of the amount of traffic due to Yosemite employee who commute on SR 140/El Portal Road must account for employees’ travel mode as well as their residence and workplace location. Residence and workplace location establish both ends of each commute trip, and thus, direction. The distribution of the estimated number of Yosemite employees who commute along SR 140/El Portal Road by travel mode and direction of their morning (or shift start) commute is shown in Table 51.

Table 51: Yosemite Employees who Commute on SR 140/El Portal Road by Travel Mode and Direction of Morning Commute, number

Mode	Direction of morning (or shift start) commute on SR140/El Portal Road	
	East	West
Only Carpool	129	0
Only drive alone	322	11
Both carpool and drive alone	150	0
Transit	23	0
Transit or carpool	10	0
Transit or drive alone	7	0
Transit, carpool, or drive alone	31	0
Total	671	11

Based on our survey results, we estimate very few people commute westbound to El Portal from the direction of Yosemite Valley. This includes a small number of people who commute from Yosemite West and Wawona. Because there are so few Yosemite employees commuting westbound (in the morning) to El Portal, we will not consider them further.

Calculating the number of vehicles used by the 671 employees who commute eastbound on SR 140/El Portal Road in the morning requires counting the number of drive alone vehicles and buses, as well as estimating the number of carpool vehicles.

To estimate the number of carpool vehicles a number of intermediate assumptions are necessary. Most important, we need to know the occupancy of carpool vehicles and the number of days per week that each travel mode is used by people who indicate they use more than one mode. First, all carpools are assumed to contain exactly 2 people. This assumption means we will overestimate the number of carpool vehicles (if the average occupancy of carpools is much above 2). But it also means we cannot underestimate the number of carpool vehicles. Second, the largest number of Yosemite employee vehicles will be obtained by assuming that all people who ever drive alone do so on the same day, and that among those

people who use transit and carpool, all carpool on that same day. The least number of employee vehicles is similarly calculated by assuming that all those who ever use transit do so on the same day, and all those who carpool and drive alone, carpool on the same day.

The largest number of vehicles on SR 140/El Portal Road due to Yosemite employees driving alone is simply the number of people driving alone, since by definition vehicle occupancy is 1. From Table 51, this is $322 + 150 + 6 + 31 = 510$ vehicles. The number of carpool vehicles is equal to $(129 + 10 \text{ carpoolers}) \div 2.00 \text{ (carpoolers/vehicle)} = 70$ vehicles. The number of buses is 2 (one YCS, one VIA), and does not vary. (At no point in any of these calculations does the estimated number of Yosemite employees currently riding transit exceed the seating capacity of two buses.) The maximum number of vehicles associated with the commute travel of Yosemite employees is the sum of these 3 components, i.e., 582 vehicles.

The least number of vehicles is found by assuming all employees use the highest occupancy mode they ever use on the same day. For drive alone drivers, we still have 309 vehicles. The number of carpool vehicles is $140 (= (129 + 150) \div 2.00)$. The number of buses is still 2. Therefore, the minimum number of Yosemite employee vehicles on SR 140 is estimated to be 451 vehicles.

The final step before comparing these figures to the Caltrans traffic estimates is to apportion these vehicles to two groups—those that travel to El Portal, and those that travel to Yosemite Valley. The latter category includes vehicles that start in Midpines, Mariposa, and other towns, i.e., trips that pass both the counter at Briceburg Station and at El Portal Road, and vehicles that only pass the El Portal Road counter, i.e., vehicles that start in El Portal. These data are summarized in Table 52.

Table 52: Yosemite Employee Commute Vehicles

Mode	High Traffic Assumption		Low Traffic Assumption	
	Briceburg Station to El Portal	El Portal to Yosemite Valley	Briceburg Station to El Portal	El Portal to Yosemite Valley
Carpool vehicles	40	49	72	105
Drive alone vehicles	302	393	204	243
Transit vehicles	2	2	2	2
Total	344	444	278	350

Note that in neither the low nor high traffic cases does the number of vehicles sum to the actual number of vehicles i.e., 548 or 435. This is because summing the totals (within each assumption) in Table 52 double counts some vehicles.

We can now estimate what proportion of total traffic on SR 140/El Portal Road is due to the commute travel of Yosemite employees. Recall we selected the Briceburg Station counter to represent the section of SR 140 between Midpines and El Portal and the counter at the intersection of SR 140 and the local El Portal Road to represent the section of SR140/El Portal Road between El Portal and Yosemite Valley. Each estimate is calculated as the

number of Yosemite employee vehicles divided by the peak month ADT for the corresponding counter. The estimates are presented in Table 53.

Table 53: Estimates of Yosemite Employee Commute Traffic as a Percent of Total Traffic on SR 140/El Portal Road.

Traffic Counter	Traffic Assumption	
	High	Low
Briceburg Station:		
Eastbound	344/2200 = 15.6%	278/2200 = 12.6%
Westbound	344/2450 = 14.0%	278/2450 = 11.3%
El Portal Road (local):		
Eastbound	444/2700 = 16.4%	350/2700 = 13.0%
Westbound	444/2250 = 19.7%	350/2250 = 15.6%

Under the range of assumptions discussed above, the percent of all daily traffic at the Briceburg Station traffic counter which consists of Yosemite employees commuting to and from work is between 11.3% in the westbound direction under the low traffic assumptions and 15.6% in the eastbound direction under the high traffic assumptions.

The estimate of the percent of all traffic at the intersection of SR140 and El Portal Road (local) which is due to Yosemite employees commuting to and from work ranges from 13.0% in the eastbound direction (under the low Yosemite employee traffic assumptions) to 19.7% in the westbound direction (under the high Yosemite employee traffic assumptions).

Summarizing the key assumptions we have made:

- Caltrans peak month ADT data are representative of August traffic volumes
- No traffic is “lost” between the traffic counters at Briceburg Station and the intersection of SR 140 and (local) El Portal Road
- Carpool vehicle occupancy is equal to 2.00. If carpool occupancy is higher, then the number of vehicles, and therefore the percentage of total traffic, is lower
- The small number of “reverse” commuters—those who commute westbound on SR 140/El Portal Road in the morning—are ignored.

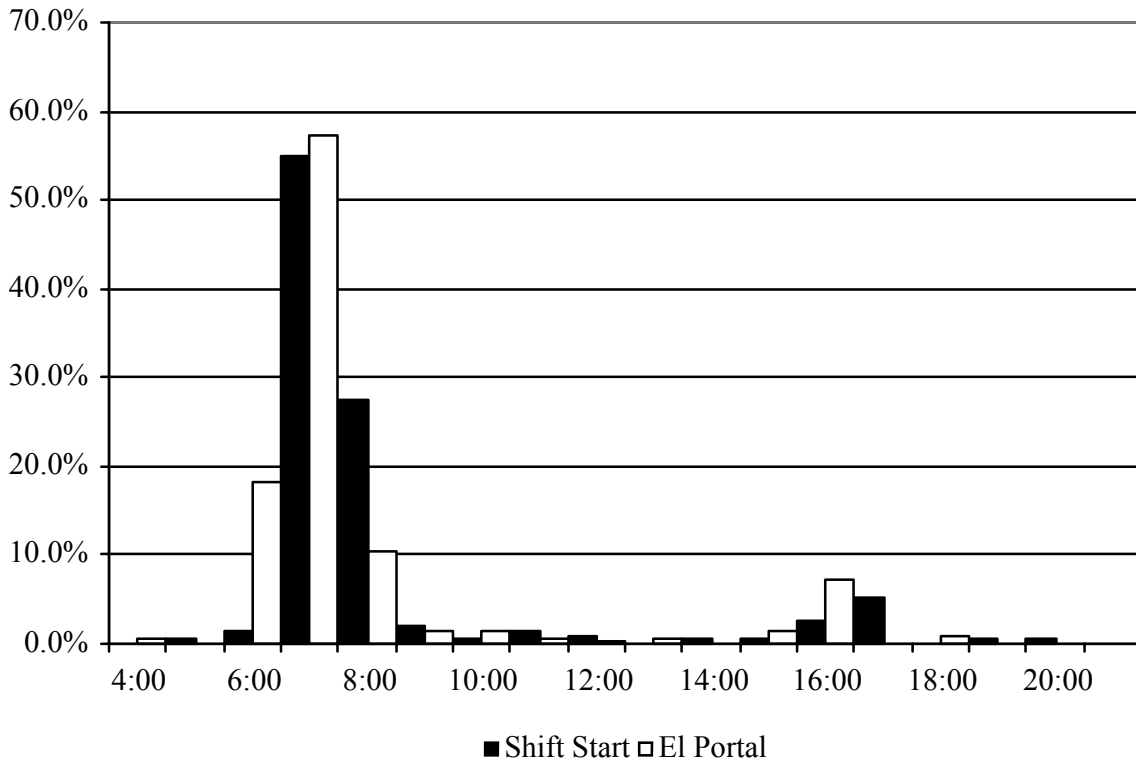
Time of Day Distribution of Yosemite Employee Commute and Visitor Trips

As we saw in the analysis of the commute bus potential, employee commute travel tends to be concentrated in time. Thus, while employee commute travel may account for 11 to 18% of the peak month average *daily* traffic, employee traffic tends to all occur within two brief time periods each day. Visitor travel also shows a regular pattern over the course of a day. In this section we examine the extent to which employee and visitor travel occurs at the same time.

As shown below, the commute and visitor travel times do not coincide in the eastbound direction in the morning, but visitor departures from the park and employee commutes home do overlap in the afternoon, contributing to congestion at the Arch Rock gate.

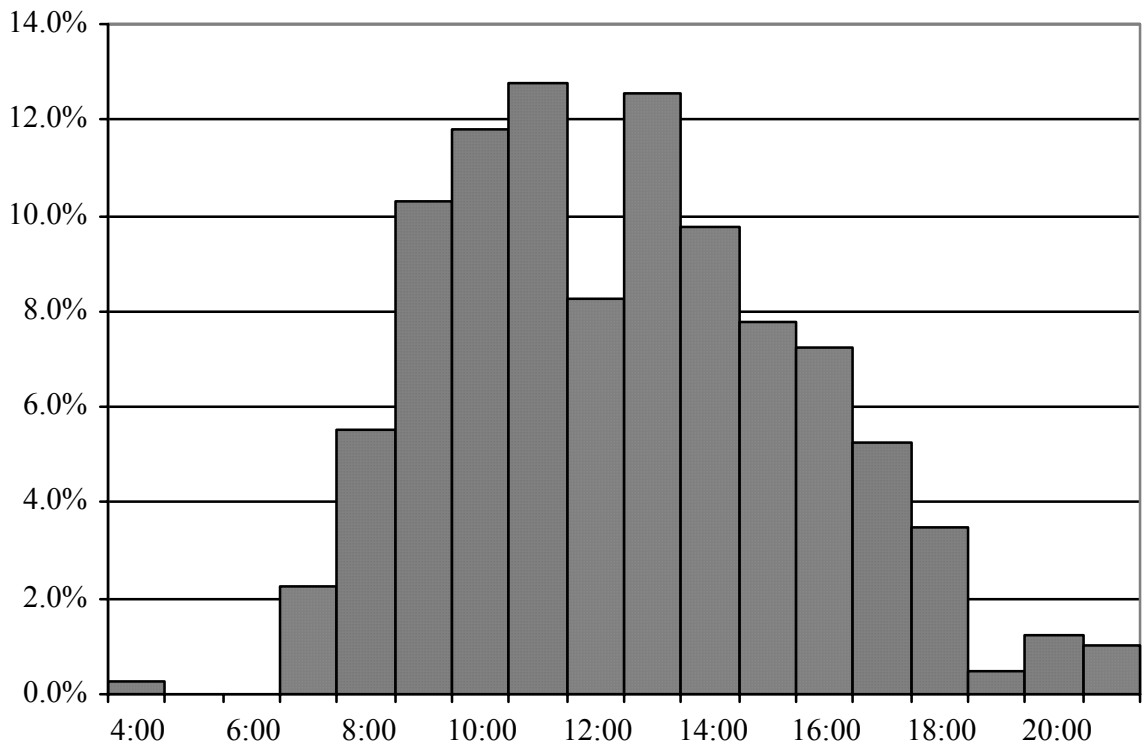
Figure 15 shows the time of day distribution of the shift start times and the time that employees either arrive at El Portal (if that is their work location) or pass through El Portal on their way to Yosemite Valley. Only eastbound commuters are included. The time at which employees on their way to Yosemite Valley pass through El Portal is estimated by subtracting 30 minutes from their shift start time. As we see, the shift start times are concentrated between 6:30 and 8:00. The peak in eastbound Yosemite employee traffic on SR 140 at El Portal occurs at approximately 7:00.

Figure 15: Shift start times and Time at El Portal among SR 140/ El Portal Road Commuters, Eastbound Morning Commute, August 1998, percent of total by hour



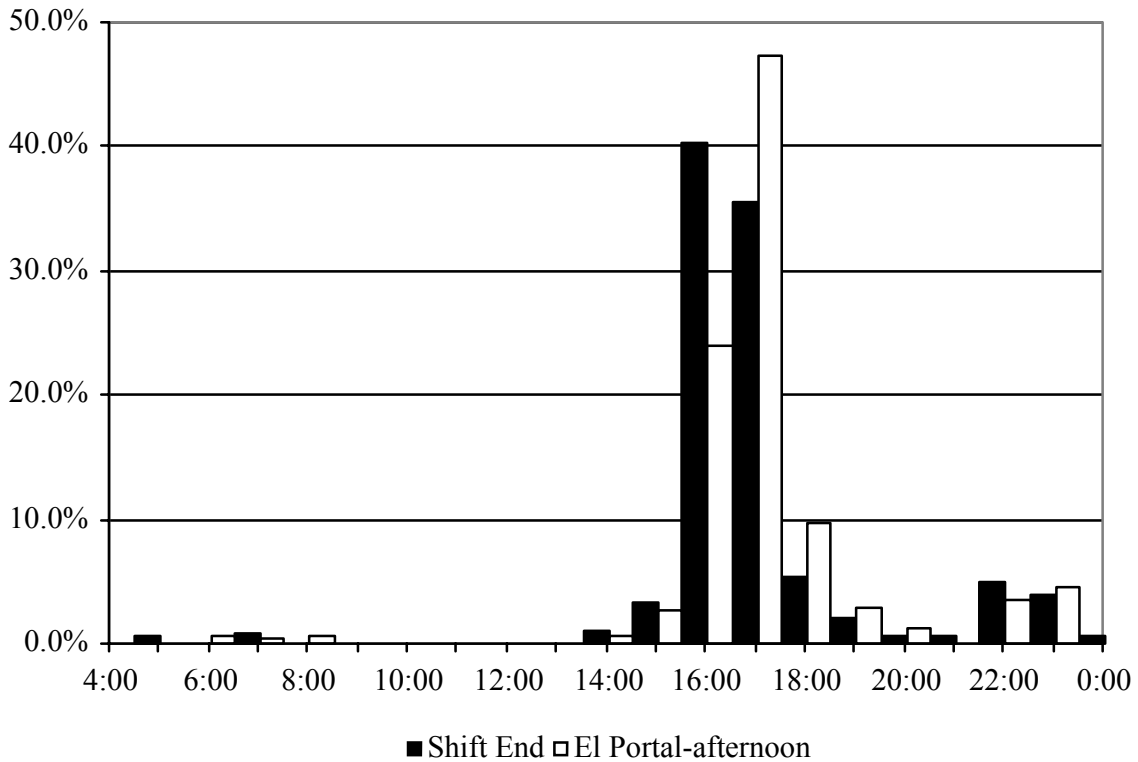
The time of day distribution of eastbound Yosemite visitor traffic on SR 140 is estimated from data collected in an exit survey conducted by ITS-Davis in August 1996 as part of its evaluation of the Yosemite Area Traveller Information system. The distribution shown in Figure 16 is based on the self-reported time at which visitors first entered the park. The data are only for those visitors who entered the park through the Arch Rock Entrance Station. Eastbound visitor traffic on SR 140/El Portal Road is minimal during the peak eastbound Yosemite employee travel period. Less than 3% of visitors in 1996 arrived at the Arch Rock Entrance Station during the hour from 7:00 to 8:00. Based on the Caltrans traffic counts and the estimates of the total number of employee vehicles developed in the previous section, this amounts to approximately 70 visitor vehicles. Thus while approximately 55% of eastbound Yosemite employee commuters on SR140 arrive at, or pass through, El Portal between 7:00 and 8:00, employee traffic accounts for between 73% and 78% of all eastbound traffic on SR140 at El Portal during this hour.

Figure 16: Time at the Arch Rock Entrance Station, Eastbound Yosemite Visitors, August 1996, percent of total by hour



The time of day distribution of westbound Yosemite employee commute traffic is shown in Figure 17. The time at which employees from Yosemite Valley are estimated to arrive at El Portal is calculated by adding 30 minutes to their shift end time. Based on these estimates, westbound Yosemite employee commute traffic peaks at El Portal at about 17:00. Between the hour of 17:00 and 18:00, 47% of all westbound Yosemite employees arrive at, or pass by, El Portal.

Figure 17: Shift end times and Time at El Portal among SR 140/ El Portal Road Commuters, Westbound Afternoon Commute, August 1998, percent of total by hour

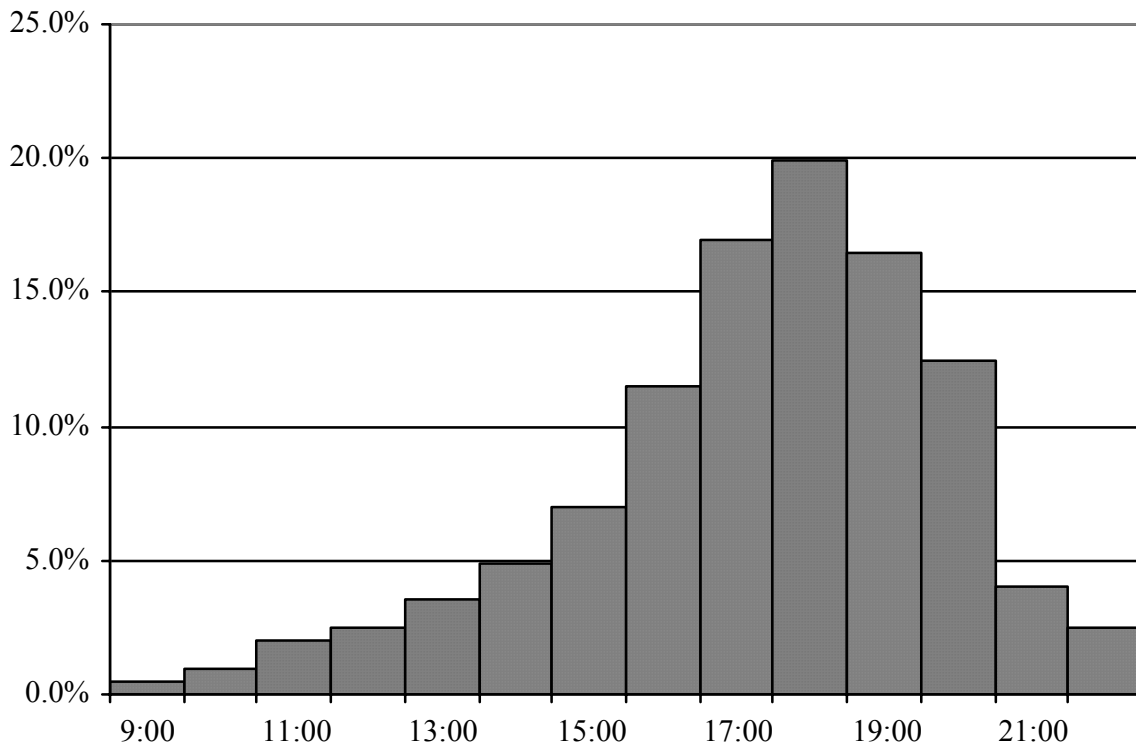


In July 1998, the consultant to the YARTS project collected park visitor exit times. (The data collected by ITS-Davis in 1996 does not contain visitor exit times.) Their report however does not provide a breakdown of exit times by park exit. The data illustrated in Figure 18 below are visitor exit times averaged over all four park exits.

A comparison of Figures 17 and 18 indicates that the timing of the peak westbound Yosemite employee traffic very nearly coincides with the peak westbound visitor traffic. The actual visitor peak appears to occur an hour after the employee peak, but the visitor peak is fairly broad, spanning a period of about three hours from 17:00 through to 20:00. The combined westbound employee and visitor traffic peak does occur during the hour from 17:00 to 18:00, simply because there is so much more employee traffic than during the following hour.

We estimate that employee commute traffic accounts for between 34% and 41% of westbound traffic on El Portal Road between 17:00 to 18:00. As with the morning traffic estimate, the range of estimates depends on the high and low employee traffic assumptions outlined in the previous section.

Figure 18: Time Visitors Exit Yosemite National Park, All Exits, July 1998, percent of total by hour



Source: Data interpreted from Nelson\Nygaard Consulting Associates (1998) Working Paper III-2 Summer Data Collection. Yosemite Area Regional Strategy Major Investment Study. Report Submitted to the Yosemite Area Regional Transportation Strategy Management Board. September. Figure 3, p. 10.

These data confirm anecdotal information regarding traffic congestion on this road. Traffic on SR 140/El Portal Road is heaviest during the late afternoon because the largest group of employees commuting out of the Valley coincides with the largest group of visitors leaving the park. The actual point of highest congestion is not at El Portal, but at the Arch Rock gate. Congestion is caused by a combination of high levels of traffic and the physical impediment caused by a long traffic queue which blocks the outside exit lane that employees and visitors who hold season or lifetime passes could use to exit the park without stopping at the gate. That is, there are two lanes at this gate (in both the entry and exit directions). But on occasion the traffic queue backs up to the point where traffic is waiting in a single queue on the one-lane, El Portal Road.

Conclusions

This report summarizes the results of a survey conducted of Yosemite employees during August and September 1999. Thus it best characterizes summer employee travel. There are large seasonal differences in both total employment and the spatial distribution of that employment. The three largest employment centers—Yosemite Valley, El Portal, and Wawona—sustain year-round employment, but Tuolumne Meadows and other parts of the park do not. Overall, peak summer employment is about 50% higher than off-season employment. For these reasons, there is more employee travel, in more locations throughout the park in summer than in winter.

While the overall response rate to the employee survey was 35%, there were significant differences between the three sub-populations of employees—NPS, YCS, and the park partners. Based on the socio-demographics of the sample, their reported seasonal vs. permanent employment status, and the timing of the survey, it appears likely that the sample under-represents summer seasonal YCS employees. Known distributions of employees (by employer and workplace) are used to develop a set of weights to use when estimating behaviors of the total population of Yosemite employees based on the survey sample.

Employment and Residence Location

The analysis and results of this report focus primarily on employees who work in Yosemite Valley or El Portal. As the two largest employment and residence locations, most employee travel is made to, and within, these locations. We estimate 70% of all Yosemite employees (NPS, YCS, and park partners) work in Yosemite Valley, 11% at El Portal, 8% at Wawona, and just over 7% at Tuolumne Meadows. And while Yosemite Valley (46%) and El Portal (17%) are the two largest residential centers for Yosemite employees, Tuolumne Meadows (6%) and Wawona (4%) rank behind the town of Mariposa (11%).

The distribution of residence and workplace locations is very different for employees of the different employers.

- Over 61% of summer YCS employees live and work in Yosemite Valley.
- NPS employees, even those working in Yosemite Valley, are more likely to live outside the Valley—only about 17% of NPS employees both live and work in the Valley.

Commute Trip Characteristics

At each of the major employment centers, there are some employees who reside in the immediate area and others who commute from more distant locations. Because of the limited number of possible residence and employment locations, the distributions of commute time and distance are “multi-modal,” showing distinct spikes which correspond to the possible residence and workplace locations. Such distributions are not well described by averages, i.e., means. Therefore, throughout this report we have supplied medians and other quantiles of the distributions of measures such as commute trip duration and distance.

Commute characteristics of the four employment centers are compared in Table 54 below. For each location, the median and maximum commute times and distances are shown for the

two distinct groups of “local residents” and “long-distance commuters.” At all four locations, we see the employees in these two groups have very different commutes. Those who live near where they work typically spend only a few minutes a day commuting; those who live far from work (typically in the local towns outside the park) are likely to spend upwards of 45 minutes commuting in each direction.

Because of the short duration and distance of commute trips for those employees who both live and work in Yosemite Valley or Tuolumne Meadows, their commute travel is accomplished primarily on foot and by bicycle. For all other employment locations and for all employees commuting from the local towns, light-duty vehicles are the primary commute travel mode. While driving alone is the single most common travel mode, an appreciable number of Yosemite employees do carpool or take transit to work. Commute travel modes are summarized in Table 55.

Table 54: Commute Trip Characteristics at the Four Largest Employment Centers in the Park

	Commute Time, minutes		Commute Distance, miles	
	Median	Maximum	Median	Maximum
Yosemite Valley, all	10	120	1.0	130
Local residents	5	45	0.5	4
Long-distance commuters	45	120	18.0	130
El Portal, all	30	90	22.5	91
Local residents	5	30	1.0	5
Long-distance commuters	40	90	30.0	91
Wawona, all	15	90	3	75
Local residents	5	30	1.125	3
Long-distance commuters	45	90	26.0	75
Tuolumne Meadows, all	2	120	0.1	100
Local residents	1	17	0.019	8
Long-distance commuters	120	120	77.5	100

The mode shares of commute travel at each location represent a mix of the proportion of employees who live nearby versus commute long-distance, as well as the availability (or lack thereof) of different modes. The number of commuters who travel in privately owned vehicles (drive alone, carpool, or both) varies from a low of 23.8% at Tuolumne Meadows to a high of 90.3% at El Portal. At Tuolumne Meadows, 81% of employees live at or near their workplace. At El Portal, only 34% of employees live nearby. Further, there is no local transit within the El Portal Administrative Site.

Table 55: Estimated Population Commute Travel Mode Shares of Yosemite Employees, percent

Commute Mode[s]	Yosemite Valley	El Portal	Wawona	Tuolumne Meadows
Drive alone only	28.1	62.2	58.0	17.4

Walk only	28.0	3.3	6.7	58.0
Bicycle only	10.3	1.3	4.8	1.0
Drive alone and carpool	9.7	13.0	13.8	5.4
Car/vanpool only	6.1	15.1	9.8	1.0
Bike and walk	3.9	0.7	0.7	1.9
Transit only	3.9	1.0	0	0
Drive alone and walk	2.8	1.3	3.8	13.6
Drive alone and bike	2.7	1.0	2.4	1.0
Transit, Drive alone and carpool	1.8	0.3	0	1.0
Transit and walk	1.4	0	0	0
Transit and Carpool	0.8	0	0	0
Transit and Drive alone	0.5	0.7	0	0
Transit and Bicycle	0.2	0	0	0

Employees at Yosemite Valley have the greatest variety of commute travel modes, and a large number of people commute by non-motorized modes. The number of people who walk to work (28.0%) is essentially the same as the number of people who only drive alone (28.1%). Those who walk and/or bicycle (42.2%) are as numerous as those who take a privately owned vehicle (43.9%). The high level of use of non-motorized modes is possible because over 62% of employees in Yosemite Valley also live there. Of the four employment centers, Yosemite Valley has the greatest variety of transit services, including both long-distance commute services from the towns of Mariposa and Midpines along SR140 and the local Valley shuttle. Counting all people who ever use any of these transit services, 8.6% of employees in Yosemite Valley at least occasionally use transit and 3.9% use only transit to commute to work.

Whether driving alone or carpooling, automobiles and light trucks used for commuting are almost all owned by the employees (or some member of their carpools). No employer supplies vehicles which are regularly used for commuting to more than a few employees. In contrast, travel for work is largely accomplished in motor vehicles provided by employers.

Employee Travel in Yosemite Valley

Based on an index of the number of employees making light-duty vehicle (LDV) trips, it appears as if commute travel itself accounts for about half of all employee trips made by LDV in Yosemite Valley. Relatively few trips to accomplish personal errands, either in conjunction with a commute trip or as a separate trip, are made by LDV in the Valley. The greatest uncertainty in converting the index to an actual count of trips by LDV is in the number of trips per day that are undertaken in the course of completing job-related responsibilities. Despite supplementary data collection activities, we were unable to collect

enough additional data on the daily incidence of trips for work. We suspect that travel for work is a larger percentage of all LDV trips than the index indicates.

Alternative Travel Modes for Commute Trips

- Overall, it appears as if most Yosemite employees who now drive alone to work are willing to consider alternative travel modes, even if they now commute exclusively by driving alone.

Among those who already use some mode in addition to driving alone, their current alternate mode is chosen by most as their preferred alternative. Carpool and vanpool are the most frequently chosen preferred alternatives. This choice may reflect a desire to maintain as much flexibility as possible. We note that we found no difference in the distribution of preferred alternatives by employment location. We anticipated that we might have found differences based on the fact that transit is a realistic option only at El Portal and Yosemite Valley.

- A guaranteed ride home in the event of an emergency or last minute change in work schedule was cited by two-thirds of all people who selected carpooling or vanpooling as their preferred alternative to driving alone.
- About 40% wanted help identifying people with whom to carpool or vanpool.
- Concern over scheduling constraints implied in these two answers, and made explicit in the third most frequent response—a change of work hours—far outweighed comparative travel costs between driving alone and carpooling or vanpooling.

Estimating Potential Riders of an Employee Commuter Bus Service on SR140/El Portal Road

We have applied a constraints analysis to estimate the potential number of riders of a commuter bus service for Yosemite employees traveling along SR 140/El Portal Road. Based on workplace and residence locations, work hours, and the regularity in work hours and seasonal employment, we have estimated the number of people who could use such a service. To be included, employees must work at either El Portal or in Yosemite Valley. They must live either in the park or in the towns located along SR140. Their work hours must fall within the work hours of large numbers of other employees.

- Based on these assumptions, we estimate there are 399 Yosemite employees who could use transit to get to work.
- These people represent a potential number of 361 riders per weekday (as not all employees commute to work every weekday).

One factor that lowers the potential ridership is the fact that so many employees in Yosemite Valley currently live in the Valley. If any planning alternative which calls for reducing employee housing in the Valley is implemented, then the potential ridership of a commuter bus service to Yosemite Valley would increase.

The types of service characteristics that people say they need in order to consider using a bus are bus stops near their workplace and near their homes, frequent service, and a guaranteed ride home in the event of emergency.

The design of an actual bus service is complicated by the fact there are two distinct employment centers, located relatively far from each other and relatively far from some of the residential centers where many potential bus riders live. We have provide Tables 46 and 47 (in the section where the details of this analysis are described) which show the distribution of the potential bus riders by their residence and workplace location, and work shift start and end times. These tables can facilitate the design of bus schedules and routes.

Employee Traffic on SR140/El Portal Road

We estimated that the percentage of traffic on SR140/El Portal Road during the peak travel month that is made up of Yosemite employees commuting to work. We did so by comparing data from the employee survey to summary data on traffic counts made by the California State Department of Transportation (Caltrans). The estimates fall in the range of 11% to 20%. The estimates vary by location, the direction of travel, and assumptions about employee travel modes. The range of estimates at any one location, or in any one direction, or under any one set of travel mode assumptions, is much less than the 9 percentage point difference across all possible variables. We do not estimate non-commute non-work trips made by employees.

The assumption about travel modes have the largest effect. Some people report they both drive alone and carpool to work, others report they drive alone or take transit, and some report using all three modes. We make two sets of assumptions that we believe define reasonable limits on how often people use each of these modes, and thus define limits on the number of vehicles on the road that are due to Yosemite employees commuting to work. In one set of assumptions, we calculate an estimate based on every employee traveling in the lowest occupancy mode that they every use, on the same day. For example, all employees who report the either drive alone or carpool, are assumed to drive alone on the same day. The alternative assumption is that all employees travel in the highest occupancy mode on the same day. Thus, for example, any employee who reports they ever use transit, is assumed to do so on the same day. In general, this assumption results in about a 3 to 4 percentage point difference in our estimates. For example, in the eastbound direction, at El Portal, we estimate that Yosemite employee commuter traffic is between 13.0% and 16.4% of total daily traffic. In the westbound direction, the estimates range from 15.6% to 19.7%.

Based on data from the employee survey and surveys distributed to park visitors in previous years, we conclude that the morning commute takes place at a time when very few visitors are traveling on the section of SR140/El Portal Road. However, the afternoon/evening commute period coincides with the time when a large number of visitors are leaving the park, thus contributing to congestion.

Summary Remarks

Much of employee travel in Yosemite National Park is structured by the location of their workplace and residence. And while this is true in general of all commuters everywhere, it is especially true when the number of possible workplace and residence locations are few.

Evidence of this structure is seen in the sharp differences in commute travel mode, commute trip duration, and commute trip distance between those people who live and work at the same location and those who live and work at different locations. The implications for planning include the potential to shape employee travel through transportation and land use policy to a degree that is not possible in typical urban or suburban settings.

- Planning alternatives which remove employee housing from Yosemite Valley may increase employee travel on roads leading to, and entering, the park, but will also increase potential transit populations.

The largest share of current employee commute traffic moves along SR140/El Portal Road. Increases in employee traffic along this route may not impact visitor experience if that increase occurs at the same time as, or earlier than, the current morning Yosemite employee commute. Increasing employee traffic during the exiting afternoon/evening commute period appears likely to exacerbate an existing traffic congestion problem. Policies and programs to promote transit use—among employees and visitors—can facilitate the elimination of afternoon traffic queues at Arch Rock.

Appendix A: Yosemite Employee Questionnaire

Dear Yosemite Employee:

This survey is part of a larger study of travel in Yosemite National Park. This questionnaire is intended to provide Park planners information about employees travel. The following questions are about your employment, as well as travel to and from work, in Yosemite National Park. We ask you about commuting travel *to* your *work place*, and travel *for* work.

Your *workplace* is the place you either work at, or the place to which you usually first report before heading out to the various sites you may visit in the course of your work day. Your workplace might be an office, dispatch office, workshop, store, restaurant, etc.

Travel *to work* means your commute trip from home to your workplace at the start of your work shift and your commute trip home at the end of your work shift.

Travel *for work* is any travel you make to complete your job responsibilities, other than commuting between home and your workplace. Examples of travel for work include traveling through campgrounds to collect fees, travel to attend a meeting in El Portal if your workplace is in the Valley, travel to public hearings in towns around the Park, delivering linens to lodging facilities, delivering materials to the recycling center, responding to emergency calls, patrolling—anything that takes you away from your workplace as part of your job.

If you select the response “Other” to a question, there is usually a line after it. Please use that space to provide a brief description of your answer.

Thank you for your help.

Yosemite National Park

The Institute of Transportation Studies; University of California, Davis & the University of California, Merced

8. How do you travel from your home to your workplace? (Select all that you use.)

- Drive alone.(Please continue with question 9.)
- Carpool or vanpool. (Please skip to question 12.)
- Public transit or commercial bus. (Please skip to question 15.)
- Bicycle (Please skip to question 16.)
- Walk (Please skip to question 18.)
- Other:_____ (Please skip to question 18.)

9. Do you drive your own vehicle, or one that is provided by your employer?

- I commute to work in a vehicle that I own, rent or lease.
- I commute to work in a vehicle that is provide by my employer.
- Other:_____

10. When you arrive at your workplace, where do you park your vehicle?

Please describe: _____

11. Which one of the following best describes your parking situation? (After you answer, skip to 18.)

- I park in a space reserved for me specifically.
- I park in a parking lot or space reserved for employees.
- I park wherever I am able.

12. Do you or one of your carpool or vanpool members own the vehicle you travel to work in, or is it provided by your employer? (Check one only.)

- I own, lease, or rent the vehicle that I carpool or vanpool to work in.
- Someone else in my carpool or vanpool owns, leases, or rents the vehicle
- My carpool or vanpool shares driving in our own vehicles.
- I carpool or vanpool to work in a vehicle that is provide by our employer.
- Other:_____

13. When you arrive at work, where do you park?

- We park in a space reserved for one of the carpool or vanpool members.
- We park in a parking lot or space reserved for employees, but not our carpool or vanpool.
- We park wherever we are able.

14. Do you drive your carpool or vanpool? (After you answer, skip to 18.)

- No, I **never** drive my carpool or vanpool.
- Yes, I **share** driving with other members of my carpool or vanpool.
- Yes, I **always** drive my carpool or vanpool.

15. Is the bus you take to work a VIA bus, a Yosemite Valley Shuttle, or some other bus? (After you answer, skip to 18.)

- VIA
- Yosemite Valley shuttle
- Midpines commuter
- Other:_____

16. Do you own the bicycle that you travel to work on, or is it provided by your employer?

- I own the bicycle that I ride to work.
- The bicycle I ride to work is provide by my employer.
- Other:_____

17. When you arrive at work, where do you park your bicycle?

- I park it inside my workplace
- I park it in a bike rack near my workplace.
- I park wherever I am able.
- Other: _____

18. Do you make stops for other activities (for example, grocery shopping, picking up children, socializing, or other personal reasons) on your way to work, or on your way home? (Choose one.)

- No, I never stop between home and work.
- Yes. If yes, how many days a week do you make such stops?

19. How often do you run personal errands between the time you start work, and the time you leave for home at the end of your workday?

- Never
- Once a month
- About once a week
- A couple times a week
- Everyday

(If you select one of these, Check all that apply in the list to the right.)

How do you travel to your errands?

- Walk
- Bicycle
- Car or truck
- Bus

20. How often do you listen to highway advisory radio broadcasts on the way to work?

- Every day
- Weekly
- Seldom
- Never.

Section C: Travel for work

Recall that travel for work is travel you do to complete your job, but does not include commuting between home and your workplace.

21. During a typical work day, do you work only at your workplace, or do you make trips for work? (Choose one only.)

- I typically don't travel for my work. (Skip to Section D.)
- In the course of a typical month, I will make one trip for work. (Please continue with question 22.)
- In the course of a typical week, I will make one trip for work. (Please continue with question 22.)
- In the course of a typical day, I will make one or more trips from my workplace for my job. (Please continue with question 22.)

22. Considering all the trips you make for work, how do you make these trips? (Select all that apply.)

- I make trips for work in a car or truck I own, lease or rent.
- In a car or truck provided by my employer.
- In the Yosemite Valley shuttle.
- On a bicycle.
- Walk.
- Other: _____

If your workplace is NOT in Yosemite Valley, skip to question 24.

23. If your workplace is in Yosemite Valley, how often do your trips for work take you outside Yosemite Valley? (Choose one only, then skip to question 25)

- never once a month. once a week. more than once a week.

24. If your workplace is not in Yosemite Valley, how often do your trips for work take you to Yosemite Valley? (Choose one only.)

- never once a month. once a week. more than once a week.

25. No matter where your workplace is located in the Park, how often do your trips for work take you outside Yosemite National Park? (Choose one only.)

- Never
- Once a month
- Once a week
- More than once a week

Section D: Other ways to travel to work and for work

If you EVER drive alone to commute work, please complete this section.
If you NEVER drive alone for your commute to work, please skip to Section E.

26. On those days you commute alone to your workplace, would you consider using an alternative such as walking, bicycling, riding a bus, or car or vanpooling?

- Yes I would, definitely consider an alternative to driving alone. (Skip to question 27.)
 - Possibly yes. (Skip to question 28.)
 - Probably no. (Skip to question 28.)
 - No, I would definitely not consider an alternative to driving alone.
- (Continue with question 28.)

27. What are the three most important reasons that you are committed to driving alone to work? (After answering, skip to question 32 in the next section.)

- 1. _____
- 2. _____
- 3. _____

28. Which one of the following alternatives would you most likely consider to driving alone?

- Carpool or vanpool. Continue to question 29.
- Bus. Skip to question 30.
- Bicycle. Skip to question 31.
- Walk. Skip to question 32.

29. What would encourage you to carpool or vanpool to your workplace? (Choose up to three. After answering, skip to question 33 in the next section.)

- Personal assistance in finding partners with whom to carpool or vanpool.
- Changes to my typical work hours. Describe those changes: _____
- Changes to my typical work days. Describe those changes: _____
- Childcare facilities at or near my workplace.
- Preferential parking for my carpool or vanpool.
- A guaranteed ride home when I needed one in event of an emergency or last minute change to my work schedule.
- Another vehicle available to me to make trips for my work during the day.
- An analysis of my travel costs that showed me whether carpooling or vanpooling would save me money.
- If my residence location moved out of Yosemite Valley, but my workplace stayed there.
- Other: _____

30. What would encourage you to use public transit or some other bus system to commute to your workplace? (Choose up to three. After answering, skip to question 33 in the next section.)

- Information on bus routes and schedules.
- A bus stop close to my home.
- A bus stop near my workplace.
- More frequent bus service.

- Reduced fare for riding the bus.
- Charge to park at work.
- Changes to my typical work hours. Describe those changes: _____
- Changes to my typical work days. Describe those changes: _____
- Childcare facilities at or near my workplace.
- A guaranteed ride home when I needed one in event of an emergency or last minute change to my work schedule.
- A car or truck available to me to make trips for my work during the day.
- An analysis of my travel costs that showed me whether taking a bus to work would save me money.
- If my residence location moved out of Yosemite Valley, but my workplace stayed there.
- Other: _____

31. **What would encourage you to bicycle to your work place? (Choose up to three. After answering, skip to question 33 in the next section.)**

- Showers and lockers at my workplace.
- Bicycle repair facility at my workplace.
- A secure place to lock a bicycle at my workplace.
- Ability to put my bicycle on a bus for part of the trip.
- Bicycle paths or routes between my home and workplace.
- Seminars on safe riding.
- Changes to my typical work hours. Describe those changes: _____
- Changes to my typical work days. Describe those changes: _____
- Childcare facilities at or near my workplace.
- A guaranteed ride home when I needed one in event of an emergency or last minute change to my work schedule.
- A car or truck available to me to make trips for my work during the day.
- An analysis of my travel costs that showed me whether taking a bicycle to work would save me money.
- If my residence location moved out of Yosemite Valley, but my workplace stayed there.
- Other: _____

32. What would encourage you to walk to your work place? (Choose up to three. After answering, continue with question 33 in the next section.)

- Showers and lockers at my workplace.
- Changes to my typical work hours. Describe those changes: _____
- Changes to my typical work days. Describe those changes: _____
- Childcare facilities at or near my workplace.
- A guaranteed ride home when I needed one in event of an emergency or last minute change to my work schedule.
- A car or truck available to me to make trips for my work during the day.
- Other: _____

Section F: Personal Characteristics

Your answers to the questions in this section will be used for statistical purposes only, for example, to establish whether the group of people who respond to this questionnaire match the general profile of current employees in Yosemite National Park. Your answers are confidential and anonymous.

32. How long have you worked in Yosemite National Park?

_____ years _____ months

33. In which one of the following age groups are you?

- 16 to 19 years old
- 20 to 29
- 30 to 39
- 40 to 49
- 50 to 59
- 60 to 64
- 65 or over

34. What is your household's gross annual income from all sources?

- Less than \$20,000
- \$20,000 to 39,999
- \$40,000 to 59,999
- \$60,000 to 79,999
- Greater than \$80,000

35. Are you male or female?

- Male Female

36. If you live outside Yosemite National Park, how many people live in your household?

Number of people in my household _____

THANK YOU AGAIN FOR YOUR TIME.

This study is being conducted by the Institute of Transportation Studies at the University of California, Davis and University of California, Merced. It is being conducted for, and in cooperation with, Yosemite National Park.

If you would like to submit written comments separately from this form, please address them to:

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Institute of Transportation Studies
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One Shields Avenue
Davis, CA 95616 USA

If you have any questions about this research, please call Ken Kurani at (530) 752-6500.

Or, send e-mail to him at: access@foothill.net

Please use the space below to add any comments that you wish to submit as part of your response to these questions.

Appendix B: Employees' Comments

A total of 71 respondents provided additional written comments. Their written comments are summarized in Table B1. They are shown in full in Table B2, with minor editing.

Table B1: Summary of Written Comments

General Topic Area	Number of Comments
Want alternatives to drive alone commute	15
Jobs/housing balance, including the negative effects of the lack of balance and the desirability of re-establishing or maintaining balance	9
Reasons why automobile needed to commute to work or to execute job responsibilities, including law enforcement and EMS response, distance of commute, last minute work schedule changes	8
Need new buses, more buses, or more frequent buses for employees	7
Visitor transportation options, including eliminating private automobiles	5
SR 140/El Portal Road construction complaints, including road condition and daily schedule	4
Uses travel mode other than automobile to commute to work	4
More bicycle infrastructure including racks, paths, lighted paths	4
Yosemite Valley employer and/or visitor parking	4
Stopped using bus to commute, generally due to unreliability of schedule	4
Specific responses to Yosemite Valley transportation options other than jobs/housing balance, including roadway changes	2
No more buses for employees, carpools and vanpools instead	1

Table B2: Verbatim Comments

- Carpooling is difficult because my type of work requires me to work late on short notice.
- My commute home is 5 hours on the weekends, too long for carpooling or public transit.
- I am a law enforcement ranger so I am committed to being on duty whenever I am able to respond to emergencies and need to carry my gear with me.
- A secure area to lock up bikes that is protected from the elements would be helpful. It would be nice if bikes were allowed to be kept in the valley on bike racks for during the day errands without being confiscated.
- I need to commute home on my own time on the weekends because I live in the valley during the week at Tuolumne meadows which is not my actual home.
- If employees are moved out of the valley, more cars appear. YCS has a shuttle system for employees but the park service does not. We need a shuttle system that runs long enough so employees can do things before or after work.
- Commuting is not the problem with employees in the valley, car storage is the problem. Cars should be able to be stored near their houses, and then the employees will use alternative transportation due to a lack of parking if they move their cars. If they do not find a place to park they will keep driving around the valley looking.
- Need newer busses that don't require repairs everyday.
- I use the employee bus in the winter and live in the valley in the summer and rarely ever use my car.
- I would like to see a questionnaire with the employees commute during the El Portal road closure. I travel 150 miles a day to take highway 41 travelling at 4 a.m. (the most dangerous time) because there are no snowplows. Please help with this situation.
- Yosemite is being ruined by people like you. Decisions shouldn't be made by people who don't live here.
- Please do not make North Side Road a bicycle road. Please do not make South Side Drive for two way traffic. A pedestrian tunnel under the main road, west of intersection for Yosemite Falls Parking lot and Yosemite lodge
- There should be better transportation for tourists and no vehicles other than employees allowed in the park. There is too much noise, pollution, so that Yosemite is more of an urban experience than wildlands one. Car alarms also ruin the atmosphere of the park.
- Buses that burn fossil fuels should not be allowed in the park
- The removal of Glacier Point housing would add to future traffic and parking problems.
- The highway 140 construction is trashing my vehicle, parts are falling off and the rattle is increasing. There should be mandates that employees are shuttled to and from the valley in government vehicles until 140 is completed.
- Patrol rangers begin shift from work and end at home, there is no commute.

- Carpool vans for employees that run @usual times one for 7:30 am starters and one for 8:30 am starters. then leaving at 16:30 and 17:30 each evening, everyday of the week. 2 sites in El Portal, Old EP & Rancheria.
- Most YCS employees use YCS van to commute to the valley
- The YCSC employees were not considered when contract was set up with Kiewitt Packard, if you work hours other than 9-5 its an ongoing nightmare to get to work. The parking lot at the lodge is filled with trailers for slumlike housing.
- Parking in the valley is hard to come by but you can't leave the cars that belong to valley residents out of the valley because of emergencies.
- Due to a lack of government housing most employees except for seasonal and required occupants are forced to drive long distances and impact the parks environment in addition to impacting existing traffic problems. I would like to see a commuter van or bus for employees with bicycle carrying capacity for use within Wawona.
- It would be great to have public transportation for people who commute from Wawona from the Oakhurst, Ahwahnee, mariposa area.
- As a patrol ranger my car is my office and I spend most of my day patrolling roadways and trails.
- I worked for YCS 3 years prior to working for NPS, I always biked or walked to work since housing was a reasonable commute. I would much prefer the shorter commute and I feel that local commuters significantly increase Yosemite's traffic problems.
- I am required to drive throughout the park to perform my job. I keep my government vehicle at home at night for emergency fire and EMS response.
- I lived in Yosemite Valley for the last 22 years, the employee parking problem is the same, we never have enough for the guests and employees. I hope your study will improve the situation.
- Consider the possibility of installing more bike paths lights. I feel much safer at night on lighted paths.
- Bike paths for bikers only are needed in Yosemite, there are too many tourists walking on the paths and it is very hard to walk.
- Good, reliable transportation is important.
- NPS is a conservation organization it is important to take the lead in alternative transportation.
- I prefer walking or riding to work. However, after dark I only feel safe riding my bike.
- I recommend a day-use permit system with assigned parking spots. Once within the valley the visitors are forced to use alternative forms of transportation. A traffic light placed at the intersection of Camp 6 and lower Yosemite Falls would solve the majority of the summer congestion.

- If you can reduce the number of vehicles coming in by providing a reduced entrance fee for shuttle service. I am concerned about the idea to move employees out of the valley, I only work here because I am able to live in the valley.
- I live in the dorms in Yosemite Village, there is not enough parking at the dorms. The Tecoya dorms usually parks in the Village store parking lot.
- If the YCS commuter bus ran on the weekends it would eliminate some drivers from the road. The VIA bus is too expensive and unreliable. Many times employees are treated like second class citizens in favor of guests paying full price.
- As a Yosemite working couple, we commute together on days we work together and take the bus if only one of us works.
- I will have to triple my commute after NPS closes the Trailer Village in El Portal, this will contribute more to the transportation problem in the valley.
- One can not learn anything from a survey. It frightens me that someone who lives four hours away from Yosemite might have an impact on the future of our homes.
- We need more buses and a positive attitude. Better control of people loading and unloading would help with the chaos and experience.
- Road closures are based on what is best for Park Service Employees and not Concession employees. This causes problems in the community and policy of Yosemite.
- The NPS created this problem through gross stupidity now they want us to pay for it. If there is to be a reduction in commuting than provide housing in the valley.
- The bus system between El Portal and Yosemite is too limited. The bus leaves at 8 and returns at 5. The road work is restricting carpooling due to time considerations and the closure at 10:30 makes the commute impossible at night.
- No private vehicles should be allowed in YNP. We need to start thinking about the future impacts on the park and public transportation is the first step. The business in outlying towns would increase because the tourists would have to stop before entering the park. We must make changes before we cause permanent damage.
- Should have an employee only shuttle.
- I had driven my car to work for 14 years, until the addition of the free shuttle from Midpines to work, now I take the shuttle everyday.
- I commute from the valley to El Portal everyday, and start at 7:30 in the morning so that I can be home early. There are not many commuters like myself but we do exist.
- I stopped using the VIA bus for these reasons. 1. The bus schedule does not compliment my schedule. 2. The bus was late to pick me up and sometimes skipped me completely. 3. The bus schedule does not allow for flexibility or taking a walk after work.
- I just moved to the area and want to find a carpool but I find it difficult to find anyone. I live in Mariposa and the commute is hard on my car, we need a better system for people to find carpoolers.

- I used to commute when I lived in the valley, now I commute to the valley and would like there to be mass commuter option available.
- There are not many radio stations to receive weather information and road conditions, an efficient transportation system would be welcome for the work force.
- I love riding the bus to work, and all the mandatory occasions have been pleasantly welcomed by supervisors. The bus would work for me if there were more frequent arrival and departure times.
- Numerous times VIA has fallen short of reliable transportation. Tardiness is not an excuse to leave people on the side of the road. The local community has not been taken into consideration on the VIA bus system.
- The 140 road construction is the worst thing I have ever seen in a National Park, serious mistake. Save our canyon, river, leave this place alone. Please no more new structures or roads into our park.
- I walk to work because I don't have a car but I would love to see public transportation in the park. It is difficult to get around in the valley without a vehicle, a bus from the south entrance to Wawona would be nice.
- I took VIA in the past even though it didn't match my work schedule. Now the bus leaves later and I can not take it and be late. The evening schedule is later and makes my days too long. I would love to find alternative transportation.
- BIKE LANES especially from El Portal to the valley. I need safe pathways and showers to ride my bike to work.
- Please consider alternate transportation ideas for all visitors to reduce noise pollution and air quality. Gas and electric buses free on arrival, reduce the car traffic, public connection to larger cities employee free shuttle
- No more buses. They are loud and dirty, noise and pollution. Vans and carpools are great.
- How can you accommodate climber or heavy load recreationists into your survey? We move around more on the weekend or days off then during a work day.
- I would like to bike to work but I would have to bike 13 miles on highway 140. Maybe the planners could implement underground housing that will not impact the valley as much.
- If Yosemite NP is trying to convince its visitors to use public transportation the employees need to set an example. The valley shuttles should be expanded to include the west end of the valley.
- Employees with children have a difficult time carpooling and need to be considered.
- Employees who are stationed at El Portal need to frequently drive into the valley with important equipment. We need to be able to park at the NPS buildings in the valley, please consider this need. The planning for parking at the El Portal warehouse has been poor & deficient to date. Employees need more parking lot spaces, not in dirt lots.

- Employees are encouraged to live outside of the valley to lessen the parks burden on housing, yet there is no incentive for those who comply. People who commute should get a break, the DOI has a program for making commuting expenses tax deferred, but YOSE has not implemented it.
- People in the winter want to use the bus as well
- I am considering reducing my usage of VIA due to the quality of service. They are unreliable and often times don't wait for passengers to arrive. AT times I am stranded in El Portal. It would help to have and hourly shuttle from El Portal to the valley.
- The present system of using employer vehicles is working very well. Employees are able to communicate any situations before work.
- Within the last 5 years most of the implemented NPS plans have gone awry. For instance, the path by HR, the clinic, the flood response, all of these are scary.
- Convenience is a big issue for me, the VIA bus does not stop in Mariposa at the time I need. I need a bus that will get me to work at 7:15 am.
- I would walk to work if during the dark hours afterwards, I could get a ride from a ranger or security.